LME Roadmap: Sustainable Metals Premia

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LME
An HKEX Company

SETTING THE GLOBAL STANDARD

Contents

1 Executive summary

In April 2025, the LME began a process of market engagement on proposals to discover if the enhanced sustainability credentials of specific metal brands traded on the LME could command price premia (informally known as “green premia” or “sustainability premia”). This process followed increased market interest in whether or not such premia exist, and if so, how could they be transparently and credibly priced.

This roadmap provides an update on the outcomes of that market engagement, as well as the background to this discussion, the current context and work undertaken to date. It details the LME’s proposed course of action to take this initiative forward, including a process through which sustainability premia could be discovered that incorporates premium sustainability thresholds, and the incorporation of a new HKEX Group price reporting entity in Dubai. The roadmap outlines next steps and opportunities for further market engagement with the LME on the subject of sustainability premia for LME-listed metals.

Finally, this roadmap underscores the link between sustainable metals and the topic of critical minerals; as set out in Section 7, the LME believes that there is a strong correspondence between the promotion of sustainable production, and the supply chain security aims of the critical minerals agenda.

2 Note on anti-trust considerations

The LME has been cognisant during market discussions that the topic of premia pricing represents a sensitive topic for much of the metals industry. Indeed, although the LME originally proposed to host per-metal workshops for group discussion, concerns around anti-trust / competition issues required the LME to adapt to focus on bilateral meetings rather than group feedback. It is important to note in this context that the LME is price agnostic in respect of its core, exchange-traded contracts and similarly, it also does not have a view on whether sustainability premia do exist, or if they do, what the level of such premia should be. As a market infrastructure provider, however, it is the LME’s job to provide solutions through which price discovery can take place on a fair and transparent basis. Market engagement to date has been conducted on that basis, and the LME’s proposed route forward will also be grounded in the principle that it is the LME’s role to provide pricing infrastructure, not to take a position on the “right” level of any particular price. Within this context, it is entirely feasible that the methodology outlined below discovers that sustainability premia do not currently exist, while leaving open the possibility that they may emerge in the future.

3 Background

Over recent years, many parties have called for the LME to reflect the enhanced sustainability credentials of specific metal brands in prices discovered on the LME. This has been part of the broader conversation around “who pays” for sustainable production and supply chain practices; the growing demand for better sustainability credentials has been offset by the cost, time, and resources required to deliver such improvements, and the difficulty in achieving a pan-industry consensus on the price value of that work.

The LME has considered the options to differentiate sustainable metal, but structural concerns have meant that these represent specific risks, as outlined below, and differing market views have made it difficult for progress to be achieved in practice. However, momentum has been accelerated by new policy measures such as the EU’s Carbon Border Adjustment Mechanism (“CBAM”), the US Inflation Reduction Act, and mandatory supply chain due diligence rules. These, alongside growing investor and consumer expectations, have continued to create conditions for sustainability premia to move from bilateral deals to be more transparent, and the LME believes, therefore, that a degree of market consensus is now forming – and that sustainability premia are now a more actionable and realistic proposition than has been the case historically.

However, it is of course possible (and in the case of certain metals, likely) that the sustainability premium is actually zero – that is to say, buyers will not pay any premium for metal with sustainability credentials – but increasingly it seems reasonable to test more formally whether this is, in fact, the case. Even if the result is that no sustainability premium currently exists, the LME believes that that outcome is still valuable for the market, providing increased transparency and reducing uncertainty. And further, the LME understands the strong desire for a reliable method of assessing enhanced sustainability premia, with broad industry buy-in, so that (i) those investing in sustainable metals production can have visibility on the economic value that can be achieved via such an investment, and (ii) those calling for greater sustainable metals supply can support their words with economic action, in terms of willingness to pay an appropriate premium for access to that supply.

3.1 The current LME model of delivery and pricing

As a physically delivered market, at contract maturity, a seller on the LME must deliver a warrant of an LME-approved brand. The LME price will then converge to the value of those warrants which are delivered against maturing contracts.

The LME approves brands for each metal in accordance with its published criteria. For most of the LME's existence, those requirements have been purely physical in nature – i.e. ensuring that the metal was of appropriate shape and chemical purity.

Given the breadth of brands listed on the LME, it will naturally be the case that certain brands will be more desirable than others. In general, warrants delivered on the LME will be of the least desirable brands (the choice of warrant being with the seller, who will rationally choose to give away their least desirable metal at the point of delivery, since there is not currently an LME mechanism to reward them for delivering more desirable metal). As such, the LME price will, in general, reflect the value of the least desirable brand of metal on the market at that point in time. This structural feature of the LME model ensures fungibility and liquidity, but it also means that differentiation – for example, on enhanced sustainability characteristics – has not historically been reflected in the LME price

This is a natural corollary to the concept of the LME price being a unitary, global figure. To reflect this, the concept of premia (i.e. an upcharge above the LME price) arose in the market; the "all in" price of metal would therefore comprise the LME price as well as any associated premia. However, in general, published premia relate more to physical locations of metal stocks (i.e. whether they are close to where they will be needed, or whether they need to be shipped). Premia for higher-quality brands are generally established through bilaterial sales negotiations between buyer and seller.

