



## Employ America Research Report

# Making the Market: DOE Can Secure Our Supply Chain with Financial Innovation

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## Introduction

Despite the unprecedented “supply-side” investments included in the IRA, IIJA, and CHIPS, demand-side uncertainty and price volatility may prevent commodity producers from making full use of these policies. Commodity extraction projects have long lead times and high up-front costs, which make them uniquely sensitive to changes in commodity prices. Investing in production involves betting on future prices, unless producers can hedge away this risk by selling their exposure in financial markets. Unfortunately, since producers lack fast and affordable options for hedging their exposure to future price uncertainty, the threat of bankruptcy due to a crash in commodity prices continues to limit investment in new productive capacity.

**Given the centrality of many new and relatively illiquid commodities to the decarbonization transition, it is critical to build markets where producers can access affordable hedges against price volatility, and where other participants will affirmatively “buy the dip” in order to manage supply-related price declines and keep critical producers investing in capacity.**

The federal government can and should play a central role resolving this issue by using its lending tools to alleviate relevant market failures and secure supply chains in the process. To do this, the Loan Programs Office (LPO) of the Department of Energy should help build and support the financial and market infrastructure necessary for providing sufficient and sufficiently affordable hedging opportunities for producers of critical minerals. Policy action could also provide overall liquidity support for this new market, ensuring that producers can find counterparties to help limit extreme and unnecessary price crashes. Without this support, market instability may yet prevent producers from accessing the full benefit of enacted policy support, thereby limiting long-term expansion of capacity and corresponding decarbonization.

Existing tools provide avenues for government support. First, loan guarantees

can be used to support exchanges like the Chicago Mercantile Exchange (CME) to establish physically cleared benchmark contracts in critical minerals and other novel commodities. Secondly, providing purpose-built loan guarantees to market makers will build market liquidity and dramatically lower the costs of hedging price volatility for commodity producers. Together, these strategies will support the establishment of a standardized market while ensuring its use—much like LPO’s recent guarantee for [Project Hestia](#), which supported household access to a virtual power plant (VPP) while building distributed energy resources and other infrastructure to build out the VPP itself. Through such a transaction, the LPO could preserve public interest by leveraging private markets and capital in form, while substantively delivering public governance of strategic reserves.

## Analysis

For enacted policy to be maximally successful, it must be able to operate through market channels. This means closely understanding the limitations of existing markets as well as the impact of those limitations on producers in targeted sectors. In the case of domestic critical minerals and other decarbonization commodities, underdeveloped markets and extreme price volatility limit the incentive to invest, even with the substantial support provided by the IJJA and IRA.

Without mechanisms that help consumers and producers alike by stabilizing prices and providing hedges to producers, it is unlikely that we will see sufficient capacity built out to address our decarbonization needs. In liquid commodity markets like crude oil, the presence of market makers can help producers (and others across the value chain) use benchmark financial contracts to hedge away unwanted risk, and focus more closely on core competencies. Unfortunately, most critical minerals markets are not as mature. Hedging away price risk is costly, both financially and in time. Even when firms can hedge through long-term offtake contracts, they are imperfect at best. **The environment for innovation is ripe—with the right policy, the federal government could secure greater production and increased capacity by acting to lower the costs and frictions that hinder producers looking to hedge price risk.**

### The Boom and The Bust

Commodity markets are notoriously boom-bust, with frequent price crashes due to periods of temporary oversupply. However, these periods of oversupply put producers out of business and lead investors to reduce investment in capacity until the glut has been taken up. In the current context, producers are vulnerable to two factors which could ultimately frustrate existing policy and limit investment: (1) excess supply continuing to drive the current low-price environment; and (2) inadequate financial market depth – in terms of instruments and liquidity – for producers to sufficiently hedge against future price risk.

As we've seen this year, falling prices have led critical mineral producers to delay or cut back investments in capacity and production. Albemarle, the world's largest lithium producer, [reduced](#) its capital expenditure budget by more than 10%. In real terms, this strategy has included a decision to defer investment on a technology park and a \$1.3bn lithium refining plant in North Carolina. Pilbara Minerals, an Australian spodumene producer, announced that it's unlikely to pay an interim dividend for the first half of fiscal year 2024 to preserve its balance sheet, a sign of distress. As was reported:

*"analysts anticipate that Australian lithium miners will continue to curtail supply in the near term due to uncertain prices" and "that projects may face delays, with a particular impact on unfunded greenfield projects. They also foresee more higher-cost and pure-play lithium producers exiting the market or postponing their projects due to the current challenging conditions."*

This problem is unlikely to remain contained to Australian markets and could easily extend to projects like the Piedmont mine in North Carolina – which is intended to be a [major source](#) of supply for the Tesla gigafactory in Texas – or the Thacker Pass mine in Nevada, which was [recently awarded](#) a \$2bn loan commitment from the Department of Energy's (DOE) Loan Programs Office (LPO).

