

April 2016 ■ RFF DP 16-14

Turning Rainy Day Oil
into Clean Energy
Gold: Funding Mission
Innovation with a
Strengthened Strategic
Petroleum Reserve

Heather L. Ross

1616 P St. NW
Washington, DC 20036
202-328-5000 www.rff.org

Turning Rainy Day Oil into Clean Energy Gold: Funding Mission Innovation with a Strengthened Strategic Petroleum Reserve

Heather L. Ross

Abstract

Establishing a public-private agency to operate the US Strategic Petroleum Reserve, a common arrangement in other member nations of the International Energy Agency (IEA), can improve the reserve's performance as an oil shock buffer in a systemically volatile market by strengthening its coordination with other government and commercial stockholdings and transportation infrastructure. Requiring oil companies to purchase and maintain oil in the reserve sufficient, in concert with other stocks, to meet the IEA's 90-day strategic stockholding standard can protect the reserve from loss of functionality as a result of future federal budget-driven drawdowns or inadequate operating funds. The fee paid on oil production and imports to purchase the oil in the reserve will introduce an essential price corrective in the domestic oil market. Most important, it will release the large store of value locked in the little-used reserve to combat, through essential clean energy R&D, a monumentally bigger energy threat—climate change.

Key Words: oil, climate, clean energy R&D, Mission Innovation, Strategic Petroleum Reserve

© 2016 Resources for the Future. All rights reserved. No portion of this paper may be reproduced without permission of the authors.

Discussion papers are research materials circulated by their authors for purposes of information and discussion. They have not necessarily undergone formal peer review.

Contents

Introduction..... 1

The Reserve to Date 2

Improving SPR Function 3

Accessing SPR Value 5

Looking Ahead 8

References 9

Turning Rainy Day Oil into Clean Energy Gold: Funding Mission Innovation with a Strengthened Strategic Petroleum Reserve

Heather L. Ross

Introduction

The biggest energy threat to the United States today is not the possibility of a temporary oil disruption somewhere in the world but the likelihood of long-term climate deterioration everywhere in the world. The reasoning world recognizes the enormous potential of this threat and the urgent need to generate what civilization has always called on to move forward—new technology.

*After its presence in the top five most impactful risks for the past three years, the **failure of climate change mitigation and adaptation** has risen to the top and is perceived in 2016 as the most impactful risk for the years to come, ahead of **weapons of mass destruction**, ranking 2nd, and **water crises**, ranking 3rd. (World Economic Forum 2016, 6)*

—[The Global Risks Report 2016 11th Edition](#)

Accelerating widespread clean energy innovation is an indispensable part of an effective, long-term global response to our shared climate challenge. . . . Participating countries have come together to launch Mission Innovation to reinvigorate and accelerate public and private global clean energy innovation. . . . Each participating country will seek to double its governmental and/or state-directed clean energy research and development investment over five years. (Mission Innovation 2015, 1)

—[Mission Innovation Joint Launch Statement](#)

The Breakthrough Energy Coalition is working together with a growing group of visionary countries who are significantly increasing their public research pipeline through the Mission Innovation initiative.

—[Introducing the Breakthrough Energy Coalition](#)

COP-21 is a bet on new low-cost technology.

—Martin L. Weitzman, professor of economics at Harvard University, speaking at an RFF seminar: [Can Negotiating a Uniform Carbon Price Help to Internalize the Global Warming Externality?](#)

The bet taken at the 21st Conference of the Parties in Paris in November 2015—closing the gap between stated ends and agreed means—is a big one. Technology innovation is essential to make that leap. One way to fund the US commitment to double clean energy research and development (R&D) is to tap the store of value created in response to the original energy crisis—the Strategic Petroleum Reserve (SPR)¹. Establishing a public-private agency to manage the reserve—a common arrangement in other stockholding members of the International Energy Agency (IEA)—can improve the performance of the reserve as an oil shock buffer and release resources to confront the far greater energy-driven risk of climate destruction that we face now.

With US oil production increasing and imports declining as a result of new well-fracking technology, the 695 million barrel SPR for a time exceeded the 90 days of net import replacement required of IEA members. Federal legislation was passed authorizing substantial future sales from the reserve to fund SPR modernization and other budget purposes. While the reserve has been tapped for federal deficit reduction before and has required periodic maintenance spending, these significant sales will go well beyond the scale of prior of SPR usage. They can be seen as a constructive effort to realize value from an over-target repository while updating its functionality or, alternatively, as the opening rounds of piecemeal raids for deficit reduction that will undermine the reserve's purpose and value. The first path is the far better one and can be pursued far more effectively.

