Hedging Battery-Material Price Risk: The Case of Lithium Compounds

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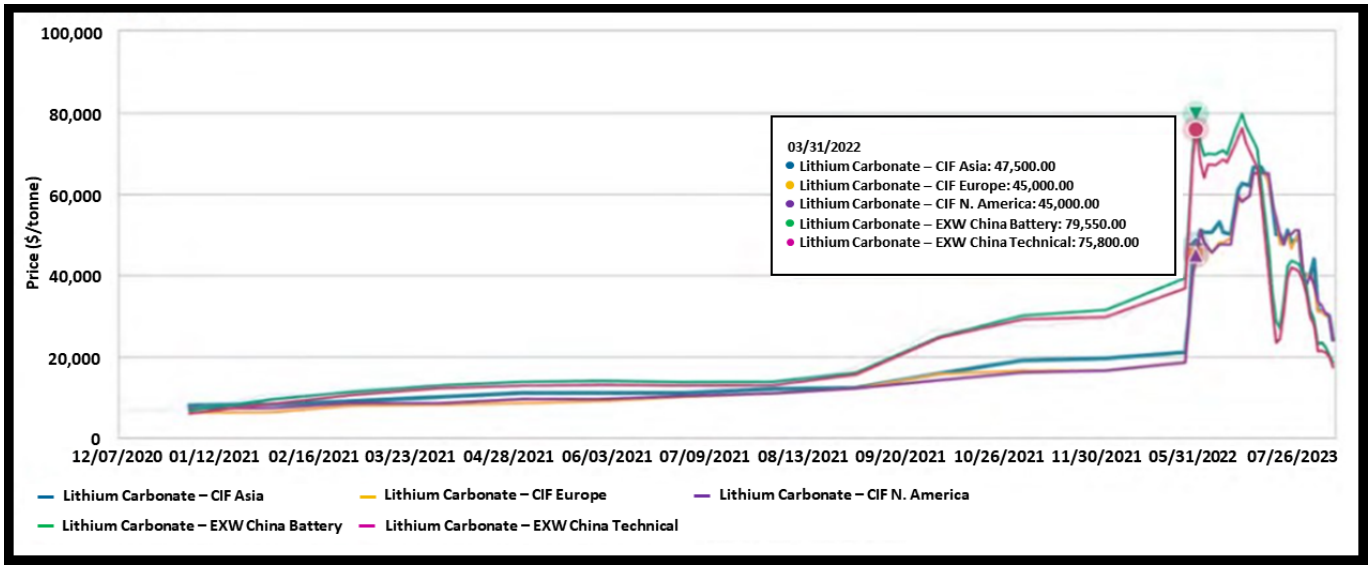
Introduction

Amongst other factors, the success of the clean-energy transition currently relies on lithium. With their distinctive properties, lithium compounds are a crucial component in lithium-ion batteries, electric vehicles (EVs), and energy storage systems. There are currently no foreseeable alternatives to lithium's use in modern battery technology. But as shown in Figure 1, lithium-compound prices have been on a rollercoaster. And Citi Research (2024) notes that "[l]ithium price volatility is set to continue in 2024[,]" especially given that "[l]ithium is extremely sensitive to shifts in fundamentals." Can this price risk be hedged by industrial consumers, thereby facilitating the scaled-up use of one of the essential materials in the energy transition? This article will briefly examine this question solely from a U.S. perspective, and the answer is promising.

Figure 1
Lithium Spot Pricing 2020-2023



Source: Gordon (2024).

