27 March 1981, Volume 211, Number 4489 SCIENCE

Energy Supply Interruptions and National Security

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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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0036-8075/81/0327-1379$01.75/0

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—$2\frac{1}{2}$ 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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2. U.S. Department of Energy, *Weekly Petroleum Status Report* [DOE/EIA-0208 (80-50), Government Printing Office, Washington, D.C., 1981].
3. National Foreign Assessment Center, U.S. Central Intelligence Agency, *International Energy Statistical Review* (ER/IERS 80-013, National Technical Information Service, Springfield, Va., 1980).
4. U.S. Department of Energy, *Reducing U.S. Oil Vulnerability: Energy Policy for the 1980's* (DOE/PE-0021). An analytical report of the Secretary of Energy, 10 November 1980.
5. For example, the U.S. strategic reserve fill is currently only 0.2 percent of free-world consumption. Even a tripling of this level would only amount to 0.6 percent.
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.

Research in EPA: A Congressional Point of View

George E. Brown, Jr., and Radford Byerly, Jr.

The fact that a problem will certainly take a long time to solve, and that it will demand the attention of many minds for several generations, is no justification for postponing the study. . . . Our difficulties of the moment must always be dealt with somehow: but our permanent difficulties are difficulties of every moment.—T. S. ELIOT (*1*).

This article arises from what we have learned in the last few years in the course of congressional oversight of the Office of Research and Development of the U.S. Environmental Protection Agency (EPA). It addresses the basic question of how research can best serve the needs of that agency, and it is aimed not only at EPA managers, advisers, and researchers but at all who share responsibility for the conduct of research programs in regulatory agencies, including members of Congress, the Office of Management and Budget, and the Office of Science and Technology Policy.

The message we wish to deliver is first that achievement of EPA's regulatory mission demands a foundation of basic information which must be built through a program of rigorous basic research, and second that this means a change in the way research is viewed and managed in EPA. Scientific quality must become the first criterion for research programs. No matter how "relevant," proposed research that does not meet this standard should not be funded.

The Nature of Research at EPA

The EPA Office of Research and Development (ORD) is one of six major units of that agency. Three of the others are responsible for the development of pollution abatement programs, and one is responsible for enforcement activities. A fifth unit is responsible for agency-wide planning and management. We refer collectively to these five other offices as program offices.

One of our fundamental premises is that EPA should conduct or fund only such research activities as will support its mission. That mission is defined in large part by several federal statutes, principally the Clean Air Act, the Clean Water Act, the Safe Drinking Water Act, the Federal Insecticide, Fungicide, and Rodenticide Act, the Resource Conservation and Recovery Act, the Noise Control Act, and the Toxic Substances Control Act. The details of the laws provide guidance to research managers. Thus for our purposes the agency's mission (now seen to be manifold) is well defined, and the need is to translate legislated regulatory objectives into criteria for managing research.

Research being planned or conducted in the present will bear fruit only in the future, but the problems facing the agency exist now; so the question for EPA research managers becomes one of how to plan and operate a program that will be supportive of the immediate agency mission. Part of the answer lies in the realization that while the problems facing EPA indeed exist in the present with terrible urgency, they are likely to be disappointingly similar and just as urgent in the future. For example, even after years of research there are still fundamental questions concerning the best way to control photochemical oxidants (*2*).

Because of the regulatory (and thus adversary) nature of EPA's mission, in order to be supportive the research must withstand rigorous scrutiny. Litigation has come to comprise a significant element in the overall EPA program. What is not clear is the degree to which EPA in response to this turn of events must prepare or preserve a legal chain of evi-

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