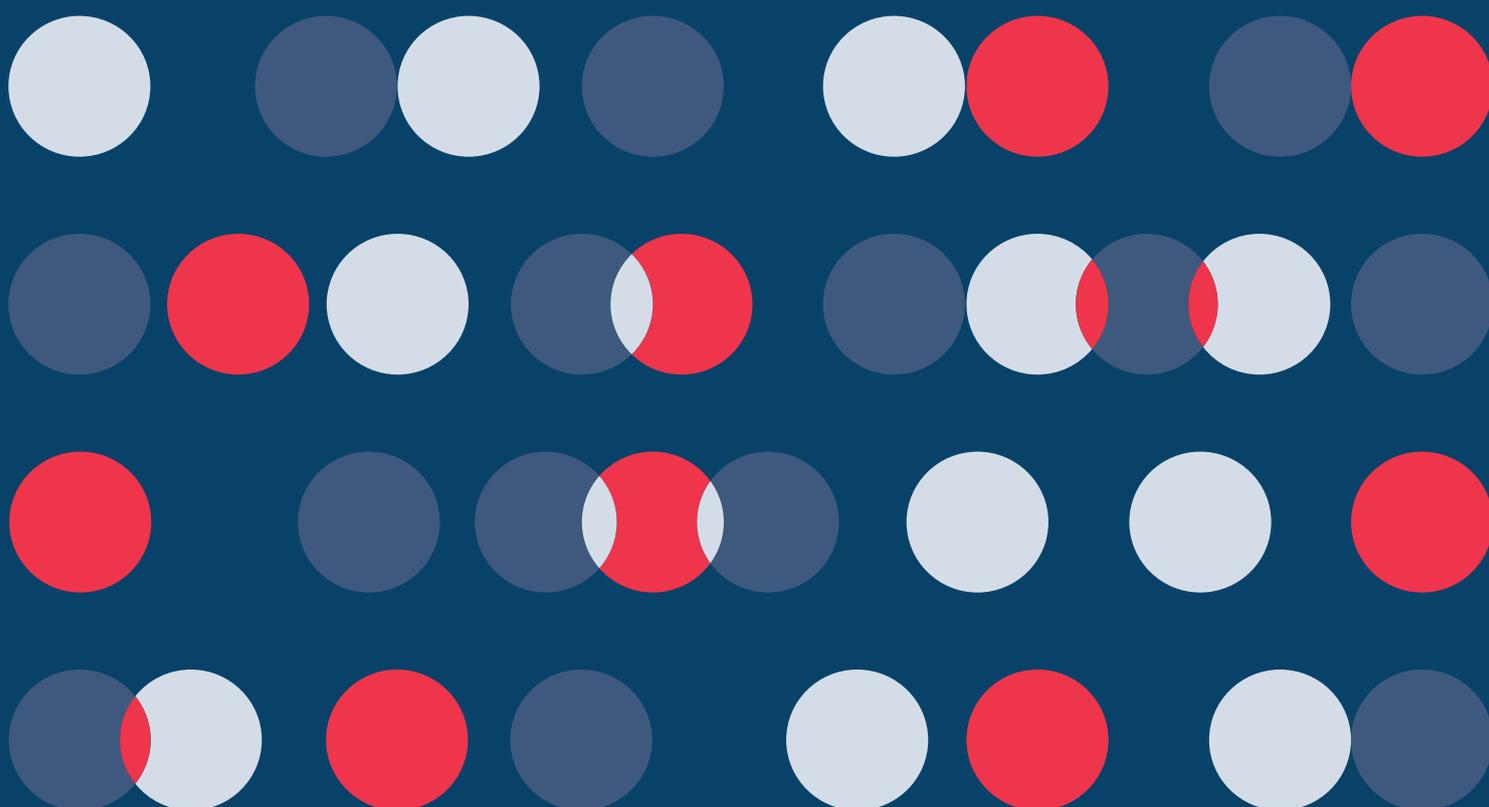


July 2020

RESEARCH REPORT

THE LONDON METAL EXCHANGE —  
THE WORLD'S INDUSTRIAL METALS TRADING  
AND PRICING VENUE



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## **SUMMARY**

This paper gives an introduction to the London Metal Exchange, a brief history, an overview of market structure, contracts traded, operations and services.

## INTRODUCTION TO THE LONDON METAL EXCHANGE

The London Metal Exchange (LME) is the world centre for industrial metals price discovery, hedging and trading. The physical metals industry — those who mine metal, produce metal and make things out of metal, together with financial participants who trade metal — use the LME to transfer or to take on price risk.

