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Energy Supply Interruptions and National Security

Alvin L. Alm

Summary. Vulnerability to oil supply interruptions poses serious threats to the U.S. economy and the life-style of its citizens. The Iranian cutbacks in 1979 resulted in price increases of 120 percent in 1 year and gasoline lines across the country. Creation and use of ample public and private stocks could moderate price increases after another interruption and prevent disruption of supplies. Use of the marketplace to allocate shortages, coupled with rebates to cushion blows to the economy and hardship to individuals, would be eminently more efficient than government allocation programs. International cooperation, through coordination of stock buildup and withdrawal, could mitigate the damage from oil disruptions among all the Western nations.

As the Reagan Administration grapples with controlling inflation and removing the regulatory yoke on the economy, it faces the threat of another oil interruption that could again send the consumer price index soaring and create demands for more government intervention in the economy. If the Iran-Iraq war spreads or other oil-producing nations would have been unthinkable a few years ago. The extent to which special government-to-government sales and tailored oil contracts have already been arranged raises serious questions about the workability of the International Energy Agency (IEA) agreement to share shortages. With an oil emergency, the new Administration may find the Western Alliance cut back production substantially, the United States and its allies could again face spiraling oil price increases and domestic shortages. If shortages should occur, they could create domestic political pressures to shield consumers from higher prices and protect segments of the industry from disproportionate reductions in supply. The new Administration could find itself mired down in government controls and facing inflationary pressures from another oil crisis.

The threat to international stability may be even greater. As the new Administration moves to rekindle comity among the industrialized democracies, oil policy will be a divisive force. Another oil shortage could panic Western Alliance partners into making their own deals with producing countries, offering political and economic concessions that sliding apart before it has an opportunity to strengthen the ties that bind it together.

At this time, few options exist to cushion the blows from another supply interruption. President Reagan's act of decontrolling crude oil prices should help in pushing down demand, stimulating some additional supply, and reducing the need for government allocations of supply. New taxes on consumption could further help both moderate world oil prices and reduce domestic shortages. Looking to the future, the development of large stockpiles in the United States and other consuming nations, of systems to allocate scarce supplies, and of standby emergency actions can prepare us to absorb some of the shocks from supply interruptions. Unless we take these steps, we will fail to deal with the most probable and devastating threats to our national security.

To understand how supply interruptions could lead to another round of inflation and recession, we need to review carefully the experience from the Iranian crisis. We can then turn to policies that would strengthen energy security in the future. Finally, we can assess why the United States has been slow in recognizing the threat posed by supply interruptions.

The Iranian Experience: Revolution to Recession

By any statistical analysis, the oil shortage that resulted from the Iranian revolution was small. In early 1979 it was only about 4 percent of free-world consumption. Yet this modest worldwide reduction resulted in profound changes in world oil prices, in future production of the Organization of Petroleum Exporting Countries (OPEC), and in the structure of the world oil market. How did this happen? During and after the Iranian cutback in production, consuming nations and the international oil companies simultaneously attempted to meet current demands and to build up stockpiles, even beyond normal levels. For example, the Japanese, whose contracts with major oil companies were substantially canceled, set about building stockpiles to the level of 90 days of imports, almost without regard to price. As heavy bidding began to make spot prices soar, many long-term oil contracts were canceled, leading to a larger spot market. In the face of high spot market prices, OPEC was split on future pricing policies. Those urging price moderation, namely Saudi Arabia, lost out as OPEC not only raised prices substantially, but also formally agreed to the reality of a two-tier pricing system. By July 1979 Saudi Arabian oil, priced at $18 a barrel, was selling at $5 a barrel less than oil sold by Algeria, Nigeria, and Libya. With revenues ballooning, a number of

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OPEC nations cut production during 1979, further aggravating price pressures and encouraging oil companies to build larger stockpiles. By the end of 1979 the price of oil rose by a staggering 120 percent, setting a new plateau for more gradual increases in 1980 and adding to our economic woes.

Besides increasing prices, the seller's market emboldened many OPEC countries to tie contracts to economic concessions and to limitations on destination. Accelerating an already existing trend, the major oil companies' share of world oil supplies dropped from 90 percent in 1973 to only 55 percent in 1980. With these losses in sources of supply, the major oil companies lost the flexibility to allocate shortages, as they did successfully in 1973 and 1974.

The U.S. oil companies were guilty of their own form of panic or—depending on one's point of view—caution. During the early part of 1979 supplies were ample and consumption was high, despite the knowledge that the Iranian cutback had caused a 150-million-barrel loss in crude oil supplies. By the summer of 1979 the combination of previously high demand and shortages led to gasoline lines, which started on the West Coast and spread to the East. While large numbers of Americans were seething in gasoline lines, the oil companies built up oil stocks and reduced gasoline supplies to service stations. By June 1979 stocks of gasoline and crude oil were almost equal to those of the previous year, while gasoline supplied to consumers was down by 9 percent. In August the stocks were 11 percent higher than the previous August, while gasoline available to consumers was down by about 8 percent. In retrospect, if oil companies had restricted supplies early in 1979 and drawn down stocks during the summer, gasoline lines could probably have been avoided. But the companies were initially confident that they could obtain supplies, and once it became obvious that this optimism was unjustified, they hedged against further shortages by building up stocks.

Government price controls and allocations also made the 1979 shortage worse. By deciding to protect supplies of home heating oil, the government made a conscious decision to concentrate all the shortage on gasoline—magnifying a 4 percent crude oil shortage into a more than 8 percent gasoline shortage. The supplies available were allocated according to historic use, the only "equitable" measure available to government. To deal with special problems, gasoline was set aside for states and for special purposes such as agriculture, further reducing the supplies available to service stations. The allocation system caused gasoline stations supplied by some refineries to be desperately short, while others had ample supplies.

Changes in driving habits during the shortage created further supply imbalance. Although vacations were canceled, gasoline destined for resort areas was not. Big cities on the East Coast suffered through the summer, while many rural and resort areas were awash with gasoline. Fear of shortages in urban centers panicked motorists into topping off their gasoline tanks, creating a large, one-time surge in demand. Thus, during 1979, millions of U.S. motorists unnecessarily suffered great inconvenience from the combination of government regulations and conservative oil company stock management practices. In retrospect, this inconvenience was unnecessary.

A number of lessons emerge from the Iranian experience that can help us understand what might happen in the future. First, the panic that gripped consumers, oil companies, and governments made the situation worse. At times during the Iranian crisis, the Western nations looked more like customers at a fire sale than alliance partners. Hoarding and panic stockpiling reduced available petroleum supplies, adding to shortages and price pressures.

Second, the world oil market adjusted convulsively to temporary scarcity because of the relatively slow response of demand to price increases. In such cases, spectacular price increases become necessary to soak up excess demand. These price hikes hinder economic recovery as policy-makers restrict economic growth to fight the oil-price–induced inflation. They cause efficiency losses as yesterday's energy inefficient technology confronts today's higher energy costs. And high payments to OPEC nations transfer large amounts of wealth to those nations. In the future, the costs in the United States alone could range from $85 billion for a 1-year world shortfall of 3 million barrels per day up to $325 billion for a shortfall of 10 million barrels per day. A complete year-long curtailment of Persian Gulf supplies would result in a percentage of economic losses approaching that of the Great Depression (*1*).

Third, government price control and allocation programs telescoped a relatively small crude oil shortfall into a serious gasoline shortage. And virtually every "improvement" made to the program created more uncertainty and confusion.

The Iran-Iraq War: Implications for the Future

There are striking similarities between conditions at the beginning of the Iran-Iraq war and those existing when Iranian production fell in 1979. In both cases, the world oil market was glutted with excess OPEC production when the supply reduction occurred. In both cases, other OPEC countries increased production to relieve the shortage. In both cases, the net world shortfall was initially in the range of 4 to 5 percent. In both cases, the U.S. strategic petroleum reserve was less than one-tenth filled, no gasoline rationing system existed, and emergency preparedness tools were in a rudimentary state.

But there is one significant difference. Brimming private stockpiles in the United States and abroad were at an all-time high when the Iran-Iraq war broke out. In the United States private stocks reached a high of 1.36 billion barrels in October 1980, although they are now being drawn down as the shortage worsens (*2*). Japanese stocks rose by 17 percent from June 1979 to June 1980, to a level of 466 million barrels. European stocks increased by 10 percent during 1979, to 1.2 billion barrels (*3*). Total excess stocks equaled over 600 million barrels at the outbreak of hostilities.

These stock levels, although probably adequate under current conditions, do not provide much protection for potential adversities. Stock levels are not very high in some countries and the rigidity of the current oil market makes it difficult to even out supplies, even within the same country. Companies and countries with low stockpiles may be driven to purchase oil at higher prices on the spot market. These rising spot market prices would be a barometer for OPEC to raise contract prices; witness the increases in December 1980. Ultimately, the official price could become a floor for a new, higher price plateau.

Even more serious, the Iranian experience shows that we cannot depend on orderly markets during disruptions. A prolonged interruption of supplies from this war or even a perception that shortages are imminent could panic buyers in the world oil market. It could lead individual countries to bid ferociously for available supplies and to stockpile oil. Such competition would cause prices to spiral much faster than if the adjustments to the shortage were orderly.

At present, unpredictably low levels of oil demand and higher than expected production in Iran and Iraq have led to a temporary glut in the world oil market.

Although offering a temporary respite from earlier predictions that 1981 would almost inevitably see another large price spiral, this dramatic change also highlights the delicate balance between shortage and surplus in the world oil market. A modest cutback in supplies from other OPEC countries, coupled with an intensification of hostilities, could again lead to a tight market, higher prices, and conceivably physical shortages. If conditions should worsen and oil companies perceive tight markets and higher prices in the future, panic stockpiling could again drive up spot prices. Should that process take place, contract price increases will quickly follow.

The impact of large oil price increases on the economy is serious. A 50 percent oil price increase, for example, would add 3.5 percent to the level of prices in the United States. As higher prices reverberated through the economy—triggering increases in wage contracts and government income transfer programs and raising the prices of products—the underlying inflation rate would rise by 1.5 percent. Loss of disposable income and government policies to control inflation would increase unemployment and reduce economic growth. The price increases would raise our OPEC oil bill by $35 billion annually and increase total consumer payments for oil by more than $95 billion.

Should the war spread to other Persian Gulf states or lead to closure of the Persian Gulf, the threat of large-scale economic damage would increase. At present, other countries seem unlikely to enter the war, although that possibility cannot be discounted altogether. Likewise, neither contestant appears to be capable of closing shipping in the Persian Gulf for any extended period. But if that unlikely event occurred, more than half of OPEC's exports would be disrupted. Under the IEA agreement, the United States would lose 75 percent of its imports, and our European and Japanese allies would fare worse because of their greater dependence on imported oil.

Sustained closure of the Persian Gulf would send economic tremors throughout the world. It would result in an economic contraction comparable to the Great Depression, drive developing countries into bankruptcy, and strand motorists in cold homes. But the industrialized nations could not live with such externally forced deprivation for any extended period without a political explosion; some form of military conflict would be likely, either resolving the cause of the shortage or leading to a major war.

No one can predict what price increases or political upheaval will ultimately emerge from the current war. A combination of continued low demand, high production from noncombatant OPEC nations, and the current leisurely pace of the war could result in stable or even slightly declining oil prices. But intensification of the war, OPEC cutbacks, and panic could lead to another round of price hikes, inflation, unemployment, and possibly shortages. No one can accurately predict events, even over the relatively short period of the next year. However one views the likely outcome, it forcefully signals the need for action to ease the impact from supply shortfalls.

Policy Options for the Future: The Bullet Awaits Biting

With the experience of the past in mind, we can now focus on measures to cope with supply interruptions. These include both the limited steps that can be taken now to lessen the effects of the current crisis and measures such as stockpiles, allocation systems, and international cooperation that can help us deal with future supply interruptions. I will not deal at length in this article with the many possibilities for increasing use of domestic energy supplies during curtailments. Briefly, the best options appear to be creation of a natural gas reserve and strengthening the U.S. electric interconnection system. A natural gas reserve might be created by designating surge capacity and existing storage to be used during emergencies and by building additional storage through purchases of excess Canadian natural gas. If sufficient supplies of natural gas were available on an emergency basis and regulatory obstacles could be overcome, up to 1.1 million barrels of oil per day could be replaced during an emergency (*4*). If the U.S. electric interconnection system were strengthened, generation of electricity from coal and nuclear plants in the Midwest could be increased and the power transmitted to New England and other regions that are heavily dependent on oil. Development of standby plans to tap these two energy sources during an emergency deserves high priority.

Our past failure to erect defenses against supply interruptions leaves us few alternatives for dealing with an immediate crisis. The two options still available are to continue drawing down already dwindling stocks and to curb demand. The IEA has already been active in coordinating the drawdown of Western nations' stocks, but no similar mechanism exists to curb demand. For the United States, an emergency tariff on imports would be a powerful way to cut demand further, as well as to stimulate some increase in production. But an import tariff would risk retaliation by OPEC countries, raise the price of U.S. products in world trade, and have unpredictable macroeconomic impacts. A less satisfactory alternative, but one more predictable in outcome, would be enactment of an emergency gasoline tax. Either a $10 tariff on imports or a $1 a gallon gasoline tax would reduce demand by 500,000 to 700,000 barrels of oil per day. These alternatives would help moderate world oil prices and ease or prevent shortages should they appear. Before considering them as real defenses against interruptions, however, we need to know more about their broader economic impacts.

Some will suggest that strategic stockpile buildup be suspended in the United States, Japan, and France as a way to relieve market pressures arising from small interruptions. Although this would provide some short-term relief against oil price pressures, it would also increase the vulnerability of Western nations to future supply interruptions. Considering that there will never be a good time to fill strategic stockpiles, that the amounts involved are not very large (*5*), and that the future threat is great, continued deferral would be counterproductive to long-term economic and security concerns.

Stockpiles: Brimming Tanks and Dry Caverns

From the dawn of civilization, man has protected himself from the caprices of nature by building stockpiles. In the book of Genesis, Joseph advised the Pharaoh to lay up stockpiles of one-fifth the land to tide Egypt over 7 years of famine. Although the comparison is somewhat fanciful, it is interesting that a similar percentage fill of the U.S. strategic petroleum reserve would net 2 million barrels of oil a day at current production levels. In fact, our current fill is only 100,000 barrels of oil a day, a rate so glacial that, if it continues, our 1-billion-barrel target will not be achieved until nearly 2010.

The public debate on stockpiles has centered almost exclusively on the strategic petroleum reserve. Large salt domes in Louisiana and Texas were originally slated to hold 500 million barrels of

oil. In his 1977 National Energy Plan, President Carter doubled this goal to 1 billion barrels, with 500 million barrels to be filled by 1980 and the full 1 billion barrels by 1985. Management failures and government termination of fill after the Iranian revolution, however, slowed the reserve's progress; only one-tenth of the original goal has yet been met. The roughly 100 million barrels currently in a partially filled cavern would cover only 16 days of imports. In fact, private stocks in excess of normal operating needs—which were as high as 135 million barrels in October—exceeded the amount in the strategic reserve during the early stages of the war (*6*). The record high private stocks were built up because of uncertainties about future supplies and expectations that prices would be higher, not because of positive government policies and incentives. In essence, a desirable outcome was precipitated by gloomy expectations.

In the future, large stockpiles could shelter the United States from a large and severe supply cutback and help it meet its IEA sharing obligations. Stock drawdowns during an emergency could stem panic and ease price pressures. If a 1-billion-barrel strategic reserve had been available and fully used during the Iranian cutback, virtually all of the price increases could have been avoided. If it were now available, the U.S. share of a prolonged shortfall could be met for many years.

A large reserve could also deter politically motivated embargoes, designed to blackmail the United States or its allies into changing their foreign policies. These interruptions are particularly dangerous because, in addition to their economic cost, they raise international tensions and increase the risk of war. Finally, stockpiles provide political flexibility during an oil supply interruption. For example, war or sabotage in the Persian Gulf might create inexorable pressure for precipitous action to restore oil supplies. If the United States could shield itself from the immediate pain of an interruption, it would have time for a reasoned response. This pause before taking action could make the difference between war and peace.

Before the Iranian revolution, 300,000 barrels of oil were pumped daily into the reserve's salt domes. If oil purchases for the reserve had not been terminated in early 1979—when spot prices began to soar—the current salt dome capacity of 248 million barrels could have been filled. If the United States could sustain the fill rate of 300,000 barrels per day that Congress recently mandated, the 750-million-barrel interim target could be reached in 6 years and the 1-billion-barrel target in 8 years.

But reaching a higher fill rate is only half the problem. By the latter part of 1982, the fill rate of 300,000 barrels per day would be constrained by limited salt dome capacity. To sustain that fill rate, emergency aboveground storage, storage in tankers, and other alternatives would be necessary. To keep on schedule over a longer period, the development of new salt dome capacity would have to be accelerated. Because of the nearness of the 1982 date and the long lead times involved for creating cavern capacity, critical decisions must be made quickly.

Government policies could also be consciously aimed at encouraging or even requiring greater private stocks. Many firms would be willing to hold higher stocks if they were certain the government would not subsequently allocate them away. Tax incentives would make holding stocks even more attractive. Alternatively, the government could mandate that certain minimum stock levels be held at refineries, a practice followed by some European countries. Or a nonprofit corporation, similar to the one now operating in the Federal Republic of Germany, could store both public and private stocks. The corporation could use the oil as collateral for financing and assess companies for the costs of purchase and storage. It would be ironic if we inadvertently frittered away the one bright spot in our current energy security picture. Whichever alternative is chosen, the United States should develop a program to build private stocks of no less than 300 million barrels.

Public and private stocks each have distinct advantages. A public reserve can be centrally managed to reduce panic in the United States and abroad, ease price pressures, minimize domestic shortages, and pursue geopolitical goals. But because of its visibility, it acts as a political lightning rod. Producing and consuming nations will both complain about the effects of its filling on world oil prices. And the producing nations are less than ecstatic about actions that reduce their power to control prices and exert political influence. Finally, a public reserve is subject to budget tightening and normal bureaucratic problems.

Buying oil for private stocks and releasing it during interruptions is less visible and hence less political. And because of its greater resiliency, a decentralized system offers fewer opportunities for massive blunders. But a potential conflict exists between the goals of private and public stockpile managers. Oil companies hold stocks, at least in part, to profit from future high prices, while the government should hold them, in large part, to moderate future price spikes.

Developing a system for drawing down stocks during interruptions is important. To minimize price hikes, oil must be released quickly and predictably at the early stages of an interruption. Since historically there is a greater threat in failing to use stocks adequately, as during the 1979 shortfall, there are strong arguments in favor of generous withdrawal early in a shortage, even at the risk of having a smaller cushion later. The strategic reserve could be the first line of defense, with private stocks providing insurance against continuation of the crisis. Or incentives could be created to withdraw private stocks first, holding the strategic reserve for insurance. How best to coordinate public and private stocks is the subject of spirited and so far inconclusive debate. Congress and the Administration need to devote much more attention to this issue.

Allocating Shortfalls: The Invisible Hand or the Clenched Fist?

Gasoline allocations are the only combat-ready weapon for coping with shortages arising from supply interruptions. This blunt and cumbersome instrument can prevent pervasively long lines at service stations if the shortfall is 10 percent or less (*7*). For larger interruptions it would be necessary to use gasoline rationing or some other method of allocating supplies directly to consumers rather than service stations. For this reason, Congress authorized a standby gasoline rationing plan. But Congress effectively limited the President's rationing authority to interruptions of 20 percent or more. That would be more than twice the cutback experienced during the Iranian crisis. Hence, during shortages of 10 to 20 percent, gasoline lines could become unbearable while Congress debated the wisdom of gasoline rationing.