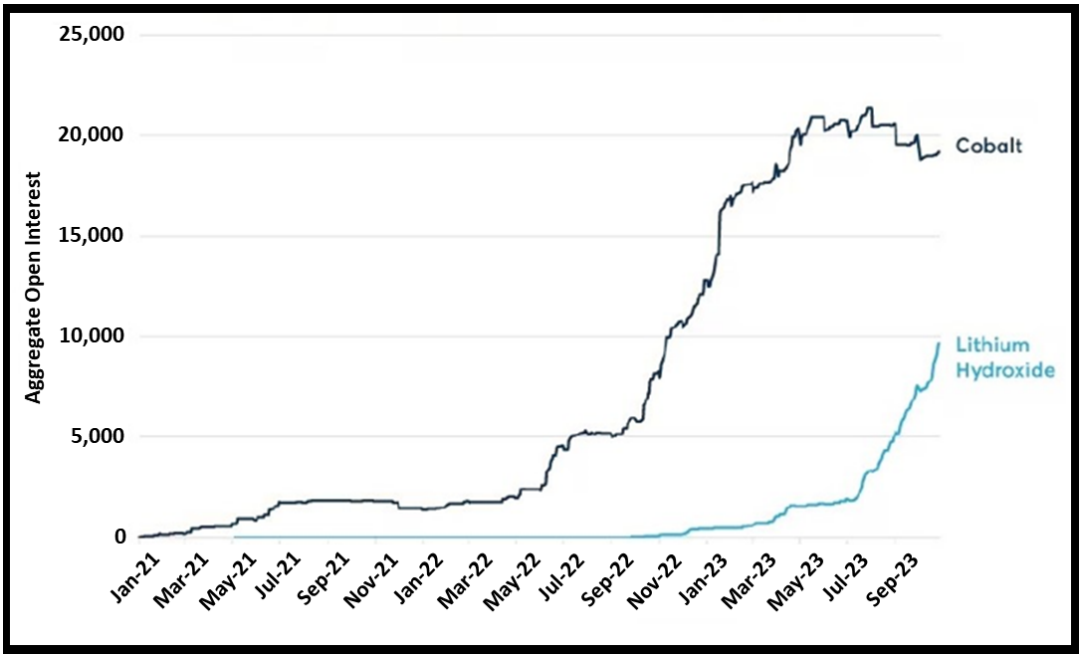
CME Group's Lithium Hydroxide Futures Contract

While the London Metal Exchange's cash-settled, battery-grade lithium-compound contract currently shows zero current activity, the CME Group's lithium hydroxide contract started gaining traction in July

2023, as seen in Figure 2. That said, the CME contract's open interest is currently at the lower end of viable contracts, as illustrated in Figure 3 in the next page.

For completeness, we note that the CME contract is "financially-settled based on the lithium hydroxide assessment published by Fastmarkets, which reflects the cost, insurance and freight (CIF) spot price in China, Japan and South Korea, where the majority of battery manufacturing capacity is concentrated," as explained by CME Group (2021).

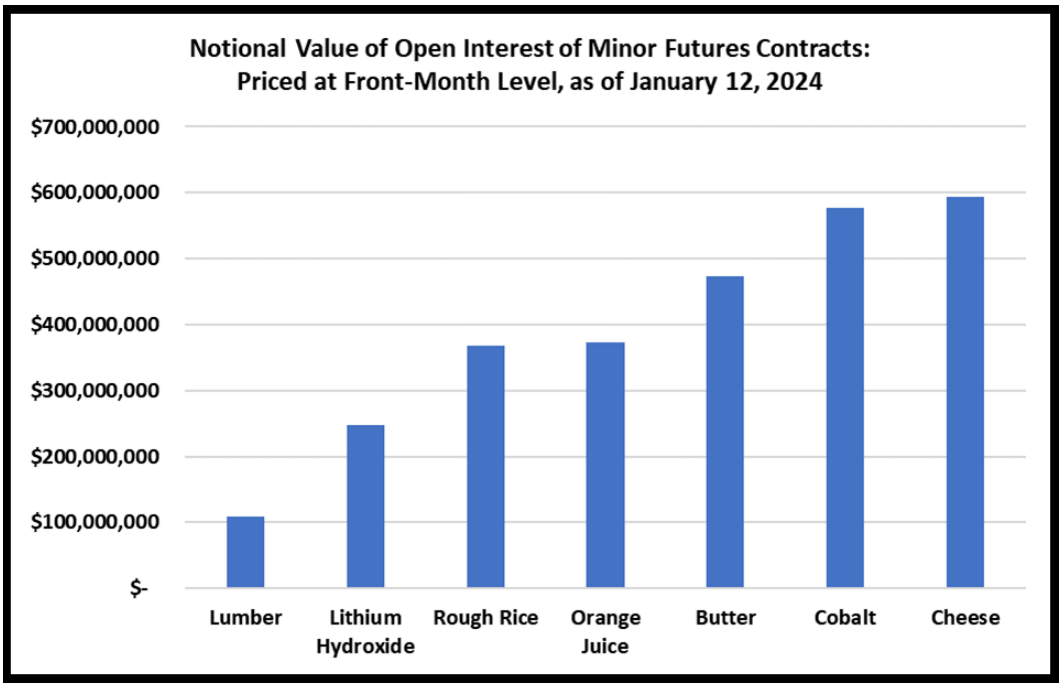
Figure 2
Cobalt and Lithium Hydroxide Aggregate Open Interest



Source: Norland (2023).