A wholly-owned subsidiary of HKEX Group, the LME provides a forum bringing together participants from the metals and financial communities to create a robust and regulated market where there is always a buyer and a seller, where there is always a price and where there is always the opportunity to transfer or take on risk — 24 hours a day.

The majority of all non-ferrous (also known as “base metals”) futures business is transacted on its three trading venues: LMEselect (electronic), the Ring (open outcry) and the 24-hour telephone market. In 2019, 176 million lots were traded at the LME equating to US\$13.5 trillion and 3.9 billion tonnes of metal.

Market participants can trade a variety of contracts on the LME including physical futures, options and cash-settled futures as well as average-price and premium contracts. Metals currently available to trade are alumina, aluminium, aluminium alloy, cobalt, copper, gold, NASAAC (North American Special Aluminium Alloy Contract), lead, molybdenum, nickel, silver, steel, tin and zinc.

Investors value the LME not only as a vibrant futures exchange but also for its close links to industry. The possibility of physical delivery via the world-wide network of LME-approved warehouses and deep liquidity makes it an attractive hedging venue for industry and provides a trusted and robust reference price. The prices “discovered” on the LME’s platforms are used as the global reference and as a basis for physical trading as well as in the valuation of portfolios, in commodity indices and for metal exchange traded funds (ETFs).

Since being formally established in 1877, the LME has sought to innovate whilst maintaining its traditional strengths and relationships. The LME remains close to its traditional users by ensuring its contracts continue to be relevant to the physical metals industry. With the recent introduction of a suite of cash-settled contracts; the expansion of the LME’s ferrous suite; the introduction of gold and silver futures; greater engagement with battery materials and electric vehicle industries; and a commitment to develop a transparent lithium pricing solution, more and more participants have the opportunity to benefit from LME risk-management tools and liquidity.

Counterparty risk is mitigated by LME Clear, the LME’s own clearing house which was purpose-built for the metals market. All LME registered trades made on the Ring, the electronic market and by telephone are cleared and settled by LME Clear.

The LME is a Recognised Investment Exchange (RIE), regulated directly by the UK’s Financial Conduct Authority (FCA). The FCA also regulates those LME members that conduct investment business. As an RIE, the LME maintains orderly markets in all its contracts, providing proper protection to investors. LME Clear is regulated by the Bank of England.

### 1. HISTORY OF THE LME

The origins of the LME can be traced back as far as the opening of the Royal Exchange in London in 1571 during the reign of Queen Elizabeth I. It was there that traders in metals and a range of other commodities began to meet on a regular basis.

Table 1 gives an account of the significant events in the history of the LME.

Table 1. Significant events in the history of the LME	
Date	Event
Early 1800s	The Jerusalem Coffee House, off Cornhill in the City of London, became the favourite of the metal trading community and it was here that the tradition of the Ring was born.
1869	The opening of the Suez Canal reduced the delivery time of tin from Malaya to match the three-month delivery time for copper from Chile. This gave rise to the LME's unique system of daily prompt dates for up to three months forward, which still exists to this day.
1877	The traders formed the London Metals and Mining Company and moved into their first premises over a hat shop in Lombard Court in the City of London. Copper and tin have traded on the LME since the Exchange was established.
1881	Membership increased rapidly and, after surpassing the three hundred mark, a move was made to a purpose-built exchange in Whittington Avenue in the City of London, where it remained for 98 years.
1903	The trading of lead began.
1914	Market closed for several months with the advent of World War I.
1915	Zinc began trading on the LME.
1939	Trading came to a virtual standstill as World War II broke out.
1963	The first European LME warehouse was authorised in Rotterdam.
1978	Primary aluminium was introduced in December of this year. The contract has since become the LME's most "liquid" (most heavily traded) contract.
1979	Nickel commenced trading on the LME.
1987	The LME became a centrally cleared and regulated exchange.
1987	The first non-European LME warehouse was authorised in Singapore.
1988	The LME becomes a Recognised Investment Exchange (RIE).
1989	The Vendor Feed System (VFS) — the first electronic price feed from the LME — was launched. In the same year, the first Japanese LME warehouse was authorised.
1991	The LME authorised its first US warehouse in Baltimore.
1992	Aluminium alloy began trading on the LME.
1994	After a period of 14 years at Plantation House in Fenchurch Street, the LME moved to Leadenhall Street in the City of London.
2000	The LME demutualised.
2006	LMEminis — small-sized, cash-settled monthly futures contracts — were introduced for copper, aluminium and zinc.
2008	The LME made a move into ferrous metals with the introduction of two regional contracts for steel billet. In July 2010, these contracts merged into a single global contract.
2010	Two minor metals futures contracts for cobalt and molybdenum were introduced.
2012	The LME was acquired by Hong Kong Exchanges and Clearing Limited (HKEX).
2014	LME Clear, a customised clearing house was built from scratch to specifically meet the needs of the metals community.
2015	The LME launched LME Steel Scrap and LME Steel Rebar, together with a suite of physically settled aluminium premium contracts.
2015	The LME moved to its current home in Finsbury Square.
2017	LMEprecious, the service offering LME Gold and LME Silver contracts for the precious metals market, was launched.
2019	The LME set out responsible sourcing requirements for its approved metal brands. HKEX London Minis were launched for aluminium, copper, lead, nickel, tin and zinc on the HKEX derivatives