And the situation in lithium is hardly unique among critical minerals markets. The cobalt market has seen a price crash caused by overcapacity in China, which has led producers to [curtail investment](#). The value of these investment projects is dropping across a range of metals involved in battery production. If this dynamic continues, it may precipitate a possible [wave of takeovers by Chinese firms](#) in a repeat of a market episode from the late 2010s.

### **Getting From The Short Term to The Long Term**

But if we expect strong demand in the long term, why should we worry about demand certainty now? After all, a wide range of clean energy technologies – from electric vehicles to grid storage batteries to solar panels – all rely heavily on these minerals as necessary inputs.

The problem is twofold. First, even a long period of rising demand can still be interrupted by periods of overcapacity where prices plunge, precipitating a premature market shakeout or consolidation. Relatedly, when prices crash in less mature markets, like lithium or cobalt, the limited access to leverage means there are few participants willing to put up the liquidity to "buy the dip." Without these key players, prices may stay lower for longer as producers wait out the eventual return to more "normal" pricing that typically involves an abrupt price spike in the process.

The second leg of the problem is even more pernicious in the long run. These price crashes also persuade producers to underinvest in capacity. Whereas underproducing in a tight market only implies suboptimal profits – failing to take advantage of a good situation – oversupplied market conditions regularly push producers to insolvency and consolidation. This problem is even worse in situations when volatile patterns of technology adoption drive sudden changes in demand.

Producers need to manage their risks on both sides. They must work to both ensure their long-term financial viability, but also secure adequate capital to undertake their projects—lenders often require a certain level of risk mitigation before signing off on investments.

Unfortunately, the cost to manage price risk is currently quite high. Producers try to secure offtake agreements but doing so takes time, and the existing market of purchasers is relatively thin. While benchmark contracts do exist, those in Western jurisdictions are not physically cleared at a point of storage. This means that the instruments are purely financial – buyers do not actually receive the physical commodity. Since producers ultimately need to move product to keep paying wages and operations going, these contracts are of limited utility for hedging purposes. The only benchmark financial contracts deliverable to physical storage are in China and are highly problematic for a number of reasons.

Whether they come as offtake agreements or as transactions linked to a financial exchange—these current contracts are generally linked to Chinese or South Korean prices. This exposes American producers to the risk that a localized supply glut in Asia crashes the value of their offtake contracts, even outside Asian markets. Purchasers are also naturally incentivized to get the lowest price possible—good for them but not ideal for producers looking to earn a return on their significant capital investment. These factors all result in a patchwork of bespoke, bilateral contracts, insufficient to bring necessary production online and with limited transparency about the market's exposure to price risk.

### **Making Markets With Market Makers**

In deeper commodity markets, the (sometimes imperfect) solution is the market maker. Rather than buying and holding based on long-term convictions about price, trading houses like Cargill, Glencore, or Vitol act as market makers, maintaining open positions buying and selling the same contract. This allows them to take advantage of the mismatch between producers and consumers while providing market liquidity in the short term. In mature markets, benchmark contracts simplify market-making activity.

Trading houses assume the risks associated with physical trading and delivery in

exchange for the premium they can extract from the spread – the difference between the prices at which they buy and sell the commodity or its contracts. They also act as nonbank financiers by signing longer term offtake agreements for production that is risky both in terms of price and delivery in exchange for prepayment funding.

Prior to the 2008 global financial crisis, big banks also traded heavily in these commodities, and the ability to finance the trading with debt was lucrative and encouraged extensive investment in the sector. However, changes in regulation and market dynamics have dramatically reduced bank participation in commodity markets over the past decade and a half. This matters because it means banks have less readymade infrastructure and less institutional knowledge on the management of commodity market-making infrastructure. This has left frontier markets like those for critical decarbonization minerals immature, underpopulated and vulnerable to sharp and prolonged price crashes without market makers willing and able to step in.