Rationing of gasoline among 150 million vehicles poses an extraordinary management challenge. It would require no less than the creation of an entirely new currency and distribution system in a few months. The use of 20 billion coupons a year—2½ times the actual units of money in circulation—would create almost insuperable administrative problems and an alluring enticement to counterfeiters. [By the end of World War II, 15 to 50 percent of all rationing cou-

pons were counterfeit (*8*).] Special appeals and exceptions would spark a new bureaucracy charged with making fine-tuned decisions about who gets how much gasoline. By the time a rationing system was in place, skyrocketing oil prices would be pushing demand down anyway. Rationing may be unavailable when needed to shorten gasoline lines and unnecessary when the system is finally ready. By then, unless price controls are reimposed, oil prices may be high enough to absorb excess demand.

Recently, a number of alternatives to gasoline rationing have been suggested. Senator J. Bennett Johnston (D–La.) has proposed legislation to impose an emergency tax to recoup potential windfalls during an interruption; the proceeds from the tax would be rebated to owners of registered vehicles. The Departments of Energy and Treasury have suggested, but not endorsed, an alternative that would decontrol all energy prices and rebate the proceeds of the Windfall Profits Tax to consumers during emergencies. The Harvard Energy and Security Research Project suggests, in its book *Energy and Security*, decontrolling gasoline prices and imposing an emergency tax on refiners and distributors to allocate shortfalls and provide equity. As in the other options, the proceeds from the tax would be rebated to consumers.

All of these options have flaws as well as virtues. Rebating billions of dollars raises a host of management and economic problems. And nagging equity issues still remain. Rather than carrying on a divisive debate now as to whether a market or regulatory system is superior, Congress and the Administration should push forward on the development of a market allocation system as an alternative standby measure. They could then decide which system is most appropriate when actually faced with an emergency. Considering the immediacy and enormity of the threat posed by supply interruptions, the United States should expand emergency options rather than prolong a fruitless and unresolvable debate.

International Energy Security: Cooperation or Competition?

The IEA sharing agreement, a legacy of Kissinger diplomacy, was conceived more as a political response to embargoes than a finely tuned instrument to moderate prices. It establishes a complex formula for sharing supplies among its member nations, to be triggered by a 7 percent oil shortfall in any participating country. Although bold in concept, the sharing agreement has been handled with almost striking tenderness. The IEA Secretariat, for example, avoided triggering the agreement during the Iranian crisis by rerouting cargoes to the nations that were hardest hit.

Many observers have grown pessimistic about the feasibility of the sharing agreement because of past IEA caution and the political obstacles to sharing oil supplies. Skeptics question whether the Western partners have the political cohesiveness to share supplies, particularly if their citizens and business firms feel the pinch of shortages. Even if the agreement is triggered, skeptics believe individual nations will augment supplies in the spot market, which could grow quickly to meet such demand. They even question whether the U.S. Congress would countenance export of U.S. oil supplies, which, while legal to implement the IEA agreement, is otherwise precluded by law.

The sharing agreement is also technically flawed. The 7 percent trigger does not unlock the IEA mechanism, if applied uniformly, until an interruption almost twice the size of the Iranian shortfall occurs. At the other extreme, the IEA sharing formula favors energy-rich nations such as the United States during large interruptions (*9*). Complete closure of the Persian Gulf would result in Japan receiving 30 percent less oil than it would if oil were allocated by the historic consumption formula, while the United States would receive 38 percent more. A relative U.S. advantage under such catastrophic conditions would be politically untenable. Our allies would simply opt out of the sharing agreement.

Even with these perceived and real weaknesses, there are conditions under which the IEA agreement is likely to succeed. In small interruptions, just exchanging information and diverting cargoes to the countries that are hardest hit can help moderate panic. In larger interruptions, the IEA sharing agreement can work if stockpiles are at relatively comfortable levels. For example, during disruptions, countries with ample stocks may be willing to share them with those less well endowed. By doing so, they could prevent panic spot market purchases by the countries facing shortages, reducing the potential for sharp oil price increases. Otherwise, higher contract prices would follow, to the detriment of all IEA participants. In large interruptions or even moderate ones where stockpiles are inadequate, however, imposition of the sharing agreement would be politically divisive, particularly when sharing nations are forced to accept sharp domestic shortages. The bias in favor of the energy-rich IEA members compounds this political problem.

A number of policy implications can be drawn. The United States should support the IEA's flexibility in dealing with small interruptions, both by applying a more liberal antitrust policy and by encouraging more flexibility in triggering the sharing agreement. A rigid interpretation of antitrust laws could hamper cooperation among the oil companies in distributing supplies. Consideration of less formal ways to trigger partial sharing during relatively small interruptions could improve the capability of the IEA to moderate price spikes. Most important, greater emphasis on IEA's role in encouraging stock-building and coordinating withdrawal could help make the sharing agreement work. The IEA can work better as an instrument for stock management than as an instrument for sharing physical shortages.

At present, IEA efforts to encourage stock drawdowns are about all that is possible. But when the Iran-Iraq war ends, rebuilding stockpiles should be the top priority for consuming nations. A substantial glut may well follow supply restoration, just as it did after the Iranian episode. If that happens, Western nations need to decide whether to encourage a softening of prices by allowing excess supply to develop, or whether to use this interlude to rebuild and expand stockpiles. If substantial stock-building is deferred—a politically attractive short-term proposition—two consequences must be faced. OPEC will probably cut production to prevent price shaving, as it agreed to do before the Iran-Iraq war, and the West will have failed to construct a price shock absorber for the next interruption. The West will have not gained any price advantage from an apparent soft market because of OPEC decisions to cut production. And when the almost inevitable interruption occurs, the West will have to face soaring price pressures without the stocks that could moderate them. The Western nations would be extremely shortsighted if they failed to take advantage of another soft world oil market to fill their stocks as fast as the market allows.

In addition to encouraging members to make a stronger effort to build up stocks, the IEA should work toward better coordination of drawdowns during emergencies. A coordinated drawdown policy—which clearly sets forth proportionate withdrawal schedules from each country's stockpiles—could work wonders in stemming panic and ensuring equitable sharing of potential shortages.

Coordinated management of stockpiles could provide a collective insurance policy against any country or countries being particularly hard hit, prevent panic purchases by the least prepared country, and, to some extent, help overcome the rigidity in the world oil market.

These steps could help in coping with small and medium-sized interruptions. But a large interruption—more than 10 million barrels per day, for example —would open up serious cracks in the IEA sharing system. Changing the agreement so that all supplies are shared on the basis of each country's consumption, rather than on the basis of imports, would at least improve the fairness of the sharing system. Whether the agreement could work under those conditions, however, is questionable—even if stock levels are relatively high.

Another step to improve consumer protection against price hikes—advance agreement to impose disruption tariffs or taxes—may take longer to achieve. But it is worth discussion now. A disruption tariff could be imposed either as an actual per-barrel tariff on imports or as an internal tax on oil products, both designed to absorb excess demand during supply interruptions. If the major consuming nations agreed to establish emergency tariffs or tax equivalents at the beginning of an interruption that were high enough to bring supply and demand into balance, then producers would find it difficult or even impossible to raise prices. Each government could rebate the revenues collected to its citizens, preventing both losses in disposable income and perverse macroeconomic impacts.

A disruption tariff is plagued with political problems. Some countries could gain a competitive edge if they opted out of the agreement, selling their products cheaper in international markets. By preemptively raising energy prices, it may appear politically that one's own government is adding to the problem. And key OPEC nations, denied large windfall profits from higher oil prices, may retaliate by cutting production.

All of these options would steam into uncharted international waters, running against the tide of traditional and long-cherished beliefs about national sovereignty. But if a 4 percent decrease in world supply can cause oil prices to shoot up by 150 percent, as it has since the Iranian revolution, the Western nations may wish to think and act differently. Indeed, such a change in attitudes and actions may well be necessary to prevent an economic and political catastrophe.

Political Barriers to Protecting Against Supply Interruptions

Despite a great deal of handwringing over the national security threats raised by energy supply interruptions, there is a conspicuous paucity of support for energy emergency measures. Only a handful of senators and congressmen have consistently taken up the cudgels for energy security, and no private interest groups consistently push for energy emergency measures. This shortage of support flows not from a lack of intellectual concern or political rhetoric, but rather flows from a broad misunderstanding of how energy security can be achieved, an absence of immediate benefits from emergency measures, and the unpleasant political nature of most of the decisions that must be faced.

From the time of President Nixon's Project Independence, the United States has tried to shield itself from supply interruptions by reducing or even eliminating imports. But reducing dependence on imports can only partially reduce our vulnerability to interruptions. It is helpful, but not sufficient. Even if we were willing to bear the large economic and environmental costs necessary to reach zero imports, we would still have legal and moral obligations to share supplies with our allies. And the goal of zero imports continues to face the limitations of politics and geology.

The percentage level of imports is only one measure of our vulnerability to supply interruptions. The most important measure is our capacity to prevent damage to our economy, our citizens, and our allies. Import reductions help reduce this damage, but they do not eliminate vulnerability. Do we, for example, feel more secure today, importing slightly more than 6 million barrels per day, than we did in 1977, when we imported 8.8 million barrels per day? Most of us do not. This preoccupation with reducing imports has diverted our intellectual and monetary resources away from dealing more directly with supply interruptions.

The absence of a political constituency promoting emergency preparedness measures is a second reason progress has been so disappointing. Normally, political constituencies are formed from groups that benefit directly from certain actions, or from groups with strong ideological concerns. But energy emergency programs—such as creating a large strategic reserve or a better system of allocating shortages—do not meet these criteria. They do not unite interest groups who seek government contracts or higher prices for oil and gas production. Nor do they engender the same ideological commitment as more efficient homes and automobiles, or a renewable energy future. The seemingly mundane measures required to protect against supply interruptions fail to arouse the passion and self-interest necessary for an enduring political coalition. Because constituencies have coalesced around measures to reduce imports, it is no wonder that everything from developing synthetic fuels to erecting windmills has been cloaked in the energy security flag, while interest in emergency measures is tepid at best.

Finally, although in the abstract energy security is a politically attractive issue, specific measures to achieve it are fraught with political problems. To secure protection against supply interruptions, we must make tough choices that conflict with other policies and goals. Filling the strategic reserve, for example, risks hostile reactions from producer countries that could precipitate production cutbacks and higher prices. Raising energy prices during disruptions evokes almost primordial resistance by consumers and their representatives, even if tax rebates would make these groups as well or better off.

The difficulty of mustering a political coalition around a problem that is not clearly understood, that does not confer direct financial benefits on powerful interest groups, and that requires some amount of sacrifice by the general public cannot be overstated. It is neither fair nor accurate to blame our current lack of preparedness on bureaucratic bungling. We are unprepared because the public and Congress have not forcefully demanded tools to counter interruptions and have indicated little willingness to accept sacrifice.

Conclusion

There are striking parallels between public attitudes at the outbreak of World War II and public attitudes today. Before the Japanese attack on Pearl Harbor, the public did not understand what measures would be necessary to protect U.S. national security, just as they are confused today about what steps can protect U.S. energy security. President Roosevelt lacked a political constituency to prepare the United States adequately for the coming confrontation, just as no constituency exists today to prepare the country adequately for supply interruptions. And the choices facing Roosevelt required a measure of sacrifice that was not forthcoming, just as energy choices

today appear to require a politically unacceptable level of sacrifice. This lack of public understanding, support, and willingness to bear sacrifices did not change until the debacle at Pearl Harbor. After World War II, the Truman Doctrine and the Marshall Plan, by most accounts, enhanced our security for decades. But public support for these policies emerged only after a devastating war that took over 400,000 American lives.

This historical analogy raises a central question: How much punishment will be necessary before we take oil supply interruptions seriously? Seven years have passed since the Arab oil embargo exploded on the world scene, leaving inflation, recession, and disruption in its wake. Two years ago the Iranian revolution set in motion similar forces. The troubled waters of the Persian Gulf seem to be inflamed, not soothed, by oil. And yet we have not faced up to the challenge posed by supply interruptions—a challenge that affects every aspect of our personal lives, our economy, and our position in the world. Further delay in facing the hard decisions will cost us dearly.

References and Notes

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6. Stock releases reduced this level to 75 million barrels by the beginning of December 1980. Estimate derived from *Weekly Status Report*, Department of Energy, 16 January 1981.
7. During the Iranian crisis, shortages reached 8.5 percent of gasoline supplies, leading to the specific shortages described earlier.
8. D. Robinson, assistant administrator, Economic Regulatory Administration, testimony before the Senate Energy and Natural Resources Committee, 2 June 1980.
9. For large interruptions, greater weight is given to imports than to consumption in allocating shortages. Since the United States imports only about 40 percent of its oil, it would face smaller percentage shortages than Japan, which imports nearly all of its oil supply.

ENERGY POLICY COORDINATION AMONG OIL IMPORTERS

INTRODUCTION

The relationships among the various actors in the world oil market contain a mixture of opportunities for cooperation and confrontation. Due to the imbalance of effective power, the emphasis among oil importers has been on avoiding confrontations with the oil exporters. In this essay we seek to stimulate a discussion of cooperative energy strategies for oil importers that might reverse this tendency and arrest further damage by the oil exporters.

POLICY OBJECTIVES

A diagnosis of energy markets reveals two distinct problems that frame the agenda for policy action[1]. First, there is the long-run requirement to stop the drain of wealth and replace expensive supplies of oil and gas with new sources of energy. Second, the oil-importing countries must meet the immediate threat of a sudden disruption of oil suppplies.

Until recently, policymakers blurred the distinctions between these two broad challenges and fashioned policies that met neither well. For example, propelled by the import threat, the United States adopted the misnamed Energy Security Act to create the Synthetic Fuels Corporation, which will contribute nothing to meeting security problems in this decade , but dominated by a sense of the immediacy of the import danger, may fail to make the technological contributions that could be so important in providing a later alternative to natural deposits of oil and gas[2]. At the same time the United States dallied in the creation of a strategic petroleum reserve and made a practice of rejecting serious preparations for energy emergencies.

After years of analysis and debate, we now recognize that with foresight, ingenuity and time, the resources and technology will be available to make the long-run change. The most important adjustments, through conservation and increased production, will come naturally in response to the formidable incentives created since 1972 by the nearly 500% in the real wellhead price of oil or the greater than 100% in the real delivered price of energy. With relatively modest government support of public goods such as research and development, information programs, and subsidies for the disadvantaged, the long-run adjustment could be no more than an energy problem; serious enough, but not a first-order political and security matter.

The wider concern with energy, particularly oil, stems from the great reliance on supplies which are vulnerable to major disruption at any time. All oil-importing countries share in this danger and all have been searching for strategies to lessen the risk or reduce their own exposure. But this recognition of the critical security problem has not produced much more than rhetoric and non-sequitors like the synthetic fuels program. Agreement on the need for targeted energy policies to meet the supply vulnerability threat has not led to agreement on the substance of those policies.

Oil importers have made elaborate attempts at promoting cooperation with oil exporters, producing a dramatic change in the structure of the world oil market as direct sales and government-to-government arrangements expanded and the role of the international oil companies contracted. However, we have had only modest success at building cooperative arrangements among oil-importers, with little more than the de minimis International Energy Program (IEP) or the so-far-unrestrictive import targets as the anemic products of our diplomatic labors.

It takes only a glance at the narrow range of immediately available supply security options or the relative weakness of the oil importers to understand the failure to confront the oil vulnerability problem. Energy policymakers prefer to focus on the long term, when much more is possible. Political leaders prefer to scramble for special arrangements with oil exporters,

where security gains can be imagined by those desperate enough to ignore the fungibility of oil. Noone wants to sit at the international table with a bad hand and few chips; as a result, oil importers are losing by default.

Mistrust adds to the difficulty of promoting cooperative agreements among oil importers. Smaller countries fear that the United States can and will take care of itself, possibly through its special relationship with Saudi Arabia. The United States, on the other hand, injures itself by fretting over the possibility of exploitation by free-riders. This mistrust and concentration on relative positions finds expression in the language of the IEP, with its concern for assuring "supply rights" and enforcing "sharing" agreements. Apparently the purpose of the IEP is to defend the signatories against each other during an oil emergency, not against the source of the emergency. Slowing the enormous transfer of wealth from importers to exporters takes a back seat to garnishing a slightly larger share of suddenly smaller pie.

We find the same strange lack of concern for the loss of wealth in the cycle of shortages and glut in the oil market: A contrived or accidental event precipitates a reduction in oil supply with a sudden surge in prices, and the western economies reel from the shock. Slowly, however, the wrenching adjustments in demand begin and new sources of supply come forth. Production starts to exceed demand and prices soften, a little. Soon talk

turns to the "oil glut" and the weakening power of the oil exporters; complacency returns to the consumers[3].

This is a theory that defines power only as the potential to inflict damage. Why do oil importers take comfort in accepting the now greater drain of their collective wealth? The United States, for example, paid only 0.5% of its GNP for oil imports in 1973. During the "glut" years of 1974 - 1978, this figure held steady at about 1.8%. By the time of the "soft" market of early 1981 this import bill was near 3% of GNP. In Japan, without the benefit of domestic oil production, the import bill rose from 1.4% of GNP in 1973 to 4.1% in 1980! Maybe the greatest accomplishment of the oil exporters has been in making this abnormal transfer of wealth appear normal.

Fearing each other, and little concerned with the loss in wealth, oil importers are locked in a debilitating game where the individual best defeats the collective good. The net effect is a policy vacuum which leaves an insecure market where oil exporters are free to serve as tax collectors and importers pay to compete against each other. Before abandoning ourselves to reliance on the restraint of oil exporters, we should look to the opportunities for cooperative action to lessen the danger of supply interruptions and to reduce the flow of wealth in payment for oil imports.

CONFRONTING VULNERABILITY

Capitulation is not the only option. Although weak, the oil importers are not powerless. There are individual and collective actions available to lessen the exposure to damage from the unstable world oil market. Unfortunately, the best we can hope for is the mitigation of damages; no true solutions have appeared on the scene. (This unpleasant fact may explain why little has been done so far to prepare for emergencies and develop effective cooperative strategies among oil importers. Most serious actions will impose real costs now -- investing in storage capacity, imposing import restrictions -- but offer no more that a softening of impacts in the future. Without immediate results, certainty, or a panacea, energy security policy is a hard product to sell.) But when the potential costs are as great as they are for disruptions in the oil market, where comparisons can be made to the 1930's, even partial savings could be worth a great deal. We should turn to the agenda for cooperation to confront the threat of oil vulnerability and the loss of wealth.

The opportuntiies for cooperation and action must begin with a strengthening of the framework for international cooperation. Within the framework each country can take a variety of steps to prepare to manage oil supply interruptions. In parallel, oil importers can work with the exporters to lessen the likelihood, duration or intensity of future supply

emergencies. In addition to improving the resilience of the oil system, there are long-run energy policy actions that will help with security problems while easing the transistion away from oil and gas. Finally, these energy policies must be balanced by military and diplomatic efforts focussed on the Persian Gulf.

International Framework

The oil market is international. The fungibility of oil and the relatively low cost of transportation make it extremely difficult for one country to insulate itself from the effects of changes in the market elsewhere in the world. During past supply interupptions, promises of special treatment have evaporated and the competition among the oil importers has helped only the exporters. The first step in forging a program for cooperative action is to recognize the need for positive government initiatives to expand and use the international framework for cooperation. Free market philosophies are out of place in the international oil market.

