



# Reimagining the SPR

## Adapting the Federal Reserve's playbook for commodity risk

Arnab Datta  
Managing Director of  
Policy Implementation,  
Employ America

Daleep Singh  
Former Chief Global  
Economist, PGIM

*Daleep Singh most recently served as chief global economist at PGIM. Arnab Datta is the managing director of policy implementation at Employ America, a macroeconomic policy research and advocacy organisation committed to achieving and sustaining full employment.*

*The authors worked on this piece several months prior to Mr. Singh's decision to rejoin the Biden Administration as Deputy National Security Advisor for International Economics. The views reflected are expressed strictly in their personal capacity.*

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Global energy markets have changed and grown dramatically since the creation of the Strategic Petroleum Reserve (SPR) nearly 50 years ago. The purpose and operations of the SPR should change and grow as well.

The SPR was established after the 1970s Arab oil embargo to insulate the US economy from shortages, and has largely succeeded in that mission, releasing crucial supply into markets amid destabilising geopolitical events or natural disasters. Most recently, the US tapped the SPR to combat price spikes before and after Russia's invasion of Ukraine.

One recent [rule change](#) has already expanded the SPR's remit somewhat; it can now use fixed-price contracts to spur on additional US crude production. The successful stabilisation of oil prices following the Biden administration's actions has reinforced both domestic disinflationary pressures and international support for a tough sanctions regime.

This adjustment was important but may not go far enough. Today the US is not just a net exporter, but also the world's top producer of crude oil. It is much less vulnerable to outright shortages than it was in the 1970s. Supply shocks today mean inflation and price pressures, not rationing.

Indeed, the guidelines provided by the International Energy Agency – which call for 90 days of net import cover, a threshold that the SPR now exceeds substantially – are both outdated and inadequate. They address the problem of shortages, which no longer exists for the US, while ignoring the problems that come with volatile pricing and inflation. The guidelines also can't address newer threats: global supply disruptions in everything from refined products like diesel to the critical inputs of the clean energy transition – lithium, copper, graphite, and rare-earths magnets, to name a few.

This isn't just a theoretical worry. Russia has repeatedly exploited Europe's dependence on Russian natural gas, and China's restrictions on graphite exports can be seen as an effort to undercut the US's ambition to build a rival battery ecosystem.

Against this backdrop, we propose repurposing the SPR as a "Strategic Resilience Reserve" (SRR), with a flexible mandate to bolster resilience against future commodity shocks. A bipartisan congressional committee recently recommended the creation of critical mineral reserves, but the executive branch can take action even without Congress.

An SRR could follow the model of the Federal Reserve's efforts to address financial stability risk: aiming to prevent crises, and reducing harm when they occur. With sufficient scale and scope, the SRR would provide relatively cheap insurance against economic coercion from adversaries, and perhaps even deter aggression during the transition to cleaner sources of energy.

### **Commodity shocks threaten the energy transition**

The commitment by the United States and its allies to accelerate global decarbonisation is both laudable and necessary, but the transition provides adversaries with increased opportunity for disruption. Shifting from fossil fuels to clean energy will require sustained technological innovation and the buildout of productive scale over the course of decades – the IEA [estimates](#) that more than \$4tn in investment will be required by 2030 to be net zero by 2050.

Steady and affordable access to clean-energy inputs is required for the transition to proceed in an orderly manner. To give a few examples: battery development requires abundant lithium; wind energy requires rare earth magnets; and intermittent sources like solar and wind scale faster when complemented with fuels such as natural gas.

Notably, the supply of clean-energy inputs and refined products is even more concentrated than production of crude oil. Taken together, the US and its allies face heightened risk of increasing demand for critical energy inputs being met

with repeated and disruptive shortfalls of supply.

## “Rockets on the way up, feathers on the way down”

Because commodity prices are set on the margin, even minor shortfalls of supply can cause major price spikes. For example, in recent decades, a swing of just 1 million barrels can swing crude oil prices dramatically even in a market supplied by roughly 100 million barrels per day.

