RETHINKING EMERGENCY ENERGY POLICY

The Congress of the United States
Congressional Budget Office

NOTES

Unless stated otherwise, all years referred to in this report are calendar years.

Numbers in the text and tables may not add up to totals because of rounding.

Cover photo shows a U.S. firefighter using a sheet of metal to approach a burning oil well at Al Ahmadi fields in Kuwait in March 1991. (Reuters/Bettmann)

Preface

Given major structural changes in the U.S. and world economies since the Arab oil embargo of 1973 and the experience of the Persian Gulf crisis in 1990, current policies for responding to oil supply disruptions may no longer be as effective as the Congress originally envisioned. Chief among these policies is the nation's Strategic Petroleum Reserve (SPR), an emergency stockpile of crude oil. This study, prepared by the Congressional Budget Office (CBO) in response to a request from the Senate Committee on the Budget, analyzes changes in the effectiveness of the SPR and presents options on when and how the government can best use the SPR to protect the economy from losses in the event of supply disruptions.

Richard Farmer of CBO's Natural Resources and Commerce Division prepared the study under the supervision of Roger Hitchner and Jan Paul Acton. Pete Fontaine of CBO's Budget Analysis Division contributed to the section on the budgetary history of the SPR, and Adrienne Kearney of CBO's Macroeconomic Analysis Division provided a valuable review of the overall document. The author thanks Douglas R. Bohi and Lawrence J. Goldstein for their review of an early draft of the study and their many useful comments.

Paul L. Houts edited the manuscript. Christian Spoor provided editorial and production assistance. Donna Wood typed the many drafts. Kathryn Quattrone prepared the study for publication.

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Summary

Emergency policies to reduce or avoid economic losses from severe disruptions of world oil supplies may no longer be as effective as the Congress originally envisioned. Since the Arab oil embargo of 1973, the United States has based most of its emergency energy policy on the Strategic Petroleum Reserve (SPR), a government-owned stockpile of crude oil.

Many analysts feel that the economic threat posed by severe disruptions of oil supplies has decreased and that as a result, the benefits from releasing SPR oil in a crisis are smaller today than in the past. Moreover, the experience of the Persian Gulf crisis in 1990 and 1991 demonstrated disturbing problems with current policy guiding the use of the SPR in a crisis. Indeed, during the Gulf crisis, both the process of deciding to use the SPR and the mechanism for selling the oil may have actually contributed to market uncertainty at the time. This study examines the rationale for U.S. emergency energy policy in light of this recent experience and considers options for altering the policy guiding when and how the SPR is used.

Policies guiding the government's response to energy emergencies have changed remarkably little over the past 20 years, despite major changes in the structure of oil markets and in the broader economy. Those changes have both weakened and altered the link between oil price shocks and economic activity. Moreover, other government policies have changed over this period in ways that have further weakened the impact of price shocks on the economy. Those changes include phasing out price controls on petroleum and windfall profit taxes on domestic oil producers, introducing fuel-efficiency standards for motor vehicles, changing the federal regulatory structure affecting natural gas and electricity, and providing federal support for the development and use of alternative fuels.

The recent experience of the Persian Gulf crisis underscored the importance of those changes in policy and market structure, demonstrating the economy's ability to reduce oil imports in the face of rising prices without incurring shortages of gasoline or other petroleum products. That experience also highlighted problems with current programs for responding to energy emergencies.

Evaluating the Strategic Petroleum Reserve and International Programs

Two cornerstones of U.S. policy for responding to energy emergencies are the Strategic Petroleum Reserve and the United States' participation in the multilateral programs of the International Energy Agency. Those programs are closely linked because the President has legislative authority to release SPR oil in support of IEA actions and because the SPR constitutes the bulk of the IEA's capability for emergency response. The official policy of the United States regarding severe oil supply disruptions is to rely on market forces to allocate the remaining sup-

ply and to supplement that supply by an early drawdown of the SPR in large volumes and in coordination with the IEA.

What Is the Strategic Petroleum Reserve?

The Strategic Petroleum Reserve is a government-owned stock of crude oil that is available for release at the President's discretion in the event of a severe energy supply interruption or under the obligations of international agreements. The original legislation authorizing the creation of the SPR and U.S. membership in the International Energy Agency was the Energy Policy and Conservation Act of 1975. As amended in 1990, the act authorizes the Department of Energy (DOE) to store up to 1 billion barrels of crude oil in the SPR. Storage capacity today is 750 million barrels, located in five underground storage facilities along the gulf coasts of Texas and Louisiana. The maximum drawdown capability for the reserve is 4 million barrels per day (bbl/day).