Historically, when the focus was only on shape and chemical properties, this approach was appropriate. Generally, brand premia are specific to the needs of the buyer and the commercial interests of the seller – for example, copper cathode, where certain rod mills will pay for specific brands of cathode given its superior drawing properties. However, it would be difficult to create a single representative set of criteria to discover this premium, given that each brand has specific characteristics (e.g. level of impurities).

The greater focus (over the last c.10 years) on metal sustainability has somewhat changed this analysis. Although extrinsic to the metal, sustainability credentials are capable of being quantified in a standardised manner (e.g. carbon or water footprint), and those standardised characteristics then reflected by a consistent, discoverable price.

3.2 Alternative models of sustainability price discovery

The LME has considered a number of methods through which it could discover enhanced sustainability-related premia, including incorporating sustainability credentials into its price discovery process, or prescribing price adjustments to reflect sustainable metal.

3.2.1 Incorporating sustainability credentials into the LME brand-listing requirements

Firstly, it is important to note that the LME has indeed done this, in respect of responsible sourcing. In 2019, the LME introduced requirements (which took full effect in 2023) that brands would need to achieve certain ISO certifications, as well as demonstrate their compliance with the *OECD Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas* ("OECD Guidance", addressing issues such as conflict financing and the worst forms of child labour).

However, this step was only possible because a global consensus had emerged that the OECD Guidance represented minimum standards in respect of metal – that is to say, metal produced without these assurances could not be accepted into global supply chains. As such, the LME felt that its actions reflected the views of the industry – and, although a number of parties objected to the LME's plans on the basis of the work required, the LME was confident that time would prove its actions to be correct and, indeed, necessary for the benefit of the wider industry (which has been shown to be the case).

The LME does not believe that other aspects of sustainability enjoy the same level of global consensus. As such, any additional requirement may result in the exclusion of metal, even though that metal would be acceptable to much of the global supply chain. To take carbon as an example, a maximum carbon footprint figure of 10-12 tonnes of CO_2 / tonne of aluminium (cradle to gate) would result in the exclusion of all coal-powered smelting production (50% of the world's supply, including 90% of India's production and 70% of China's)[1] – which is an important input into many global supply chains, as well as an important driver of development economics for individual countries.

Admittedly, under this example, the LME price would then move up to reflect the price of low-carbon aluminium – and higher-carbon aluminium would presumably trade at a discount to the LME price. However, producers of higher-carbon aluminium would be at a material disadvantage – because their product would no longer be deliverable into LME warehouses as the "market of last resort".

This outcome would also be negative for LME market users, because it is important to have sufficient underlying physical stock to enable contract liquidity. Additionally, global metal supply chains are not as well set-up to deal with the concept of discounts to the LME price, as they are to premia. As such, the LME does not believe that such an approach would be desirable for the market. These topics were discussed in more detail in the LME's 2020 Sustainability Discussion Paper[2].

Of course, variations on this theme could be envisaged – for example, annually decreasing carbon caps, or specific exemptions for developing economies. However, at heart, any solution of this nature proceeds on the basis that the LME will "put at risk" the universal delivery model, which has underpinned its role in the industry for more than a century. This is not a risk which the LME feels it is appropriate to take at this point, given the potential collateral damage to the pricing on which the entire market relies. However, as outlined below, the LME recognises that broader sustainability considerations may become embedded into its core contracts over time as global standards converge; the Exchange expects that this would need to be a market led process, with premia discovery acting as an essential first step in testing appetite and building liquidity.

[1] International Aluminium Institute – https://international-aluminium.org/statistics/primary-aluminium-smelting-power-consumption/.
[2] See: LME Sustainability Discussion Paper August 2020.

3.2.2 Prescribing price adjustments to reflect sustainable metal

An alternative route would be to leave the brand lists unchanged, but to apply an adjustment to the settlement mechanism, whereby the delivery of less sustainable metal would be economically penalised. So, for example, the delivery of metal without an assessment against a set of sustainability criteria would result in a discount in the settlement price paid by the buyer to the seller.

The challenge, of course, is that such an approach requires an adjustment price to be calculated – and that adjustment price would be the sustainable premium, which is not an agreed-upon figure (after all, the request from industry is to provide a transparent and robust method to discover such premia). The only route which seems at all feasible would be on carbon, where a maximum carbon threshold could be set, and the delivery of any metal containing more than this threshold would be penalised with a discount in the LME settlement process (or, equivalently, would require to be delivered together with an accompanying set of carbon credits under an acceptable standard). This would, logically, cause the LME price to converge to the price of metal at the lower-carbon threshold.

But even on carbon – the most heavily assessed sustainability dimension – there is not an established global price. It is clear from anecdotal observation that the metals markets do not penalise high-carbon metal based on the observed price of that carbon (e.g. €68/t as per the EU carbon price)[3]. It is possible that, over time, mechanisms such as the CBAM will drive that convergence – but this cannot be guaranteed, and will certainly not happen immediately. If this type of adjustment is not yet available to be used for carbon emission issues, it is even further off in the future for the broader set of sustainability characteristics.