**Table 1. Significant events in the history of the LME**

Date	Event
	market. Seven new cash-settled contracts were introduced for alumina, aluminium premiums, cobalt, molybdenum and steel hot-rolled coil.

## 2. WHO USES THE LME?

The LME connects physical and financial market participants to create a global pool of liquidity. These participants buy and sell LME futures and options to transfer (hedge) and take on (invest in) price risk and in that process discover globally relevant prices.

Participants on the LME include:

- Metal producers such as miners, smelters and refiners;
- Metal consumers such as industrial manufacturers;
- Merchants and physical traders;
- Banks, financial funds and commodity trading advisers (CTAs);
- Proprietary traders, algorithmic / high-frequency traders; and
- Brokers and clearing institutions.

### 2.1 Physical market participants

The LME has been helping metal producers and consumers manage their price risks since 1877. It performs this task in several ways:

- **Hedging** — Producers and consumers use the LME to hedge their price risk. The time between a physical contract being agreed and the time it is settled can span days, weeks, months and years — and in that time a lot can happen to the price of a metal. It is this risk that the physical market seeks to mitigate. Benefits of hedging include:
  - protection against price movements;
  - the ability to lock in margins and offer long-term fixed prices to customers;
  - improving budget forecasts;
  - the opportunity to turn inventory into cash or security for finance;
  - protection of physical inventory against price falls; and
  - hedging physical purchases in time of production challenges.
- **Price discovery** — The LME provides the world with daily, transparent and real reference prices. The prices are discovered using risk capital and are truly reflective of global supply and demand. The ability to hedge is dependent on these prices.
- **Price convergence** — LME physical futures contracts are settled via its global warehouse network. This is key because it means that futures prices discovered on its markets converge with (and are reflective of) the prices of physical metal.
- **Physical settlement** — Only LME-registered brands of metal that are actually used by the physical market are accepted for good delivery. This, coupled with ongoing testing and reference to numerous global standards, means its contracts are always relevant.

- **Prompt-date structure** — No other market offers such a range of prompt dates and no other market provides the metals community with such flexibility in matching and hedging their real-world needs.
- **Reference pricing** — The prices discovered on LME trading platforms are global reference prices used for valuing and settling physical contracts.

### 3. THE PHYSICAL MARKET

In times of extreme shortage or over-supply, the LME also provides producers and consumers with a physical market of last resort. This is achieved via the LME's global warehouse network.

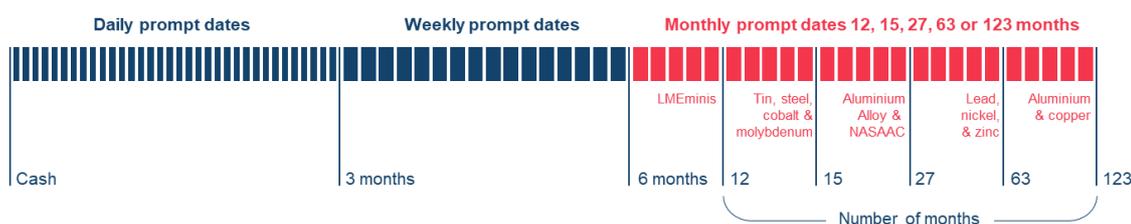
All metals stored on warrant in LME-approved warehouses are LME-approved brands from LME-approved producers, which ensures that the LME's strict rules on commodity grade, quality and shape are met consistently. The LME warehouse network complements the physical market. The possibility of physical delivery — supported by storage facilities around the world and numerous LME listed brands — results in price convergence ensuring its prices remain in line with the physical industry.

The combination of price convergence, the global reach of over 550 LME storage facilities and almost 500 listed metal brands, the fact that physical deals are negotiated using LME prices, and its high levels of liquidity, mean that the world gains reference prices it trusts.