In an environment of increasing disruption and volatility, it's rational for commodity producers to err on the side of under-investment. Whereas underproducing in a tight market merely implies suboptimal profits, oversupplied market conditions regularly push producers to insolvency.

This uncertainty is irreducible and difficult for producers to manage, particularly because of the long lead times between investment decisions and actual production. The capital discipline of producers often results in an energy supply that, in aggregate, is relatively insensitive to price signals, driving energy inflation with outsized effects for low-income consumers and industrial end users. “Rockets on the way up, feathers on the way down,” as energy economists [quip](#).

Under-investment is not just a feature of production and mining but can also occur in refining. Domestically, most acquirers of production and refining capacity are financial buyers aiming to generate as much profit as they can from existing facilities, rather than investing in new capacity with a long payback period. Consequently, the cash flows from such assets are no longer as certain or sustainable as they used to be given the general lack of investment in such facilities. We have not built a new, large production capacity oil refinery [since 1977](#).

Recurring mismatches between supply and demand for key commodities are likely to be pernicious for the US economy and its national security. The US's chief geopolitical competitor, China, leads production for many critical minerals — over [65 per cent](#) of rare earth mineral production in 2023 was in China, and one [forecast](#) estimated that 97 per cent of mined lithium in Africa would come from Chinese-owned projects. Its supremacy is even more profound in processing — China [processes](#) over 35 per cent of the world's nickel, 58 per cent of lithium, and 70 per cent of cobalt.

Of course, clean-energy inputs have key differences with oil: there are not many upstream commodities with price fluctuations that affect businesses and consumers so profoundly. However, the downstream impacts of concentration are remarkably similar.

Graphite demonstrates the challenge. It is an essential material for lithium-ion battery anodes used in electric vehicles. On average, a 60 kWh EV battery contains over [50kg](#) of graphite, over a quarter of the EV battery's weight. According to the International Energy Agency ([IEA](#)), the electric vehicle and low-carbon energy sectors will demand 25 times more graphite per year by 2040. As a critical input with few substitutes, graphite is indispensable for decarbonising road transport through rapid EV adoption. Any constraints or price volatility in graphite supply chains would pose threats to the US's EV manufacturing ambitions.

Unfortunately, the US relies on China for importing graphite. China [produces](#) 61 per cent of global natural graphite and 98 per cent of the final processed material to make battery anodes. As American EV manufacturing ambitions grow, China's dominance creates a chokepoint to exploit and also leaves global economic outcomes vulnerable to local Chinese circumstances. The risks became apparent in 2022, when China's lockdowns and export restrictions caused graphite prices to more than double within a year, putting enormous strain on other global EV industries. More recently, in a wholly transparent attempt to exert leverage and hinder US EV ambitions, China [imposed graphite export restrictions](#).

More generally, China has aggressively manoeuvred to control access to the critical materials for renewable energy. They are building on that strategy now by establishing financial exchanges for these commodities. As Zongyuan Zoe Liu recently [wrote](#), [by] "establishing commodities exchanges across its industrial cities, China aims to boost the use and power of the renminbi in global commodities pricing to establish an alternative global financial system that is less reliant on the almighty dollar." Though any effort to weaken the status of the dollar is unlikely to succeed, building financial markets for these commodities could strengthen China's already-firm grip on the minerals supply chain.

### Using the Fed as a model for managing risk

To manage commodity risks, we recommend a framework based on how the Fed manages financial stability risk. With the aim of improving the financial system's resilience to shocks and mitigating harm should they occur, the Fed enhanced its financial stability "toolkit" in the wake of the 2008 crisis.

Though hardly perfect, the combination of supervision and surveillance exercises, enhanced requirements for buffers against shocks, emergency response tools, and global co-ordination has helped the Fed and its peers to navigate recent bouts of volatility, most recently in the wake of several US regional bank failures last year.

The Fed has an exceptionally wide and varied range of tools to preserve financial

stability, which can be grouped into two categories: crisis prevention (ex-ante) and crisis mitigation (ex-post).