International Energy Agency (IEA). This is a place to start. All the major oil importers are real or de facto members of the IEA, which has the administrative and information tools in place to provide the foundation for a significant expansion of the strength of cooperative policies. However, "The agreement is opaquely technical, ... It is probably fair to say that many usually knowledgeable people ... do not understand this

critically important agreement"[4] And for those who do understand the agreement, there is little confidence that it will help much in its present form. A few obvious reforms stand out, principally in the rules for sharing oil during supply interruptions.

For small shortages, the IEA sharing formula is based on total oil consumption, which should be compatible with the allocation that would result from competitive bidding on the spot market. But for large shortages, those above a 10% loss of expected oil supplies, the rule shifts to an import base, which would work to the advantage of those countries with a large volume of domestic production, notably the United States. However, those countries relying more heavily on oil imports would be able to obtain a larger share of the total oil supply by entering the spot market, and they would be under great pressure from their own consumers to ignore the IEA. The sharing agreement would collapse, prices would rise, and to the extent that all countries have about the same elasticity of oil demand, higher prices would ration the oil in proportion to total oil consumption. Only the oil exporters stand to gain from this peculiar sharing formula, which could be revised best by making all allocations proportional to consumption.

For sub-crisis shortages, those below 7% of expected supplies, the IEA has no provisions for action. Yet in the early stages of an emergency, when the measured shortfall may be quite

small, there is always the danger of precipitating a larger disruption by failing to take corrective action. Although informal mechanisms for coordination exist now, the IEA could be more effective if its members put in place procedures for joint response to subcritical emergencies. The chief policy tool, besides consultation and information exchange, would be to coordinate the use of inventories to prevent a sudden rush to the spot market, with its attendant signal to the more militant oil exporters.

The IEA effectively ignores the question of the price for oil exchanged under the sharing agreements. Sudden changes in prices are a characteristic of oil supply interruptions, so pricing is sure to be a critical issue during implementation. Without a definite rule, the debate over pricing may overwhelm the sharing agreement. After all, there will always be a shortage of cheap oil, and everyone will feel a right to today's oil at yesterday's prices.

Sweden and Turkey both have tried to use the IEA to gain access to oil at below-market prices, but no supplier wanted to support such a subsidy. The IEA needs a pricing rule. And, just like the principle for designing a sharing scheme, the rule should formalize the incentives in the market while capturing the rents for the importers. For example, countries with excess supplies could be required to share oil at a "high-ten" price: the average price of the highest 10% of their other sales. This

would provide security for the small countries who fear they will be frozen out by the giants, prevent the rush to the IEA as the source of protection from the reality of the new scarcity of oil supplies without simultaneously driving everyone into the spot market, and preserve at least the minimum incentives for the haves to share with the have-nots.

These small changes in the IEA would not expand the narrow scope of the agreement. The oil importers need a mechanism for cooperation that allows them to extend their horizons beyond just containing the putative voracity of their fellow importers. The need a policy to meet the observed voracity of the oil exporters.

Summit Process. Part of the explanation for the feeble state of the IEA agreement is found in the cumbersome nature of any process involving multilateral negotiation among tweny-one countries (with the tewnty-second, France, standing in the wings). The IEA may be too large, and the demands of energy security policy too great, to expect this to be the forum for introducing fundamental changes in the objectives of international cooperation. The summit meetings offer an alternative mechanism that includes the major oil importers; should be small enough to arrive at any agreement that could be fashioned; and would be able to induce cooperation from others. And the precedent for dealing with energy policy was set at the Tokyo Summit with the negotiation of oil import targets.

The focus on import reductions and stanching the flow of wealth to oil exporters is the new initiative needed for international cooperation. By various calculations, the true cost of the extra barrel of oil imports is far above the price in the world market. Reduced oil imports by anyone would give everyone the benefits of both a lower price and reduced exposure to the damages of oil supply disruptions. During normal times this import premium could be at least 30% of the price of oil; during supply interruptions it could jump to 100% or more[5], reflecting the great transfer of wealth that high prices bring. Evidently there are great gains to be had through cooperation to reduce import levels. The IEA has been reluctant to step up to this issue; the summit leaders have approached it gingerly, by adopting non-binding import targets. In mid-1981, with complacency on the rebound, the summit countries should act to impose import controls that recognize the large premium not captured in the price.

The choice of the optimal import redcution policy is problematic. The program must be visible and effective in each country, or cooperation will not last long. And it must work within the context of an uncertain game of confrontation with the oil exporters. The two stylized extremes of tariffs and quotas illustrate the difficulties.

A collective oil import tariff would be highly visible. Every participating country would be able to see and measure the sacrfices being made by others, and the tariff could be tuned to reflect the best measure of the import premium. A tariff would also be visible to the oil exporters. If we are lucky, they would recognize that further increases in oil prices would not affect the tariff, but would drive demand down even more. Faced with this prospect, they would lower prices to maintain demand. If we are not lucky, the oil exporters may have unused market power or some belief about the high value of oil in the ground. They could interpret the tariff as evidence that importers can absorb even higher prices, and they would oblige us by raising prices and cutting production to maintain a tight oil market.

A quota would be visible, but not so clearly effective. Differences in the business cycle could make the same quota for any one country either irrelevant or a binding constraint. Without careful tuning, the agreement could collapse. Perhaps an even greater danger would follow from the change in incentives for the oil importers. Few countries would volunteer to import less than their quota, so the quota would become an effective prediction of the total demand for imported oil. Oil exporters would be free to raise their price without fear of losing their market, at least up to the price that makes the quota non-binding. Oil importers could end up with the worst of both conditions: restricted supplies and higher prices.

Neither of these stylized problems is exactly descriptive of what would happen with either a tariff or a quota. Neither the exporters nor the importers could tune their policies well enough. Tariffs would not stay fixed in the face of a sudden jump in oil prices; in all likelihood they would be lowered. And quotas could not be met exactly; the oil importers could not change their policies fast enough to protect oil exporters from all loss in demand due to higher prices. But both sets of difficulties are serious enough to warrant a search for a compromise.

Politically, import targets have been more appealing than tariffs or strict quotas; witness the Tokyo agreements. A tariff may be too hard to explain at home since there is no disguising its price effects in domestic markets. A quota sounds a little too simplistic, and as we have seen, could be counterproductive. Import targets, on the other hand, leave a certain flexibility to the individual countries in designing the policies to meet the goal. This diversity of policies may make cooperation more possible for many countries and more difficult for the oil exporters to counter.

Perhaps the best strategy would involve a combination of the most attractive features of the tariff, quotas and targets: an agreement on oil-import-value-share targets. Under this proposal, each oil importing country would adopt a target for oil imports expressed as a value share of total GNP. As with

quantity targets, the policies adopted to achieve the goal would be left to the preferences of the individual countries. There would still be the problem of choosing equitable targets that imposed a fair burden on each country, but the use of value shares would avoid at least two problems. First, countries whose economies suddenly expanded would be allowed automatically to increase their oil imports; similarly those who were contracting would still share in the sacrfice at the margin. Second, although not confronted with the provocation of a tariff, oil exporters would face strong disincentives for raising prices -- higher prices would require lower demand for oil imports in order to meet the value share targets.

A policy of restricting the value share of oil imports could be extended to all the IEA members once adopted by the summit countries. In normal times, this might mean no more than an acceleration of programs already underway to control oil use and subsidize the production of import substitutes. (The United States, for example, through the decontrol of domestic oil prices, recently eliminated one of the chief sources of subsidies for oil use and controls on production.) Therefore, the summit nations may be able to avoid a confrontation with the IEA countries who did not participate in the negotiations to establish the targets.

This ability to select the forum and participants will not extend into the realm of managing oil shortages. Here there

seems to be an unavoidable conflict between using the more wieldy summit process and strengthening the IEA. Use of the IEA has the advantages of an existing framework and staff for preparing for and coordinating emergency responses. But it is limited by its narrow focus on oil policy. During a major interruption of oil supplies, military and political initiatives will be at least as important as the sharing of oil production and stockpiles. In a real crunch, the IEA will either implement the policies of the summit countries, or it will be ignored.

It seems better to use the existing mechanism but to fashion new IEA policies to reflect the realistic priorities that will prevail during a major supply interruption. The summit countries should expand the scope of cooperation during emergencies, with a principal energy policy objective of stopping the drain of wealth caused by supply shortages. The form of the agreement during interruptions could be the oil-import-value-share targets, adjusted to reflect the expected size of the supply interruption. The delicate diplomatic effort should then follow to extend participation to include all the IEA countries.

Demonstrating Commitment.

Whether through the IEA, the summit process or some other mechanism, the oil importers have much to gain from the development of cooperative energy policies. But no agreements will succeed if the principal players do not demonstrate a

commitment to cooperation in actions that fall short of a crisis. There are many actions that oil importers could take to signal early an intention to join in collective actions during an emergency.

In the United States, for instance, at least two positive steps would help now. First, the Congress should remove the restricitions on exporting Alaskan oil. The present limitation has a complicated history rooted in the early environmental debate over the need for the Alaskan pipeline. Today the restriction is maintained out of a false hope that keeping Alaskan oil in the United States somehow increases our security. But because of the international character of the world oil market, there is no security in such restrictions; they only add to the cost of using the oil, in this case because of the necessity to ship a large portion of the Alaskan oil to the Gulf of Mexico. It would be far more efficient to allow the Alaskan oil to go to Japan and to redirect Japanese imports to the US. There would be no loss in security, but the demonstration of willingness to share oil during stable times would make more credible the pledge to share oil during crises.

Second, the Congress could change the anti-trust laws to allow the major oil companies to participate more freely in IEA exercises and informal negotiations during periods of shortages too minor to trigger the full IEA sharing scheme. The oil companies have the critical information and expertise needed to

manage oil supply shortages. As mentioned above, the IEA should be expanding its capability to deal with relatively small shortages. The United States could help by removing restrictions that now prevent taking action to nip emergencies in the bud.

All countries should consider more aggressive programs to monitor the behavior of their public and private oil traders, especially during the early stages of a supply emergency. Even a few companies rushing into the spot market and driving up prices can destroy confidence in the likelihood of cooperation. And each country must make the preparations for credible domestic programs that will give it the tools to live up to cooperative agreements for sharing during emergencies.

EMERGENCY PREPAREDNESS

Individual countries acting alone or collectively should pursue the same list of energy policies for emergency preparation. The chief force of the consideration of cooperative action is to strengthen the incentives or increase the optimal scale for each action. And a credible domestic program will be a prerequisite for building and implementing wider agreements across countries. Since further disruptions of world oil markets are likely to come, all oil importing countries should prepare the plans and capabilities to curtail demand, expand supply and manage the economy during an oil supply disruption.

Demand Restrictions.

A shortage in oil supplies means that some uses of oil must be foregone. The only choice is in selecting the mechanism. At one extreme, governments can do nothing, and the price will rise until the reduced demand matches the avaliable supply. But then the revenues from the higher prices go to the oil producers. Ideally, with a quick and effective response, governments could take steps to reduce demand and prevent the shortage from driving up the price of oil in the world market. If precisely the same demands are eliminated, then all the rents might stay with energy consumers.

Perhaps the easiest way to imagine this government intervention is through the imposition of an emergency tax or tariff. Added to the price of oil, this would present the consumer with the same incentives as the free market in the presence of a suddenly reduced supply of oil, and demand would drop. But then the rents would go to the government. Unfortunately, the necessary tax or tariff during a major supply disruption could be very large. The price of oil more than doubled, to $33 per barrel, between 1979 and 1980, when Iran's output dropped about two million barrels per day, even though the curtailed production was quickly replaced by increased output from other sources. It is possible that a large interruption in the future could propel the market clearing price of oil over $100 per barrel. It is hard to imagine a government with the

ability to impose overnight a $2 per gallon tax on oil products, but this is what will be needed if the oil exporters are not to be left to impose the tax for us.

Such a tax or tariff may be the best polciy in a country like the United States or Germany. Others, such as Japan or France, with a tradition of greater success in administrative control, may find it easier to design a system of direct restrictions on oil use as more effective in achieving a quick response. Lowered thermostat settings, curtailed driving, emergency van pooling operations, rapid conversion to alternative fuels, and rolling blackouts could combine to yield large and rapid reductions in the demand for petroleum products. The proposals for such plans in the United States are contained in the Emergency Energy Conservation Act (1979)[6].

Probably the best approach is in a pragmatic combination of tax incentives and administrative controls. The higher prices could reinforce the restrictions on use and induce many small adjustments that would be beyond the reach of direct controls. To the extent that anything less than a full price allocation system is used, government will face the problem of deciding on the allocation of scarce oil supplies. Part of the evidence of the credibility of preparation for cooperative action across countries will be in the preparation for the domestic allocation of supplies during a major interruption. For example, if a country has no more effective tools available than the univerally

derided gasoline rationing plan now on the books in the United States, it would be natural to assume that internal chaos would make it difficult for the government to cooperate in a program requiring sensitive coordination among countries.

In addition to preparing detailed allocation systems, investments in fuel switching facilities would improve both a country's capability and credibility to meet the threat of oil supply interruptions. Between crises, these emergency preparations should be managed by a standing organization with the visibility, stature and resources to implement emergency plans. During the confusion of a supply interruption, there will not be time to pull togethor an effective team. A failure to prepare now will make it impossible to perform later. The foundation for a strong program of international cooperation among oil importers must be effective programs for domestic management of oil emergencies. Plans for these programs must be put in place now to complement the initiatives for coordinated action during the next major catastrophe on the world oil market.

Supply Expansion.

Part of the preparations must include investments to provide the capability for a burst of new supply during an emergency. With the effective domestic price of oil doubling or tripling overnight, any source of emergency oil supplies would be a most valuable form of insurance. The source of new supplies

could take many forms, ranging from a specially prepared strategic reserve of oil, to surge production of coal or natural gas to replace oil through fuel switching programs.

The strategic petroleum reserve is the first and most obvious source of emergency oil supplies. Estimates of the value of filling the strategic petroluem reserve in the United States far exceed the companion estimates of the social cost of oil imports. Every country should be expanding their capacity to store oil and filling that capacity as rapidly as possible. A large inventory of oil would be one of the most visible and most credible tools for deterring supply interruptions or mitigating their effects. With oil prices softening in 1981, only an attention to the need for emergency preparedness could overcome the temptation to reduce oil inventories. Reversing these incentives should be among the highest priorities for government action.

Part of the dilemma and policy debate surrounding the expansion of strategic reserves of oil has been the design of the appropriate ownership and use arrangements. Particularly in the United States, this debate has inhibited action to acquire and store the oil. At present, with only a small reserve in place, the priorities should be clear. Each country should use whatever mechanisms it has to expand and fill its storage facilities. In parallel, the debate can proceed about long-rum mechanisms for private financing, a merger of the storage program and a futures

market, the coordination of drawdown policies across countries, and the depoliticization of storage by the transfer of decisionmaking to private hands or independent public boards. But it is not likely that the outcome of this debate will much affect the size or disposition of the reserve that could be built over the next year or two. Therefore, these important decisions about what to do with a large strategic reserve should not be allowed to delay further the creation of that large reserve.

The importance of the oil rerserve often overshadows equally impressive opportunities for building surge capacity with other forms of energy. For example, both coal and natural gas are relatively easily stored in large quantities. In some uses, such as heating, natural gas can be a direct substitute for oil. When matched with companion programs for fuel conversion, even greater possibilities open up to store supplies that can substitute for oil in an emergency. Studies by the National Petroleum Council and Pan Heuristics suggest that with a little preparation, over one million barrels of oil per day can be obtained via substitution of stored natural gas[7]. And at the suddenly higher price of oil, power wheeling from coal plants, and surge production of domestic oil and gas wells, may be both technically feasible and economically justifiable.

Macroeconomic Preparations.

A dramatic jump in oil prices will change our perceptions of the policies that are economic. In addition, it will present entirely new problems that require coordination of energy policy and macroeconomic management. Unfortunately, we do not fully understand the interactions of the two, but a few examples can illustrate the need for viewing oil supply disruptions as macroeconomic problems.

Higher payments for oil will draw a substantial amount of purchasing power from the economy. Compared to 1978, for instance, oil payments in the United States during 1980 increased by 100 billion. During a large supply interruption, the figure could much larger. The first challenge will be to manage the international banking system in order to handle the recycling of these dollars. Part of these revenues were recycled immediately as the domestic owners of oil began to spend their windfall, but at least half those revenues went to pay for imports, and those payments will return slowly in the form of increased exports of goods and services. If governments act wisely in the future, they will capture the rents from the shortages by using taxes and tariffs. In the United States, for instance, the windfall profits tax has been enacted to keep the rents from domestic producers. A product tax or an oil import tariff would add even more to government coffers. But these sudden accumulations of unspent surplusses would multiply throughout the economy to

depress aggregate demand and output well below that necessary to accomodate the reduced oil supplies. Hence, part of the challenge for managing an oil supply interruption will be in maintaining full employment despite the sudden loss in purchasing power.

At the same time, oil prices play a large enough role in the economy so that an oil supply interruption could add a noticeable amount to inflation. This direct effect on the aggregate price level will present macroeconomic managers with the temptation to further depress the money supply in order to dampen the new burst of inflation. Combined with the potential recessionary effects of the fiscal drag caused by higher oil payments, the potential exists to create a major economic contraction, exacerbating the direct impacts of the new scarcity of oil. Such is the diagnosis of the counterproductive response to the oil shock of the 1973 oil embargo[8].

If these two challenges were not enough, the national leaders will face angry consumers on every side complaining about the inequities of the sudden redistribution of income caused by the higher prices on all oil. It was these distributional issues that dominated decisionmaking on pricing in the United States and led to the subsidization of oil imports. The result, a combination of price controls and the entitlements program, increased the payments out of the country in order to slow the redistribution of payments within the country.

One can speculate that a balanced program of taxes and income transfers could meet all of these three problems simultaneously. The taxes would be needed to capture the scarcity rents, especially those for imports, which would be real resource costs for the country. The income transfers would be targeted to the population hardest hit by the increase in oil prices, to avoid both the unnecessary reduction in standard of living and the fiscal drag. And , depending on the institutional arrangements in each country, the form of the income transfers could be designed to compensate for the inflationary effect of the oil price increases. In the United States, for example, reductions in withholding for income taxes and Social Security payments could provide a quick transfer of income through existing institutions and provide a one time drop in the aggregate price level. Berman[9] has shown that the potential exists to accomodate as much as $400 billion in annual transfers without creating a new administrative structure. This could be large enough for all but the most extreme case of a supply interruption.

At least two problems have been suggested for this tax and income transfer package. First, those familiar with the practice of macroeconomic management by the government blanch at the thought of a hundreds of billions of fresh dollars sloshing through government hands. No doubt this is a problem, but with the tax structure already in place, it cannot be avoided, except

for the revenues we are willing to give away to the oil exporters. Therefore, unless we can design such efficient emergency respsonses that prices do not rise appreciably during a supply interruption, the only open issue is the degree to which we prepare for the complicated management task.

Second, and more disturbingly, at least two recent analysis[10] of the behavior of the US economy in the short run suggest that the timing of the taxes and payments is critical and, if our performance is no better than the average behavior shown in the past, disuption tariffs and massive rebates could be counterproductive, with the rebate coming too late to counter the negative effects of the inflation caused by the tariff itself. While these are preliminary results, there are at least two potential resolutions of the difficulties. For one, there is no reason why the income transfers should be tied to the timing or scale of the government taxes on oil or related energy products. The income transfers could well be "prebates" , preceding the arrival of tax revenues and with a scale determined by the needs for macroeconmic management. Finally, the optimal policy will depend crucially on the state of the business cycle at the time of the oil supply interruption. More research must be done to illuminate attractive policies under a range of likely conditions. But in the interim all countries should be planning and preparing the taxing and income transfer aurthorities for coordinated management of energy and economic policy.

