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Strategic Petroleum Reserve: Mandated Sales and Reform

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SUMMARY

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Strategic Petroleum Reserve: Mandated Sales and Reform

The Strategic Petroleum Reserve (SPR), administered by the Department of Energy (DOE), has played a role in U.S. energy policy for over 40 years. Over that time, its primary focus has changed from its original intent as world oil market conditions have changed. Originally intended to offset the market power of cartels and prevent economic damage from oil supply disruption, it has become primarily a tool for combatting the fuel market effects of domestic natural disasters like hurricanes. Most recently, U.S. net imports of oil and petroleum products have decreased as a result of the increase in domestic oil production. Because of lower reliance on imports, some stakeholders see less need for an oil stockpile, and view the SPR more as a mechanism for providing funding for a wide variety of legislative purposes, ranging from health care, to highways, and general purpose revenues. Over this period, the SPR has expanded its potential usefulness to cover all of these purposes.

As a member of the International Energy Agency (IEA) and a participant in the International Energy Program established by the IEA, the United States, as are all net-importer nations in the IEA, is required to hold the equivalent of 90 days of its net imports of oil and petroleum products as a reserve stock. As a result of relatively stable U.S. oil consumption and rapidly increasing production, and declining net imports, available oil stocks held in the SPR now are almost double the 90-day requirement.

While the SPR has recently seen relatively little use in combatting oil supply disruptions caused by political and military instability, or even natural disasters, it has provided a source of funding for a variety of legislative initiatives. These mandated sales from the SPR have committed almost 260 million barrels of oil for sale by FY2027, leaving less than 400 million barrels of uncommitted oil reserves. Determining whether further reductions can be made from the reserve while maintaining its ability to carry out its designed purpose is a key energy policy question. The extreme variant of this question is whether a reserve is required at all, or whether privately held stocks, as practiced by most European countries, are adequate to meet international commitments.

Legislation in the 115th Congress, H.R. 6511, sought to maintain the SPR facility and infrastructure, while reducing operating and maintenance costs, by renting unused storage capacity in the reserve to private companies and foreign nations. As of this writing, no bills have been introduced in the 116th Congress modifying the SPR.

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Introduction

The Strategic Petroleum Reserve (SPR), administered by the Department of Energy (DOE), has been a part of U.S. oil security policy for over 40 years. Originally intended as a reserve to replace oil that might be withdrawn from the world market to forward political purposes and objectives, its rationale has evolved with the changing world oil market and the role of the United States in the market. In addition to replacing oil lost to political turmoil, as in Libya in 2011, in recent years it has been more commonly used to replace oil supplies curtailed due to natural disasters, mainly hurricanes. The effects of hurricanes, especially those of the magnitude of Katrina, Rita, and others, has threatened to disrupt oil production, refining, and distribution, creating potential economic dislocation. Use of oil from the SPR has helped to minimize the economic effect of those events.

Since 2010, the oil market in the United States has been transformed. Low growth in petroleum product demand, rapidly increasing domestic oil production, and falling net imports of crude oil and petroleum products have reduced U.S. dependence on foreign oil suppliers. At the same time, export sources on the world market have expanded, reducing the ability of any one exporter, or group of exporters, to manipulate the market.

As the U.S. oil position in the world oil market has strengthened, some have questioned whether the SPR should be either downsized to reflect current supply and demand balances, or even eliminated entirely. Since 2015, Congress has passed legislation which mandates the sale of SPR oil to fund a variety of government activities. For some, a question exists as to how much oil might be withdrawn from the Reserve while still maintaining an adequate oil "safety net." Others question whether the evolving world oil market requires the United States to maintain any government-owned reserve holdings.

Enacted legislation to date has mandated the sale of over 250 million barrels of oil from the SPR, a situation that brings up another policy issue. If there is less oil in the SPR, what might be done with the "excess capacity" inevitably created? The government may be able to reduce the operating costs of the SPR by leasing reserve capacity freed by mandated sales.

This report addresses the questions of mandated sales and "right sizing" the SPR, as well as strategies to make optimal use of the reduced need for oil storage capacity.