Over the past 20 years, the United States has spent about $4 billion constructing five underground storage sites and related transportation facilities for moving and holding SPR oil. It has spent an additional $17 billion to fill partially the Strategic Petroleum Reserve with 592 million barrels of crude oil. Current annual costs to operate and maintain the SPR are about $200 million.

What Is the International Energy Agency?

The International Energy Agency was created to carry out the goals of the Agreement on an International Energy Program, signed by 21 industrialized nations in November 1974. In the International Energy Program, the IEA members agreed to maintain sufficient reserves to sustain domestic oil consumption for at least 90 days with no net oil imports. (The United States meets its 90-day commitment by combining Strategic Petroleum Reserve and private stocks.) Members of the International Energy Agency also agreed to develop capabilities to respond to a significant disruption of the world oil supply system, including a formula for sharing the available supply of oil.

In addition to drawing down stocks and sharing oil, the capabilities of individual IEA members to respond to emergencies include restricting demand, switching away from oil products on a short-term basis, and increasing oil production by member nations. As evidenced by the IEA's response to the events of the Persian Gulf crisis, however, drawing down stocks is the most significant of these actions in terms of volume, with most of the stocks coming from the U.S. Strategic Petroleum Reserve. (Only two other countries--Germany and Japan--maintain large government-owned stocks of oil.) In other words, the Strategic Petroleum Reserve constitutes the biggest part of the IEA's emergency response program.

Current Guidelines for Releasing Strategic Petroleum Reserve Oil

Current guidelines for identifying conditions that justify a release of SPR oil reflect early thinking about the nature of the economic threat from disruptions. The original government view was that economic losses would result from a disruption of oil supplies to the nation's industries and from any accompanying rise in price inflation. Later government thinking projected economic losses from the costs of adjusting to higher prices. In keeping with the current view on the importance of replacing lost supplies, the government's plan for releasing SPR oil has always been to set the volume of release and let the market determine the price.

How the Original Policy for Emergency Response Has Changed

Over the past two decades, Congressional debate about energy emergency policy has centered primarily on the SPR's optimal capacities for storage and distribution, on annual funding levels for filling the reserve, and, more recently, on alternative funding mechanisms for acquiring oil. Recent Congressional action has, however, expanded the list of market events that could justify a release of SPR oil. For

example, amendments to the Energy Policy and Conservation Act in 1990 and 1992 expanded the authority for release to include minor or regional shortages and directed the President to consider severe price increase as evidence of a supply shortage.

Yet surprisingly little discussion has surrounded the issues of what nature or level of adverse impact on the economy would merit a release of oil and whether other processes for selling that oil might be more effective in protecting the economy from losses.

When and How to Use the Strategic Petroleum Reserve

Any search for policies on when and how to best use the SPR should consider the basic benefits from releasing those stocks in the first place. A release of SPR oil can convey benefits by helping avoid some part of the economic losses that stem from a disruption of oil supplies. Specifically, a release can reduce economic losses if it can contribute to lowering both oil prices and the nation's total imports of oil.

In deciding when to use the SPR, two specific considerations are important. One is how large are the economic benefits from release at any given time. The other is how large are the benefits from an immediate release of stocks in the face of a crisis compared with the expected advantages from a future release when the disruption in supply may be even more extreme. The SPR should be used only if the benefits from immediate release would exceed those from future release.

Identifying the benefits from release at any time--present or future--is not straightforward, however, because the drop in the nation's total oil imports can be greater or smaller than the direct amount of SPR oil released. For example, if the SPR release succeeds in lowering oil prices, higher domestic use of oil and lower domestic oil production in response to those lower oil prices can add to the demand for imports. That change would offset some of the direct effect of the SPR sale on lowering imports and, hence, reduce the benefits from release. In addition, changes in private oil stocks in response to changes in expected oil prices and price uncertainty can lead to higher or lower demand for imports. For example, if the release of SPR oil helped to lower market uncertainty and encouraged a higher rate of withdrawal from private stocks of oil, a bigger drop in total imports and greater economic benefit would result.