Its crisis-prevention tools are, in effect, an array of supervisory and regulatory practices to ensure that the US's most important financial institutions are safe and sound. The Fed sets rigorous capital and liquidity requirements, along with regular stress tests, to confirm banks' ability to withstand major adverse shocks.

The Fed's crisis-mitigation tools include the discretion to inject liquidity into the US financial system, or to purchase financial assets, in an attempt to restore market functioning, ease financial conditions, and help provide dollars where they are scarce.

A key feature of the Fed's ex-post interventions has been its ability to intervene directly *through market channels* by purchasing assets, engaging in direct purchasing and lending. Its crisis firefighting powers undergird confidence in the market, and often even a signal of the Fed's willingness to intervene is enough to restore stability when market psychology is fragile.

With a combination of authorities to prevent shocks to the supply of critical energy inputs and limit harm when shortfalls occur, an SRR could generate analogous benefits for US economic and national security interests.

### Crisis Prevention

To reduce the incidence of commodity shocks, the first step is to build the capacity to identify future vulnerabilities and their underlying drivers. The Department of Energy (DOE) already has a regulatory requirement to conduct market and pricing analysis before the SPR buys crude oil. Rather than tie these analyses strictly to SPR purchases, the DOE could broaden the effort into an ongoing monitoring function.

Knowing that the US's vulnerabilities change over time, the monitoring function would evaluate a set of core questions on a regular basis — eg, “which commodities are most critical for the strength of our economy and national security?; “do we have enough domestic production capacity, or among our allies, to respond to a supply shock?; “are storage buffers sufficient to compensate for shocks?”; and “what is the appropriate balance of refined products and their precursors?”

Extending the logic of the Fed's stress tests, the SRR monitoring function could model the impact that various commodity shocks would have on our economy. Evaluating the cost of a diesel shock on our agricultural sector and global food prices, for example, would suggest how much refined product we should store to

mitigate the effects of an expansion of Russian aggression against its neighbours.

Risk prevention should also proactively reduce vulnerabilities. In the financial system, capital and liquidity requirements are meant to ensure sufficient buffers against shocks, but the challenge with commodities is different: officials face a systemic pattern of under-investment among producers. There may be a role for imposing storage requirements by private producers, but those costs would ultimately flow to consumers. Instead, a toolkit that ensures sufficient surge capacity – from both domestic sources and trusted partners abroad – is the optimal approach.

The Biden Administration has [successfully executed](#) a version of this with its [innovative use](#) of fixed-price acquisition for the SPR. By contracting in advance at a fixed price, DOE can essentially provide a price floor for crude oil producers and in doing so, motivate a steady flow of investment and supply buffers.

The SPR is stored in vast and expensive-to-build salt caverns that allow crude oil to remain usable for long periods of time. Refined products degrade faster than crude oil, however, and are more difficult (or impossible) to store for extended periods. Instead of focusing on storage, the SRR could contract with refiners to ensure sufficient refining capacity over time. By actively managing the amount of refining capacity built into the production architecture, the SRR could better manage risk of supply shocks that push up prices of gas and diesel fuel for industry, agriculture, and American consumers.

Other critical energy inputs trade in markets that are far less mature than those for crude oil or refined products. In these markets, direct interventions by the SRR should attempt to reduce the risk of excess supply for producers. This might take the form of fixed-price forward contracts (similar to what the SPR is doing now), put options, or non-recourse lending for special purpose vehicles.

Lastly, an international dimension is needed. Miners from some of our closest allies, like Canada and Australia, are highly dependent on China as purchasers of lithium – the SRR should offer a demand backstop for these producers, too, to maintain and enhance a diverse set of global suppliers.

Indeed, the lithium market offers a cautionary tale. In its 13th Five-Year Plan, the Chinese government implemented a massive set of subsidies to spur lithium production as part of an effort to drive more electric vehicle production. An investment boom followed, bringing in miners from across the world to take advantage. By 2019, however, the Chinese government dramatically [scaled back](#) these subsidies. Canadian and Australian miners suddenly found themselves with no ready market for their products when Chinese counterparties reneged on bilateral contracts signed with the expectation of continued subsidies. Producer

revenues fell sharply, and many defaulted, with mines only partially built or put on care and maintenance. The excess supply led to a [60-per-cent slide](#) in the price of lithium and drove bankruptcies of companies including [Alita](#) and [Nemaska](#) in Australia and Canada, respectively.