A Brief History of the SPR

The SPR was authorized by the Energy Policy and Conservation Act (EPCA, P.L. 94-163) of 1975. The intent was to establish a petroleum reserve of 1 billion barrels that could prevent the economic dislocation caused by the Organization of Arab Petroleum Exporting Countries (OAPEC) 1973/1974 embargo of oil sales to the United States and other countries. That event, in retaliation against the United States' support for Israel in the 1973 Arab-Israeli War, came at an important transition point in U.S. petroleum markets. U.S. production of crude oil had reached a then-peak in 1970 at about 9.4 million barrels per day (mm/d) and was considered likely to be in long-term decline.[1] It was also believed that U.S. oil consumption would likely continue to

[1] By 1975 U.S. crude oil production had declined to 8.7 mm/d, a reduction of almost 14%. Energy Information Administration data available at http://www.eia.doe.gov.

increase.[2] These supply and demand trends seemed to guarantee that U.S. oil dependence on the world oil market through increasing imports would continue to grow.

Although the original intent of EPCA was to create a reserve of 1 billion barrels of crude oil, the SPR only reached its original design capacity of 750 million barrels in 1991. Available storage capacity was reduced to the current 726.7 million barrels with the closure of the Weeks Island facility due to structural damage in 1996. The SPR was filled to near its maximum capacity at 726.6 million barrels on December 27, 2009. That total represents the largest amount of oil ever held in the SPR. In 2011, 30 million barrels of oil was sold from the reserve in conjunction with the loss of Libyan oil exports due to the political and military upheaval in that country.

Over its history, the SPR has expanded to include the Northeast Home Heating Oil Reserve (NEHHOR) as well as the 1-million-barrel Northeast Gasoline Supply Reserve (NGSR) located on the U.S. East Coast.[3] The NEHHOR was created to support and stabilize the essentially regional demand for home heating oil in New England. The NGSR was set up in the wake of Hurricane Sandy in 2012.[4] That hurricane caused disruption of gasoline supply deliveries due mainly to electric power disruption and flooding.

Gasoline is less amenable to long-term storage than crude oil. While crude oil may be stored with little observed deterioration for periods in excess of five years, the storage life of gasoline is shorter. Typical gasoline blended with 10% ethanol may have a shelf life in storage of approximately three months. The short shelf life of gasoline requires active supply management of the NGSR.

International Energy Agency (IEA) Obligations

The IEA was established in November 1974, with a broad mandate on energy security and energy policy coordination among member countries during energy-related emergencies. Strategic stock holdings are one of the policies included in the agency's International Energy Program (IEP).[5] IEA member countries, including the United States, have committed to maintaining stocks of crude oil and petroleum products equivalent to 90 days of their previous year's net imports; developing programs for demand restraint in the event of emergencies; and agreeing to participate in an allocation of oil deliveries program to balance shortages among IEA member nations.[6] For example, in 2011, the United States participated in a coordinated IEA oil stock drawdown in response to the withdrawal of Libyan oil exports from the market as a result of political and military turmoil in that country.[7]

[2] Although U.S. oil consumption declined in 1974 and 1975 from the peak of 1973 due to the embargo, increasing oil prices, and the resultant economic downturn, many continued to expect long-term growth in oil demand.

[3] On July 10, 2000, President Bill Clinton directed the Department of Energy to establish a 2 million barrel home heating oil component of the SPR.

[4] On June 20, 2014, Energy Secretary Ernest Moniz directed the Office of Petroleum Reserves to establish a 1 million barrel gasoline component of the SPR.

[5] The "Agreement on an International Energy Program" is a formal treaty obligation among IEA member countries.

[6] IEA member countries are Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Japan, Republic of Korea, Luxembourg, the Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, the United Kingdom, and the United States. See http://www.iea.org/about/membercountries.asp.

[7] For more information on U.S. drawdown policy and requirements see CRS Report R42460, *The Strategic Petroleum Reserve: Authorization, Operation, and Drawdown Policy*, by Robert Pirog.

The SPR at its current holdings of 649.1 million barrels of crude oil satisfies the U.S. strategic stock holding requirement.[8] Based on 2017 net import levels of 3.768 mmb/d, the SPR holds over 170 days of net imports of crude oil and petroleum products.[9] Considered in another way, the net import level of 3.768 mmb/d, when multiplied by 90 days required stocks, implies a need for the United States to hold about 340 million barrels in the SPR. The difference between actual SPR holding and the implied holdings required to meet the IEA requirements has given rise to the viewpoint that U.S. reserve oil holdings are in excess of those needed and might be sold on the market.

At the full drawdown rate, the SPR can deliver 4.4 mmb/d of crude oil for 90 days, dropping to a rate of 3.8 mmb/d for an additional 30 days, and dropping further in drawdown rate for up to 180 days as stocks deplete. These drawdown rates are those likely to be associated with a total, or major, curtailment of potential imports from the world market, an unlikely scenario given the large portion of U.S. imports obtained from Canada, Mexico, and Venezuela, until recently.