3.3 Foundational factors for sustainability premia

Given the risks associated with these routes, the LME believes that the most viable path forward is to create parallel physical sustainability premia markets, which will sit alongside the LME's main contracts. Two core foundational factors now exist that support further efforts to discover if there is a sustainability premium:

- **Standardisation.** For many years, a key obstacle in the discovery of enhanced sustainability-related pricing differentials has been the lack of standardisation in how to define sustainability, which element of sustainability is being measured, what area of the business is included, how it is measured, and over what period of time.

  Many of these challenges remain, but the LME believes that sufficient progress has been made to support new pricing methodologies. For example, there are now a number of initiatives which feature standardised reporting on issues identified as material to the industry. These can fall into both compliance-style classifications (e.g. compliance against a set of principles such as the OECD Due Diligence Guidance, in respect of human rights) or quantitative-style classifications (in particular, per-metal standardised carbon footprint classifications).

  The question of how to define "sustainability" remains – and it is likely that this remains a subjective decision for individuals, company or industries, based on specific requirements and other circumstances. While the LME does not pretend to have "the answer" on behalf of the metals industry, it does recognise that an absence of such a definition will be a material impediment to progress in respect of pricing. As such, the LME has proposed a definition here – or rather, a set of premium sustainability thresholds which must be met – in order to for metal to be considered sustainable. The LME does also recognise, however, that these criteria will be the subject of ongoing debate (outlined further in Section 5), and that they will need to evolve over time (see Section 6).

[3] European Energy Exchange ("EEX") EU ETS Auctions ("EUA").

- **Transparency.** When the LME began the implementation of responsible sourcing requirements in 2017, one topic that was consistently raised as a barrier to progress was a general market reluctance to provide greater transparency over mining, value chain and general supply chain practices. While this remains a work in progress, the LME believes that the industry should be proud of progress made, including 47 countries implementing the Extractive Industries Transparency Initiative principles, and per company, per smelter, an even per-product disclosures through LMEpassport as of October 2025. The LMEpassport platform, the LME's centralised digital provenance register for metals, allows brands to disclose sustainability credentials against a standardised set of methodologies. This data is displayed according to the LME's sustainability taxonomy, which enables comparability between brands and material. As of 30 September 2025, LMEpassport offers 1,340 sustainability disclosures, across 57 standards and metrics. Almost all of these are accompanied by third party authentication or audit.

  Furthermore, all producers of LME-listed brands (with the exception of copper brands[4]) will be digitally linking data from their sites of production to the LMEpassport platform before the end of 2025, with 70+ primary aluminium smelters already having uploaded certificate of analysis credentials related to over 1 million tonnes since July 2024[5].

Other factors have also contributed to continued progress. An increased focus on critical minerals from governments around the world, for example, has engendered a renewed focus in minerals, metals, and their supply chains. As those governments move to ensure the security of their supply chains, the challenge once again falls to the industry to ensure it is meeting evolving expectations – including centralised pricing and transparent supply chains.

Overall, and as a result of this significant investment driven by the Exchange itself, but also the broader market as the industry collaborates to drive progress, the LME believes that now – for the first time – sufficient data and comparability exists to facilitate a fair and scientifically-based sustainability premium market.

3.4 Low-carbon nickel pilot

A key advantage for the LME has been that this core premise – that a premium contract in parallel to the main contract represents the best route forward – has been developed by the LME as part of a pilot for low-carbon nickel pricing.

Starting in 2023, the LME received a large number of requests to provide a solution for low-carbon nickel pricing. Accordingly, in March 2024, the LME launched a low-carbon nickel price discovery initiative together with its partner, Metalshub, a Germany-based digital solutions provider[6] which is already well-embedded into industrial metal supply chains. Metalshub was chosen because the LME also believed that because of the limited liquidity initially expected on these growth initiatives, spot markets would provide a more supporting platform than futures markets. Spot markets can be accessed more easily and by a broader range of market participants, which can be beneficial for the development of nascent pricing.

As part of the pilot, any class 1 nickel on the Metalshub platform can be offered with specific ESG credentials, including its carbon footprint, which allows buyers to incorporate this information into their buying decisions ensuring they source material that fits with their ESG strategy. Raw materials worth billions of dollars are traded every year on Metalshub, and market participants can also use the Metalshub platform to buy and sell nickel sulphate, ferronickel and other types of class 2 nickel.

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[4] Historically, the LME has not required certificates of analysis for copper due to complexities of metallurgical quality assessments and logistical concerns; however, the lack of certificates of analysis for copper is increasingly causing friction for compliance, traceability and digitalisation, and the LME believes that this would merit further market discussion.
[5] See e.g.: First LME brand producer builds enhanced digital link to LMEpassport.
[6] Metalshub provides a full supply chain solution that allows buyers and sellers of metal to procure or sell metal on a spot or term contract basis – as shorthand, spot trading / spot trades are terms used throughout.