Enabling more “market making” activity in immature commodity markets would offer a means for producers to hedge price risk, which in turn would help bring more production online. Encouraging the participation of more intermediaries with longer term views on market balances will help, but **the ability of intermediaries to perform that function is ultimately limited by the cost of capital they face in doing so.** If that function is funded entirely with equity, and cannot be hedged with exchange-traded products, the high cost of capital for these activities will persuade participants to deploy a correspondingly small volume of capital. This limited involvement limits the shock absorbing capacity provided by intermediaries and translates into much wider and more violent market fluctuations. Speculators do not even enter this picture because they cannot get involved without benchmark contracts and exchange traded hedges that match physical demand for hedging purposes. If mere participation in the market requires storage capacity, vessels or a mine, the pool of parties who can absorb offloaded risk is very limited.

We have seen this issue play out already in lithium markets as well. A number have been deferred recently, and in one particular case in Australia financing offers were withdrawn due to price estimates provided by a consultant. With limited long term capacity in the market to absorb the risk of substantial changes to spot price, the risk of sudden stop in funding is high. This brings along the risk of short term supply and demand imbalances, which can lead to acute corporate distress. The role that policy can play here is to ensure sufficient intermediary capacity in the market to deal with these periods of distress by providing term funding on tight terms to market makers tasked with stabilizing demand and spot prices. If followed, this approach to policy would lead to greater market stability and more accessible financing for critical mineral projects going forward.

Furthermore, these intermediaries would support the financial innovation necessary to reduce the costs associated with securing insurance against price risk. Whether by establishing and supporting new benchmark indices through trading, or by designing low-cost frictionless auction systems like the [recently conducted](#) MetalsHub auction in Australia—these intermediaries could dramatically reduce the cost for producers to secure price insurance for their projects.

### **Building On Previous Success**

Government support for market making activities would be a novel policy, but it follows from a few principles that have already shown success in the past.

We have evidence that physical stockpiles of specific commodities can be used to address market dislocations in the example of the Biden Administration's recent use of the Strategic Petroleum Reserve. The Russian invasion of Ukraine created significant uncertainty which drove a spike in near-term oil prices while leaving market-implied long-term prices relatively unaffected. The SPR released oil to market, easing upward pressure on spot prices. At the same time, to support domestic production alongside this stabilization role, the SPR has also begun to [issue](#) fixed-price forward contracts to [put a floor under prices](#) and reduce demand uncertainty.

This same principle can be applied to critical mineral markets, but first requires the establishment of market infrastructure and benchmark contracts supported by physical commodity reserves as well as the participation of buyers and sellers. For policy to play a stabilizing role, it has to first build out the market to stabilize. But the underlying economic principle is the same.

We also have evidence of the ability of private market makers to act as agents in the context of market stabilization policy in the case of the primary dealer banks which transact with the New York Fed in the implementation of monetary policy. In order to secure orderly market functioning, the federal government works directly with private market makers in the form of specific regulated trading desks at specific banks. Working directly with commodity trading houses to establish specific regulated desks to encourage market participants to trade these new financial instruments would extend the same principle into the target domain from an institutional design perspective.

## **Proposal**

Given that certainty of stable demand amidst turbulent pricing is a necessary condition for further productive investment, the federal government's tools should be used, where possible, to support demand certainty. In an ideal world,

the federal government could manage the demand uncertainty and volatility challenges with a “[Strategic Resilience Reserve](#)” as we’ve previously written about. Such an entity could have an acquisition authority broad enough to engage in contracts directly with counterparties or trade on exchanges to mitigate price volatility as well as physical clearing facilities.

Absent that, where lending and loan guarantees are the most common tool for the relevant agency, making affordable leverage available to market makers is a suitable intervention to provide demand side support. The Loan Programs Office at DOE is equipped to make such an investment, through the 1703 lending program.

There are many design questions that are flexible, including what type of entity would be supported with lending (direct to an exchange like CME, to a trading house, or some other entity), what type of restrictions and covenants would be placed on the entity to carry out the goal, how funding would be structured to ensure compliance with the authorizing statute of 1703 in addition to laws like the Anti Deficiency Act. These are all challenges and questions that would be solved through the application process. To provide some clarity, here’s one rough structure that could work.