The Reserve to Date

Set up in response to the 1973–1974 Arab oil embargo, the SPR stores crude in underground caverns at four sites along the US Gulf of Mexico. While the United States has not faced another state- or cartel-sponsored embargo, the SPR has been used 21 times for a range of purposes—to offset supply dislocations from storms and accidents on the US Gulf Coast (10), to serve as a source of funding for federal actions both related to (3) and unrelated to (3) the operation of the reserve, to guard against disruptions during military activity (2), and to conduct stated tests of drawdown capability (3). On three occasions—Iraq/Desert Storm (1991), Hurricane Katrina (2005), and Libya (2011)—releases also involved emergency drawdown provisions of the IEA.

The biggest single SPR release to date was the IEA-coordinated Libya action in June 2011, when 30.64 million barrels of oil were sold to 15 companies. Next in size was 30 million barrels exchanged in October 2000 to bolster the newly created Northeast Home Heating Oil

¹ See: <http://energy.gov/fe/services/petroleum-reserves/strategic-petroleum-reserve>.

Reserve for the coming winter. Companies engaged in that exchange deposited return barrels in the SPR, including additional premium barrels as a form of interest, over the years 2001–04. Such exchange transactions, while generally much more limited in size and duration, account for 11 of the 21 total SPR releases to date and part of another. Of these 12 exchanges, 10 were to smooth local infrastructure disruptions on the Gulf Coast. As a security buffer—far and away the biggest in the world—the 40-year-old reserve has contributed only a small number of small-scale releases, each less than 5 percent of its current volume, and the most common purpose has been to deal with operating difficulties in the domestic market that are textbook matters for private account.

Improving SPR Function

The tight oil boom that has transformed the United States and world markets poses a challenge to the SPR. US oil infrastructure has been significantly stressed by this historic shift in the origin and flow of crude. Transportation has been especially strained on the Gulf Coast, where crude movement from interior tight oil plays to coastal refineries has increased dramatically and reversed the direction of some pipelines. Keeping SPR crude efficiently linked to refining will require new coordination and expense. The Department of Energy's 2015 Quadrennial Energy Review determined that maintaining the SPR's distribution capacity to deliver incremental barrels of oil during a disruption will require building dedicated docks and terminals, at a cost of \$1.2 billion. Maintaining its design drawdown capacity of 4.4 million barrels a day will require life extension investments of around \$800 million to keep 30-plus-year-old caverns and wells serviceable (DOE 2015). These amounts are in addition to tens of millions of dollars of routine maintenance costs that did not receive requested federal budget funding over the years.

Given the history of joint public-private benefits, it is appropriate that these costs to maintain the effectiveness of the reserve as a disruption buffer be shared with industry. Indeed, these joint benefits are very likely to grow in the future as petroleum operations on the Gulf Coast face increasing risk of severe weather disruption, due to rising temperature and sea level, and prospectively more operating accidents as overall activity picks up. Closer public-private coordination can also strengthen future effectiveness. Operational coordination of the SPR and private stocks can optimize both overall US stockholding and midstream transportation. With current US net crude imports of around 7.7 million barrels a day, the SPR presently provides 90 days of net import coverage and 159 days of coverage when commercial stocks of crude are included. Commercial crude stocks have been increasing with infrastructure bottlenecks and market volatility and reached a modern-day record of half a billion barrels in February 2016, from which they are continuing to climb. Closer coordination of private and public stocks can

help rationalize the aggregate level of stockholding and help that rationalization take place with maximum operating efficiency.

Greater coordination can also introduce an increased degree of flexibility with respect to holding crude and refined product stocks. While 60 percent of US commercial stocks are currently in the form of product, 100 percent of the SPR is crude. Among IEA countries other than the United States, nearly 50 percent of strategic stocks are held as product. Gulf Coast operating risks are substantially to refineries, so stored product can be particularly needed in a disruption. This was the case with Hurricane Katrina, when an IEA emergency was declared to allow coordinated drawdown of product from outside the United States to replace output lost from storm-damaged US refineries. Another weather event, Superstorm Sandy, was cited by the Department of Energy as the basis for creating in 2014 the Northeast Gasoline Supply Reserve, with three sites near New York, Boston, and Portland, Maine, holding a total of one million barrels of gasoline. These new stocks joined the Northeast Home Heating Oil Reserve, established in 2000 and holding one million barrels of ultralow sulfur distillate at two private terminals in New England. The growth and proliferation of public stocks strengthens the case for umbrella oversight in the interest of efficiency and performance. Were all public and private stocks of crude and product considered together, they would cover 265 days of net crude imports.