LONG RUN ADJUSTMENTS

The threat of an oil supply interruption will be a persistent short-run problem. Although many of the policies needed to meet this challenge are not automatically required for the longer run adjustment to new sources of energy, there are many actions focussed on reducing dependence or stabilizing the oil market to reinforce the preparations for dealing with emergencies.

Import Restrictions.

We have already examined import restrictions, both for the long run and during disruptions. The most attractive approcah may be through the oil-import-value-share target that would leave felxibility for individual country action and present the oil exporters with a diversity of programs and incentives that would be about as difficult to counter as any program that could be put in place through multilateral negotiation.

Excess Capacity.

Oil importers will benefit from excess oil production capacity anywhere in the world. It would not be quite as good to have the spare capacity in the oil exporting countries as elsewhere, but it could help in many cases. Although a

production reserve in Saudi Arabia would not protect us in the event of the loss of Saudi Arabia, it proved to be valuable during 1980 in compensating in part for the loss of production from Iran and Iraq. For obvious reasons, construction of excess capacity is not likely to be part of an explicit arrangement with oil exporters. But it should be a continuing goal for quiet diplomacy and implicit bargains.

Supply Diversification.

Increased production outside the volatile Persian Gulf lessens the power of the oil exporters and reduces the threat and importance of a sudden disruption of oil supplies. The oil importing countries should be looking everywhere to promote the diversification of the total world oil supply. Of course, this is not the same as the scramble of individual countries to diversify their own contracts. While rearranging existing contracts may help ease some of the adjustments during a disruption, the fungibility of oil makes this policy futile as a way to remove the systematic risk of a large total volume of unstable supplies. More appealing are arrangements such as the original proposal for a World Bank affiliate, to underwrite the private risk of expropriation of successful exploration ventures in developing countries.

Over the long run, diversification can include the expansion in the trade of fuels that serve as an alternative to

oil. Notably the trade in coal should expand greatly over the next decade. Fortunately, the inexpensive coal supplies are in different hands than the inexpensive oil supplies, so the increased availability of this new source of energy supply should serve to mute the power of the oil producers. And with the example of the vulnerability of oil supplies fresh in mind, coal importers are likely to take the precautions necessary to prevent falling into the energy-vulnerability trap a second time.

Guaranteed Returns.

One of the most perplexing problems which increases the likelihood of occassional disruptions of oil supply is the view in many oil exporting countries that the oil is more valuable if left in the ground. Cremer and Salehi-Isfahani[11] have shown that restricted access to capital markets can validate this fear and rational behavior would call for reduced supply in response to higher prices. In this circumstance, both the oil importers and the oil exporters would be helped by creating opportunities for investment in less liquid long-term assets with acceptable real rates of return. Given the size of the investments and the necessity to move the capital across national boundaries, such an ideal could be beyond our reach. But a better rate of return on petrodollars could result in a higher rate of oil production at a lower price. And entangling the oil exporters in long-term assets in other countries could be an effective stimulus for

moderation in the oil market. It might pay the IEA to offer the surplus Persian Gulf states a special rate on long-term bonds backed by the oil-importing governments.

Government-to-Governments Deals.

Special production arrangements between governments seem much less attractive. At best the oil importer ends up making concessions in exchange for empty promises; for instance, the French seemed to have gained little from their Iraqi connection. And at worst the arrangements might reduce the flexibility in the world oil market, making it more difficult to reallocate oil supplies during a major emergency. The direct involvement of governments in the oil trade would politicize every oil transaction. We should take heed from the example of the US difficulty in filling the strategic petroleum reserve once the decision arrived on the diplomatic agenda between Saudi Arabia and the United States. All importing governments should benefit from maintaining their distance from the oil exporters when it comes to individual oil deals. In our confrontations with the oil exporters we need the non-confrontational cover of a dispersed market.

MILITARY AND DIPLOMATIC OPTIONS

New action on energy policy could improve the security of oil supply and slow the transfer of wealth to the oil exporters. But there is no hope that energy policy alone could be sufficient to eliminate the need for military and diplomatic efforts to protect the vulnerable oil supplies in the Persian Gulf. In the near term, the need is greater for action in these arenas, for even the best hopes for cooperation among the oil importers will produce only marginal gains in stabilizing oil markets.

These military and diplomatic options are discussed elsewhere[12] in detail that goes beyond the scope of this paper. The oil importers need to accelerate the already growing efforts to project military power into the Persian Gulf. A land base within tactical air range of the oil fields is prize worth a few risks. Failing this, the Rapid Deployment Force, advance positioning of supplies, oil field repair capabilities, aircraft carrier support, regular deployment exercises and coordination with allies in the Middle East are items high on the agenda for improved defense of the Gulf. Of necessity, the balance will be precarious. Most of the options appealing for dealing with the external threat from the Soviet Union will exacerbate the threat from the local radicals.

Even more delicate will be the fashioning of a diplomatic policy that threads its way through the thicket of local

rivalries. Inevitably, every negotiation will encounter an impasse over the Arab-Israeli issue. And oil importers must choose between heavy support of existing regimes and the dangers of later retaliation by their replacements. The primary objective of diplomacy should be to buy time and reinforce the military and energy policy initiatives needed to prepare us for the inevitable disruptions that noone can expect to prevent.

CONCLUSION

Our expensive experience in the world oil market has taught us of the importance of oil vulnerability problem as a first-order security threat. And the evidence at the pump is a constant reminder of the drain in our wealth caused by periodic supply interruptions or sustained high oil prices. After an early blush of optimism about the imminent demise of the new realty in the oil market, importing nations lapsed into the doldrums of despair about their ability to counter the power of the exporters.

Although there is no doubt that the exporters hold the highest cards, the importers are not so weak that they need concede every trick. There are opportunities for collective action to protect ourselves against the instability in the Persian Gulf supplies and the continued drain of exorbitant payments for oil imports. This agenda for cooperation,

Table 1

AN AGENDA FOR COOPERATION

- INTERNATIONAL FRAMEWORK
  - Reforming the IEA
    - Sharing Proportional to Consumption
    - Subcrisis Cooperation
    - Pricing According to High-Ten Rule
  - Summit Nations
    - Focus on Wealth Transfers
    - Oil-Import-Value-Share Targets
    - Provide Lead for IEA
- DEMONSTRATING COMMITMENT
  - Share All Oil Supplies
  - Remove Anti-Trust Restrictions
  - Control Trading Companies in Spot Market
- EMERGENCY PREPAREDNES
  - Demand restrictions
    - Tax/Tariff
    - Administrative Controls
    - Fuel Switching Investments
    - Allocation Programs
    - Emergency Management Teams
  - Supply Expansion
    - Fill Strategic Oil Reserves
    - Expand Storage Capacity'
    - Develop Management Plans
    - Natural Gas and Coal Stockpiles
  - Macroeconomic Management
    - Tax Policies
    - "Prebates"
    - Recycling
- LONG RUN ADJUSTMENTS
  - Import Restrictions
  - Excess Capacity Construction
  - Supply Diversification
  - Guaranteed Returns
  - Avoid unilateral Oil Deals
- MILITARY AND DIPLOMATIC OPTIONS
  - Protect Oil Fields
  - Buy Time for Energy Options

NOTES

1. The present paper continues the discussion along the lines of H.Rowen and J. Weyant, "Improving International Cooperation on Energy," presented at the Tokyo workshop of the Security Conference on Asia and the Pacific, January 23-25, 1981. For a summary of many diagnostic studies, see A. Alm , "Energy Supply Interruptions and National Security," Science, Vol. 211, March 27, 1981; or H. Rowen and W. Hogan, "The Persian Gulf and the Western Economies: Energy Issues," presented at the Security Conference on Asia and the Pacific Wokshop, Tokyo, January 23-25, 1981.

2. The original proposals called for the creation of an Energy Security Corporation. The name change corrected the most embarassing misnomer; Energy Security Act (1980).

3. For a recent example, see L. Silk, " The Slippage in OPEC Power," NY Times, May 13, 1981.

4. D. Deese and J. Nye, "Energy and Security," in Harvard Magazine, January-February, 1981. For a description and analysis of the IEA, see E. Krapels, Oil Crisis Management John Hopkins University Press, Baltimore, MD, 1980; or R. Weiner, "The Oil Import Question ...," Discussion Paper, Energy and Environmental Policy Center, Harvard University, 1981.

5. See, for example, chapter nine in D. Deese and J. Nye, Energy and Security, Ballinger Publishing Co., Cambridge MA, 1981.

6. See J. Berman, "A Summary Of Contingency Planning for Energy Emergencies," Discussion Paper, Energy and Environmental Policy Center, Harvard University, January 1981.

7. National Petroluem Council, "Emergency preparedness for Interruption of Petroleum Imports Into the United States," Washington, DC, April 1980; Pan Heuristics, "Persian Gulf and Western Security," Marina del Rey, CA, November 1980.

8. For example, see chapter four in H. Landsberg et al., Energy: The Next Twenty Years, Ballinger Publishing Company, Cambridge, MA, 1981.

9. J. Berman, " Rebate Strategies for an Oil Emergency," Discussion Paper, Energy and Environmental Policy Center, Harvard University, 1981.

10. K. Mork in J. Plummer (ed.), Energy Vulnerability, (draft), Ballinger Publishing Co., expected 1981; and G. Hubbard and R. Fry, "Macroeconomics and Oil Supply Disruptions," Discussion Paper, Energy and Environmental Policy Center, Harvard

University, 1981.

11. J. Cremer and D. Salehi-Isfahani, "Competitive Pricing in the Oil Market: How Important is OPEC?", Working Paper, University of Pennsylvania, 1980.

12. H. Rowen, "How the West Should protect Persian Gulf Oil -- and Insure Against Its Loss," presented at the joint European American Institute/ Security Conference on Asia and the Pacific Workshop, Kronberg, Germany, June 4-6, 1981.

3

ENERGY PAST: AN ASSESSMENT OF THE FOUNDATIONS OF U.S. ENERGY POLICY

by

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Introduction

Over the last decade the government has become increasingly involved in the development, distribution and pricing of energy. This involvement cannot be attributed solely to a general suspicion of markets or the power of the major oil companies. The government's extensive role in energy stems from four widely-held beliefs about the world oil market. Taken together, these beliefs have been the principal rationale for many domestic and foreign policy initiatives to address the energy problem.

The four beliefs are:

(1) The world is running out of oil faster than the participants in the market think. Unless government acts to change consumer and industry behavior, the western economies will suffer enormous economic shocks in the future. Only a centrally managed government program of research, development, and demonstration can ensure an orderly transition to the alternative fuels of the future.

(2) The world oil market is fragile--in one direction. Any sudden drop in production or increase in consumption can force oil prices to permanently ratchet upward. Because oil demand is price inelastic in the short-run, governments must intervene during both major disruptions and minor disturbances to prevent rapid and permanent increases in world oil prices.

(3) The world oil market has become overly-constrained and cannot be relied on to distribute oil during a supply emergency. A significant fraction of the world's oil supply is now traded under government to government deals or subject to destination restrictions. These constraints may prevent individual countries from obtaining the oil they need during a disruption.

(4) Some members of OPEC, especially Saudi Arabia, are now producing their oil faster than they would like. The high production rates represent "goodwill" towards the West, and a political accommodation with the "moderate" OPEC countries is essential if we hope to keep production at current levels.

These four beliefs about the world oil market justify extensive government involvement in oil and other energy markets. The energy policies of the Carter Administration were based squarely on these four tenets of interventionism. Policymakers in the Carter Administration believed that U.S. consumers and businessmen were too short-sighted to see how quicky the world was running out of oil. For this reason, they requested, and often received, funding for government-sponsored conservation programs and subsidies for the production of synthetic, renewable, and high-cost fossil fuels. They believed that the world oil market was extremely fragile--in one direction, and therefore, pushed hard for the OECD import ceilings and government management of both private sector inventories and purchases on the international spot market. In addition, the Carter people thought the world oil market distribution system was overly-constrained and required government management.

Finally, officials in the Carter Administration believed that the special relationship between Saudi Arabia and the U.S. would prompt the Saudis to produce more oil in the early 80's. To preserve this relationship, Carter officials consulted with the Saudis on a wide range of domestic energy policies including the fill rate for the U.S. Strategic Petroleum Reserve and oil import tariffs.

Although it is still too early to be sure, the Reagan Administration's energy policies appear to be based on a rejection of the four tenets of interventionism. Reagan's FY 81 and FY 82 budgets for the Department of Energy (DOE) will radically transform that agency. Research, development, and demonstration (RD&D) programs in conservation, fossil energy, and renewables are all being cut dramatically.[1/] The new administration's energy program calls for greater reliance on market forces for setting the pace and direction of energy development. Initial decisions within the administration indicate a lack of interest in import quotas, allocating oil supplies, or international oil stock management initiatives for any but the largest oil supply disruptions. Finally, the Reagan Administration's dealings with Saudi Arabia appear to reflect more of a desire to increase stability in the Persian Gulf region, than to change the short-run production decisions of Saudi Arabia or other moderate OPEC producers.

There is still a serious energy problem, and government has a role in solving it. That problem is to reduce the likelihood of supply disruptions and to reduce the costs of those disruptions when they occur. But even the Administration's policy for dealing with oil supply interruptions will likely emphasize market forces. For truly major interruptions, such as a closing of the Strait of Hormuz in the Persian Gulf, the contingency strategy may be limited to reliance on the Strategic Petroleum Reserve (SPR) and financial relief for those suffering severe hardship.[2/]

Former Carter officials argue that the Reagan approach to energy policy is simplistic and naive. However, a review of the operation of the world oil market over the last decade does not support the four tenets of interventionism. In fact, a review of

our energy past indicates that a more limited but more highly focused role for government may be a more productive response to the energy problem.

The Interventionists Speak for Themselves

The four beliefs of "interventionism" were firmly entrenched and widely accepted among members of the Carter Administration. Among many observers of the world oil market these four beliefs are still viewed as an accurate characterization of the world oil market. Robert Stobaugh and Daniel Yergen in their book, Energy Future, argue for a massive government program in solar power and conservation to reduce U.S. dependence on imported oil. Stobaugh and Yergen argue that without such a program growing demand and declining U.S. oil and gas production will lead to oil imports of 14 million barrels/day by the late 1980s.[3] Speaking on the same topic but emphasizing different fuels, former Secretary of Energy James Schlesinger was more specific:

> Quite bluntly, unless we achieve the greater use of coal and nuclear power--over the next decade, this society may just not make it.[4]

A large role is also seen for the government in managing the fragile supply and demand balance in the world oil market. It is argued that a large role is needed for the government because even a relatively small and short-run loss in world oil supplies can cause a permanent ratcheting-up of world oil prices. In a recent article in Science, Alvin Alm, director of the Harvard Energy Security Program and a former Assistant Secretary of DOE during the Carter Administration describes the fragile nature of the world oil market:

> A modest cutback in supplies from other OPEC countries, coupled with an intensification of hostilities, could again lead to a tight market, higher prices, and conceivably physical shortages. If conditions should worsen and oil companies perceive tight markets and higher prices in the future, panic stockpiling could again drive up spot prices. Should that process take place, contract price increases will quickly follow.5/

Mr. Alm's description of the fragile nature of the world oil market is drawn from the price increases that followed the 1979 Iranian Revolution. It is a widely-held view of how the of the world oil market works. In the summer 1980 issue of Foreign Affairs Walter Levy writes:

> As early as February 1979 it was painfully clear that this state of affairs posed a massive danger for the world oil economy and that it required coordination and cooperation among importing countries and among their companies if this buying panic were to be stopped. As a minimum, the major importing countries would have had to establish a firm policy for themselves and their companies not to buy oil at above OPEC price levels; at the same time they had to be willing to establish an international and national allocation system that would assure all countries and companies an equitable share in the oil that was available at OPEC prices. Without such arrangements, higher spot prices would sooner or later be incorporated into higher official OPEC prices. This would be especially damaging because OPEC prices are not freely fluctuating market prices. Once raised, they are unlikely to come down again, because any future softness in prices would be countered by a cutback of OPEC production.6/

Leslie J. Goldman, former Assistant Secretary of Energy for International Affairs, writes on the same subject:

> The moment our international partners sense that the United States may be content to go it alone in 1981, the delicate cards erected by the IEA will collapse and the cutthroat bidding for limited world oil supplies that saw an unnecessary (emphasis added) doubling of the oil price in 1979 could be repeated. The economic devastation associated with this route is almost unthinkable.7/

These three observers suggest that prices can be permanently increased through small production cuts or through panic in the market place. In addition, many observers believe the U.S. and the major oil importing countries should implement an effective inventory control policy on the stockpiling decisions of international oil companies, and keep traders off the spot market to prevent rapid oil price increases like those that followed the Iranian Revolution. These same analysts believe that these very measures by the importing countries prevented a permanent increase in world oil prices during the Iran/Iraq war.

There is also little confidence that the petroleum distribution system responds adequately to market signals. It is argued that government-to-government deals, destination restrictions, and the loss of dominance of the major integrated oil firms have made the distribution system highly inflexible. On the constrained nature of the world oil distribution system, Walter Levy writes in the summer 1980 issue of Foreign Affairs:

> Instead, restrictions on destinations in many recent OPEC export contracts and the proliferation of direct oil supply deals between the governments of importing countries and OPEC national oil companies might deprive the importers of the necessary flexibility for the diversions of oil shipments. Moreover, the importers might well fear that if they arrange any such diversion, the producing country might cancel their oil supply

> arrangements. And in those cases where the consuming country has obtained oil supplies only by granting the OPEC country special political or economic advantages, it would, in any case, most likely be reluctant to make such oil available for reallocation to other countries.[8]

Commenting on the same issue, former Administrator of The Federal Energy Administration (FEA), Frank Zarb was considerably more succinct, "The government sometimes has to say 'That tanker has to go to Long Island instead of Florida.'"[9]

Finally, there is the view of the world oil market that suggests that OPEC, or hostile producers within OPEC will wreck havoc with the economies of the industrialized world through production cutbacks. Many OPEC producers, we are told, do not need the funds from their oil production and are producing at levels far beyond their own economic self-interest (i.e., the oil is worth more in the ground). It is often argued that a political accommodation with OPEC (primarily Saudi Arabia) on a broad range of issues will yield more oil production and lower prices.[10]

Former U.S. Ambassador to Saudi Arabia, John C. West, on the Saudi production and pricing strategy writes,

> Because of Saudi Arabia's concern for that (sic) free world economy and its friendship for the United States, it has increased its production...[11]

The Lesson From Economics

Economic theory teaches that the only difference between competitive and monopolistic production of a depletable resource

is the rate at which prices approach the "backstop" price. The "backstop" price is the amount necessary to produce significant quantities of substitute fuels. Higher prices act as a signal to bring on the more costly substitutes eliminating the risk of "running out". In a competitive world oil prices would approach the backstop price at the rate of interest. In a monopolistic world prices begin much higher but approach the backstop at a slower rate.[12/] The rate at which prices rise is subject to change as expectations shift on producible world reserves, the backstop price, demand, and the degree of OPEC market power.

However, it is in the economic interest of both the competitive and monopolistic producer to deplete their reserves in a fashion that maximizes the value of the resources. Hence, a very large reserve holder can actually produce his reserves too slowly forcing oil substitutes into the market too quickly. It is often argued that many producers do not "need" the revenues or that the excess revenues yield low rates of return. However, selecting a production rate on short-run revenue requirements or keeping production low because of a lack of high yield investments may be a risky and costly strategy. If oil prices get too high, the production of oil-substitutes and the world's oil-using capital stock can change rapidly forcing a decline in real and even perhaps nominal oil prices. Under these circumstances, it is preferable to produce at higher rates rather than leave the oil in the ground.