### Crisis Mitigation

Even with an effective approach for ex-ante risk prevention in commodity markets, crises are inevitable. These could take numerous forms: a recession driving energy demand down and leading to a price crash that wipes out producers and future supply; a severe price surge, resulting from a sharp contraction in supply, that causes both recession and inflation; or a decision by a geopolitical competitor to weaponise the supply of a critical commodity to gain leverage. Just as in the context of managing financial stability, the key question is how to mitigate the effects of shocks after they emerge.

And much like the Fed, officials and regulators would likely need to address ex-post risks by acting directly through market channels. However, the physical nature of commodities would add complexity to this effort. Even benchmark financial contracts for commodities like West Texas Intermediate (WTI) are tied to a physical good and, if held until delivery, physically clear and require physical storage.

That requires a toolkit for crisis mitigation that includes a wide range of authorities to intervene at different pressure points.

Let's consider the example of a dramatic rise in prices driven by an import restriction for a mined commodity. This would raise costs for refiners, which would have to spend more to purchase raw ore; ultimately, these costs would get passed on to consumers of refined products such as car companies, which would likely pass on at least a portion of their added costs to consumers.

The most straightforward SRR intervention, in this example, would be to limit price increases by releasing the refined product from stored reserves, much like SPR does for oil. But the toolkit could be even more flexible. If paired with robust ex-ante interventions, like selling put options, the SRR's intervention would be self-executing: with market prices high relative to the strike prices on put options outstanding, producers would sell their product on the spot market, thereby easing spot price pressure without the SRR having to release any physical product.

Another scenario might involve a precipitous fall in prices, perhaps caused by a foreign adversary dumping product to wipe out competitors. Here the most pernicious effects would be on the incentive for producers to invest. Worried

about the possibility of persistently low prices, domestic or allied producers would likely cut back on investment, setting the stage for a future price spike. The SRR could mitigate such a risk by serving as a “buyer of last resort,” purchasing excess supply to keep producers in business and mines open.

Of course, reserves can fill up, and physical delivery can be a complex undertaking. Here again, going beyond a simple acquisition authority would be useful. The unique strength of the Fed is its capacity to inject liquidity to “bridge” the economy to the other side of a crisis without sacrificing the economy’s productive capacity with long-term unemployment and needless bankruptcies.

With a similar motivation, the SRR could offer financial support to producers during a crisis to offset the costs of storage, limiting the cost of waiting out the market glut. In such surplus “contango” markets, the SRR could engage in a timespread contract by which it would in effect acquire the commodity at depressed spot prices, only to reverse the transaction at a later date and a higher forward price for a profit.

Indeed, the ability for the SRR to provide bridge capital would be an important part of a crisis-mitigation toolkit. In an environment with low spot prices and under-investment, non-recourse lending and price-backstop mechanisms can address key points of risk aversion that otherwise lead to suboptimal levels of long-term investment. Providing direct capital infusions, in the form of grants or equity, could also help domestic or allied producers to stand up or expand production facilities to meet demand.

## Implementation

There are two routes to create an SRR: through Congress, or with the existing authorities of the executive branch.

### The Congressional option

Congress recently took a small but important step. The House Select Committee on the Chinese Communist party, led by Reps. Mike Gallagher and Raja Krishnamoorthi, [proposed](#) the creation of a critical minerals reserve to “insulate American producers from price volatility and PRC weaponisation of its dominance in critical mineral supply chains.”

In broad strokes, the bipartisan committee endorsed the crisis-mitigation framework we described above. This is an important step but ultimately insufficient. Congress should build further on the concept by authorising a reserve capable of implementing the full crisis-prevention and crisis-mitigation strategies.