Given the importance of changes in the rate of withdrawal of private stocks, decisions concerning how to use the SPR should consider how the sales mechanism affects market uncertainty.

Appraising Changing Institutions and the Changing Threat to Energy Security

Since the creation of the Strategic Petroleum Reserve and the International Energy Agency, four important changes have occurred that affect the basic need for these programs and the best way to use them.

First, oil markets have changed dramatically--price controls are gone, supplies of oil have diversified, and an active futures market has developed. (Futures markets are federally regulated institutions where traders buy and sell contracts that lock in prices today for crude oil and petroleum products to be delivered in the future.) Those changes make oil prices better indicators of true scarcity than before. With freer markets, disruptions are now more likely to appear as oil price shocks rather than physical shortages. Also, futures markets now allow firms to use financial instruments rather than physical stocks of oil to guard against (or speculate in) price changes, freeing up private stocks of oil during supply disruptions. Nevertheless, SPR and IEA policy has not adapted fully to these new market conditions.

The second major change is the way the economy uses oil. Many analysts believe that the U.S. economy is more flexible in its use of oil and other energy sources than it was in the past, although that claim is subject to some controversy. With more responsive prices and the opportunities to hedge that futures markets offer, oil consumers today have greater incentives and capabilities to reduce their oil purchases

in response to a loss of oil supplies. As a result, a given supply disruption should have a smaller effect on the economy than a similar disruption would have had 20 years ago. Oil imports now can drop more quickly in response to a loss of oil supplies. Moreover, a drop in purchases of imported oil can now come about without a commensurate drop in consumer and business expenditures. Oil markets did not respond in this fashion in the early supply disruptions, which helps explain why the oil price shocks of the 1970s tended to be self-sustaining and were a big contributor to the inflationary cycle.

In addition to those possible real effects, some studies of the effects of oil price changes on the economy over the past 20 years have concluded that the effects never were as great as many analysts believed. Of particular note is a body of research indicating that the severity of economic recessions in the past has been attributable more to price controls, restrictive monetary policy, and the state of business cycles in the United States and the other major industrialized countries than to changes in oil prices.

The third major change is the growing interdependence of world economies--particularly between oil-producing and oil-consuming areas. The Middle East is still a highly risky source of oil, but one should keep in mind that those oil-producing countries have invested large amounts of their oil earnings in the United States and other oil-consuming countries. Because any action on their part that harms the U.S. economy also endangers their investments in the United States, oil producers and consumers now have a shared economic interest in stability. That economic interdependence dampens foreign political and economic incentives for disrupting oil supplies.

The fourth major change affecting emergency policies is that oil prices are much more volatile today. Small changes in the current supply or in the outlook for supply can lead to large movements in oil prices within a short time frame--both up and down. Price volatility is greater today than in the past because of the combined effects of price decontrol, greater sales of oil and oil products on a spot basis (for delivery within one or two months) rather than under long-term contracts, and more competition among businesses producing, processing, and marketing oil. Those changes have had more impact on greater price stability than any increased capability of oil consumers to substitute oil products on short notice for other forms of energy.

Price volatility is a concern because it is closely linked to market uncertainty. Oil prices are generally more volatile and uncertain during major supply disruptions for two other reasons. First, an increased frequency of smaller changes in supply--both actual and threatened--seems to accompany large supply losses. Second, a large disruption of world supplies will cut into the worldwide buffer of excess capacity to produce oil.

In normal times, producers--especially in the large oil-exporting countries--can increase oil production at relatively little extra cost because they maintain some level of excess capacity. But if that capacity is diminished, larger increases in oil prices would be needed to bring forth additional supply than would otherwise be needed. Consequently, a release of SPR oil can help to reduce market uncertainty simply by helping to restore the buffer of excess capacity.

How Effective Were Emergency Policies During the Persian Gulf Crisis?

The experience of the Persian Gulf crisis, instigated when Iraq invaded Kuwait on August 2, 1990, provided the first opportunity to assess the usefulness of current policies guiding the release of SPR oil and the activation of IEA emergency procedures. Those programs had never been used before, except in tests.

The government's response to that actual crisis demonstrated the difficulties of deciding whether any such supply emergency could benefit from early attention. The crisis could have ended very early, in which case the SPR would not have been needed, or it could have dragged on for years, in which case the SPR could not have helped. Moreover, differences in the domestic political and economic situations of the major U.S. trading partners in the International Energy Agency weakened the mutual interest in a co-

ordinated release. Even the original precondition for action--a supply shortfall--made little sense in the current free-market environment.