According to the IEA, only the United States, the Czech Republic, and New Zealand meet their stock requirements using solely government-owned emergency oil and petroleum product stocks. Other nations meet their stock requirements through holding private industry or agency stocks or portions in combination.[10] It is also possible, under IEA rules, for a nation to hold its IEA required oil reserves outside its borders. This could create a demand for SPR unused capacity by nations that have a shortage of domestic oil storage facilities.

Total U.S. oil stocks, including both commercial and publicly held stocks, of both crude oil and petroleum products, are generally in excess of 1.9 billion barrels on a monthly basis, far in excess of IEA requirements.

Recent SPR Exchange/Sales Activity

The most recent emergency release of SPR oil was in 2011 due to the Libyan export curtailment. At that time, the United States and other members of the IEA decided to release 60 million barrels of oil onto the world market.[11] The U.S. obligation was set at 30 million barrels. In June 2011, competitive offers were solicited for the purchase of selling oil to be delivered by the end of August 2011.

In addition to selling oil, the SPR can enter into exchange agreements. Exchange agreements, which are similar to loans, allow for delivery of oil from the SPR with return of the oil in kind, plus a premium, by a set future date. For example, in August and September 2017, following Hurricane Harvey, 5.2 million barrels of oil was delivered to Gulf Coast refineries to offset fuel shortages as a result damage and flooding. All of the original 5.2 million barrels plus the premium was returned by February 2018.

[8] See SPR Quick Facts and FAQS at https://www.energy.gov/fe/services/petroleum-reserves/strategic-petroleum-reserve/spr-quick-facts-and-faqs.

[9] The Energy Information Administration has reported net import data only through October 2018. Required SPR holdings for 2019 cannot be determined accurately until these data are available.

[10] See http:www.iea.org/topics/energysecurity/respondingtomajorsupplydisruptions/ for a list of how IEA member nations meet their emergency stock requirements.

[11] Total world oil consumption at that time was about 90 mmb/d and has risen to approximately 100 mmb/d in 2018.

In 2014, a test sale was undertaken to evaluate SPR drawdown and sales procedure capabilities. Between March and May 2014, 4.62 million barrels was delivered by pipeline to successful bidders, and 0.38 million barrels was delivered via marine transportation.[12]

Mandated Sales

Beginning in 2015, the debate over whether the SPR storage balance was too large given the evolving nature of U.S. oil production, consumption, and net imports resulted in Congress mandating the sale of SPR oil. The sales revenue accrued through SPR sales was allocated to a variety of uses; however, energy policy, or security, was not among them.[13]

The legislation that mandated SPR oil sales includes the Bipartisan Budget Act of 2015 (P.L. 114-74), the FAST Act of 2015 (P.L. 114-94), the 21st Century Cures Act of 2016 (P.L. 114-255), the 2017 Tax Revision (P.L. 115-97), the Bipartisan Budget Act of 2018 (P.L. 115-123), and the Consolidated Appropriations Act, 2018. Broadly considered, this legislation requires oil to be sold from the reserve over the period FY2017 through FY2027.

Table 1 presents mandated SPR sales data.

[12] See U.S. Department of Energy, "Strategic Reserve Test Sale 2014 Report to Congress," November 2014. Available at https://www.energy.gov/sites/prod/files/2014/11/119/2014%20SPR%20Test%20Sale%20Final%20Report.pdf.

[13] P.L. 114-74 did allocate up to $2 billion of SPR sales revenue in 2017 through 2020 for the purpose of modernization and maintenance of the Reserve.

Table 1. Mandated SPR Sales

(Fiscal Years, Millions of Barrels)

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	Total
Budget Act 2015	0	5	5	5	5	8	10	10	10	0	0	**58**
FAST Act	0	0	0	0	0	0	16	25	25	0	0	**66**
Cures Act	10	9	6	0	0	0	0	0	0	0	0	**25**
Tax Revision 2017	0	0	0	0	0	0	0	0	0	4	3	**7**
Budget Act 2018	0	0	0	0	0	7.5	7.5	7.5	7.5	35	35	**100**
Consolidated Appropriations Act 2018	0	0	0	5	5	0	0	0	0	0	0	**10**
Total	**10**	**14**	**11**	**10**	**10**	**15.5**	**33.5**	**42.5**	**42.5**	**39**	**38**	**266**

Source: Data is extracted from cited legislation: P.L. 114-74, P.L. 114-94, P.L. 114-255, P.L. 115-97, and P.L. 115-123, P.L. 115-141.