Prices can, of course, fluctuate significantly in the short term and a major supply interruption will cause large economic losses to the world's oil-importing nations. In the short-term, prices are determined by the rate of production, consumption (demand), and inventory accumulation. But, the short run interaction of

supply, demand, and inventory accumulation should not be an important determinant in long-run production decisions if the producer has vast reserves (such as Saudi Arabia).

To summarize, there are two important lessons to be learned from economics about the oil market. First, because oil is a depletable resource, prices will rise until the backstop price (i.e., the price of oil substitutes) is reached. "Running out" is just not possible. Admittedly, a large reserve holder may take advantage of his monopoly power by raising prices. However, the monopolist loses money if oil prices rise to a level where the value of the oil remaining in the ground is lost due to competition from substitutes. Second, short-term and long-term oil prices may differ significantly. The usual cause of short-term price increases are supply disruptions. Prices should return to their long-term trend following a disruption unless there has been a change in expectations about oil production and consumption far into the future. A temporary withholding or interruption of oil supplies should not cause a permanent ratcheting-up of long-term oil prices.

Energy Past: Do Prices Obey the Lessons of Economics?

Table 1 shows world crude production data from 1960 to 1980. In 1974-75 and in 1979-80 there were large downward shifts in world output. Admittedly, the price increases that accompanied these shifts in output were not independent of the growth in demand for oil. Nonetheless, these unexpected changes in world oil production were primarily responsible for the large price increases of 1973-74 and 1979. The downward changes in world oil production did not occur because the world was suddenly

TABLE 1

World Oil Production[1]/
(Thousands of Barrels Per Day)

Year	Non-OPEC Production	OAPEC[2]/ % Change	OAPEC[2]/ Production	Non-Arab[3]/ % Change	Non-Arab[3]/ OPEC	Communist % Change	Communist Production	Total World % Change	Total World Production	% Change
1960	8,890	—	4,480	—	4,366	—	3,342	—	21,078	—
1965	10,365	3.1/yr	8,336	16.8/yr	6,149	7.1	5,320	9.7/yr	30,170	7.4/yr
1969	13,094	6.0/yr	12,812	11.3/yr	8,348	7.9/yr	7,123	7.6/yr	41,377	8.2/yr
1970	13,796	5.4	14,223	11.0	9,087	8.9	7,917	11.1	45,023	8.8
1971	14,137	2.5	15,053	5.8	10,756	18.4	8,608	8.7	48,554	7.8
1972	14,377	1.7	16,004	6.3	11,496	6.9	9,171	6.5	51,048	5.1
1973	14,580	1.4	18,111	13.2	13,199	14.8	9,972	8.7	55,862	9.4
1974	14,251	-2.3	17,810	-1.7	13,246	0.4	10,886	9.2	56,193	0.6
1975	13,886	-2.6	16,192	-9.1	11,462	-13.5	11,794	8.3	53,334	-5.1
1976	13,990	0.7	18,800	16.1	12,511	9.2	12,554	6.4	57,855	8.5
1977	14,842	6.1	19,507	3.8	12,427	-0.7	13,109	4.4	59,885	3.5
1978	15,973	7.6	18,723	-4.0	11,753	-5.4	13,896	6.0	60,345	0.8
1979	17,148	7.4	21,325	13.9	9,987	-15.0	14,206	2.2	62,666	3.8
1980	17,601	2.6	19,569	-8.2	8,012	-19.8	14,488	2.0	59,670	-4.8

1/ The sources of this data are: The International Petroleum Encyclopedia, 1975 and 1980; and, the Oil and Gas Journal, March 2, 1981, "Worldwide Crude Oil and Gas Production," Page 163.

2/ The Organization of Arab Petroleum-Exporting Countries (OAPEC) includes Abu Dhabi, Algeria, Bahrain, Egypt, Iraq, Kuwait, Libya, Neutral Zone, Qatar, Saudi Arabia, and Syria. Egypt was suspended from OAPEC in April 1979, but is included for consistency in OAPEC totals for 1979 and 1980.

3/ The non-Arab members of the Organization of Petroleum-Exporting Countries (OPEC) are Ecuador, Gabon, Indonesia, Iran, Nigeria, Venezuela, Dubai, and Sharjah.

running out of oil. Nor did prices rise because the market was so fragile that short-run shifts in supply or demand caused a permanent increase in prices. The oil price increases of 1973-74 and 1979 were largely the result of unique events in the world oil market.

From 1918 to 1973 the rate of increase in world oil production was 7 percent per year. In the 13 years prior to 1973, the growth rate of oil production was 7.8 percent per year, and in the period 1972-1973, just prior to the Arab Oil Embargo, it was 9.3 percent. After the Arab Oil Embargo the annual increase in world oil production was 2.3 percent per year through 1979. The slowdown in oil production between 1973 and 1979 was a two-thirds reduction in the growth rate that had been sustained for over 50 years.[13/]

For the 50 years prior to the Arab Oil Embargo real crude oil prices dropped significantly. The price increases that occurred in 1974 were a fourfold rise from the previous year, a spectacular increase considering the history of the previous 50 years.[14/]

The 1973-74 world oil price increase can be explained by three events:

(a) a change in the ownership of much of the world's low cost reserves.

(b) a concentration of those holdings among a small number of producers.

(c) a decline in the rate of world oil production and a decline in the rate of additions to reserves.

In the 1960's decisions about the rate of production from oil reserves in the Middle East were made almost exclusively by the international oil companies. By the end of 1973, most Middle East producing countries had taken control over production decisions away from the companies.[15/] In the years prior to expropriation, the companies realized that their "property rights" were in jeopardy and depleted the reserves at high rates.[16/] These rates were inconsistent with the proper economic management of the reserves. However, from the firm's point of view a high and uneconomic depletion rate was rational because they expected the reserves would soon be expropriated.

Once the "property rights" were firmly established by the host countries, it became apparent that historical increases in production would not continue. This contributed to a sudden and sizeable price increase. If a large portion of the world's reserves had not been produced at high rates because of the threat of expropriation it is likely that prices would have increased well before the 1973-74 Arab Oil Embargo and subsequently followed a more gradual upward path. Although great care must be taken in assessing world reserve data, Table 2 shows a leveling off in increases to world reserves through the 1970s. During this decade, oil exploration and development were on the whole less productive than during prior periods. The world was not suddenly running out of oil, but the previous phenominal increases in reserves were declining.

The 1973-74 price increase was not caused entirely by declining growth in production or declining additions to reserves. Market power was also an important factor. OPEC's share of world oil production increased from 39 percent to 47 percent during the 1960s. From 1970 to 1973 it rose to 52 percent and has since fallen to 49 percent. During the 1960s, Saudi Arabia's

Table 2

World Reserves and Production*
(Billions of Barrels)

Year	Reserves	Production	Years of Inventory
1950	77	3.8	20
1960	290	7.7	38
1970	531	16.4	32
1971	611	17.7	35
1972	633	18.6	34
1973	664	20.4	33
1974	627	20.5	31
1975	712	19.5	37
1976	659	21.1	31
1977	642	21.9	29
1978	646	22.0	29
1979	642	22.9	28
1980	649	21.8	30

* Includes estimates of proved reserves in communist countries

Sources: International Petroleum Encyclopedia 1976 and 1980, The Oil and Gas Journal

share of OPEC production was virtually constant, rising from 15 percent to 16 percent. However, from 1970 to 1973 the Saudi Arabian share increased sharply from 16 percent to 25 percent. By 1980, Saudi production was well over 30 percent of OPEC output.[17/]

OPEC has been able to exerise market power because a substantial portion of the world's low cost oil reserves are concentrated among a few members. Of some 550 billion barrels of proven oil reserves in non-communist countries, over 350 billion barrels or about 64 percent are held by the Middle East members of OPEC.[18/] This concentration of reserves gives a few countries the power to charge high prices by producing at rates that are lower than in a competitive market.

The second major increase in world oil prices followed the Iranian Revolution. In October of 1978, Iranian production began to decline, falling from 5.5 million barrels per day (b/d) in October of 1978 to 400,000 b/d by January, 1979. In the same period Saudi Arabia raised its production by nearly 2 million to its sustainable technical capacity of about 10.5 million b/d.[19/] Iranian production averaged 3 million b/d in 1979 compared to 5 million b/d for all of 1978. However, by mid-1980 Iran's sustainable technical capacity had dropped from 6 million b/d to about 3 million b/d.[20/]

Contract prices rose throughout the period after the onset of the Iranian Revolution. Official Saudi prices for Arab light rose from $12.70/barrel in the fourth quarter of 1978 to roughly $32/barrel by November, 1980. Spot market prices exceeded the increase in contract prices for Saudi crude throughout 1979 and for most of 1980. By the fourth quarter of 1979 spot prices

for Saudi crude reached $38/barrel, but then declined to $33/barrel by the thrid quarter of 1980.[21] However, it was not spot market activity or a fragile oil market which brought about this price increase. Iran, which was a major oil producer and holds 10 percent of the world's oil reserves, would no longer produce at historical rates (including expected increases) for a long time.

The Iranian Revolution brought about two important changes in the outlook for future oil production. First, production from the Persian Gulf would grow even more slowly than after the Arab Oil Embargo. Second, the risk of all the Persian Gulf production to interruptions in supply rose dramatically. The market reacted rationally to this shift in expectations. Free world oil stocks increased by over 1 billion barrels from the average of 3.5 billion held between 1974-1979. The historical peak of 4 billion barrels held in the late 1979 was exceeded by 600 million barrels when stocks reached a level of 4.6 billion barrels in the third quarter of 1980.[22]

At the outbreak of the Iran/Iraq war spot prices rose again and reached $40/barrel in late 1980 and early 1981. However, no significant increases occurred in contract prices for Saudi light.[23] It is possible that had the Iran/Iraq war not broken out, contract prices would have declined. An additional factor is that the Iran/Iraq war did not introduce a new set of expectations about the future as had occurred in the Iranian Revolution. The Iran/Iraq war is seen as a temporary disruption in oil production that will not necessarily lead to a lasting change in long-term output.

Another factor which kept prices rising at the outbreak of the Iran/Iraq war was declining demand for OPEC crude oil. By 1979, many adjustments to the price increases of 1973-74 began to take effect. Indeed, Stobaugh and Yergen's estimates of the U.S. importing 14 million barrels/day by 1990 are viewed now as wildly high. U.S. oil imports are not expected to exceed six million b/d in 1990 and may be considerably lower.[24/] Even a somewhat pessimistic study by the Rand Corporation estimates that recoverable resources in the U.S. could allow oil and gas production to remain relatively constant over the next 20 to 40 years.[25/] Market forces have brought about increased production, significant conservation, and capital stock adjustments.

The argument often given for government intervention to manage a small supply shortfall is drawn from an incorrect perception of oil price behavior during the Iranian Revolution. It is argued that by preventing the companies from acquiring stocks a permanent increase in prices could have been avoided. However, such stockpiling was rational, even essential, under expectations that the magnitude and duration of the curtailment of Iranian exports would be extensive, as well as the likelihood that other disruptions in the world's oil supply might occur. These expectations proved to be well founded when the Iran/Iraq war broke out and privately held world stocks kept spot prices from rising to extremely high levels. Unless inventory behavior has some effect on long-term production decisions by OPEC, then government intervention cannot prevent permanent price increases. At best, the government, by managing private-sector inventory behavior, can stretch out the price rises. However, such actions require that the government know the exact depth and duration of the supply shortfall.

The lessons from our energy past are that the world is not running out of oil faster than consumers and industry think. Significant adjustments are taking place. And the world oil market is not fragile in one direction. The price increases of 1973-74 and 1979 were largely the result of significant shifts in both current and expected production from the world's reserves.

One Oil Market - A Realistic View?

Many critics argue that viewing the world oil market as one large integrated system is unrealistic. Contract restrictions and other inflexibilities in the distribution of oil ensure that producers can impose their political and economic will on consumers. It may be true that a portion of the world's crude supply is constrained. But the evidence indicates that more than enough crude will be free to allow prices to equalize between regions, and to allow supplies to be shared during a disruption.[26/]

A very important, but often overlooked, aspect of the world oil market is that oil is exchanged widely among consumers as well as between consumers and producers. Producers and consumers have the opportunity to profit from the sale of oil to regions where prices are high. As a result, oil supplies will move rapidly to regions with high prices and away from regions with relatively low prices until prices in all regions are about the same. This characteristic flexibility of the oil market has some significant implications for periods of market instability.

During supply disruptions, the forces of price equalization will bring about an efficient sharing of available supplies. All consuming countries will experience an approximately equal shortage, measured as a proportion of their demand before the disruption, regardless of whether a consuming country's source of crude is also the source of the disruption.[27/] This occurred during the 1973 Arab Oil Embargo when the Arab members of OPEC imposed a complete embargo on crude exports to the U.S. and the Netherlands. At the same time, total OPEC production was cut back by 10 percent. Exchange between consumers, and between consumers and non-OPEC and non-Arab OPEC producers, made the attempt to prevent the U.S. and the Netherlands from obtaining crude imports largely ineffective. In the end, all consuming countries suffered the same 10 percent reduction in consumption caused by the lower level of OPEC production. Price increases and supply losses were also experienced equally among consuming countries during the Iranian Revolution and the Iran/Iraq war.

Examples of flexibility in the world oil market and the ability of consumers to overcome destination restrictions are plentiful. However, a particularly unique case in point is South Africa. South Africa is able to import 1.5 million barrels of oil each week. This is in spite of a trade embargo of South Africa by more than 100 countries, including all of the OPEC members.[28/]

Table 3 shows recent trends in crude sales by producing countries. Direct commercial sales by producing countries have increased and, to a lesser extent, so have government-to-government sales. The increase in commercial sales corresponds with the growth in the volume of crude oil sold on the spot market, (which was a negligible quantity before 1973), and the expanded role of oil traders and non-major oil companies in the purchase and resale of crude.

Table 3

Trends in Crude Sales by Producing Countries*

(Millions of Barrels Per Day)

	1973	(%)	1976	(%)	1979	(%)
Commercial	.9	(3)	3.3	(11)	7.8	(26)
Government-To-Government	1.5	(5)	3.8	(13)	5.0	(17)
International Oil Companies	27.9	(92)	21.8	(76)	17.5	(57)
Total	30.3	(100)	28.9	(100)	30.3	(100)

Source: The Petroleum Intelligence Weekly, February 25, 1980, pp. 3-4.

* Includes sales and exports from OPEC and Non-OPEC producers. Most of the Non-OPEC exports would fall under the commercial sales category, but the increase in these exports were not large in the period shown. Nevertheless, an increase in Non-OPEC export volumes contributes to greater flexibility in the market.

** Includes the oil acquired under special provisions such as equity and buy back arrangements. This category does not include the amount of oil that the large interntional companies may be purchasing from the commercial sales category.

Because producers usually get the highest prices for their crude on the open market, it will not be surprising if many producers increase their commercial crude sales. This will be especially true during supply disruptions. And cartel agreements will not likely restrain OPEC members from seeking to expand direct commercial sales.

Six months after the Iranian Revolution, in July 1979, Qatar broke the OPEC Geneva Agreement on maximum spot prices by offering three million barrels of crude for sale at auction. Qatar was reportedly seeking $37 per barrel while the maximum price for spot sales under the Geneva Agreement was $23.50 per barrel. At the same time, Nigeria also sought to increase offerings on the spot market. The equity share of crude oil produced by international oil companies in Nigeria was reduced from 45 percent to 40 percent of total production. Nigeria took this additional crude along with 100,000 b/d it was withholding from British Petroleum and offered it on the spot market to any willing purchaser.[29/]

It has long been suspected, and recently documented, that even Saudi Arabia reponds predictably to high market prices. At the outbreak of the Iran/Iraq war, Saudi Arabia was offering over 2 million b/d of its production in direct sales. Many members of the Saudi royal family have been personally negotiating secret terms for much of this crude at prices well above the official Saudi price and with no restrictions on who purchases it.[30/]

The willingness of some producers to sell crude to consuming regions experiencing relatively high prices during a disruption plays an important part in the flexibility of the world oil market. Among the OPEC producers, the willingness to respond

to powerful price incentives is readily apparent. The Non-Arab OPEC members have political and economic interests that differ from those of the Arab-OPEC members. The Non-Arab members generally are small reserve holders who want oil prices to rise rapidly, and who tend to quickly take advantage of price increases through commercial sales or spot transactions. They are also somewhat removed from the social and political issues that dominate the Middle East. The Non-Arab members did not support the arab embargo of the U.S. and the Netherlands in 1973, and currently produce over 8 million b/d, or almost one-third of the total amount of oil exchanged on the world market.

A final question is whether consuming countries may protect themselves from supply disruptions by entering into special contractual arrangements or through political concessions with producers. It is true that many oil purchases involve complex exchange agreements. A producer may offer a "discount" on price in exchange for a transfer of an advanced technology from an industrialized consuming country. However, efforts by consumers to diversify foreign sources of oil imports to producers outside of the Persian Gulf, or to extablish a special relationship with a producer is of little value in reducing vulnerability to a supply disruption. Producers have not been, and will not be, bound by contract terms which fix prices particularly during supply disruptions when market prices are rising rapidly.

Oddly enough, the perception on the part of consuming countries that a "deal" can be made to reduce vulnerability persists. Members of the Japanese Parliament are likely to bring Yasser Arafat of the PLO as a "private guest" to Tokyo. The director of Tokyo's PLO office was quoted as saying that, "It is a

question of mixing economics and politics."[31] The Wall Street Journal reported that Europe and the Arab oil producers were moving toward a special relationship. The article reported that the Arab States would get control over European refining and petrochemical processing operations and, in return, the Europeans would be guaranteed fuel supplies and prices on a long-term basis.[32]

The evidence strongly supports the view that there is one oil market. Prices are a dominant influence on both consumers and producers. During supply disruptions, differences in prices between regions will result in a reallocation of crude supplies until prices are about the same in all regions and supplies are about the same proportion of the amount demanded before the disruption. It is unlikely that contract restrictions imposed by some producers will prevent supplies from being distributed to regions where prices indicate they are needed the most. Nor is it likely that consumers will be able to insulate themselves from supply disruptions by seeking to develop special political or economic relationships with producing countries.

The Saudis: How Important Are the Lessons of Economics?

Few have a better appreciation for the interests of the large petroleum reserve holder than Saudi Arabian Oil Minister Ahmed Zaki Yamani. In a lecture given at the University of Petroleum and Minerals at Dammam on January 31, 1981, Yamani pointed out that Saudi Arabia with its vast reserves has significantly different interests than many other OPEC producers with smaller reserves. Yamani pointed out that "if the life span of oil as a source of energy ends at the close of the present decade, this will spell disaster for Saudi Arabia."[33]

Admittedly, it is what nations do and not what their leaders say that is important. The Saudis may allow prices to rise too high because, as in our own society, there are genuine political constraints to achieving economic goals. For example, surge production capacity is one sure way for the Saudis to protect their economic interests by restraining price increases. However, a large amount of spare capacity will expose the Saudis to considerable political liabilities. Western allies will pressure Saudi Arabia to use this capacity. If the capacity is used, the Saudi government then runs the risk of appearing to be mainipulted by the West. Yet, the Saudis must be primarily concerned with how quickly substitution away from their oil occurs.

Saudi Arabia has 163 billion barrels of proven reserves with a high probability that significant resources remain to be discovered. Any reduction in present production might yield short-term oil savings with very little revenue loss (prices rise as production is curtailed). However, such a strategy is also likely to reduce future demand and require the Saudis to accept lower prices (or lower production levels) in the future. The costs to the Saudis of allowing prices to rise to a level that accelerates the transition to oil-substitutes is high. Even modestly lower prices and/or lower production in the future could easily cost the Saudis over $100 billion in lost value on their remaining reserves. The Saudis may have important political goals, but one has to argue the Saudis are willing to give up a large portion of their wealth to achieve these goals. Once large segments of the capital-stock of consumers and industry adjust to higher prices (e.g., the purchase of an efficient automobile) it does not revert to historically high consumption levels quickly. Oil is <u>not</u> worth more in the ground if short-run production levels accelerate the downward changes in long-run demand for oil exports.