The passage of time since the SPR's creation has shown that price volatility is a feature of crude oil markets, that such volatility has material macroeconomic costs to the United States, and that suitable stock releases can smooth that volatility and ameliorate those costs. Structuring the SPR to function effectively in this fluid market is a valuable reorientation from the original concept of major drawdown for an extended hostile disruption of supply. In addition, price fluctuations can alter where and in what volumes oil is produced and shipped, and material swings in these flows, as we are seeing now, raise the value of well-coordinated infrastructure adjustment. As with lifting the oil export ban, a companion provision to the SPR in the 1975 Energy Policy and Conservation Act, updating old law for new conditions will upgrade the SPR for today's market. Our ability to respond more effectively will enhance our ability to exert leverage on threatening actions in the world and mitigate the effects of those actions should they occur.

The benefits of better coordination of stocks and more appropriate sharing of costs can be achieved by establishing an entity—an agency, in IEA terms—to hold and manage the SPR in coordination with private and other public stocks. Just three IEA members—the United States, New Zealand, and the Czech Republic—currently maintain government-only strategic stocks. Other members with stockholding obligations rely in whole or in part on industry participation. Fourteen of them have set up agencies. These are separate entities “endowed with the

responsibility of holding all or part of the stock obligation ... with structure and arrangements (that) vary from country to country but in all cases are clearly defined by state legislation.” (IEA 2014). The trend in recent years has been in the direction of agency stocks, which the IEA describes as attractive for their operational links with oil companies to help ensure rapid drawdown in an emergency.

The value of an agency to the United States will be these operational links and efficiencies, plus the opportunity for industry financial participation. As defined by the IEA, an agency is a legislated entity responsible for keeping an identified stock equal to 90 days of net imports. This leaves a lot of room for tailoring to US conditions and participants. Some current IEA member agencies are government-administered; others are industry-owned or industry-led. Choices by other members as to oil versus product, dispersal versus consolidation, and location vis-à-vis supply and demand centers vary widely. In the United States, establishing agency authority will provide an occasion and framework to update rules that are already seen as needing improvement. Notably, well-crafted authority to release buffer stocks to head off serious disruption rather than react to it has the potential to significantly improve the effectiveness of releases in a systemically volatile market.

Industry participation will not change the mandated purpose of the reserve as an IEA-recognized security stock. Rules governing the reserve will be set by federal law, including all provisions for operation and for acquisition and release of oil. The agency arrangement will recognize the most appropriate role and best capacities of each participant, enabling the public sector to define the rules for maximizing national security value and the private sector to carry them out in the most efficient manner possible. This is a familiar arrangement in a mixed economy. As an example, the federal government sets rules for oil exploration and production on the US Outer Continental Shelf (OCS), and industry operates within them to maximize efficiency and value. When the Department of Energy was set up, transferring the OCS leasing program from the Interior Department was discussed, including the possibility of federal OCS drilling in certain circumstances. These ideas went nowhere. Industry is better able, by established capability and role, to conduct oil drilling; government’s role is to establish the rule of law under which that drilling occurs. With appropriate rule of law, industry is also better at coordinated management of oil stocks and midstream infrastructure.

Accessing SPR Value

On the financial front, cost sharing with industry will be beneficial, but the big payoff will come in obtaining the value of the stored SPR oil to tackle the vastly greater security threat of climate change. Realizing the long-dormant SPR value for public use can be accomplished by

having industry over time acquire the reserve at a true, carbon-adjusted price, with proceeds placed in a dedicated public fund for clean energy R&D. Industry ownership will facilitate flexible sector-wide adaptation as US production and imports change. That could mean meeting the 90-day strategic stock requirement with a matrix of reserves rather than the current SPR stockpile only. Industry ownership will also support investments in infrastructure to keep the reserve in up-to-date working order and to fund any needed modifications in type or location of stocks as domestic or international market structures change. Industry funding arrangements are far more efficient, timely, and value-oriented than federal budgeting processes to accomplish this, and they are much better resourced even in down markets.