#### 3.1 Prompt-date structure

A key feature of the LME is the unique settlement-date structure of its physical contracts and its focus on the physical market. Designed to reflect the nature and timing of bilaterally negotiated metal trades, market participants can use the LME's contracts to transfer or take on risk against metal prices every business day out to 3 months, weekly out to 6 months and monthly out to anything up to 123 months (depending on the underlying metal) — that is over 10 years in the future. The prompt-date structure from cash to 123 months is illustrated below.

**Figure 1. Prompt-date structure of contracts on the LME**



The cash date is the nearest delivery date and is two working days from the date of executing the contract. LME contracts for 3-month delivery (that is, the furthest away daily prompt) are typically the most actively traded contract on any business day. The 3-month contract is most commonly traded on the LME's electronic platform, LMEselect.

3<sup>rd</sup> Wednesday contracts are monthly futures that exist within the current prompt-date structure for all major LME contracts. These contracts only expire on the 3<sup>rd</sup> Wednesday of each month. Therefore, they are monthly futures. 3<sup>rd</sup> Wednesdays are also the underlying contracts for LME options. Up to 65% of open interest (open positions) sits on LME 3<sup>rd</sup> Wednesday expiry dates.

The 3-month contract and the uniform 3rd Wednesday contracts interact as pivotal points of concentrated liquidity within the LME prompt-date structure.

### 3.2 Calendar spread trading

Calendar spread trading, or “carry trading” is the act of buying a contract with a particular prompt date and simultaneously selling another contract with a different date. It allows market participants to adjust dates and roll positions that are due to expire. It can also be a way to hedge physical inventory or to finance stock. Financial traders, meanwhile, can buy and sell spreads in the LME’s liquid carry market to profit from changes in the shape of the forward curve.

## 4. TRADING VENUES AND PRICING

### 4.1 LME trading venues

#### 4.1.1 The Ring

**Trading hours:** 11:40 – 17:00 London time

**Open-outcry trading floor:** Liquidity is concentrated in short trading sessions known as “Rings”. There are up to 200 tradable dates per LME metal and open-outcry is the most efficient way of trading multiple dates. LME Official, Unofficial and Closing Prices are all, or in part, derived from trading activity on the Ring.

- The LME Official Price is used by the industry when entering into physical contracts.
- The LME Unofficial Price is the last bid and offer quoted during the third Ring and is a good indicator of afternoon trading. It is particularly used as a reference price in markets in different time zones.
- LME Closing Prices, also known as the Evening Evaluations, are used by LME Clear and LME members to calculate margins and mark positions to market.

#### 4.1.2 LMEselect

**Trading hours:** 01:00 – 19:00 London time

**Electronic trading platform:** It offers a range of advanced features for the trading of all LME contracts, all tailored to the LME’s unique prompt-date structure. LMEprecious trading hours on LMEselect are 01:00 – 20:00.

The LME is working on developing a new electronic trading platform to replace LMEselect as at time of print. The existing LMEsource data platform will also be enhanced to include data from all LME venues: LMEselect, inter-office telephone market and the Ring. The new trading platform will have an entirely new architecture, leveraging HKEX technology, and will bring higher performance capability, more stability, and will be even more dynamic to facilitate future development.

#### 4.1.3 Inter-office (telephone) market

**Trading hours:** 24 hours

Member’s indicative quotes are distributed via the vendor network and can be executed by telephone.

Real-time bid and offer prices are available 24 hours a day via the LME's market data services, LMElive, and from approved data vendors. LMElive provides a comprehensive view of futures and options trading with easy digital access to prices. The LME also aggregates and publishes a set of reference prices that are based on highly liquid periods of the trading day.

## 5. LME CONTRACTS

The LME is a meeting place of buyers and sellers of metal futures and options. The owner of a long futures contract has the right and the obligation to buy an underlying metal at a predetermined time in the future while the owner of a short futures contract has an obligation to sell the underlying metal in the future, unless they “close out” their positions before that date.

The owner of an option has the right but not the obligation to buy or sell an underlying metal at a specified price on or before a predetermined date in the future.

The LME provides producers and consumers of metal around the world with the means to manage their exposure to the risk created by metal price volatility.

Producers (those who sell the metal they mine and refine) are at risk of prices falling, and consumers (those who buy and make things from metal) are at risk of prices rising. Hedging against these price movements using the LME's futures and options contracts enables the metals industry to focus on their core business.