Note: As of January 12, 2024, cobalt's aggregate open interest was 19,398 contracts while lithium hydroxide's open interest was 16,604 contracts.

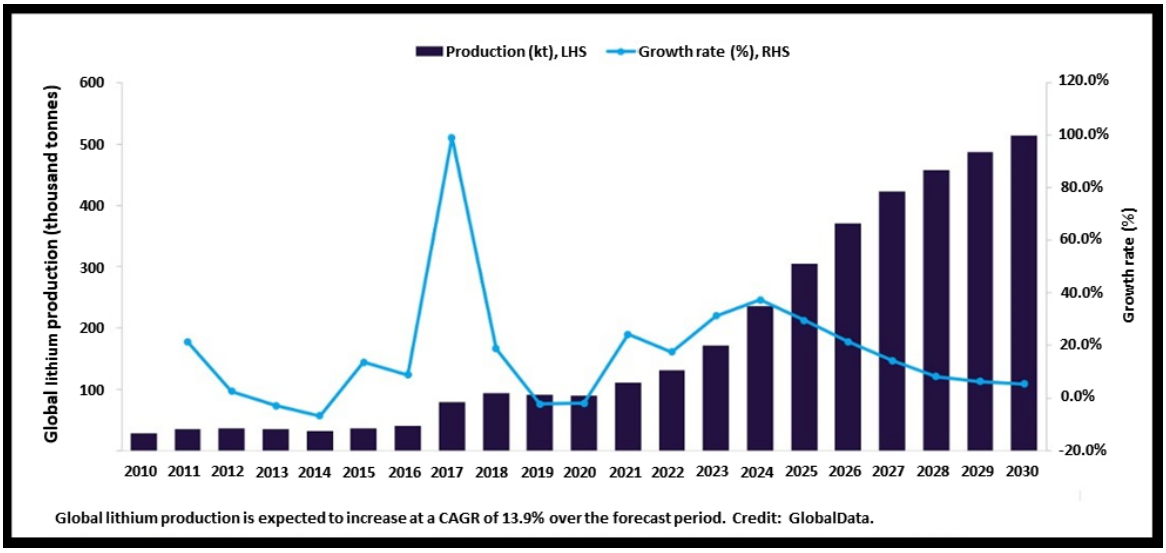
Figure 3
Notional Value of Open Interest of Minor Futures Contracts



Sources: Premia Research LLC, CME Group data.

Fizaine (2018) had warned that futures contracts have not succeeded when the market size has been insufficient. In the past, the probability of success for a lithium futures contract, according to his model, was as low as 0.39% (that is, lower than 1%.) But the growth in the production of lithium, in line with its crucial role in battery technologies, has evidently made such a prediction obsolete. Figure 4 on the next page provides the historical growth in lithium production since 2010, along with plausible forecasts.

Figure 4
Global Lithium Production, Including Forecasts



Source: Mining Technology (2023).

Market Structure

A sufficient market size is not the only factor in determining whether a futures contract can be successful. There must also be a commercial need for hedging *and* a pool of speculators must be attracted to the market (Till, 2016). Regarding the former factor, Daisy Jennings-Gray at Benchmark Mineral Intelligence noted in Devitt and Liu (2024) that "[l]ithium hedging strategies are becoming increasingly important to … automaker procurement teams, given the (price) volatility … over the last few years." If there is not a natural producer short to be on the other side of long-side demand, then speculators (or non-commercials) would need to be induced to enter the market on the short side. Petzel (2001) helpfully explains how this can be achieved. For those "who might supply speculative capital, one way to minimize risks is to enter spread positions across markets. By monitoring the basis between related markets, traders are more likely to present bids and offers and supply the necessary liquidity to a new market without incurring too much risk," he wrote.

Let us examine the current market structure of the CME contract in order to understand the interplay of commercials and noncommercials. This understanding will assist us in making predictions on the current and future success of the contract.

The U.S. Commodity Futures Trading Commission (CFTC) issues the Disaggregated Commitments of Traders (DCOT) report. This report provides the breakdown of open interest between pure handlers of commodities and other market participants. Specifically, the DCOT report includes the following categories of large traders: (1) Producer/Merchant/Processor/User, (2) Swap Dealers, (3) Managed Money, and (4) Other Reportables. Let us examine a recent DCOT report that includes the CME contract. See Table 1 on the next page.