It is in the national interest of Saudi Arabia to prevent oil prices from rising to a point where they are priced out of markets by substitutes before a large part of their reserves are produced. To do this, the Saudis should probably keep production rates high and add surge production capacity. Extended production cutbacks in retaliation to Western policies the Saudis find unacceptable represent a very high risk to their long-term interests.

Addressing the Appropriate Problem

There is, however, a serious national security problem not readily solved without government help. It is directly attributable to the large volume of world crude oil produced in the Persian Gulf. As long as the Persian Gulf is a major supplier of world crude oil, the economies and national security of the U.S. and other oil-importing countries remain vulnerable to the enormous costs of a major supply interruption.

Table 4 provides estimates of the economic costs, measured in terms of percentage losses in Gross National Product (GNP), of interruptions in world oil supplies. Interruptions of six million b/d and 12 million b/d were tested and it was assumed that these interruptions were one year in length. The estimates take into account the macroeconomic ajustments to extremely high oil prices. Thus, the price increases that follow the interruptions are attenuated somewhat by falling demand from an economic slowdown caused by the oil price drag effect.[34/] These estimates compare favorably with similar work done by Rowen and Weyant.[35/]

Table 4

PRICE INCREASES AND GNP LOSSES FROM A ONE-YEAR INTERRUPTION IN WORLD OIL SUPPLIES[1/]

Country	Import[2/] Dependence	Pre-Disruption Price ($/barrel)	% loss in GNP (6.0 MMB/D)	Post-Disruption Price ($/barrel)	% loss in GNP (12.0 MMB/D)	Post-Disruption Price ($/barrel)
U.S.	39	$36	4.7	$76	12.4	$100
Japan	100	36	5.8	76	15.4	100
W. Germany	97	36	4.3	76	11.3	100
France	99	36	4.6	76	12.2	100
Other IEA	59	36	4.6	76	12.0	100

1/ This table gives estimates of the effects of disruptions on social surplus assuming an income elasticity of +0.8, and a price elasticity of -.10. A multiplier was used to simulate the GNP losses from the dislocations in the industrialized economies from rapidly rising prices.

2/ Import dependence is the percent that imports are of total petroleum demand. These percentages were calculated frp, 1979 data on imports and consumption for the countries listed.

3/ Disruption losses are the percent reductions in Gross National Product (GNP) caused by threee disruption sizes. These are disruptions in OPEC supplies of 1.5 million barrels per day (M,MB/D), 6.0 MMB/D and 12.0 MMB/D.

Table 4 also highlights the key difference between vulnerability and dependence.[36/] Note that Japan, which is more than twice as dependent on imported oil as the U.S., experiences economic losses that are only slightly higher than the losses experienced by the U.S. This reflects the principle that all oil-importing countries are part of one large integrated oil market.

Conclusions

We believe the evidence does not support the four widely-held beliefs that have been the foundation of U.S. energy policy.

(1) The world is not running out of oil faster than the market participants think. Significant adjustments to the price increases of the last decade are already underway. While there is an important role for government-sponsored research on energy, a centrally managed and massive government program does not seem warranted.

(2) The oil market is not fragile in one direction. Prices do not permanently ratchet upward from temporary shifts in production or consumption of petroleum. The price increases of 1973-74 and 1979 are the direct result of significant reductions in expected production unrelated to short-run price fluctuations or the operation of the spot market. A government program to manage private sector inventories or consumer demand to deal with small supply interruptions is not warranted. In addition, such intervention by the government is likely to be counter-productive and discourage self-insurance by the private sector.

(3) There is sufficient flexibility in the world oil market to distribute oil during most supply emergencies. The oil-importing countries are part of one large integrated oil market. A loss of oil anywhere in the world raises prices (and reduces demand) everywhere. It is unlikely any oil-importing country can make arrangements with producers that will effectively insulate it from the rising prices (and economic losses) that occur during a disruption.

(4) It is in the economic interest of Saudi Arabia to keep production levels high and oil prices from rising rapidly. Rapid price increases and high prices will induce long-run shifts in net demand (more production, and more conservation by consuming countries). Shifts in net demand for oil could prove very costly to the Saudis. A "moderate" pricing strategy is essential if the Saudis are to protect the value of their remaining reserves. The U.S.-Saudi relationship (as well as the European-Saudi and Japanese-Saudi relationship) should recognize this factor and de-link economic and energy policy from Saudi pricing and production policy. The U.S. and Saudi Arabia have mutual interest in maintaining stability in the Persian Gulf and protecting the oil fields. This mutual security interest should prove adequate for maintaining a close and effective bilateral relationship.

The framework we believe the evidence supports suggests a more narrow but highly focused role for the government. A significant volume of the world's crude oil is produced in the Persian Gulf. This oil is subject to an interruption from strategic threats, regional instability or internal revolution. A significant and sustained interruption in the flow of this oil will cause enormous economic damage to the industrial economies of the free world. The appropriate response to this threat is both allied foreign and strategic policies to reduce the chance of an interruption and an effective contingency plan to address the interruption should it occur.

Footnotes

1/ A comparison of the FY 1981 and FY 1982 Carter/Reagan DOE budgets for R&D for conservation, fossil energy, and solar and other renewables are as follows:

Budget Authority
($ in millions)

	FY 1981			FY 1982		
	Carter	Reagan	% Change	Carter	Reagan	% Change
Conservation	$ 817.	$ 558.	-32	$ 922.	$ 195.	-79
Fossil Energy	1,131.	834.	-26	1,572.	441.	-72
Solar and Other Renewables	797.	597.	-25	684.	241.	-65
All Other	2,029.	2,142.	+ 6	2,240.	2,231.	+ 4
Totals	$4,774.	$4,131.	-13	$5,418.	$3,198.	-41

For considerably more detail on the FY 1981 and FY 1982 DOE budgets see "Department of Energy FY 1982 Budget (Revised)" Energy Insider, v. 4, n.5., March 16, 1981, U.S. Dept of Energy, Washington, D.C., pp 4-5.

2/ "Market Strategies" need not be restricted to a drawdown of the SPR and financial relief for the poor. To prevent large wealth transfers to OPEC in a major supply crisis, an emergency tax or tariff on imported oil is a promising strategy. In addition, removing regulatory impediments on an emergency basis (which would permit using high sulfur fuel oil, electricity exchanges, higher wellhead values for natural gas, etc.) can reduce the economic cost of a major oil supply interruption. These strategies are more effective if the major consuming countries act collectively in an emergency. For a thorough discussion of these issues, see Henry S. Rowen, and John P. Weyant. "An Integrated Program for Surviving an Oil Crisis", Pan Heuristics, Inc., November 1980, pp. 1-40.

3/ Stobaugh's and Yergin's estimate of U.S. oil imports reaching 14 million b/d in the late 1980's was drawn from government sources. Robert Stobaugh, and Daniel Yergin, (ed), Energy Future New York: Random House, 1979, p. 232.

4/ James R. Schlesinger, "Energy Risks and Energy Futures:Some Farewell Observations," Address before the National Press Club, Aug 16, 1979, p.5 of prepared text.

5/ Alvin L. Alm, "Energy Supply Interruptions and National Security," Science, Vol. 211, March 27, 1981, p. 1381.

6/ Walter J. Levy, "Oil and the Decline of the West," Foreign Affairs, Hummer, 1980, p. 1000.

7/ Leslie J. Goldman, "Heading Into Oil Shock III," Washington Post, February 8, 1981, p. 63.

8/ "Oil and the Decline of the West," op. cit. p. 1006.

9/ Richard Corrigan, "Without Federally Guaranteed Supplies, Small Refiners Are Scrambling for Oil," National Journal, April 18, 1981, p. 640.

10/ Theodore Moran argues that the Saudis follow "A political rather than an economic decision rule on price and production strategy that is more closely attuned to US policy on the Middle East than it is to conviction about the self-interest they have in moderation." See Theodore H. Moran, "The Middle East and the Gulf: What is the Linkage for U.S. Policy?" in the Future of OPEC and Its Long-Run Impact on World Oil Markets presented at a workshop sponsored by the University of Houston, May 8, 1981, Center for Public Policy, Houston, Texas.

11/ John L. West, Letter to the Editor commenting on an Editorial by Douglas Feith that appeared in the WSJ on April 21, 1981, Wall Street Journal, May 5, 1981, p. 25.

12/ It is not the price, but the economic rent (price minus cost) which rises as the resource is depleted. However, costs of oil production are extremely low in the Persian Gulf and the distinction between price and economic rent is not large. These concepts are presented in the classic article on the economics of a depletable resource by Harold Hotelling. See Harold Hotelling, "The Economics of Exhaustible Resources", The Journal of Political Economy, v. 39, n. 2, April 1931, pp 137-175. Also, for an excellent review of the literature on exhaustible resources see Shantayann Davarajan and Anthony C. Fischer, "Hotelling's 'Economics of Exhaustible Resources': Fifty Years Later," Journal of Economic Literature, v. 19, n.1, March 1981, pp 65-73.

13/ These data were taken from an unpublished paper by Professor George Horwich, Economics Department, Purdue University. It is entitled, "Trends in World Energy Supply and Demand, 1973-80", and is available from the Office of Energy Security, Policy, Planning, and Analysis (MS:PE-22), Room 7H-063, U.S. Dept of Energy, Washington, D.C. 20585, pp 1-7.

14/ "Trends in World Energy Supply and Demand" op cit, p. 1.

15/ Ali Johany points out that "The most important event that had drastically changed the international oil market took place on October 16, 1973 when the oil producers resolved to substitute legislation for negotiation. The net effect was a shift of property rights in crude oil from the private western oil companies to the host countries." (p. 15) see Ali D. Johany, The Myth of the OPEC Cartel: The Role of Saudi Arabia. New York: John Wiley & Sons, 1980, pp. 4-16.

16/ The Myth of the OPEC Cartel: The Role of Saudi Arabia op. cit, pp 4-16.

17/ "Trends in World Energy Supply and Demand" op cit, p. 1-7.

18/ "Worldwide Oil and Gas At A Glance", International Petroleum Encyclopedia 1980, Pen Well Publishing Co., pp 124-225.

19/ "World Crude Oil Production 1975-", International Energy Indicators, U.S. Dept of Energy, March 1981, p.4.

20/ "Iran-Capacity Production and Shut-in, 1974-" International Energy Indicators, U.S. Dept of Energy, November 1980, p. 5.

21/ "Here's PIWs 10 Year Overview of Spot Crude Oil Prices", Petroleum Intelligence Weekly, October 20, 1980, p. 11.

22/ "Oil Stocks: Free World, U.S., Japan and Europe, 1973-" International Energy Indicators, U.S. Dept of Energy, March 1981, p. 9.

23/ "Key OPEC Crude Oil Price Trends at a Glance," Petroleum Intelligence Weekly, April 6, 1981, p. 12.

24/ Reducing US Oil Vulnerabaility (Energy Policy for the 1980's), U.S. Dept of Energy, November 10, 1980, p. 1-A-7.

25/ Richard Nehring (with E. Reginald Van Driest II), The Discovery of Significant Oil and Gas Fields in the United States, Rand Corporation, January, 1981, pp 171-173.

26/ Work is currently underway in the Department of Energy's Office of Energy Security to develop a world oil market model that will address a wide range of oil supply disruption issues. In particular, the model is designed to examine the question of how much oil can be subject to constraints (destination restrictions) and yet still allow the market to perform its function of allocating crude oil supplies to the highest bidder and achieving a single world price. The work is based on ideas generated by a number of former staff members and at present is being carried out by Jerry Blankenship of the Office of Energy Security; Connie Nelson from Stanford University and David Weimer of the University of Rochester. Plans call for completion of the model by late spring with results of the model runs available in August 1981.

27/ This is strictly true when the demand elasticities of the various consuming countries are equal. Based on past experience, there is reason to believe that these elasticities are quite similar and support the statement in the text. However, if a consuming country is willing to pay more for crude imports than are other countries, its proportional loss of imports will be less than the loss experienced by other countries. This may reflect the high value placed on crude imports by this country, or it may be because other consuming countries have more effective programs to protect themselves from supply disruptions, such as large emergency stockpiles. In any event, the greater share of imports going to a country that is willing to pay relatively more for these supplies is economically efficient.

28/ "S. Africa Allegedly Buying 'Secret' Oil," Journal of Commerce, March 11, 1981, p. 35.

29/ "Qatar Offers Three Million Barrels of Crude at Auction," Oil and Gas Journal, July 30, 1979, p. 119.

30/ David Ignatius, "Royal Payoffs", Wall Street Journal, May 1, 1981, p. 1.

31/ William Chapman, "Japanese Find Links to PLO Ease Oil Quest", Washington Post, April 2, 1981, p. 17.

32/ Youssef M. Ibrahim, "Arab Oil Producers and Europeans Move Step Closer to Setting Up Special Alliance," Wall Street Journal, April 8, 1981, p. 4.

33/ "Yamani takes a look at the Future for Oil," Petroleum Intelligence Weekly, March 9, 1981, Special Supplement, p. 2.

34/ Oil price drag can aggravate the GNP losses that occur during an oil supply interruption. Because funds collected by producers (from rapid oil price increases) are not quickly respent, real GNP falls. There is considerable debate on how significant oil price drag is in an oil interruption. For an excellent discussion see George Horwich, "Government Contingency Planning for Petroleum Supply Interruptions: A Macro Perspective" (working paper), George Horwich's paper will be published in the near future by the American Enterprise Institute as proceedings from a "Conference on Policies for Coping with Oil Supply Interruptions," AEI for Public Policy Research, Washington, D.C., Sept 8-9, 1980.

35/ "An Integrated Program for Surviving an Oil Crisis," op cit., pp 1-40.

36/ A question that is often asked is why doesn't a government-sponsored program to reduce long-run oil imports represent a reasonable approach for reducing the cost of an oil supply interruption. As shown in Table 4, a lower oil import level is not necessarily an effective strategy for dealing with a supply interruption. It does, of course, make economic sense to allow all fuels (oil, gas, coal, etc.) to be priced at market levels. However, numerous DOE studies show that a strategic stockpile is a much more cost-effective strategy than government-sponsored import reduction programs. See Sweetnam, et al "An Analysis of Acquisition and Drawdown Strategies for the Strategic Petroleum Reserve (staff working paper), Office of Oil Policy, Policy and Evaluation, U.S. Dept of Energy, December 17, 1979, and Blankenship, et al "The Energy Problem: Costs and Policy Options" (staff working paper), Office of Oil Policy and Evaluation, U.S. Dept of Energy, May 23, 1980.

I. THE PROBLEM

It is accepted as dogma that Persian Gulf oil is vital to the West. This dogma should stimulate skeptical inquiry; we need to be clear on precisely why this energy source is so important because it certainly is far from secure. Today, there is far too little military power within the region to prevent a Soviet move across Iran--and perhaps Iraq or Pakistan--to the Gulf, nor is there any basis for confidence that warning of attack would permit Western forces to arrive soon enough.* Soviet leaders may be focussed on other objectives, or problems, than seizing Persian Gulf oil, or they may regard the military risks and political costs as not worth the benefits, but we should not be confused as to the outcome locally is such a move were to be made given our present dispositions.

Indirect Paths to the Gulf

A direct out-of-the-blue move is not the only--nor perhaps the most probable--path which would lead to a large increase in Soviet power in this region. It is rich in political instabilities and conflicts which include disputes over territory (e.g. Iran versus Iraq; Israel versus Jordan, Syria, and the Palestinians), ethnic tensions (Kurds, Baluchis, Arabs in Khuzestan, Alawites in Syria, among many others), political-ideological conflicts (radical states versus conservative ones, Baathists in Syria versus those in Iraq), religious tensions and conflicts

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* Albert Wohlstetter, "Half Wars and Half Policies in the Persian Gulf", presented at the European American Institute Workshop "The Alliance and the Persian Gulf", 27-29 June 1980.

(Shias versus Sunnis, Arab Christians versus Arab Moslems), revolutions (Iran), assassinations (North Yemen), terrorism (in many countries), insurrections (Mecca), and wars (Israel versus Arabs, Libya versus Chad, Iran versus Iraq).*

These instabilities, even without strong Soviet involvement, have caused the West grief enough since 1973. The abrupt interruptions in oil supply in 1973, 1979, and 1980 have cost the oil importing countries at least one trillion dollars. (This is in addition to the cost to them of a slow rise in real oil prices which was inevitable in any case.) These instabilities have the potential for inflicting worse damage on us by providing an opportunity for the extension of Soviet power into the region. The potentials here include manipulating and exploiting 1) weakness at the center in Iran and also centrifugal tendencies throughout the country; 2) similar structural weaknesses which exist in Pakistan; 3) "friendships" with Syria and Iraq; 4) the waning power of Numeiri in the Sudan; 5) potential opportunities in North Yemen; and 6) dissident movements in Saudi Arabia, Oman, in the small Gulf sheikdoms, and elsewhere.**

Soviet interests in extending power to the Gulf could be several: A source of energy of great importance to the economies of the NATO countries and Japan would be available to us only at Soviet will. It would have control over a resource of immense economic value. Turkey and the Southern Flank of NATO could be put in grave jeopardy. And the Soviet Union would have freer access to South Asia and Africa.

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* Zalmay Khalilzad, "The Struggle for Afghanistan", presented at the European American Institute Workshop "The Alliance and the Persian Gulf", 27-29 June 1980.

** Francis Fukuyama, "The Soviet Threat to the Persian Gulf", presented at the Security Conference on Asia and the Pacific Workshop "The Persian Gulf and the Western Economies", 23-25 January 1981.

These observations suggest a strategy for the Soviet Union. It includes Soviet assertion of its stakes in the stability of the region and its candidacy as a guarantor of this stability (along the line put forward by Portugalof and Brezhnev); bolstering of communist parties in Iran and elsewhere; support for ethnic groups with separatist aspirations (Baluchis, Kurds, and others); efforts to unseat conservative regimes; strengthening the military ties with radical states, especially the "rejectionist" states vis-a-vis Israel; support for radical factions of the PLO; and threats to punish those who aid the Afghan rebels, especially Pakistan. Such a program has internal inconsistencies and it might experience reverses as the Soviets did in Egypt a decade ago. But as the Soviets demonstrated when they dumped Somalia in favor of Ethiopia, they have an eye for the main chance. What matters most is the vector of all the instruments used and the positions built; in the past five years this vector has moved strongly in a favorable direction.

If favorable circumstances emerge or can be created, a Soviet military move could then be made which would result in the burden being placed on <u>us</u> to remove Soviet forces. Although Soviet power can be displaced from areas remote from the Soviet Union, as it was from Egypt in 1972, such displacement may not be easy in the 1980s. It is especially difficult to bring about in areas contiguous to the Soviet Union; Afghanistan looks like a case in point.

Iran is the most obvious and vulnerable target. The Khomeini government has variable control over different parts of the country. Its behavior has alienated large groups of its population, many of whom want more independence from Teheran or simply want to replace the regime.

The Iraqi attack has rallied support for Khomeini but this support may not persist long. There is a high likelihood of more turmoil as those opposing the Khomeini regime--working toward different aims--continue their efforts. If Soviet VTA delivers airborne troops to Teheran International Airport, Bandar Abbas, Abadan, Bushire and elsewhere at some point in the 1980s, and if the tanks roll across the border into Azerbaijan, Turkestan, and Baluchistan, this operation may well be accompanied by the invitation of factions with some claim to local--or central--authority.