LME base metal contracts are, strictly speaking, forward contracts. This means that, unlike standard futures, profits and losses are realised at expiry, not before.

All LME contracts are traded in lots which vary in size depending on the contract type and the underlying metal.

Broadly speaking, there are two main types of LME contract — physically settled and cash settled.

Table 2 below shows the list of LME contracts as of February 2020 including how each is settled, the types of contract available for each metal and the prompt dates. (Section 5.1 below describes the different contract types.)

Contract name	Settlement type	Lot size	Contract type	Prompt dates	First traded
<b>LME Alumina (CRU/Fastmarkets MB)</b>	Cash	50 metric tonnes	Futures	Monthly prompts out to 15 months	2019
<b>LME Aluminium</b>	Physical	25 metric tonnes	<ul style="list-style-type: none"> <li>• Futures</li> <li>• Monthly Average Futures</li> <li>• LMEminis</li> <li>• HKEX London Minis</li> <li>• Traded options</li> </ul>	<ul style="list-style-type: none"> <li>• Daily: out to 25 days</li> <li>• Weekly: 3 out to 6 months</li> <li>• Monthly: 7 out to 123 months (63 months for traded options and TAPOs)</li> </ul>	1978

Table 2. LME contracts (as of May 2020)					
Contract name	Settlement type	Lot size	Contract type	Prompt dates	First traded
			<ul style="list-style-type: none"> <li>Traded Average Price Options (TAPOs)</li> </ul>		
<b>LME Aluminium Alloy</b>	Physical	20 metric tonnes	<ul style="list-style-type: none"> <li>Futures</li> <li>Monthly Average Futures</li> <li>Traded options</li> <li>TAPOs</li> </ul>	<ul style="list-style-type: none"> <li>Daily: out to 3 months</li> <li>Weekly: 3 out to 6 months</li> <li>Monthly: 7 out to 27 months</li> </ul>	1992
<b>LME Aluminium Premiums</b> US Premium / West-Europe Premium / East-Asia Premium / South-East Asia Premium	Physical	25 metric tonnes	Futures	3rd Wednesday of each maturity month, subject to trading regulations	2017
<b>LME Aluminium Premium</b> Duty Paid US Midwest (Platts) / Duty Unpaid European (Fastmarkets MB)	Cash	25 metric tonnes	Futures	Monthly prompts out to 15 months	2019
<b>LME Cobalt</b>	Physical	1 metric tonne	Futures	<ul style="list-style-type: none"> <li>Daily: out to 3 months</li> <li>Weekly: 3 out to 6 months</li> <li>Monthly: 7 out to 15 months</li> </ul>	2010
<b>LME Cobalt (Fastmarkets MB)</b>	Cash	1 metric tonne	Futures	Monthly prompts out to 15 months	2019
<b>LME Copper</b>	Physical	25 metric tonnes	<ul style="list-style-type: none"> <li>Futures</li> <li>Monthly Average Futures</li> <li>LMEminis</li> <li>HKEX London Minis</li> <li>Traded options</li> <li>TAPOs</li> </ul>	<ul style="list-style-type: none"> <li>Daily: out to 25 days</li> <li>Weekly: 3 out to 6 months</li> <li>Monthly: 7 out to 123 months (63 months for traded options and TAPOs)</li> </ul>	1877
<b>LME Gold</b>	Physical	100 fine troy ounces	Futures	<ul style="list-style-type: none"> <li>Daily: out to 25 days</li> <li>Monthly: out to 24 months</li> <li>Quarterly: out to 5 years</li> </ul>	2017
<b>LME Lead</b>	Physical	25 metric tonnes	<ul style="list-style-type: none"> <li>Futures</li> <li>Monthly Average Futures</li> <li>LMEminis</li> <li>HKEX London Minis</li> <li>Traded options</li> </ul>	<ul style="list-style-type: none"> <li>Daily: out to 25 days</li> <li>Weekly: 3 out to 6 months</li> <li>Monthly: 7 out to 63 months</li> </ul>	1920