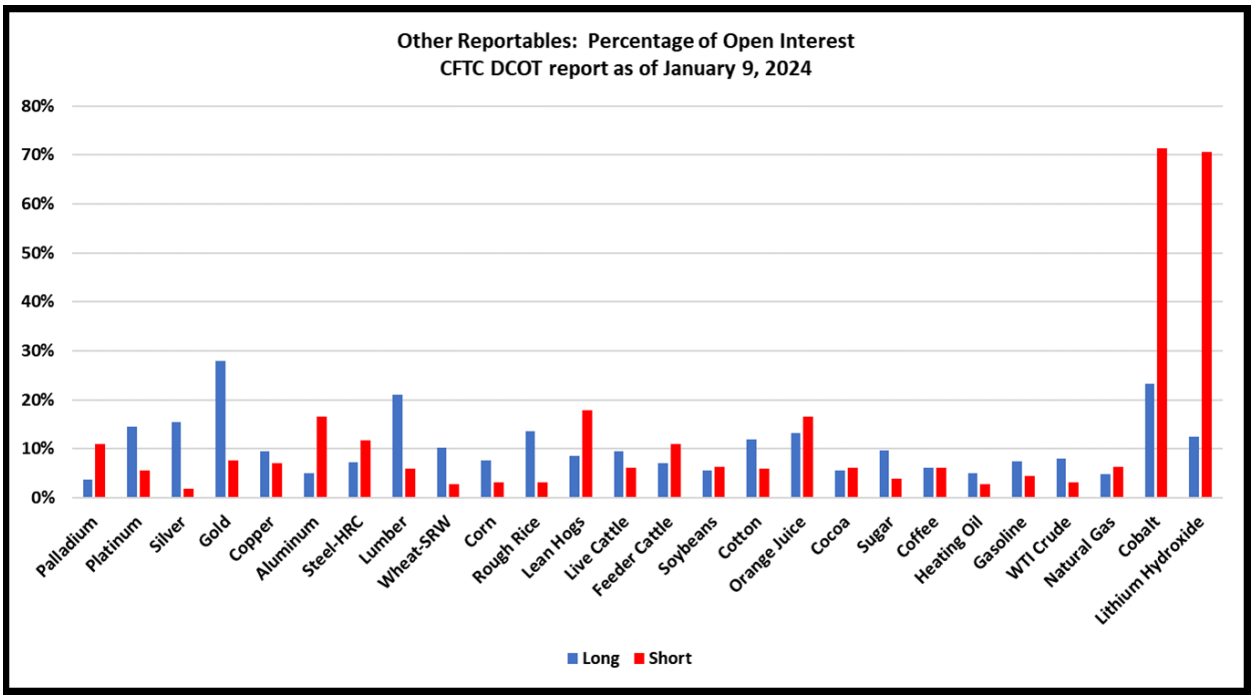
Table 1
Excerpt from the DCOT Report of January 9, 2024: the CME's Lithium Hydroxide Contract

		Producer/Merchant/ Processor/User		Swap Dealers			Managed Money			Other Reportables			Nonreportables	
	Open Interest	Long	Short	Long	Short	Spreading	Long	Short	Spreading	Long	Short	Spreading	Long	Short
Lithium	15,467	2,615	1,856	5,053	364	4	5,733	1,670	-	1,929	10,940	-	133	633

Source: CFTC (2024).

Given that lithium-compound contracts are not currently part of a commodity index strategy or Exchange Traded Fund, let us assume that the Swap Dealers' net position is due to banks hedging over-the-counter swaps that were provided to consumer clients. In that case, the DCOT report would be showing the effective commercial position as being net long. Managed Money is also net long. *Other Reportables are net short*. A noteworthy observation is that the fraction of open interest due to Other Reportables is unusually high for battery-material contracts, as compared to other exchange-traded futures contracts. This observation is illustrated in Figure 5.

Figure 5
Other Reportables



Sources: Premia Research LLC, CFTC data.

There is evidently an insufficient amount of short hedging by commercials to balance the structural longs. It would make sense that producers would be absent from the futures market because the global lithium industry is consolidated in nature (Precision Reports, 2023; Mordor Intelligence, 2024). As noted by

Kokontis (2014), concentrated industries do not welcome the visible prices that come with the launch of a new futures contract. Given that the non-commercials in the "Other Reportables" category are providing the futures contracts' structural short, how are they, in turn, hedging this exposure?