To enable low-carbon nickel trading, the LME created a clear and robust initial definition of low-carbon nickel – namely, nickel containing fewer than 20 tonnes of CO_2 equivalent per tonne of refined nickel, per the Nickel Institute methodology. The Metalshub platform then allows buyers and sellers to agree trades for the sale and purchase of that low-carbon nickel, per the LME's definition.

This approach saw encouraging progress early on, with public support from producers[7] and steady transaction volumes (*see Figure 4*); however, volumes overall have been mixed, with reduced interest possibly related to the fact that no premium price has yet been published.

While amounts have been small compared to the global nickel market, it is also worth noting that even on the LME's main contracts, only a small proportion of global physical metal is delivered through the LME – but this small proportion still produces highly meaningful price signals. The LME anticipates that the same logic will apply to sustainable metal as well, and that small numbers on the low-carbon offering can also represent meaningful progress towards premium calculation.

Month	Class 1 nickel volume	Low-carbon nickel offered	Traded low-carbon nickel
Jan-24	4,399	0	0
Feb-24	2,375	4	4
Mar-24	2,126	27	0
Apr-24	1,805	171	0
May-24	1,991	216	144
Jun-24	5,955	1	1
Jul-24	1,013	264	168
Aug-24	734	13	0
Sep-24	1,041	672	120
Oct-24	233	5	0
Nov-24	1,050	0	0
Dec-24	2,648	0	0
Jan-25	623	0	0
Feb-25	283	0	0
Mar-25	483	0	0
Apr-25	50	0	0
May-25	154	178	24
Jun-25	206	48	24
Jul-25	326	225	7
Aug-25	92	5	0
Sep-25	160	144	0

Figure 1: Traded volume of Class 1 Nickel on Metalshub[8] in metric tonnes

[7] See e.g.: Wyloo and Metalshub partner for green nickel transparency.
[8] Source: LME Metalshub Collaboration.

The LME's low-carbon nickel pilot in collaboration with Metalshub has provided an invaluable test case for the trading approach to underlie a new pricing methodology, and the LME welcomes the learning provided, and the opportunity now presented by the market, to both expand the sustainability criteria involved, and also to address the learning that spot trading volume takes time to build, and that interest in such pricing could be further engendered by the ability to produce outcome pricing as early as possible.

4 Market engagement process

It was in the interest of such progress that the LME began further market engagement in April 2025[9]. To support this market engagement, the LME drafted a memo outlining a possible set of sustainability requirements and methodology through which enhanced sustainability premia could be discovered against a more comprehensive set of criteria than carbon alone.

As part of that process, the LME committed to hosting per-metal workshops with relevant stakeholders of each of the four proposed metals with a view to discussing in detail the proposed definition of sustainability for that metal, calibrating thresholds, understanding concerns with its proposals, and fine-tuning methodological requirements. The LME was also interested to hear whether the degree of choice within emissions measurement methodologies meant a risk of too great a discrepancy in measurement outcomes and as a result, the LME needed to further specify the criteria.

However, it became apparent that group discussion on the topic of premia pricing was not a solution with which many stakeholders were comfortable given the sensitivity of the topic (see Section 2). As such, while the LME did host a workshop for zinc stakeholders, most engagement took place on a bilateral basis, and at relevant LME advisory committee meetings. The LME would like to thank its committee chairs, committee members, and all market stakeholders who provided in person or written comments on this topic.

Specific feedback per metal is provided in dedicated sections below, capturing the range of views expressed on the topic of sustainability premia. However, at the broadest level, the feedback has borne out the LME's view that it would be too simplistic to say that producers are in favour of sustainability premia (looking to achieve a financial return on the resources they have invested) and consumers are against (not wanting to pay increased costs). Some producers are already achieving a premium and would prefer for this not to be a centrally produced price; equally, some consumers are in favour of public premia, given their concern that they are paying too much on a bilateral basis without a centralised reference price.

Aside from more general macro feedback, the LME has heard questions around the methodology (reporting-based price discovery in the absence of any physical trades conducted through the spot trading platform), costs (in particular in respect of undertaking transactions through the spot trading platform), the time required to generate liquidity, and the sustainably criteria chosen by the LME. On this final point, however, it is worth noting that this was focused on the proposed carbon thresholds – the emissions measurement methodologies and the sustainability assurance providers received uniform support across the spectrum.

On the positive side, many participants expressed their enthusiasm for the initiative and that they would be pleased for the LME to take on the challenge of both defining sustainability, and to provide a price discovery method for premia. Those who were less supportive were reassured by the voluntary nature of the initiative – that the LME would not require mandatory participation from any market participant.

There were a number of questions about the future of this initiative too. The LME has been open that the current thresholds do not represent a nuanced view of sustainability; the qualifying criteria are binary (metal

[9] LME explores establishing price premia for sustainable metals

meets the threshold or does not), and the proposed emissions thresholds do not currently represent "stretch targets". Finally, the LME is conscious the range of inputs impacting the overall cost of metal (including both sustainability factors but also regional considerations, metallurgical quality, shape, brand and location) means that isolating a sustainability-specific price differential remains a challenge.