Table 2. LME contracts (as of May 2020)					
Contract name	Settlement type	Lot size	Contract type	Prompt dates	First traded
			<ul style="list-style-type: none"> <li>• TAPOs</li> </ul>		
<b>LME Molybdenum (Platts)</b>	Cash	2,205 lbs	Futures	Monthly prompts out to 15 months	2019
<b>LME NASAAC</b>	Physical	20 metric tonnes	<ul style="list-style-type: none"> <li>• Futures</li> <li>• Monthly Average Futures</li> <li>• Traded options</li> <li>• TAPOs</li> </ul>	<ul style="list-style-type: none"> <li>• Daily: out to 3 months</li> <li>• Weekly: 3 out to 6 months</li> <li>• Monthly: 7 out to 27 months</li> </ul>	2002
<b>LME Nickel</b>	Physical	6 metric tonnes	<ul style="list-style-type: none"> <li>• Futures</li> <li>• Monthly Average Futures</li> <li>• LMEminis</li> <li>• HKEX London Minis</li> <li>• Traded options</li> <li>• TAPOs</li> </ul>	<ul style="list-style-type: none"> <li>• Daily: out to 3 months</li> <li>• Weekly: 3 out to 6 months</li> <li>• Monthly: 7 out to 63 months</li> </ul>	1979
<b>LME Silver</b>	Physical	5,000 fine troy ounces	Futures	<ul style="list-style-type: none"> <li>• Daily: out to 25 days</li> <li>• Monthly: out to 24 months</li> <li>• Quarterly: out to 5 years</li> </ul>	2017
<b>LME Steel HRC FOB China (Argus)</b>	Cash	10 metric tonnes	Futures	Monthly prompts out to 15 months	2019
<b>LME Steel HRC N. America (Platts)</b>	Cash	10 short tons	Futures	Monthly prompts out to 15 months	2019
<b>LME Steel Rebar</b>	Cash	10 metric tonnes	Futures	Monthly prompts out to 15 months	2015
<b>LME Steel Scrap</b>	Cash	10 metric tonnes	Futures	Monthly prompts out to 15 months	2015
<b>LME Zinc</b>	Physical	25 metric tonnes	<ul style="list-style-type: none"> <li>• Futures</li> <li>• Monthly Average Futures</li> <li>• LMEminis</li> <li>• HKEX London Minis</li> <li>• Traded options</li> <li>• TAPOs</li> </ul>	<ul style="list-style-type: none"> <li>• Daily: out to 3 months</li> <li>• Weekly: 3 out to 6 months</li> <li>• Monthly: 7 out to 63 months</li> </ul>	1920

## 5.1 Contract types

### (1) Physically settled contracts

LME physical futures contracts are unique and designed to mirror physical trading. Futures that are not closed out by an opposite sale or purchase are physically settled. All LME futures are settled on the prompt date with initial and variation margins called during the term of a contract. LME contracts can be settled using physical stock stored in LME-approved warehouses. Since most participants use LME contracts to hedge or gain

exposure to the price curve, less than 1% result in actual delivery of metal. The vast majority of LME contracts are “closed out” before settlement.

More flexible than futures, LME options provide the metal and financial communities with alternative opportunities to reduce price risk (through hedging trades) or take on price risk (on expected price moves). Tradeable out up to 63 months (depending on metal), LME options can be exercised any time up to and including the expiry date (these are American-style options). The underlying is the equivalent 3rd Wednesday LME future, which is itself physically settled. LME options are currently available on eight underlying metals.

## **(2) Cash-settled contracts**

Alongside its physically settled futures, the LME offers a suite of cash-settled futures contracts. These contracts are not physically tied to an underlying metal, but instead settle against an average price. Settlement prices are most often provided by a Price Reporting Agency (PRA). The PRA's role is to survey the market to assess a fair value (based on bids, offers and trades, combined with market intelligence) to generate a price assessment for the underlying asset. The LME then uses this price assessment to calculate the final settlement price for its cash-settled contracts.

## **(3) TAPOs**

Traded Average Price Options (TAPOs) give the metal community a flexible way of hedging exposures to average metal prices in their business contracts. This is particularly useful because a large proportion of physical contracts are negotiated based on the average prices over particular time periods. TAPOs are financially settled Asian options, whose payoff depends on the Monthly Average Settlement Price (MASP) for the contract month. TAPOs can be traded on aluminium, aluminium alloy, NASAAC, copper, lead, nickel, tin and zinc.

## **(4) Monthly Average Futures**

Monthly Average Futures are designed specifically for members of the metal community who need to hedge against the monthly average price. They were the first of their type in the world to be traded on-exchange and available for all LME non-ferrous metals.

## **(5) LMEminis**

LMEminis are five-tonne cash-settled monthly futures contracts which settle against the LME “parent” contract's Official Settlement Price<sup>1</sup>. They are available for copper, aluminium and zinc.

## **(6) HKEX's London Metal Mini Futures**

HKEX's London Metal Mini Futures are contracts designed to meet the needs of Asian participants who want to mitigate or take on metal price risk using futures denominated in offshore Renminbi (CNH) or US dollar (USD). Traded on the HKEX derivatives platform in Hong Kong, the small-lot contracts are available in six base metals — aluminium, zinc, copper, nickel, tin and lead. Like LMEminis, these contracts are cash settled against the LME “parent” contract's Official Settlement Price.