GFEX's Lithium Carbonate Futures Contract

According to industry sources, the short CME exposure is effectively being hedged via long positions in a related contract: the physically-settled Guangzhou Futures Exchange (GFEX) lithium carbonate contract in China. For example, Devitt and Liu (2024) wrote that "[h]elping the CME's contract gain traction is the … GFEX futures launched in July, which boosted arbitrage trading. … GFEX's contract is for Chinese firms only, but overseas firms can trade it via local brokers or through a China-registered entities."

By way of explanation on lithium hydroxide versus lithium carbonate, CME Group (2023) noted that "[l]ithium hydroxide and lithium carbonate are closely related but have a different chemical composition … Lithium hydroxide is often prepared by chemically treating carbonate, meaning that creating hydroxide requires an additional manufacturing step in the supply chain." Further, Fastmarkets (2023) explained that "[l]ithium hydroxide is [used in] … nickel-rich batteries such as NCMs (nickel cobalt manganese oxide), whereas lithium carbonate is used in LFP (lithium iron phosphate) batteries."

In October 2023, Li (2023) noted that the "most-active Chinese lithium carbonate contract … [was] at a level that works out to a roughly 35% discount to lithium hydroxide futures in the U.S." Continued Li (2023), "Asian funds in Hong Kong, Shanghai and Singapore have taken advantage of the price difference by buying Chinese futures and selling US ones ... [along with] … more involvement from Western traders …" Apparently, it is these funds that are the Other Reportables, and the reason for the CME contract's unusual market structure is that uniquely (at this point), the CME contract has been a relative-value trading opportunity for a much larger Chinese contract. The open interest for the Chinese lithium carbonate contract is shown in Table 2 on the next page. That the Chinese contract has become successful underscores "how China is seeking to … [gain] greater control over trading in [those] … metals [that it sees as] critical for the 21st Century," as reported by Dempsey and Lockett (2023).

Table 2
Open Interest of the GFEX Lithium Carbonate Contract

Open Interest of the GFEX Lithium Carbonate Contract
Across Contract Months as of January 19, 2024

Contract	Open Interest
lc2402	7,553
lc2403	17,277
lc2404	37,825
lc2405	11,357
lc2406	6,135
lc2407	155,078
lc2408	9,805
lc2409	7,952
lc2410	4,174
lc2411	6,732
lc2412	611
lc2501	68
Total	**264,567**

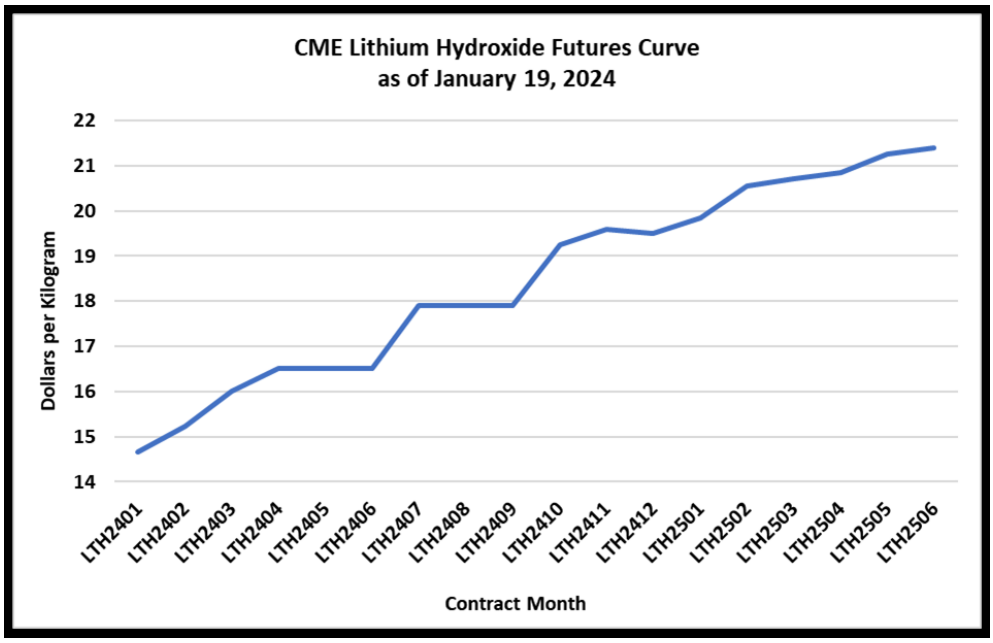
Source: GFEX (2024).