However, in the first instance, the LME has prioritised finding a balance between setting thresholds that represent a sufficient degree of sustainability-related progress but allowing a ceiling that facilitates sufficient qualifying underlying material to generate enough liquidity to produce robust numbers. Once a baseline threshold has been achieved, the LME looks forward to discussing how to progress this over time, taking into consideration pricing spectrums (varied pricing depending on targets achieved), regional variances, scrap input and other relevant factors.

The LME also recognises the debate, in particular within the sustainability world, about the respective value of sustainability credentials achieved at a particular point in time, vs the progress made from an initial starting point. This debate centres about the desire to recognise (and reward) producers who do not have a geographical advantage in respect of access to renewable sources of power, and therefore can face a bigger (and correspondingly more expensive) challenge in respect of delivering emissions reductions. The LME does recognise there is a fairness question here and is interested in ways to recognise progress over time; however, in the early stages of a new initiative would be wary of adding complexity.

4.1 Aluminium

Feedback from aluminium participants was broadly positive. Both the IAI carbon footprint methodology and the ASI performance standards were viewed as credible frameworks for defining enhanced sustainable aluminium. Participants noted that establishing a verifiable benchmark for sustainable aluminium based on real-world transactions would be highly valuable across the market.

However, there was a strong view that the proposed carbon threshold of 13 tCO_2e was too high. In response, the LME has revised this down to 10 tCO_2e. Several participants also suggested that the threshold should follow a glide path aligned with the industry's net-zero trajectory. The LME has considered this feedback and noted the importance that this is incorporated it into its approach; it will continue work on calibrating these glide paths accordingly as market adoption increases.

As with other metals, aluminium emissions tend to fall into broad categories based on the energy source used in production. Some producers naturally benefit from access to low-carbon energy, giving them a structural advantage, and therefore some in the market emphasised to the LME that the threshold should reward those who have actively invested in reducing emissions.

The LME will continue engaging with stakeholders to refine the approach over time, ensuring it remains responsive to evolving sustainability objectives.

4.2 Copper

Feedback from copper participants was mixed, with some support but broad concern expressed; in particular, there was significant doubt from market participants that consumers would be willing to pay a premium.

There was also concern that specifying a premium at the cathode production would mean that emissions engendered during the fabrication / manufacturing process would be excluded. Suggestions included moving the emissions assessment point further down the value chain to capture these numbers instead.

Other participants were concerned that copper emissions were relatively range bound by the production method of that mine or smelter, and therefore the potential to reduce these over time was limited, meaning that some producers would not be able to take advantage of premia-based incentive. Likewise, other cathode production methods preclude the possibility of incorporating higher volumes of scrap into cathode production, with the same restrictions for those producers.

The LME recognises these barriers to entry specific to the copper market, and would be interested in further discussions about potential nuances for copper (and indeed, other metals too) that would support discovering more specific factors. As result, the LME understands that there may be less initial participation in the copper premium pricing in the early stages of this initiative.

4.3 Nickel

For nickel, the emissions threshold will initially be set at 20 tCO_2e per tonne, established by the existing LME and Metalshub offering, and with reference to the methodology developed by the Nickel Institute. This underscores the dynamic nature of the market, where the LME and Metalshub's low-carbon pilot has built some early momentum, underpinned by initial market engagement.

Some participants noted that a single emissions threshold may not fully reflect the diversity of sourcing practices, production routes, and ore types across the nickel industry. The LME recognises this concern and has focused on setting a threshold that balances sustainability ambition with practicality, ensuring broad participation and sufficient liquidity in the early stages. This approach will be reassessed over time, with the expectation that thresholds will tighten as market adoption grows and data comparability improves.

On an interim basis, and in recognition of its existing work in respect of low-carbon nickel, the LME is not mandating that nickel brands also meet the third-party assurance requirement. However, once an increased uptake of eligible LME-listed nickel brands is observed, the LME proposes to expand the nickel premium sustainability thresholds to include a third-party assurance requirement, in line with the other metals; for nickel, this would be provided by The Nickel Mark. However, as with zinc, as an interim step the LME will accept signed Letters of Commitment ("LoCs") to The Nickel Mark to help incentivise adoption of the assurance process while maintaining liquidity in the early stages of sustainable price discovery. Once this is achieved, the LME intends to raise the threshold to require full site-level certification under The Nickel Mark for producers seeking to have their metal eligible for inclusion in sustainability premia formation.

4.4 Zinc

Zinc participants broadly supported the proposed sustainability thresholds and acknowledged the need for a phased approach to The Zinc Mark implementation. To facilitate early participation and maintain liquidity, sustainability premia discovery will initially allow LoCs from producers that have publicly declared their intent to complete the full assurance process subject to The Zinc Mark assurance process. Over time, the temporary LoC allowance will be phased out, and only sites that have achieved full certification under The Zinc Mark will qualify.