- From an execution perspective, the simplest option would be LPO guaranteeing lending for an entity like the Chicago Mercantile Exchange (CME) to establish benchmark, physically-cleared financial contracts. This would incentivize market participants to bring liquidity to new markets.
- To accelerate adoption of the technology and ensure domestic producers were supported through the manufacturing process, LPO could also guarantee lending for a market making entity. Doing so would dramatically improve the likelihood of long-term viability for the benchmark contracts.
- LPO would guarantee a loan from a bank, which would then issue a revolving credit facility to “CommodityVolCo LLC” – a special purpose vehicle with a 20% equity investment from the owner or owners (a requirement for participation in the LPO program). That entity could be owned in part by a market maker, but could then provide the demand necessary to justify CME establishing the appropriate benchmark contracts described in the previous bullet. CME could also participate in ownership and use the proceeds to build out the benchmark contracts.
  - o The broad purpose of the SPV would be to support manufacturing in the clean energy supply chain. This would be done by supporting projects coming online by using technological innovation in financial contracting to reduce the cost of hedging against risk—a necessary part of bringing

manufacturing production online.

- To fulfill this purpose, the entity would sell put options to producers to help them hedge their risk. More broadly, the facility could also be used to buy, stockpile, trade, and otherwise engage in commodity markets in a manner that boosts resilience in the clean energy supply chain.
- o Covenants would be necessary to ensure certain public energy policy goals were executed:
  - The entity would have a pre-determined strike price at which it would purchase raw material on the spot market to stave off a price drop to unsustainable levels for future mine production.
  - To protect from price pressure on the upside, LPO could also require what amounts to a call option to LPO at a given strike price. For example, spodumene prices as recently as last year had hit highs of \$6,000/ton, before dropping to nearly \$800, where mines are no longer viable. The SPV could be required to release a certain amount of product into the market once prices hit \$2,000, and have further thresholds at \$2,500, and \$3,000, to limit the spot price putting pain on refiners.
  - LithVolCo could sell to US refineries and plants which would be on a list of approved trading counterparties subject to DOE approval.
- To manage risk and have a “reasonable prospect of repayment” – the entity would have to set up position sizing limits.

## Legal Statement

LPO could guarantee lending through the Innovative Supply Chain program under its Title 17 lending authority. The authority comes from 42 U.S.C. § 16511 et seq., which established the program and was amended in the bipartisan infrastructure law (the Infrastructure, Investment, and Jobs Act) to include support for critical minerals projects. Broadly, the statute allows support to projects that:

*“employ new or significantly improved technologies as compared to commercial technologies in service in the United States at the time the guarantee is issued, including projects that employ elements of commercial technologies in combination with new or significantly improved technologies.”*

Per the implementing regulation, currently an interim final rule, “projects must



employ a new or significantly improved technology in the manufacturing process.” New or significantly improved technology is defined as a technology that “has only recently been developed, discovered, or learned; or involves or constitutes one or more meaningful and important improvements in productivity or value, in comparison to commercial technologies used in the United States.”

In the context of our proposal and critical minerals production, as described earlier, the value improvement is the cost reduction that comes from employing the technological solution that is the financial contract—either through a benchmark at CME, or through an auction platform. Metalshub [recently conducted](#) an auction for Albermarle to sell spodumene to the market, with prices clearing at a much [more sustainable level](#) than the equivalent on the Guangzhou Futures Exchange. Given that without a degree of demand certainty in the future at a viable price, manufacturing simply will not occur, generating offtake agreements is a necessary but high-cost, time-consuming part of the manufacturing process. Reducing that cost would be a meaningful value improvement.

LPO has used a similar authority recently, but in the context of innovative clean energy projects, as demonstrated by the loan guarantee for Project Hestia for the creation of Virtual Power Plants (“VPPs”). By supporting VPPs, as exemplified by the commitment to guarantee a loan to Sunova for up to \$3bn, LPO is capable of supporting not just the physical energy infrastructure but also the technological and financial infrastructure that undergird the physical infrastructure. While the project will support the creation of DERs and a lot of physical infrastructure, the technological hook is the software that will be provided to over 40,000 households to connect them to the system.

Given the positive value addition that a benchmark contract would provide to the manufacturing process, an LPO loan guarantee would be well-within the bounds of existing law and regulations.

## Conclusion

Decarbonization requires the direction and mobilization of trillions of dollars of capital, public and private. The transition away from fossil fuels to cleaner sources of energy is likely to be a bumpy one—with newer commodities poised to play a central role. It is imperative that policy ensure they are produced in abundance and with as few economic disruptions as possible. Unfortunately, the markets for many of these key inputs are immature, prone to volatility, and not oriented towards abundance.

Policy, working through private channels, can play a central role in accelerating these markets and ensuring sufficient capital moves the capacity frontier for key

commodities. We propose the DOE utilize its lending authority at the LPO to build out the market infrastructure necessary to increase production.

Providing the leverage necessary to build out benchmark financial contracts to allow market makers to bring liquidity to the market would help producers and others across the value chain and bring stability to a volatile global market.