Reviewing How Spread Traders Operate

In review, if consumers desire to be structurally long CME lithium (hydroxide) exposure, then there needs to be a source of a structural short. From examining the DCOT report, producers are not playing this role. Therefore, the CME Group contract would need to be bid up to the level that funds (that are set up for such a trade) would be comfortable in going short that exposure against long positions in the GFEX lithium (carbonate) contract, presumably taking into consideration the cost of the conversion from lithium carbonate to lithium hydroxide. The spreading activity thus noted is analogous to what happens when airlines desire to go long deferred jet fuel, as covered in Till (2006). Swap dealers provide this exposure to the airlines and then hedge with long positions in deferred heating oil, a correlated proxy for jet fuel. Spread traders would then sell the swap dealers the deferred heating oil as long as the spread traders can buy deferred crude oil at levels that provide a great entry point for shorting the heating oil crack spread.

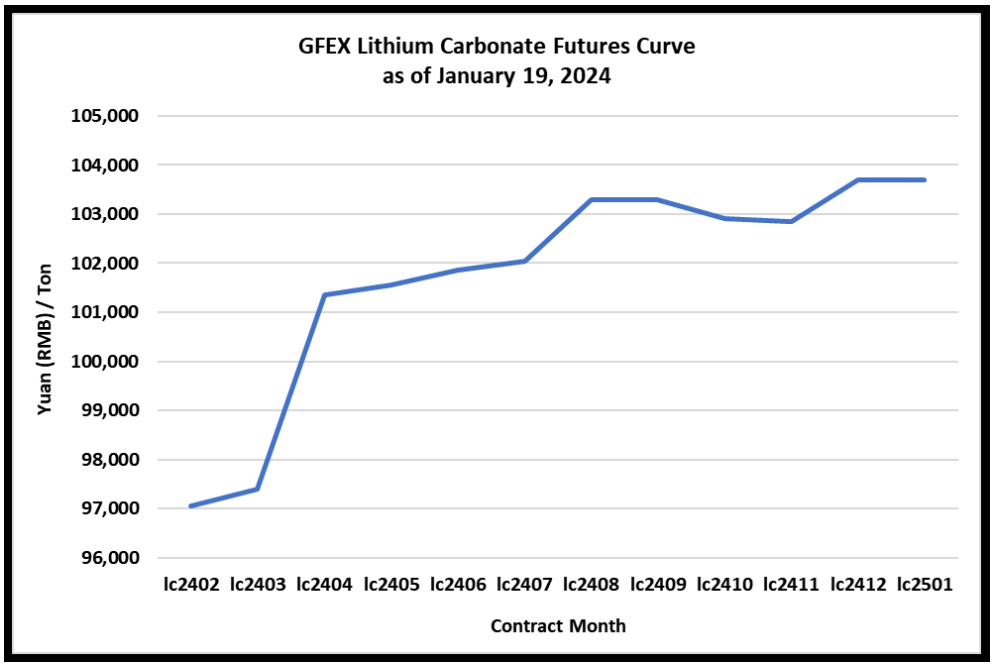
One nuance of taking a position in the GFEX vs. CME spread is to examine both contracts' term structures to find the most advantageous entry point within the limits of liquidity. See Figures 6 and 7 on the next page, which show that the CME lithium (hydroxide) futures curve is in contango from the September-2024-to-November-2024 contract months while the GFEX lithium (carbonate) futures curve is in backwardation from the September-2024-to-November contract months.

Figure 6
CME Lithium Hydroxide Futures Curve



Source: CME (2024).

Figure 7
GFEX Lithium Carbonate Futures Curve



Source: GFEX (2024).

Conclusion

The CME's lithium hydroxide contract potentially offers an effective hedging vehicle for lithium-compound consumers and their bank counterparties, who would be very familiar and comfortable with the CME Group's trading platform. The contract's open interest is in the bounds of a viable contract. But because of the apparent lack of involvement by producer shorts, the CME contract's growth may continue to rely on relative-value trading opportunities against the GFEX lithium carbonate contract whereby such traders would enter into short positions in the CME contract (vs. long positions in the GFEX contract.)

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