The true, carbon-adjusted price of oil is the price set in a properly functioning market that recognizes carbon's economic costs. Perpetuating an oil market that acts as if the economic cost of climate change is zero does not make the cost go away. But it does distort the market, sending false economic signals and generating behavior that relentlessly compounds the cost.

Adding a cost of carbon of \$16.34 per barrel (IWG 2015) to an oil price of \$40 per barrel yields a true price of oil of \$56.34 per barrel. At this price, the 695 million barrel reserve is worth \$39.2 billion. This is 79 percent of the amount of the Mission Innovation pledge to double clean energy R&D over five years, from \$6.4 billion in FY2016 to \$12.8 billion in FY2021, which can be met by an increase of 15 percent per year for a total budget of \$49.5 billion. At the \$56.34 price and current oil supply volumes, industry can fully purchase the SPR over five years by paying a fee of \$1.36 for each barrel of oil produced in or imported into the United States. With a fee at the \$10.25 level of the Obama administration's FY2017 budget proposal (OMB 2016), industry could buy all the oil in the reserve in 243 days. With a fee of \$16.34 covering the external cost of carbon owing on production and imports, the reserve would be fully paid for in 152 days. Recognizing additional external costs of oil beyond that of carbon—other pollution and traffic accidents and congestion (Parry 2014)—would raise the full cost of oil to \$94.34 and the purchase value of the reserve to \$65.6 billion. In that case, the oil fee covering the full external costs would be \$54.34 per barrel, which would purchase the reserve in 77 days.

The United States has used fees before to support R&D. Notably, a Federal Energy Regulatory Commission (FERC) sanctioned surcharge on interstate pipeline gas volumes raised over \$3 billion for the Gas Research Institute (GRI), a private, nonprofit research management organization (MIT Energy Initiative 2011). This funding provided early support for unconventional shale gas research that laid the groundwork for today's fracking revolution. George Mitchell, a board member of GRI, offered his fields for experiments, and the rest is history—a true melding of public and private capabilities, as Melanie Kenderdine of the US Department of Energy has noted (Atlantic Council 2016). Mission Innovation and the Breakthrough Energy Coalition are today's version of that partnership, albeit with a much higher

profile and scale, greater urgency, and far bigger payoff than even the current shale bonanza has turned out to be. Technology is the indispensable key to climate safety, and the United States is the indispensable place to develop it. The way forward is to embrace the textbook economics of appropriate public-private roles and true market pricing, a path we have gone down to great economic advantage before. Public R&D is a pivotal part of getting new technology going. Industry is best suited to run efficient market logistics and support the cost of stockholding adjustments to address market price volatility.

The striking thing about these numbers is how small the required investment is compared with the size of the oil sector and the economic harm of oil use. The oil industry operates on such a massive scale, doing such unmitigated harm, that in just five months a fee equal to its unpaid carbon damages can purchase the entire SPR valued at its true, carbon-adjusted price. Passing that fee of \$16.34 through to gasoline consumers will add 36 cents to the price of a gallon—far less than the nearly \$2 per gallon that gasoline prices have fallen since their most recent peak in June 2014. Industry is hurting in a down market, but it will pass the fee on to consumers, who are reciprocally better off economically in the lowered oil price environment. Consumers will cut back purchases of oil products and other goods compared with the no-fee case, which will dampen their contribution to growth in a sluggish economy. This is an important consideration, but it is an argument to scale a corrective fee appropriately, not to forgo it.

Purchasing a livable future for 36 cents a gallon is a deal for the ages. The new higher price and the new clean technologies it pays for will work against oil-driven economic disruption by reducing US oil demand and thereby dampening the price rises and instabilities forecast for the world oil market. And they will work against national defense risks posed by climate change, recognized by the military as a significant threat multiplier and catalyst to conflict (CNA 2007). Overall, the new SPR policy is both an instrument of US national security and a demonstration of US determination and ability to lead, in both policy and technology. Developing new clean, disaster-avoiding technology will be an enormous economic boon to the United States. Demand for affordable clean energy to power development in emerging markets offers the single biggest market opportunity in the world. Exchanging dormant value on the Gulf Coast for this business bonanza is a highly rewarding proposition. And the coordinated Gulf Coast stockpile will work better than before, which is no small matter as oil markets deal with big structural changes and repeated world growth swings. Industry ownership and maintenance of the reserve will preempt the possibility of its dissipation as a federal budget stopgap and its deterioration as a result of inadequate public operating funds. A dedicated funding source for the Mission Innovation R&D program will bring to it a substantial degree of highly beneficial financial certainty.