The carbon threshold for zinc will be set at or below 3.5 tCO_2e per tonne, aligning with the current average carbon footprint for Special High-Grade ("SHG") zinc. This level was informed by active engagement with the zinc market and reflects broad support among producers for the guidance provided by the International Zinc Association ("IZA"). Similarly to the thresholds in the other metal categories, this threshold will also be reviewed periodically to reflect evolving best practices. This method also achieved good market support because the IZA emissions baseline is produced using an average calculated on an annual basis. This means that, on the basis that zinc producers continue to work to lower their emissions over time, this number should also reduce, and the LME's emissions threshold would also reduce in parallel.

The LME is conscious that, in the worst case, it is also possible that this average increases, and will reserve the right to engage with the market on whether it would be appropriate for the LME to continue track the threshold in this instance.

5 Sustainability premia pricing methodology

5.1 Overview

Building on existing work in respect of standardisation and transparency, the LME / Metalshub low-carbon nickel pilot, and feedback from the LME's market engagement process, the LME now proposes to launch a series of sustainable metal premia, incorporating a more comprehensive set of premium sustainability thresholds and a broader set of underlying metals.

While the nickel offering will remain in its current form, the LME is proposing to discover enhanced sustainability premia using a hybrid methodology – where it can blend the standardisation of the LME's brand requirements (Section 5.2) and the transparency of LMEpassport (Section 5.3), with its proposed premium sustainability thresholds (Section 5.4). The LME can then leverage both spot trading (Section 5.5) and reported inputs (Section 5.6), combined with market intelligence, to deliver a new hybrid pricing methodology. This process flow is outlined further in Figure 2 below.

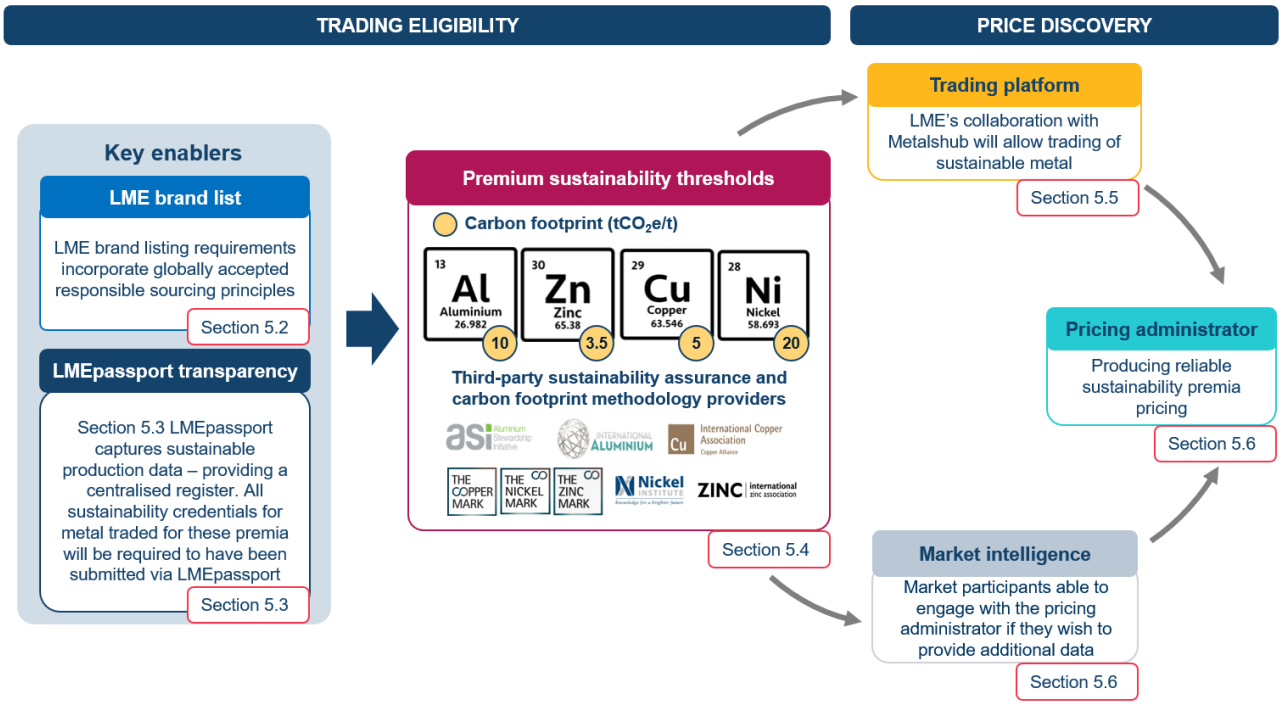

Figure 2: LME methodology to help the industry by building trust in sustainability data and enabling trade-based pricing

5.2 LME brand listing requirements

The LME requires a specific set of criteria to be met in order for metal to be approved as an LME brand and therefore eligible to be used in settlement of contracts traded on the Exchange. This includes a full set of metallurgical requirements, as well as responsible production requirements contained under the LME Policy for the Responsible Sourcing of LME-Listed Brands.

Figure 3 provides a high-level summary of the LME's brand-listing requirements, and further information can be found on the LME website here: https://www.lme.com/en/sustainability-and-physical-markets/brands/listing-process.