The Soviet aim in such a move might well be to limit their apparent threat to all of the oil of the Gulf in hope of avoiding a conflict with the U.S., or at least having it occur in a region most favorable to them. Therefore, they might choose to concentrate on northern Iran together with its principal oil region, Khuzestan, and avoid, at least initially, making a move to the Strait of Hormuz.

Although Iran is an obvious soft spot, this is not a prediction that Iran will be the point of attack. There are other candidates. Pakistan's polity has centrifugal tendencies and is now exposed directly to Soviet power. And given the rate at which regimes have been overthrown in the area in the past quarter century, one would be foolish to assume that the present regimes in Saudi Arabia, Kuwait, Bahrein, Qatar, the UAE, Oman, North Yemen, or Jordan will survive the 1980s. There are also grounds for wondering about a post-Sadat Egypt.

Predictions of specific contingencies are foolhardy. But there is one overarching fact: it is the existence of a dominant Soviet capacity to move power into the region. This is coloring the behavior of the regional states and it could do so even more in the future.

II. THE ENERGY POLICY COMPONENT OF AN OVERALL STRATEGY

Two distinct properties of Persian Gulf oil need to be distinguished:

- It is the largest source of a fuel which plays a key role in the functioning of our economies.
- It is also the world's cheapest source of commercial energy.

The first property implies that we need continuity of supply. Experience in the 1970s demonstrated that our economies do not adjust rapidly and easily to abrupt reductions in oil supply. This short run inflexibility (low price elasticity of demand) means that abrupt reductions in supply cause large price increases, a large increase in wealth transfers to the remaining oil producers, and reduced economic output. Structural rigidities can further increase losses by causing factors of production, e.g. labor, to be unemployed. In 1974-75, the result was an increase in wealth transferred to the oil exporters of around $100 billion plus a large loss in economic output, amounting in the U.S. alone to over $100 billion. The 1979 and 1980-81 experiences were broadly similar although with a smaller reduction in economic output.

We have not experienced the worst that can happen. The potential loss from a major Persian Gulf interruption is enormous: The loss of nine million barrels per day for a year would reduce the aggregate economic output of the U.S., Japan, and the Western European nations by at least seven percent ($500 billion) and perhaps by twice as much or more.*

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* This level of disruption is not far-fetched. Between December 1978 and December 1980 there was a loss of almost (continued on next page)

This estimate takes account of our present state of emergency preparations. If the disruption were as large as 18 MMBD for a year, the entire supply from the Gulf, the losses would probably be much greater, 20 percent or more of our economic output, about the scale of the Great Depression.

The distribution of these losses among the Western nations is not proportional to each nation's pre-crisis dependence on Persian Gulf oil, nor on its dependence on imported oil. For example, although Japan's estimated losses are higher than those of Europe and the United States (roughly 50 percent more than the U.S.), this difference in losses among countries is less than one might expect. The basic reason is that there is one world oil market and oil tends to find its highest value uses. Thus, during the 1973-74 oil shock, only Japan among the major oil importers received more oil during the crisis than in the preceding period. It would require large efforts by governments to impede the equalization process of the market and political forces would probably work to support the market in moving the oil to its most valuable uses.

The second and no less important attribute of this energy source is its low cost of production. At present prices, revenues flowing to the Persian Gulf producers come to about $200 billion per year; over 97 percent of these revenues are net after production costs. Whoever controls this resource controls an asset of huge value.

By way of comparison, the annual hard currency earnings of the Soviet Union are only one-tenth as large as the revenue flows to the Gulf nations.

(continued from previous page) 9 MMBD of oil supply from Iran and Iraq. The economic damage to the West, although large, was not nearly as great as for the interruption described in the text because the cuts came in stages and there were increases in production elsewhere, especially in Saudi Arabia.

Henry Rowen and John Weyant, "An Integrated Program for Surviving an Oil Crisis", presented at the Security Conference on Asia and the Pacific Workshop "The Persian Gulf and the Western Economies", 23-25 January 1981.

We can now assess some of the consequences of Soviet control, complete or partial, of Persian Gulf oil. In the absence of much more extensive preparations than we now have, the threat of disruptions would be a terrible sword hanging over us. And if we managed somehow to survive while we added to oil stocks, built synfuel plants, built more nuclear and coal electric generating plants, and the like, we would still face the fact that the Soviets were in control of an enormously valuable economic asset. Revenues from this source could make a decisive difference to the functioning of the increasingly stagnant Soviet economy. There should be little doubt that, the threat of supply disruptions aside, such a transfer of control would produce a profound shift in the world's power balance.

The Potential for Energy Insurance Measures

Our energy policy measures should be matched to the two main attributes of Persian Gulf oil:

- More actions can be taken to reduce economic losses from even large and long disruptions at a cost which is low by comparison with the prospective benefits. By 1985 we could collectively buy a high degree of insurance against disruptions. Because there is one market, measures to protect against interruption benefit all oil importing countries, those with little domestic energy as well as those with more energy alternatives.

- The fact that the real cost of producing Persian Gulf oil is much lower than that of producing alternative fuels is fundamental. Although Western energy investments in alternative

energy sources can gradually reduce our dependence on--and vulnerability to--disruptions and can limit the value of Persian Gulf oil, such programs take time and require cooperation among the oil importers to be very effective. An all-out effort to limit Persian Gulf dependence would probably be contingent on this oil seeming likely to slip into Soviet control. On the other hand, if we acted only after Soviet seizure, it might be too late.

On this view, our first order of business is to pursue preparations to avoid economic losses from major disruptions much more vigorously than we have.

Supply Side Measures

- storing oil (both in government and in private hands)
- storing natural gas
- increasing production of oil and natural gas in a crisis and rapidly substituting nuclear energy, natural gas, and coal for oil

Demand Side Measures

- emergency taxes (together with rebates to consumers)
- (more dubiously) various administrative controls to limit demand
- appeals for oil conservation

International Cooperative Measures

Supply-side measures. The potential for these measures is large. The easiest response is to bring any shut-in oil capacity into use in a crisis; an example is the increase in Saudi Arabian production in 1979

when Iranian exports fell. We cannot count on much surplus capacity existing in the future, however, and any such excess capacity in the Gulf area might be within the zone of disruption. More promising is emergency production of more natural gas to replace oil. In the U.S., about 1 MMBD of oil use could be quickly switched to gas if the gas were available. The National Petroleum Council estimates that from 350-600 MBD of oil equivalent (depending on the season of the year) in the form of gas is available.* Pan Heuristics has estimated that an additional amount of gas equivalent to 1 MMBD of oil for a year could be stored in our existing natural gas storage system (with some additions).** As Europe develops its natural gas production and distribution system, it too should be able to store natural gas for emergencies and to draw on extra supplies from the North Sea. (Supplies of oil and natural gas from the Soviet Union can hardly be counted on in a Persian Gulf conflict involving that country.)

As for the electric generating sector, if the base load is being provided by coal or nuclear energy, in an emergency it should be possible to replace most of the oil use by this sector through more intense operation of non-oil plants, shifting load to off-peak hours, accelerating the licensing of new nuclear and coal plants, and "wheeling" power among utilities.

The principal supply side measure that has received attention is the storing of oil. The International Energy Agency agreement calls on members to have a 90-day supply of imports, but this requirement can be

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* "Emergency Preparedness for Interruption of Petroleum Imports Into the United States", Washington DC: National Petroleum Council, April 1981.

** "Persian Gulf Oil and Western Security", Marina del Rey CA: Pan Heuristics, PH80-11-LV7902-60G, 4 November 1980.

satisfied by all of the supplies in the oil logistic system, fuel switching capacity, or standby oil production. As reported, as of the end of 1980, non-communist world stocks amounted to 104 days of total consumption (5,270 MMB). Although in principle these stocks could be substantially drawn down (perhaps by a third), uncertainty about the future course of any crisis would make the extent of draw-down of private stocks uncertain. Similar uncertainty would afflict the managers of the roughly 600 MMB of official and officially mandated stocks (included in the 5,270 MMB total). The level of usable stocks is inadequate for a major prolonged interruption.

If the United States were to create a Strategic Petroleum Reserve of 1,500 MMB by 1985 (which implies a daily fill rate of 760,000 barrels), the annual cost would be around $7.5 billion (some part of which would probably be borne by all importing countries in a higher world oil price than otherwise would prevail).* But in a 9 MMBD interruption for a year, with such a stock the economic saving to the U.S. would be about $100-200 billion with <u>double</u> that economic benefit accruing to other oil importers from the effect of our large stock releases in holding down increases in the world oil price. The effect of any government releasing of stocks in the market is similar; this large externality provides

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* The cost of adding to these stocks is the cost of storage (about $1 per barrel per year in salt domes) plus the carrying cost of the oil. If the oil is bought when the market is tight, the true cost of a stored barrel can be much higher than the purchase price because the upward pressure on the price of oil causes <u>all</u> imported oil to be more costly; however, if bought when the market is slack, as it is today, this premium is probably negligible. As to the annual carrying charge on the oil, at a social discount rate of six percent and an oil price of $35 per barrel the annual carrying cost is $2.10. However, over time the value of the oil is likely to appreciate in real terms; if it were to do so at the rate of six percent annually, the carrying cost would be zero.

a strong economic basis for cooperation among oil importing nations in their oil stockpiling policies.

Whether or not additional stocks of this magnitude (whether comprised of oil or natural gas) are warranted depends on one's assessment of the probability and frequency of major disruptions, the effectiveness of political-military measures in preventing disruptions, and the efficacy of fuel switching and demand limiting actions.

The annual cost of an illustrative program which would create government and government mandated stocks in our countries equivalent to 3,000 MMB (both oil and natural gas) would be around $15 billion per year in total. Once the program is in place, say by 1985, the economic savings in the event of a 9 MMBD disruption for a year would be about $400 billion to $800 billion (or more). If we estimate that on the average in any given year there is a four to eight percent probability of an interruption on this scale, we should buy this much insurance.

Missing from this list of insurance measures are efforts to diversify sources of oil or to curry favor with particular oil importers by offering them weapons or nuclear technology or support for the PLO. Good political relations with oil suppliers are to be valued, but special ties are not likely to be worth much for the contingency of serious disruption. One reason is that one's "reliable" source of supply may have been disrupted; for another, the oil market has been shown, even recently, to have a great deal of flexibility in a crisis--and oil exporters have acquired the habit of adjusting contract prices upward toward spot prices in crises.

This list of useful emergency preparation measures does not include steps to reduce Western dependence on Persian Gulf oil.

It is true that if less imported oil is being used by a country at the outset of a crisis there will be less of a shock to a country's economic system. However, the displacement of oil by other fuels will be long process unless our governments take this goal much more seriously in the future than they have in the past; they should do so, but we have to expect that our exposure to disruptions in the Gulf will last at least through the 1980s.*

During this period, our collective dependence on Persian Gulf oil will slowly decline as other energy sources are developed. Since 1973, it has moved from being the source of 22 percent of the non-communist world's energy to 17 percent in 1980; by 1990 it might shrink to 14 to 15 percent. If the Soviet Union were to gain a significant degree of control of Gulf oil, if we survived we could reduce that share further.

But in the end, it would not be possible to exclude the world's cheapest energy from much of the world market despite the fact that part of the revenues generated would be used by the Soviets against our interests.

Demand-side measures. Americans had unahppy experiences in the 1970s with price controls and government allocation of oil. We managed to increase economic losses without the canons of equity being well served. The Reagan Administration has a strong preference for letting market forces work, but it is doubtful that our political system would allow this to happen in a severe oil disruption in which oil prices skyrocketed.

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* There are some impressive counter-examples to the proposition that reductions in oil dependence can take place only slowly. The Japanese steel industry has greatly reduced its use of oil the the past three years. So has the American electric utility sector (by 35 percent since 1978). The French nuclear electric program by 1990 will have largely insulated that important sector from disturbances in the oil market.

The demands for government action to meet felt equity needs would be strong. Much the best way to meet these demands, and to help reduce the consumption of oil (and thereby to reduce the transfer of wealth to remaining oil producers), is to impose a system of taxes, with financial rebates, on oil. The development of such a system should be receiving our attention now, not a system for standby allocations.

There is also a role for voluntary conservation in a severe crisis, especially one that might be associated with a war which involves our forces. But voluntary conservation tends not to be enduring; it needs to be accompanied by appropriate price signals.

International cooperative measures. One might ask whether there are any important functions that need to be performed internationally beyond those carried out within existing mechanisms such as the IEA and occasional summit meetings. These institutions essentially have provided a political cover to allow the world oil market to function, a useful function indeed.

It can be argued that additional international cooperative steps might be important in a severe crisis. If there is conflict in the Gulf, perhaps involving our forces, there would be urgent matters for international management involving the routing and protection of tankers and repair of damaged oil facilities, among other things. There would also be a case for the major allies taking cooperative action to try to assure the maximum availability of oil from the remaining oil exporters at a high but not truly exorbitant price. If so, this would involve them in the international allocation of oil.

Designing and managing such programs might well require the creation of a planning staff reporting to a small set of major oil importing nations.

What Should We Do if the Real Price of Oil Falls?

Strong downward pressure is now being exerted on the price of oil. This pressure could prove to be a transient phenomenon if the war in the Gulf intensifies and supplies are further reduced. But if the war between Iran and Iraq winds down to the point where oil can be shipped from all of their Gulf loading facilities, within a year or two an additional 3-4 MMBD or so of oil might be exported from these countries. There may also be a decline in worldwide oil stocks which are almost one billion barrels higher now than they were in late 1978. Non-Persian Gulf oil production can be expected to grow at 0.5-0.7 MMBD per year. And at a real oil price of around $35 for light crude, world oil demand, which is likely to decline by 1-2 MMBD in 1981, is unlikely to grow much in 1982 or 1983 and might decline further.

Therefore, the size of the production cuts that Saudi Arabia and other exporters might face in the next year in order to hold the real oil price at about its present level might be as much as 6 MMBD. If they cannot manage to make such a large cut, the real price of oil--and perhaps even its current price--could experience a marked decline. For instance, a 6 MMBD "overhang" on the market would be about 25 percent of current total OPEC production--and OPEC has never managed to install a production allocation system. If such a cut were to be absorbed entirely by Saudi Arabia, Kuwait (whose production has already been cut by more than one-half since the early 1970s), the UAE, Qatar, and Libya, their aggregate reduction in output would have to be a formidable 40 percent. For every 1 MMBD in "overhang" the producers fail to absorb, at the margin the real price of oil will probably decline by around $5 per barrel. The possibility should not be excluded of the real price of oil (in 1982 dollars) declining to $25 per barrel or lower.

One might ask, how different might the world oil market be in 1982 or 1983 by comparison with 1978, the last year before the collapse of Iranian production? Iranian output under a Khomeini regime would certainly remain far below its level under the Shah, but, on the other hand, world demand will very likely be lower than in 1978 and a large impetus will have been given to oil and gas exploration elsewhere. On balance, market conditions might be broadly similar to 1978, a year when the price of Arabian light oil in the Gulf was $13 per barrel. Adjusted for probable changes in the value of the dollar to 1982, this would be equivalent to an oil price of about $20 per barrel.

This is not a forecast of such a price decline. The future price is dependent on highly uncertain events such as the resumption of large scale oil shipments from Iraq. But a decline in oil price could pose an important policy issue for our governments: whether to allow oil demand and imports to resume their growth or, instead, to hold down consumption and imports. There are contrasting benefits. A lower oil price would reduce inflation and stimulate economic growth whereas limiting imports would hold down our dependence on Persian Gulf oil and would help to maintain the downward pressure on the world oil price--under circumstances in which the oil exporters would find it very difficult to retaliate by cutting back their production even further. For instance, our governments might consider imposing a $5 per barrel tariff on oil (or equivalent fees on oil products). Such a fee might be justified today given the benefits in reduced dependence on vulnerable Persian Gulf oil and lower payments for oil, but it would be politically easier to impose if the price of oil were falling.

Saudi Incentives to Produce Oil

The oil policy of Saudi Arabia is often represented as being motivated by a concern for the interests of the Western importing nations (presumably excluding the 1973-74 crisis when Saudi Arabia took the lead in the use of the "oil weapon"). On this view, the Saudis produce more oil than is in their economic or political interest because of concern for the economic stability of the West or, more plausibly, in exchange for military protection from the United States or in return for the supply of advanced weapons. However, critics of these arguments have pointed to the impressive growth in the Saudis' ability to spend money which induces them to have a high level of production.

A more fundamental point is that the Saudis have so much oil in the ground that the present value at the margin of an unproduced barrel of oil in that country is very low even allowing for a substantial increase over time in the real price of oil. Because Saudi oil reserves (around 150 billion barrels) together with its estimated additional but undiscovered oil resources are enormous, at its present production rate Saudi Arabia will probably be a major oil producer to the middle of the next century or beyond.

Saudi Arabia's share of the world oil market is so large that production changes by it can have a big effect on the world price if the market is tight. Because the Saudi share of the non-communist world oil market is about equal to the short run price elasticity of oil demand, modest changes in Saudi output can result in little change in its revenues. This suggests that the Saudis could afford to cut their production, a point often made by Saudi officials.

But the Saudi regime also faces the problem of stimulating Western investment in alternative energy sources. Sheik Ahmed Zaki Yamani has stated the problem as follows:*

> Let us set emotions aside and look at the facts. Saudi Arabia's interest may appear to be served by lower production rates and higher prices irrespective of the outcome. As the price rises, consumption falls and capital is invested in searching for alternative sources of energy. Had you been with us on OPEC's Strategy Planning Committee . . . you would have been surprised to find out that raising prices excessively and without restrictions or limits will not be in the interests of certain OPEC members including Saudi Arabia and Iraq. . . .
>
> If we force Western countries to invest heavily in finding alternative sources of energy, they will. This would take no more than seven to ten years and would result in reducing dependence on oil as a source of energy to a point which will then jeopardize Saudi Arabia's interests. Saudi Arabia will then be unable to find markets to sell enough oil to meet its financial requirements. This picture should be well understood.

Officials of governments should not be as impressed as they often are when the Saudis ask for Western arms, or more attention to Palestinian claims, in exchange for higher oil production. To be sure, Yamani's analysis is based on a certain economic calculation and we cannot be confident that such a calculation will be the primary determinant of Saudi choices.** But it is certainly arguable that the Saudis have an economic interest in producing more oil now and in holding the price of oil below the cost of alternative energy sources.

In sum, unless we view the probability of major threats to the oil as low, or unless we regard the steps already in train to defend

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* Response to a question in a meeting at the University of Petroleum and Minerals at Dammam, Saudi Arabia, 31 January 1981.

** Kuwait, whose average income is one of the world's highest and which swings much less weight in the world oil market, has elected to cut its oil production by almost 60 percent. At its current production rate of 1.2 MMBD, Kuwait's proven oil reserves will last until 2130. This is an extreme future-oriented policy.

the oil as sufficient, then there is a clear need for buying more insurance to enable our economies to survive oil shocks and for lessening our dependence on Persian Gulf oil. Much more can be done, at a comparatively low cost relative to its expected benefits.

III. A WESTERN STRATEGY FOR PROTECTING THE OIL

A successful strategy for protecting the oil needs to take into account several salient military and political factors:

- Fundamental are the many internal political weaknesses, rivalries, and conflicts in the region; the capacity of the Soviet Union to move military forces into the area rapidly; the lack of assurance that we would have adequate strategic warning.

- The distances which separate the bulk of the Western forces from crucial areas in the Gulf are long and so is the time required to deliver these forces to the theater. And the logistic difficulties within the area are severe.