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<sup>1</sup> The LME Official Settlement Price is the price at which all LME futures are settled.

## 5.2 LMEprecious

LMEprecious is the initiative created by the LME, the World Gold Council and a group of leading industry participants to introduce exchange-traded, loco London precious metals products. LME Gold and LME Silver futures provide new opportunities for trading, price discovery and risk management, creating an enhanced market structure for the precious metals community.

LMEprecious was developed in response to market demand and in close consultation with key precious metals stakeholders. Offering daily and monthly futures for both gold and silver, LMEprecious delivers greater choice for market participants, modernising the gold and silver markets to better reflect the needs of global players in precious metals markets.

The LME currently works with the London Platinum and Palladium Market (LPPM) to administer and distribute LBMA Platinum and LBMA Palladium prices. This solution is delivered via LME's custom-built electronic auction platform, LMEbullion.

## 5.3 Electric vehicle battery materials

The LME is in the process of delivering new risk-management tools for battery materials and electric vehicle (EV) industries. It is working with global market participants along the value chain to identify and serve the evolving risk management requirements of these industries. Some key battery metals such as nickel, lead, copper, cobalt and aluminium are already well established on the LME. The LME aims to launch new futures contracts to provide further hedging and trading opportunities for battery materials, starting with a cash-settled LME Cobalt (Fastmarkets MB) contract launched in 2019, and is working in partnership with Fastmarkets MB to develop a transparent and robust pricing solution for lithium.

## 6. LME WAREHOUSING

LME warehouses are used to store LME-approved brands of metal, which themselves are used as the underlying assets for physically settled contracts traded on the LME. To support the mechanism of physical delivery, the LME approves and licenses a network of warehouses and storage facilities around the world. There are over 550 LME-approved storage facilities in many locations across the United States, Europe and Asia.

The possibility of physical delivery via the worldwide network of LME-approved warehouses makes it an appealing hedging venue for industry. The LME delivery system relies on a user being guaranteed a specified quality and quantity of metal. To ensure consistency in quality, all metal delivered into LME-approved storage facilities must be of an LME-approved brand and conform to specifications on quality, shape and weight. Producers looking to register their production for LME delivery must meet certain criteria for each brand before gaining LME approval.

The LME does not own or operate warehouses, nor does it own the material they contain. It authorises warehouse companies and the warehouses they operate to store LME-registered brands of metal, on behalf of warrant holders, and issue LME warrants (documents giving title to metal in warehouses) through their London agent for material delivered into LME-approved warehouses. Warrants are allocated from the seller of metal to the buyer of metal via LMEsword, the LME's secure electronic transfer system. LMEsword facilitates the transfer of ownership of LME warrants and stock reporting. Warrants are held in a central depository and produced to a standard format and include a unique barcode. Owners of warrants can also use LMEsword to transfer title to metal held on warrant to facilitate stock financing and other commercial arrangements. Detailed stock level reports are produced and distributed each day

by LME market data vendors. Daily stock reports are produced by LMEsword and are a key part of operating an orderly and transparent market.

LME warehouse companies must meet strict criteria before they are approved for the handling of metals and are typically located in high-consumption areas or logistical trading hubs for the shipment of material.

All metals stored in LME-approved storage facilities on warrant are LME-approved brands from LME-approved producers ensuring conformance to the LME's strict rules on commodity grade, quality and shape.

The LME regularly reviews possible reforms to its global physical network of warehouses to ensure it represents best practice for physical market infrastructure storage and logistics.

## 6.1 Location premiums and discounts

When an LME contract is physically settled; the buyer could receive the warrant for metal in an LME-approved warehouse in any approved LME location and in any of the approved LME brands or shapes. Warrants are randomly allocated from seller to buyer through LMEsword.

The metal price traded on the LME is a global price. However, as certain regions have tighter supply-demand balances than others, and transportation from one region to another incurs costs, metal from a specified delivery destination might come at a premium or discount to the LME price. The same is true if the buyer requires a specific metal brand.

Furthermore, if the buyer wishes to cancel the warrant for their metal and take physical delivery of it, the price will need to accommodate an extra premium to reflect the cost of loading out the metal, and whether a queue exists to withdraw metal from the relevant LME location.