Figure 3: Summary of LME-brand listing requirements

Metal traded as part of this sustainability premia initiative will need to be of an LME-approved brand, as LME brands represent metal that the LME is confident has undergone the appropriate testing and due diligence related to quality, shape, weight and responsible sourcing. A full list of LME-approved brands can be found on the LME website: https://www.lme.com/en/sustainability-and-physical-markets/brands/approved-brands

5.3 LMEpassport

LME-listed brands that meet the premium sustainability thresholds will be asked to disclose this on LMEpassport, as brand data added to this platform can only be submitted by approved users uploading data with a verified proof point – from an independent auditor in respect of carbon (and assessed using the relevant metal-specific emissions measurement methodology), and from the third-party standard provider in respect of the broader sustainability assurance. Once completed, owners of those metals – including the producer – will be able to sign up to the Metalshub platform (subject to appropriate onboarding due diligence) and undertake bilateral trades with metal buyers.

5.4 Premium sustainability thresholds

As outlined above, the LME does not believe that there is one "answer" as to the appropriate thresholds to define sustainability. As such, in April 2025 it proposed an initial set of criteria for market discussion. Feedback to these is discussed in Section 4 but overall, the broad consensus was that the aluminium carbon threshold should be lowered, but that otherwise the criteria were broadly appropriate – striking a balance between ambition and achievability, while also ensuring sufficient qualifying material to generate necessary liquidity.

Participants will need to meet both the intensity-based carbon threshold[10] and the requirement for a third-party sustainability assurance; further, given the ongoing debate regarding the applicability of sustainability standards at the product level, the proposed criteria is that the metal is produced at a site certified by the specific standard for that metal. The exception to this will be nickel, because the existing LME/Metalshub offering is gaining traction as a low-carbon product, and hence it is considered appropriate to respect the original specification, until such time as the industry is ready to embed The Nickel Mark assurance.

[10] The carbon footprint figures in the table below relate to cradle-to-gate emissions assessments. The LME recognises that even with the metal-specific methodologies referenced here, there will still be some nuance in measurement parameters, and that this lack of standardisation can still lead to differences in carbon footprint numbers. Despite this, the LME believes that the methodologies it has chosen represent the best available methodologies for harmonising measurement and reporting for each specific metal. It anticipates that these will continue to evolve, and will work closely with the providers to ensure the LME's requirements remain up to date as progress is made.

The LME has selected these standards as they meet not only the requirements of the LME's responsible sourcing programme, but also a broad range of additional sustainability criteria from across the ESG spectrum, have robust assessment and governance processes, and a commitment to transparency. The LME is also conscious of the work of the Consolidated Mining Standard Initiative ("CMSI"), bringing together the attributes of the existing standards of the Copper Mark, ICMM, Towards Sustainable Mining, and the World Gold Council with the aim of simplifying the current mining standards landscape and promoting continual improvement of sustainable practice along the value chain. The LME will continue to track this effort and at the appropriate time, would be happy to discuss incorporating the resulting combined standard into its premia methodology, and equally, other standards should there be demand. In a similar evolution, the LME anticipates cobalt, lead, and tin sustainability metal categories to emerge as more significant support from the LME's market stakeholders develops.

Metal	Premium sustainability thresholds
Sustainable nickel	• Carbon footprint: 20 tonnes CO_2-equivalent/tonne nickel or below (per the Nickel Institute methodology) – as offered on the existing LME/Metalshub low-carbon nickel market[11] • Future third-party sustainability assurance: The Nickel Mark[12]
Sustainable copper	• Carbon footprint: 5 tonnes CO_2-equivalent/tonne copper or below (per the International Copper Association's methodology – *Carbon Footprint of Copper Production: Best Practice Guidance for Greenhouse Gas Measurements*[13]) • Third-party sustainability assurance: The Copper Mark[14]
Sustainable aluminium	• Carbon footprint: 10 tonnes CO_2-equivalent/tonne aluminium or below (per the International Aluminium Institute methodology[15]) • Third-party sustainability assurance: Aluminium Stewardship Initiative Performance Standard
Sustainable zinc	• Carbon footprint: At or below the average current carbon environmental footprint for special high-grade ("SHG") zinc (3.5 tonnes CO_2-equivalent/tonne zinc), estimated and regularly updated by the International Zinc Association[16] using the Zinc Carbon Footprint Guidance[17]) • Third-party sustainability assurance: The Zinc Mark[18]

[11] The LME notes the Nickel Institute position paper in respect of the comparability of nickel carbon footprint. Because the LME's proposed approach would apply only to class I nickel, the LME believes that the issues in respect of the differences between nickel products are not problematic in this particular context. While the LME accepts that different producers may produce from various mineralogies, it believes that the Nickel Institute's work on carbon measurement does allow these mineralogies to be assessed on an equal footing – and the LME's 20 tonne carbon threshold has been deliberately chosen to avoid exclusion of any particular country or producer based on its particular ore availabilities.