A monitoring and evaluation program would require the ability to hire people with market expertise, in addition to specialised skill sets in economics, statistics, and even perhaps chemistry. The Fed is authorised to determine its own pay system so that it can attract talent from the private sector: the SRR should have this flexibility as well. Additionally, authorities like [direct hire](#) and [streamlined critical pay](#) could help the agency staff up in a crisis or for specific projects.

Most importantly, Congress should authorise a toolkit capable of varied prevention and mitigation techniques to address potential crises. The SRR would benefit from an acquisition authority that allowed it to determine contractual forms, whether fixed-price forward contracts or the purchase and sale of options on exchanges. This flexibility would allow the SRR to become financially self-sustaining: producer access to effective price insurance could be contingent on a profit-sharing agreement during boom cycles. Furthermore, the presence of a price backstop could also support higher standards for production: an SRR that limits the downside risks associated with new capital investment could also require the [highest labour and environmental](#) standards through its contracting.

### **The executive option**

Even without congressional action to authorise an SRR, the executive branch can lay the groundwork for its respective functions. Building a robust risk monitoring system is the first order of business. The Department of Energy's Office of International Affairs should work with the IEA to identify potential and existing shortfalls of supply relative to demand across the range of critical commodities. The IEA is [launching a program](#) to boost critical mineral security and already maintains one of the most robust energy statistics databases in the world – building it with real-time market data could dramatically improve our risk management.

US agencies' programs could aid these efforts. For example, the Defense Advanced Research Projects Agency (Darpa) has [partnered](#) with the US Geological Survey agency to “explore the potential for machine learning and artificial intelligence tools and techniques to accelerate critical mineral assessments” through the use of competitions. These competitions are primarily focused on the identification and assessment of domestic mineral sources. Darpa could work with the Advanced Research Projects Agency-Energy (ARPA-E) to include vulnerability assessments to identify key threats throughout the global supply chain.

Another potential option would be the newly established [Foundation for Energy Security and Innovation](#) (FESI). FESI is [authorised](#) to support the DOE in its mission and “to advance collaboration with energy researchers, institutions of higher education, industry, and non-profit and philanthropic organisations to

accelerate the commercialisation of energy technologies.” An abundant supply of key commodities is critical to commercialisation, so FESI could use its authorities to help DOE and the IEA build out a monitoring mechanism. For instance, it could award fellowships to experts to build (and subsequently adapt) a stress test to identify key vulnerabilities so that DOE and other agencies can use that information to prioritise and guide decision making.

The next step would be to provide support for investment, ex-ante and ex-post, domestically and among our allies. Programs with wide contracting flexibility are especially valuable. Two such programs are the Defense Production Act (“DPA”) and the Exchange Stabilization Fund (“ESF”) at Treasury.

Under Title III of the DPA, the President may make provision “for purchases of or commitments to purchase an industrial resource or a critical technology item, for government use or resale,” or “for the encouragement of exploration, development, and mining of critical and strategic materials, and other materials.” These two clauses essentially cover the full suite of crisis-prevention and crisis-mitigation tools. Direct acquisition for a reserve, “commitments to purchase” using put options, or other interventions (such as acting as the buyer of last resort) are allowed under the President’s existing authority. Two of our strongest allies, Canada and Australia, are major producers of critical minerals and were recently made eligible for Title III support. Deploying the DPA to support their production could be an important part of a commodity risk-management regime.

The ESF also has [a wide set of tools](#) that could potentially be utilised to limit the harmful effects of commodity volatility. The ESF statute allows the Secretary of Treasury to deal in “instruments of credits and securities” that she considers necessary. Beyond a minor limitation on loans or credits to foreign entities and countries, there is virtually no constraint on the type of transactions available. The ESF can be activated to support an orderly system of foreign exchange, and the Secretary has considerable discretion to determine risks to currency stability. As former Treasury General Counsel Edward Knight [concluded](#) in 1994:

*“Given the purpose of the ESF as a means of maintaining order in exchange markets and its genesis as a tool for counteracting similar funds held by other countries, it is entirely reasonable that Congress has vested complete discretion in the Secretary of the Treasury and the President for the operation of the Fund. As the chief financial policy official of the US Government, **the Secretary of the Treasury is uniquely situated in the Government to make the complex judgments necessary to determine the need for intervention in currency markets at any particular time.**”*

Commodity shocks can have harmful effects on currency markets, particularly for lesser-developed nations that import food and fuel. These shocks cause

exchange rate crises that often lead to severe social and political unrest. In just the past few years, oil and food price surges have led to exchange rate crises in Lebanon, Laos, Sri Lanka, and Pakistan. The surging price of wheat following the Russian invasion of Ukraine put considerable strain on the balance sheets of Egypt, Turkey, Tunisia, Ghana, and Kenya.

Treasury could explore the creation of a [Supply Insurance and Acceleration Program](#) to offer purchase guarantees and financing. This program would facilitate the production and refining of commodities that create risk in the currency markets, including but not limited to oil, natural gas, wheat, fertiliser inputs (eg potash), palladium, and copper. Supporting more production and stability in the commodity markets would limit the likelihood of commodity shocks, and the conflagrations that result in exchange markets.

There are other offices and programs with the contractual flexibility to manage and mitigate commodity risk, even if they are not directly intended to support commodity production. The Department of Energy (DOE) and the CHIPS office at the Department of Commerce (DOE) both have “[other transactions authority](#)” – allowing the agencies to engage in all manners of creative contracts. Through this authority, the Office of Clean Energy Demonstrations (OCED) recently announced a new program to boost investment in clean hydrogen, working with the Intercontinental Exchange (also known as ICE) and S&P. Though the CHIPS office and OCED are focused on specific industries, they could also support upstream commodities that are critical to those industries. Given the importance of graphite to the OCED’s programs (advanced nuclear, carbon capture, batteries), it would be worthwhile for it to set up a lending facility or insurance program for domestic graphite producers. CHIPS could consider the same for porous carbon, a key input for semiconductors. If we’ve decided that semiconductors are key to our economic and national security strategy, ensuring steady access to the commodities necessary for their production is critical.

Finally, other interventions are worth considering, even if they wouldn’t be ideal crisis-prevention techniques. The Department of Treasury will shortly finalise its rule for the 45X tax credit, which provides a 10 per cent credit on the costs of producing refined critical minerals. The proposed rule doesn’t allow producers to include the costs of purchasing raw unrefined products in the credited amount, even though Congress included no such limitation when it passed the law. This could force refiners to chase the lowest-cost raw materials, often produced in China. Treasury should at least explore including the costs of purchasing raw ore domestically (and ideally, among allies) to facilitate demand and help secure our supply chain.

Lending can also be structured to mimic the effective price-insurance provided by acquisition authorities. The Loan Programs Office (LPO) at DOE can provide

non-recourse lending to producers, which could dramatically limit the risk associated with investment. Other agencies could support lending to build the infrastructure necessary for a robust liquid market for many of these commodities. The Development Finance Corporation (DFC) could support resilient global supply chains while supporting economic development. Indonesia, which has significant mineral reserves, has voiced an interest in building its domestic refining capacity as well. In a high-interest rate environment, DFC lending could offer affordable loans in exchange for them serving as “trusted suppliers” and maintaining capacity to surge production if necessary. A similar approach could be taken to maintain the supply of refined fuels. The recently-completed Dangote refinery in Nigeria is purchasing American crude oil, [described as](#) “a sign of just how competitive American barrels have become in the global market.” The DFC could partner with multilateral agencies like the African Finance Corporation (which [already](#) provided \$300mn in capital to the project) to ensure the refinery has affordable debt to maintain and expand spare capacity in the event of a disruption that requires a surge in production.

These are all actionable proposals, but the key is that the executive branch builds a robust, multi-agency strategy to reduce the economic and national security risks associated with our competitors’ domination of key commodity markets.

Regardless of the avenue of implementation, an ambitious vision for a Strategic Resilience Reserve – coupled with robust and flexible authorities – can reduce the likelihood of future commodity shocks, while improving our capacity to respond when they do occur.