Notes: Table 1 does not include withdrawals for modernization and maintenance as authorized in the Balanced Budget Act of 2015. Those expenditures were specified in dollars, not barrels of oil. The future price of oil as well as U.S. net imports are unknown and therefore a conversion to barrels of oil is arbitrary.

The data in **Table 1** show that while the 21st Century Cures Act draws revenues from SPR sales during the three-year period 2017 through 2019, and the Balanced Budget Act of 2015 mandates SPR sales from 2018 through 2025, and the Consolidated Appropriations Act, 2018, mandates SPR sales in 2020 and 2021, the remaining legislation is oriented toward out-year sales, 2023 to 2027. This pattern of SPR sales might be important, because while it is likely that the favorable position of the United States with respect to oil production and imports will continue in the near-term, less certainty can be associated with a long-term perspective. Forecasting oil demand and supply is far from accurate, and when expected demand or supply respectively exceeds, or falls short of, expectations, the result is likely to be price volatility. Price volatility in the oil market can result in economic disruptions and slowdowns.

As per Section 510 of the 21st Century Cures Act, the DOE offered 10 million barrels of SPR oil for sale in FY2017. A total of 9.89 million barrels of oil was delivered in FY2017, earning over $449 million, an average price of over $45 per barrel.[14] DOE offered 9 million barrels of SPR oil sold in FY2018, earning approximately $522 million at an average price of over $58 per barrel.

The Balanced Budget Act of 2015, Section 404, authorizes the DOE to sell up to $2 billion of SPR crude oil for fiscal years 2017 through 2020. A total of 6.28 million barrels was sold in FY2017, earning $323.2 million. In FY2018, DOE offered 5 million barrels of SPR oil for sale, yielding approximately $290 million.

The legislation that directs sales from the SPR is not time coordinated. Possible problems could result from uncoordinated sales exceeding an amount consistent with energy security. However, the cited legislation generally has built-in "safety valve" language that ensures that SPR sales do not cause the United States to violate its international commitments, or allow the SPR holdings to fall below a specified value. In the case of P.L. 115-123 this value is set at 350 million barrels.

Determining the optimal level of oil holdings in the SPR is likely to remain controversial. Analytical tools common in public policy analysis, such as cost-benefit analysis, dynamic programming, or other optimization techniques depend on determining the value of variables that are highly uncertain in this case. The responsiveness of the adjustment of oil quantities on both the demand and the supply sides of the market, the price volatility of oil, and the probabilities of different degrees of political/military disruption in the oil market are all uncertain.

The SPR might be thought of as an insurance policy where fixed payments are made over time to avoid the large negative costs associated with low-probability events. For example, if conflict in the Persian Gulf resulted in the Strait of Hormuz being closed for a period of time, large volumes of Persian Gulf oil would likely be withdrawn from the world market. The reality of reduced oil supply coupled with expectations and speculation on the futures markets would likely result in an increasing and volatile oil price. Significant price increases, coupled with supply shortages could result in significant disruption of consuming and importing nations' economies. Reduced economic growth, rising unemployment, and inflation are likely consequences.

With respect to this example, an analysis of the appropriate size of the SPR might focus on values such as the risk tolerance of society with respect to bearing the consequences of an event of a given particular magnitude. Set against these values might be the cost of maintaining the SPR, which might be taken as an "insurance premium." In this case, the optimal strategy might be to minimize the cost of insurance as well as the probability that the negative event might occur.

[14] The Energy Information Administration reports that the average price paid for a barrel of oil currently in the SPR is less than $30 per barrel, measured in non-inflation adjusted dollars.

However, complications might still arise in transforming the theoretical analysis into a consistent practical decision guide.

Additional reform factors that could be considered, beyond the size of the SPR, might include the mix of crude oils held in reserve as well as the infrastructure available to deliver reserve crudes to the market.[15]

SPR Facilities Reform

A consequence of the fixed capacity of the SPR in conjunction with mandated sales from the reserve is the appearance of underutilized capacity. In the 115th Congress, the House passed legislation to reform the SPR to include commercial leasing of storage capacity as well as leasing of capacity to foreign governments. H.R. 6511 would have authorized the Secretary of Energy to develop a leasing program and establish a pilot program for the leasing of storage and related facilities.