- The perception of dominant Soviet power is affecting attitudes and behavior throughout the region, while confidence in U.S. power and determination has waned. Reversing these attitudes will take effort and time.

- The governments of several key Arab states want protection from the Soviet Union and its allies but do not want American forces on their territory.

- The Israeli-Palestinian conflict is stated as their primary concern by many Arab leaders. We observe, however, that interruptions of oil supply and extensions of Soviet power into the region since 1974 have been largely unrelated to this conflict. But, it is true that Israeli-Arab crises, such as the present confrontation in Lebanon, have the potential to cause the Arabs to temporarily surpress their differences and to act with greater unity not only against Israel but against those deemed to be its main supporters. This process has the potential of disrupting oil supplies.

- The Soviet Union is not the villain behind all of these disruptions either. Although it urged the Arabs to use the oil weapon in 1973 and its looming presence may have helped to deter Jimmy Carter from acting in Iran in 1979, there has been trouble enough without direct Soviet involvement. There may be future supply disruptions without Soviet involvement but these will be reversible whereas Soviet control may not be.

- If power is being contested in a key capital, the decisive period for settling the outcome may be measured in hours.

- Three countries in the area are currently or potentially militarily strong, have a long tradition of institutionalized government, and are Western or pro-Western in orientation: Turkey, Egypt, and Israel. Turkey, whose location is especially important for defense against Soviet moves to the Gulf, is a member of NATO; Israel is a de facto ally of the United States; and Egypt has moved into a close political relation with us.

If there is to be a viable strategy for the area, these nations must form the core.

- Saudi Arabia, the region's dominant oil producer, clearly must play an important role, but its feudal political system, the fears of its leaders, and its inhibitions about an American military presence have set strict limits to its role. We should push at these limits because its real estate is important not only for the defense of Saudi oil but also for blocking a Soviet move across Iran; Saudi money is also important for support of other regional powers including Pakistan, Turkey, and Egypt.

- Pakistan's location is of high strategic importance for Persian Gulf security but its internal divisions and its exposure to Indian as well as Soviet attack makes it a hard case for us. We should do what we can to bolster its security.

- Soviet clients and friends in the PDRY, Libya, Syria, and Iraq may choose to act independently of the Soviet Union or may act in concert with it. To the extent that these governments are tied to the Soviet Union, they are also "outposts" which may be vulnerable to Western pressure.

- All members of the alliance have a stake in the fate of Persian Gulf oil but some members have a more direct interest than others. Yet several of the nations that are most vulnerable to oil disruption have not so far been prepared to do much to protect it. This is not a stable situation.

Outline of a Strategy

These considerations make imperative a substantial increase in the power of the West in and rapidly movable to the Gulf region through the use of all the political, economic, and military instruments available to us. The core elements of a strategy should be:

- The stationing of a significant military force within the region together with naval and Marine forces "over the horizon" able to act rapidly to disrupt Soviet airborne forces and to seize key facilities in the Gulf region. Such a force would confront the Soviets directly with Western military power if they make a direct military move; this would at least embroil them in a conflict with Western forces; it would also serve to delay the Soviet advance while Western reinforcements were deployed. Such a force also could intervene locally in defense of a friendly regime under attack. Our overall objective should be to defend as far forward as we can manage: in Iran if possible but at least in defense of the Arabian Peninsula.*

- A military effort designed to defend the oil where it is is an essential. Any strategy which does not have this aim would be one largely of bluff, whether it be one of threatening nuclear escalation or of widening the war to other regions of the world. Further, a capacity and determination to defend the oil locally is essential if we want to maximize the credibility of threats of escalation ("vertical" or "horizontal").

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* John W. Vogt, "Military Considerations of a Persian Gulf Conflict", presented at this Workshop.

- Ideally, Western military units should be located in Saudi Arabia, Turkey, Egypt, Israel, Pakistan, and Oman. Having diversity in deployments is a hedge against political losses in some countries. However, political constraints make such an extensive deployment impossible in the short run and perhaps in the long run. Nonetheless, having units in a subset of these countries could have a large payoff in discouraging or dealing with the threats.

- Having small, carefully selected, mobile forces in a few key areas can have an importance far greater than their scale might suggest. They are a presence; they can make bold Soviet moves much riskier than in their absence; and they help to raise the probability that from the outset, Soviet forces would be in conflict with American ones.

- Because we cannot expect to be able to station large forces on the ground in the region (and politically it might be a mistake to do so even if we could), we must be prepared to move reinforcements rapidly. This implies a need for expanded facilities, prepositioning of heavy equipment, more airlift and sealift, and frequent training exercises. One way of meeting the political constraint on not having forces permanently there is to have a frequency of exercises high enough to have some units on the ground much of the time.

- Soviet allies in the area should be regarded as candidates for various forms of pressure.

- We should be prepared to defend important friendly regimes not only against Soviet attack but against attack by allies of the Soviet Union. We should also be prepared to aid them against internal enemies that threaten their survival.

- The logistic and combat requirements of this region are very different from Central Europe and adaptations are needed in American equipment and doctrine. Americans need to learn from the Israelis, British, and French how to use mobile intervention forces and how to operate effectively in this part of the world. We should also consider buying some of their equipment which is better adapted to these conditions than is our own.

- Active participation by allies of the U.S. is essential. The potentially most important contributors, aside from the United States, are Turkey, France, Germany, Britain, and Japan. Some can contribute military forces and expertise while some are, at this point, limited to contributing money. All of these instruments are needed.

- The outcome in the internal struggle for power in Iran is so important for our security that we should employ whatever instruments we possess to try to affect that outcome.

- We need an activist diplomacy which seeks to meliorate dangerous regional conflicts, including the Israeli-Palestinian conflict, threats to Oman and Saudi Arabia from the PDRY, etc.

- Our forces should include a substantial nuclear weapon component although our strategy should not depend on initiating the use of nuclear weapons. We would probably gain no advantage locally from doing so given the strong Soviet nuclear posture, and the overall nuclear balance has changed to our disadvantage. Nonetheless, the presence of these weapons may help to discourage a direct Soviet attack or at least Soviet first use of nuclear weapons.

- A unified American command structure apparently has finally been created. For symbolic and for practical reasons its headquarters should be located much closer to the region than Florida. In time, this command should become multinational.

- There is also a need for the principal nations with a stake in Persian Gulf oil, and willing and able to help protect it, to consult on strategy. This group does not match existing alliance mechanisms; for instance, Japan needs to be involved as well as European countries. As suggested by Karl Kaiser, Winston Lord, Thierry de Montbrial, and David Watt, a "principal nations group" needs to be established now to deal with Persian Gulf security.*

The Identification and Distribution of Tasks

A sober examination of the problems we face suggests several tasks that need doing:

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* Karl Kaiser, Winston Lord, Thierry de Montbrial, and David Watt, Western Security: What Has Changed? What Should Be Done?, New York: Council on Foreign Relations, 1981.

- Combat functions. These include having forces immediately available in the area to conduct air operations, be in a position to seize key facilities, clear mines, hunt submarines, operate against Soviet and other forces in the PDRY or Ethiopia, etc.

- Logistic functions. These include providing operating facilities, en route bases, storage of fuel, provision of equipment, airlift and overland transport, equipment storage, and maintenance and repair.

- Security and economic assistance. Included here are the provision of arms and training for military forces and financial support for the economies of the poorer countries.

- Internal security. The task here is providing help to those countries in the region which have weak internal security forces.

Each of our countries has certain areas of comparative advantage and disadvantage. The United States has technically advanced intelligence and warning systems, large naval and air forces that can be stationed in or near the region or be quickly move there, and large airlift and sealift capacities. But most of our forces are far away; our ground forces are poorly equipped and trained to operate in this area; and our political acceptability in the Arab countries is low. France, which also has naval forces in the Indian Ocean and forces at Djibouti, carries a smaller political burden locally in some countries. Britain, whose departure from East of Suez in 1971 was an historic misfortune for the West, should go back. Its advisory activities in Oman are of considerable

value but a mobile British force in or near the area (in Oman? Cyprus?) in addition would be a major contribution. Japan will not send military forces in the near future but it does send money to Pakistan, Turkey, and Egypt which contributes to the stability of the region and it should send a great deal more. Germany too could do more. Its economic support for Turkey has been of great value and it is unfortunate that Germany's economic problems have interfered with this support. Germany has also helped Turkey militarily and here too more could be done along lines discussed below.

Potential contributions of Italy to the protection of the oil are rarely discussed, at least publicly. Nonetheless, Italy has a large stake in having a secure oil supply, Italian forces are much closer to the Gulf than are those of most Western nations, and Italy's location makes it of crucial importance for the maintenance of a secure air and sea line of communication to the Eastern Mediterranean and beyond. These facts suggest the possibility of an Italian logistics and combat contribution for Gulf contingencies.

This brings us to the role of Turkey. Its role could be pivotal. Tactical air units based in Turkey, especially operating from Eastern Turkey, could interdict Soviet air operations at least in the western half of Iran. Its position also could make possible a flank attack against forces moving south through Iran. And mobile forces within Turkey could be sent rapidly to a number of countries within the area.

Several Turkish authorities have made public statements in recent months on the possible role for Turkey in Persian Gulf crises. For instance, General Guneral, Commander Land Forces in Southeastern Europe, has been quoted as saying, "Turkey is the only NATO country situated

in the path and on the flank of any threat directed toward the Middle East. Development and execution of any plans for this area, whether friendly or enemy, could not be accomplished without considering the capability and potential of Turkey."*

Although Turkey's potential importance in Gulf contingencies is of the highest importance, Turkey is directly exposed to Soviet attack and the combat preparedness of its armed forces is low largely because the equipment of its armed forces is obsolete. In order for it to be in a position to act, or to allow allied nations to use its territory in support of Western interests in the Gulf, it would need a high level of protection against direct Soviet threats. This implies not only more security and economic assistance to enable it to strengthen its armed forces and economy but also direct combat support by the other members of NATO.

The needed combat support might be provided not only by stronger U.S. forces in Turkey but also by forces from other NATO countries. Britain, France, Germany, and Italy might each send reinforcements to Turkey in a Persian Gulf crisis. To be sure, in such a contingency there would be worries about a direct Soviet attack against Western Europe which would create pressures to keep forces at home, but Turkey's role in the defense of the Gulf could be so pivotal and its exposure to Soviet attack so great that it would be important for the Soviets to face forces of several members of the alliance if it were to move against Turkey in response to Turkish involvement in a Gulf conflict.

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* New York Times, 19 February 1981.

Any major bolstering of Turkey's military capacity will raise problems with the government of Greece and will generate requests for matching of aid (e.g. at the ratio of 0.7 as much aid to Greece as to Turkey). Greece, like Italy, is also of importance in securing the line of communication through the Mediterranean in a Gulf conflict. And if Greek forces cooperate in Gulf contingencies with other Western nations, Greece too would be subject to direct Soviet coercive threats. It also would need support from allies. We need therefore to try to redirect our attention, and that of the Greeks, away from the issue of relative aid shares for Greece vis-a-vis Turkey and toward joint operations in Persian Gulf as well as strictly NATO contingencies.

Two other nations could perform important combat or logistic functions: Israel and Egypt. Israeli forces are the strongest in the region and, if political circumstances in the area permitted and if Israeli authorities agreed, Israeli forces (e.g. its Air Force) might arrive at the scene early enough to make a large difference. Many experts on the Arab world assert flatly that there is no circumstance in which the Arabs would accept being helped by Israel. Such dogmatism has to deal with an important counter-example: In 1970, King Hussein of Jordan was able to suppress the Palestinians with the aid of the Israelis who deterred the Syrians from attacking Jordan. In short, we should not rule out <u>a priori</u> an Israeli role in some contingencies. Moreover, even if Israel's combat forces were excluded from participating, Israel could be an important location for storing weapons, basing some U.S. forces, and repairing and maintaining equipment during a conflict.

A strengthened U.S. capacity in the Middle East might also contribute to the step-by-step process of narrowing differences between Israel and its neighbors. There are risks involved for all parties in this process, just as there are risks in not moving. A stronger American capacity and commitment in the area might help the Israelis to take some risks with their security, and in different ways help King Hussein and President Sadat who also face risks from the peace process.

One should not push this point too far. The Israelis have learned the hard way about the value of Western guarantees (e.g. promises to keep open access through the Strait of Tiran and the Red Sea). But if pure guarantees by distant powers, unaccompanied by a strong presence, are worth little, with such a presence they might have some value.

Egypt's importance in Gulf contingencies also derives from its location en route to the Gulf and from the potential contribution of its military forces. Egypt has offered the U.S. the use of Ras Banas, on the shore of the Red Sea, as a rear area base. In addition, Egyptian forces might operate in support of the Saudi or Sudanese or other governments which could come under attack. They might also operate against Soviet-backed governments in the area, e.g. versus Libya or the PDRY.

Although the Egyptians are averse to having foreign military forces on their territory, the creation of a peacekeeping force in the Sinai with a Western component now seems likely. Although its mission would be to create a buffer between Egypt and Israel, there may soon be in the Middle East a small Western military force capable, if properly equipped, of meeting some time-urgent demands for Western intervention.

Can the Oil Be Defended Against a Major Attack?

Some analysts hold that the proximity of the Soviet Union to the Gulf makes it inherently indefensible by the West. Or that only some form of escalation will work.

If proximity to the Soviet Union were decisive, there would today be quite a few areas under Soviet control which are not. Moreover, this region presents some impressive physical impediments not only to our own military forces but also to those of the Soviet Union. In particular, if the Soviets do not come as invited guests and if they can be deterred from using fast-moving airborne and helicopter-mobile forces to seize airfields, mountain passes, and ports in areas near the Gulf (as a consequence of our having in place the air and mobile ground forces and logistics described above), their movements may be slowed enough for us to mount a substantial defense north of the Gulf. It would be no small matter for us to get five to six divisions to the Zagros Mountains in time, but if we could and if they were supported by five to six wings of tactical air plus three or four carrier battle groups and other naval forces, it would take a very strong Soviet force to dislodge them. The Soviet force could also find strong NATO forces on its right flank in Turkey, and it would be at the end of an extended and vulnerable line of communications.

On this view, the problem is not primarily one of proximity to the Soviet Union but of the time-phasing of deployments--together with our adopting the appropriate equipment, training, and tactics.

Implications for Arms Transfers

Given the array of tensions and conflicts in the area it is not surprising that its oil-rich governments present a large market for arms. For instance, the Shah's appetite for advanced weapons was much deplored by many in the West, but now that Iran has been the object of a large scale attack his taste seems somewhat less absurd. And as the Yom Kippur War demonstrated, weapons can be chewed up at an impressively rapid rate in modern conflicts.

The great wealth of most of the oil exporters inspires them to try to buy the best, such as the F-15, AWACS, Leopard II, and Mirage 2000. It is legitimate enough for manufacturers and their governments to want to make sales. The question is, should we sell such weapons and, if so, under what conditions?

There are two principal reasons why such transfers might be inappropriate: 1) They might feed local arms competitions in an undesirable way and perhaps pose a threat to our friends. (Arms competitions might even be internal to some countries as different factions vie for more advanced weapons.) This is the central issue on the transfer of F-15 enhancement items and AWACS to Saudi Arabia and it is not difficult to see how these equipments increase the threat to Israel. 2) Sensitive technology could fall into hostile hands. The main concern here has been that the Soviet Union would gain access to advanced Western technology, but the problem is a broader one; our Navy pilots have worried about meeting Iranian F-14s equipped with Phoenix missiles.

Our concern should be principally to keep the recipients from acting so as to destroy each other's oil facilities or our friends, and to concentrate more on capabilities useful against the Soviet Union.

Moreover, most of the military forces in the region are incapable of effectively using the most advanced weapons we have to offer anyway. Their procurement of these weapons is a form of conspicuous consumption which, despite its virtues in recycling money back to us, on balance is not to our interests. It is even more obviously not to our interest to provide technology which aids nuclear weapons programs in the area. In addition to the other problems we face in the area, we do not need the threat of nuclear weapon attacks in the area, possibly directed against the oil facilities, nor do we need the threat of nuclear weapons in the hands of Middle East states against our forces.

One way to try to deal with the problem of advanced conventional weapons is to put conditions on their use. Such conditions may turn out as a practical matter to be unenforceable, but they may be better than no conditions at all. We can keep the buyer on a short tether by limiting the supply of spare parts. We can also hold back the most advanced models of any given weapon. And we should insist that our personnel continue to participate in their operation and maintenance.

Best of all, as the German government has evidently decided with the Leopard II tank sale to Saudi Arabia, we should simply agree to refuse to sell some weapons to some countries.

Implications for the Defense of Europe and Northeast Asia

American forces sent to the Persian Gulf would not at the same time be available for the defense of Europe or of Northeast Asia. This fact has been clear for some time but it has not yet been adequately taken into account in alliance planning. A failure to do so will undermine not only the strategy for the defense of the oil

but also American confidence in the seriousness of our allies about their own defense. Certainly a division of labor in which we do the costly and dangerous tasks in the Middle East and our allies work the detente side of the street won't work politically--or not for long.

We might of course be wrong in our evaluation of the threats and in the proposed steps being taken for dealing with them. If so, we should jointly be considering alternative energy and political-military strategies. In any case, we need to have thorough strategic discussions among allies and with friends within the region. The main problem to be discussed is this: The Soviet Union has a capacity to threaten us simultaneously in several theaters. Any Persian Gulf conflict would very likely be associated with a palpable threat to Western Europe and vice versa. A simultaneous threat might also be posed to Northeast Asia. Faced with actual or virtual conflicts in several regions, all of high importance, where should we concentrate our efforts? In particular, where should our mobile reserves, predominantly American, be sent? A sound principle is to send them to what appears to be the decisive theater, say Europe. But if a conflict in Europe is potential, not actual, we might end up being decoyed out of position and end up losing the oil of the Persian Gulf.

Instead, we might observe that one of the least attractive regions for the Soviets to get into a war is Central Europe and that improved European reserve forces could fill the gaps left by American reserves diverted to the Gulf. Indeed, as suggested above, it might even be wise for the Central Europeans to plan on sending some mobile forces to Turkey and to other parts of the Middle East to help protect the oil.

Risks, Costs, and Soviet Counter-Moves

The perils of pursuing this strategy are large. They are exceeded only by the dangers of not doing so. We could find ourselves caught up in a collection of internal and international conflicts of impressive complexity and volatility. Nonetheless, the American people, in their present mood, are likely to support this strategy as long as our actions are clearly related to the defense of Persian Gulf oil--and as long as we avoid a war of Korean or Vietnamese intensity and length.

There will also be financial costs for more airlift and sealift, facilities construction, equipment prepositioning, special equipment for the area, and more security and economic assistance. These costs are related directly to increasing our power in this region. Other costs involve logistic systems and combat forces that are mobile and that might be sent to Europe or elsewhere. A rough guess is that on a fairly narrow definition of attributable costs, the pursuit of this strategy would cost annually about as much as the suggested energy security program, around $15 billion per year. It should be financed not only by the oil importing countries but also by several of the oil rich countries whose assets and governments are being protected.

The Soviet Union's leadership can be expected to respond to this strategy in a number of ways: It will do what it can to stir up anti-Western, especially anti-American, passions. Those governments which cooperate with us will be singled out for especially violent attacks by progressive forces (and by some fundamentalist Islamic ones).

It will be worth a lot to the Soviet leadership to demonstrate that it does not pay to cooperate with the West and be hostile to the Soviet camp. While being busy as troublemakers, the Soviets will also offer themselves as peacemakers able to assure an uninterrupted flow of oil to the rest of the world.

Meanwhile, they will be trying to build stronger political positions to the point where they can decisively move without incurring high risks of war. It is possible that they might strike early, before we have progressed very far in implementing our strategy.