Problems with Using the Strategic Petroleum Reserve

Despite such economic and political uncertainties of the time, the use of the Strategic Petroleum Reserve during the Persian Gulf crisis can be criticized on two counts. First, the way the government sold the oil did not use the SPR to its greatest advantage, even given the stated objective of increasing world supply and lowering oil prices. Under ordinary circumstances, the Department of Energy accepts bids--subject to a minimum bid price--to deliver oil in the future at a price to be determined on that later date. But in both its test sale in September 1990 and the emergency sale in January 1991, DOE was unable to sell all of the oil it planned to release because it set the minimum bid price too high. Thus, the supply and price effects one would associate with the announced release volume could not be achieved.

Second, the lack of a clear policy for release and early indecision by the government about the use of the SPR added to the uncertainty of supply already plaguing the oil markets. Even if the government had had a clear policy, the sales process the government used (and still uses) could have added to market uncertainty because of inherent delays between the decision to release oil and the final sale of oil. Greater uncertainty caused individuals and businesses to hold onto their stocks of oil and petroleum products, and that additional demand for private stocks raised oil imports and prices--just the opposite of the original intent of the Strategic Petroleum Reserve release.

Problems with the Performance of the International Energy Agency

The Persian Gulf crisis also demonstrated strengths and weaknesses of the existing international agreements to deal with supply disruptions. Indeed, differences in the domestic political and economic situations of the IEA member nations weakened their mutual interest in making a coordinated response to the disruption of supply. In fact, when the IEA finally implemented a contingency plan--a plan that it advertised would increase the world oil supply by 2.5 million barrels per day, or about 4 percent of total world supply--the restraints on demand and reductions in stocks that most countries offered as part of that plan were largely voluntary.

In their contribution to the plan, many member countries counted reductions in demand that had already taken place or, paradoxically, would take place in response to the price increase they were trying to avoid. As a result, the maximum addition to world supply from carrying out the IEA contingency plan was probably only about 1.5 million bbl/day--largely from the release of SPR oil by the United Sates. That volume of flow would not have had any large or sustainable effect on the price of oil or price volatility had the ground war actually disrupted oil supplies further.

Options for Making Emergency Policies Work Better

In view of the many changes in oil markets that have altered the potential effectiveness of SPR policy, and given the difficulties the government experienced in attempting to use the SPR in the Persian Gulf crisis, it may be appropriate to consider ways of better using the reserve. A critical factor determining the effectiveness of any emergency programs is whether those programs recognize the important roles played by free prices and market uncertainty.

With those criteria in mind, consider three optional processes for releasing SPR oil and their effects on oil prices and on the nation's total oil imports. The first is the current sales process, calling for the sale of a set volume of SPR oil at a price to be determined in the marketplace. In the second, the government sets a single price for all the SPR oil it wants to sell. In the third, the government estab-

lishes a multitiered price schedule for the oil it wants to sell, with increasing volumes selling at increasingly higher prices.

The current policy of setting the volume could yield benefits comparable with the two price-setting processes (single and multitier prices) in a supply disruption of known size and duration. Indeed, the government commonly makes that assumption of zero uncertainty when it evaluates the benefits of releasing the SPR. Even with uncertainty about the size and duration of a supply disruption or about the prospects for further disruptions, a volume-setting sale may yield comparable benefits if it can help restore the worldwide buffer of excess supply capacity and thereby help to reduce price volatility and uncertainty.

Beyond any contribution to restoring the supply buffer, however, a release of SPR oil using either of the two price-setting options alone may yield greater economic benefits than the current sales process because those options can more effectively reduce market uncertainty and encourage the drawdown of private oil stocks. Very simply put, with SPR oil freely available to the market at a constant or increasing price, the world supply of oil would become more responsive to price changes. Moreover, price movements in response to subsequent small changes in supply or demand would be smaller--that is, less volatile.

For any sales process, the benefits from gaining a quick and complete drop in current oil prices would be greater if the government made efforts to reduce uncertainty about the sales process itself and the government's intentions, expedited the final transfer of title for SPR oil to purchasers, and hedged its sales by using futures contracts or some related risk-management tool.