## 6.2 LME responsible sourcing requirements

On 25 October 2019, the LME published its requirements for the responsible sourcing of LME-listed brands. These requirements are underpinned by the Organisation for Economic Co-operation and Development (OECD) *Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas*.

## 7. LME CLEAR

LME Clear is the clearing house custom-built specifically for users of the LME. Launched in 2014, it was designed in consultation with the market to provide cost-efficient clearing services which are compliant with the European Market Infrastructure Regulation (EMIR), using cutting-edge technology. It delivers innovative clearing and settlement services for traded transactions.

LME Clear is the central counterparty (CCP) for all LME clearing members and their trading activities. It provides a financial guarantee to every traded contract, acting as “the seller to every buyer and the buyer to every seller”. In the event of a clearing member's default, LME Clear will step in and manage the defaulting clearing member's outstanding risk positions swiftly and efficiently.

LMEmercury, LME Clear's clearing system, allows members to monitor and assess the risk they are taking on in real time. This in turn means that clearing members have more control

over their business in key areas such as portfolio management, option expiry handling and reporting.

LME Clear regularly introduces new services to meet customer needs. Recently added services include a position-transfer service, inter-prompt spread methodology, trade compression, accepting warrants and CNH as collateral, new averaging solutions and a new gross aggregated account.

## 7.1 Warrants as collateral

LME warrants entitle the holder to metals stored in LME-approved warehouses and are bearer documents. In other words, an LME warrant is the bearer document for one lot of metal held in an LME-approved warehouse. As a terminal market for the metals that are traded on the LME, the amount of metal held on warrant in LME warehouses is often used as an indicator of the underlying global supply and demand situation for a metal.

LME Clear has expanded its collateral service for members to pledge LME warrants against their margin requirements. Metal warrants are accepted as an alternative to cash and high-quality government bonds.

Warrants of a metal can only be accepted as collateral for the underlying metal, e.g. aluminium warrants will be acceptable as collateral to cover aluminium positions only. Copper, aluminium, zinc, nickel, lead and tin can currently be used to cover margin requirements on a metal-for-metal basis.

## 7.2 VaR margin methodology

As part of the LME's larger technology roadmap, the LME is currently working on a custom-designed Value at Risk (VaR) methodology to calculate initial margin for the LME market that best suits its members and their clients. VaR is a widely adopted risk valuation methodology, used in many asset classes by various central counterparties and other financial institutions. There are many different mathematical approaches for calculating VaR. In general, VaR is a portfolio-based calculation which looks to estimate the potential level of loss of the portfolio based on a set of simulations applied.

The key advantages of VaR methodology are that it looks at how the whole portfolio would perform together, reflecting current market conditions, and takes into account portfolio risk composition. The new solution will also be custom-designed specifically for LME markets.

In comparison, the current methodology adopted by the LME looks at combinations of positions and the potential loss of each combination individually before these are aggregated. This can be less efficient, particularly for portfolios with many spread positions.

## 8. CONCLUSION

Throughout its history, the LME has provided metals and financial industries with the means to trade and manage metals price risk. Innovative new products and services developed in conjunction with the market have allowed the LME to continue to stay at the forefront of commodities markets around the world. As the company looks ahead, new initiatives such as major technology developments and enhancements, requirements for responsibly sourced metals and environmental considerations will help to shape the future of metals markets. The LME and HKEX Group have worked closely together to develop products and plans for markets in Mainland China<sup>2</sup>.

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<sup>2</sup> For details, see HKEX research report, "The opportunities offered by greater connectivity between the LME and the Mainland China commodities market", published on HKEX's website, 8 July 2020.

**APPENDIX. SPECIAL TERMINOLOGY OF PRODUCTS AND SERVICES AT THE LME**

LME Clear	The LME's clearing house for all trading
LMEbullion	The LME's custom-built electronic auction platform for administering the LMBA Platinum and LBMA Palladium prices
LMElive	The LME's market data application, providing customers with LME pricing, information and tools for metals traded on its markets
LMEmercury	The core clearing system used by LME Clear, which allows trading member firms to monitor risk in real time
LMEminis	Five-tonne cash-settled contracts for aluminium, copper and zinc which settle against the LME Official Settlement Price for the "parent" contract
LMEprecious	The initiative which provides the market with exchange-traded, loco London precious metals risk-management products, including LME Gold and LME Silver
LMEselect	The LME's electronic trading platform
LMEsource	The LME's real-time multicast market data dissemination platform
LMEsword	The LME's system which facilitates the transfer of ownership of LME warrants, and stock reporting
Ring	The LME's open-outcry trading venue, where Category 1 member firms trade key industrial metals face-to-face

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