Looking Ahead

Climate change is a game changer, altering human life support on Earth as we have known it. As its loss function becomes more visible and alarming, it will change domestic politics, much as years of middle-income stagnation and loss are beginning to change voting behavior now. While loss of relative status and opportunity to advance is strongly motivating, loss of life, homes, and livelihoods is even more powerful. There are no values claims to be made for the fires, droughts, storms, and floods of unchecked warming. And there is no private salvation, no matter how rugged or advantaged, financially or otherwise, people think they are. Paying for a common solution is the only way to avoid producing a broken material world. As long as the costs are not big enough to change policy choices, they will keep getting bigger until they are.

The public expresses more acceptance of fees supporting specific desired activities than of taxes going to general revenues, and its interest in getting well-off people and institutions to contribute a greater share of their wealth to the general well-being is growing. Oil companies are certainly among the latter. Young people in particular are beginning to stir against their burdened economic future, and they are unlikely to take climate destruction lying down. As climate denier campaigns are losing traction, so will industry back-of-the-hand dismissal and realist “cant-be-done” scorn for useful policy steps.

Optimizing the security value of the SPR is such a step. Useful is not the same as perfect, but mounting a moon-shot campaign for climate safety while leading a vastly remunerative technology market, reducing a highly injurious subsidy for directly counterproductive fossil fuel overuse, and creating a better buffer for the unstable global oil market ahead is a truly winning combination. It offers a natural stopping point for the oil fee when the reserve has been fully purchased, should a better carbon pricing policy come forward. This is not a business-as-usual step, but it is a good one. We need the money and the technology. Climate change is now an all-hands-on-deck proposition for spaceship Earth. Even the richest societies must take advantage of every piece of leverage and efficiency they can muster.

References

- Atlantic Council. 2016. Transformations in Energy Technology: Innovations for a Secure Energy Future. <http://www.atlanticcouncil.org/events/past-events/transformations-in-energy-technology-innovations-for-a-secure-energy-future>
- CNA. 2007. National Security and the Threat of Climate Change. Washington, DC: CNA. https://www.cna.org/CNA_files/pdf/National%20Security%20and%20the%20Threat%20of%20Climate%20Change.pdf.
- IEA (International Energy Agency). 2014. Energy Supply Security: Emergency Response of IEA Countries 2014. Paris: IEA. <http://www.iea.org/publications/freepublications/publication/ENERGYSUPPLYSECURITY2014.pdf>.
- Mission Innovation. 2015. Mission Innovation Launch Statement. November 30. <http://www.mission-innovation.net/wp-content/uploads/2015/11/Mission-Innovation-Joint-Launch-Statement.pdf>.
- MIT Energy Initiative. 2011. The Future of Natural Gas, Appendix 8A. Cambridge: Massachusetts Institute of Technology. <http://mitei.mit.edu/publications/reports-studies/future-natural-gas>.
- Parry, Ian, Dirk Heine, Eliza Lis, and Shanjun Li. 2014. Getting Energy Prices Right: From Principle to Practice. Washington, DC: International Monetary Fund. <http://www.greenfiscalspolicy.org/wp-content/uploads/2014/11/Getting-Energy-Prices-Right-Full-Publication.pdf>.
- DOE (US Department of Energy). 2015. Quadrennial Energy Review: First Installment. Washington, DC: DOE. April. <http://energy.gov/epsa/quadrennial-energy-review-first-installment>.
- IWG (US Interagency Working Group on Social Cost of Carbon). 2015. Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866, Washington, DC: Office of the President. <https://www.whitehouse.gov/sites/default/files/omb/inforeg/scc-tsd-final-july-2015.pdf>.
- OMB (US Office of Management and Budget). 2016. Budget of the US Government, Fiscal Year 2017. Washington, DC: US Government Printing Office. <https://www.whitehouse.gov/sites/default/files/omb/budget/fy2017/assets/budget.pdf>.
- World Economic Forum. 2016. The Global Risks Report 2016, 11th edition. Geneva: World Economic Forum. <http://www.weforum.org/reports/the-global-risks-report-2016>.