The most important benefit of leasing excess SPR capacity is the receipt of fees to "fully compensate the United States for all costs of storage, and removals of petroleum products (including the proportionate cost of replacement facilities necessitated as a result of withdrawals) incurred by the United States as a result of such lease."[16] These fees can help offset the facilities operation and maintenance costs of the reserve, which were $233 million in FY2017.[17]

While leasing excess reserve capacity provides the United States the benefit of reducing the cost of the energy security insurance the reserve provides, potential problems might exist. Commercial clients' usage patterns may not match the physical capabilities of SPR facilities. The salt domes that contain SPR crude oil are suitable for long-term oil storage and they may be less suitable for short-term injections and withdrawals. Oil is drawn from the SPR storage caverns by injecting brine into the caverns and causing the contained oil to rise, and then exit, the facility. Frequent brine injection and withdrawal could result in accelerated structural deterioration of the caverns.

Commercial oil companies are more likely to store oil for the short-term, rather than as a long-term security stock. Commercial stocks are typically part of a supply chain that holds stocks only until they can be shipped to refineries or other facilities for processing. In addition, emergency withdrawals of SPR oil may interfere with commercial withdrawals unless extraction and shipping infrastructure at the SPR is enhanced.

Leasing of excess SPR capacity to foreign governments for oil reserve storage is less likely to be associated with the short-term problems identified with commercial leasing.

In addition to the H.R. 6511 reform approach, some have called for partial, or total, elimination of the reserve.[18] This approach usually cites the broader, more transparent nature of the world oil

[15] U.S. Department of Energy, "Strategic Petroleum Reserve Test Sale 2014," Report to Congress November 2014. The report uncovered problems with the SPR's offtake infrastructure. Problems were identified with respect to SPR volumes "crowding out" private volumes that used the same facilities, reducing the net effect of an SPR drawdown.

[16] H.R. 6511.

[17] See U.S. Department of Energy, "Strategic Petroleum Reserve Annual Report for Calendar Year 2017," Report to Congress, Table 9, December 2018.

[18] For example, see Institute for Energy Research, "Privatizing the Strategic Petroleum Reserve," June 7, 2017, available at https://instituteforenergyresearch.org/analysis/privatizing-strategic-petroleum-reserve/, and Nicolas Loris, "Why Congress Should Pull the Plug on the Strategic Petroleum Reserve," The Heritage Foundation, August 20, 2015, available at https://www.heritage.org/environment/report/why-congress-should -pull-the-plug-the-strategic-petroleum-reserve/.

market compared to the 1970s, the large commercial stock holdings in the United States, or the existence of derivative market strategies available to firms, not available in the 1970s, which might be used to mitigate oil supply shocks.

Beyond partial or total liquidation of the reserve, analysts have developed other alternatives.[19] Inventory monetization is a generally risk-free approach, generating revenues to cover expenses by monetizing a portion of the idle oil balances in the SPR. This approach uses options markets to generate revenues.

For example, suppose the oil futures market was in backwardation, a condition whereby the price of oil today is higher than the price a year from now by $3 per barrel.[20] The government could sell crude oil paper contracts at today's price and purchase an equivalent number of barrels of crude a year from now at the lower future price. If this strategy were undertaken with perhaps 100 million barrels of SPR oil, the net revenue would be $300 million minus expenses and fees, an amount well in excess of yearly SPR operations and maintenance costs. If, in the example, the relative prices over time were reversed, and the future price was higher than the current price the government would buy oil now and simultaneously sell oil in the future, again profiting by the amount of the spread between the two prices. These purchases and sales are all on paper, no oil is actually required to leave the reserve, and the transactions are taken at the same time, locking in a profit with essentially potentially very low risk. A drawback of this approach is that the volume of government purchases and sales might be large enough to influence the market prices, or interfere with private sector traders.

Conclusion

The SPR has met many challenges. First conceived as protection against the "weaponization" of oil in the 1970s, it later became a safeguard against the disruption caused by domestic natural disasters. Most recently the Reserve has served as a source of funding for a variety of programs and activities. In each case, while its range of application has expanded, it still maintained its ability to respond to its original requirements.

Evolving oil market conditions have raised the question of whether the SPR can be further downsized, or even eliminated. Even if changing market conditions have made the reserve's rationale less compelling in the current environment than in the past, the SPR can provide a component of energy security policy as well as meeting other policy needs.

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[19] This example is drawn from Jason Bordoff, Antoine Halff , and Akos Losz, "New Realities, New Risks: Rethinking the Strategic Petroleum Reserve," Columbia University, Center on Global Energy Policy, May 2018.

[20] The example does not depend on any particular value of the spread between the value now and the value in the future except that the price today is higher than that in the future.