[12] Future plan (once industry is ready to embed into the existing LME/Metalshub low-carbon nickel offering): given the relatively recent launch of The Nickel Mark, alongside certified brands, the LME is proposing to accept nickel producing sites that are in good standing i.e. they have signed a Letter of Commitment to the Copper Mark Assurance Process to participate in the process to obtain The Nickel Mark, asserting that they will complete the independent assessment within one year. The Letter of Commitment is Step 1 of the Copper Mark Assurance Process and is a public demonstration of a site's efforts to work towards full The Nickel Mark award. This is a temporary measure to both support liquidity in the early stages of nickel premium discovery, and to help incentivise adoption in the industry, and will be reassessed in due course with the aim of raising the threshold to sites that have obtained The Nickel Mark only. Please note, all participating nickel brands will still need to be LME-listed brands, i.e. have met the LME's responsible sourcing requirements.

[13] See: International Copper Association carbon footprint methodology.

[14] See: Copper, Nickel and Zinc Marks.

[15] See: Aluminium Carbon Footprint Methodology - International Aluminium Institute

[16] The current average was published in 2023 by IZA; updates may result in subsequent annual changes.

[17] See: International Zinc Association Guidance on calculating the carbon footprint for SHG zinc, following ISO 14040, ISO 14044, and Product Life Cycle Accounting and Reporting Standards by Greenhouse Gas Protocol.

[18] Given the relatively recent launch of The Zinc Mark, alongside certified brands, the LME is proposing to accept zinc producing sites that are in good standing i.e. they have signed a Letter of Commitment to the Copper Mark Assurance Process to participate in the process to obtain The Zinc Mark, asserting that they will complete the independent assessment within one year. The Letter of Commitment is Step 1 of the Copper Mark Assurance Process and is a public demonstration of a site's efforts to work towards full The Zinc Mark award. This is a temporary measure to both support liquidity in the early stages of zinc premium discovery, and to help incentivise adoption in the industry, and will be reassessed in due course with the aim of raising the threshold to sites that have obtained The Zinc Mark only. Please note, all participating zinc brands will still need to be LME-listed brands, i.e. have met the LME's responsible sourcing requirements.

The LME remains open to ongoing discussion in respect of the calibration of these criteria, in particular with producers of brands who consider themselves sustainable, but do not qualify under the LME's criteria – and will naturally feel disappointed by the result. The LME would observe, however, that the potential disruption caused by this will be significantly less than in respect of a change to the LME's core contract requirements. If a brand is excluded from the sustainability criteria, all this means is that its data would not be incorporated in the sustainability premium price discovery initiative – which, given that the spot platform would be expected to transact only a small quantity of metal in order to facilitate sustainability pricing, would not constitute a commercial disadvantage.

Secondly, unlike the LME price (which is embedded into almost all physical supply contracts), the new LME sustainability premia are not currently employed in any contracts – so there would be no need to use them, for any participants which did not wish to do so. And further, a brand which narrowly missed the LME's criteria above may still be able to negotiate a sustainability premium close to that published by the LME (and perhaps in excess, if other sustainability aspects of that brand went beyond the LME criteria).

While setting meaningful thresholds, the proposed premium sustainability thresholds are intended to be achievable and importantly, because the criteria are global in nature, there is no reason that any producing country or region cannot participate in the premium market. Even countries which have (for example) a preponderance of coal power are likely to have some low-carbon supply – and even a small proportion of that metal could be traded through the LME/Metalshub offering, thus democratising access to the pricing mechanism for participants from across the globe.

5.5 Metalshub partnership

Any owner of metal meeting the premium sustainability thresholds outlined above (of an LME-listed brand, meeting the premium sustainability thresholds and credentials disclosed on LMEpassport) would then be eligible to trade on the Metalshub platform. The platform then allows buyers and sellers to agree trades for the sale and purchase of that metal, per the LME's definition.

As a physical platform, the Metalshub platform is relatively "light-touch" from a regulatory perspective – and, indeed, many industry participants are already registered to trade on Metalshub (including the new sustainability markets referenced in this roadmap, once live). As set out in Section 5.6, those participants would need to give their permission for anonymised transaction data to go towards compilation of a premium – but, given the industry push for such a solution, it is hoped that this would be forthcoming. Buyers and sellers who are not yet registered on Metalshub can be set up quickly and easily to do so.

Metalshub will then publish volumes relating to the trading of both standard aluminium, copper, lead and zinc, and also relating to brands of those metal that meets the LME's robust definition of enhanced sustainability. Over time, and with sufficient underlying volumes, it would then be possible to understand if there is a resulting price differential.

However, the LME recognises that, while the market would not wish the discovery and publication of a price with no clear underlying basis, it is equally problematic if no price is published, even when there is sustainability data. The LME acknowledges that this is the challenge with the current low-carbon nickel offering – the transactions already taking place on Metalshub represent probably the most representative global prices for low-carbon nickel, but a low-carbon nickel premium price is not yet being published.

5.6 Commodity Pricing and Analysis Limited – the LME pricing administrator

The LME has heard this frustration around the time taken to publish prices from market participants, and has considered measures to respond to the issue.

To this end, the LME is proposing to establish a pricing administrator – Commodity Pricing and Analysis Limited ("CPAL"). CPAL will be a sister company to the LME, wholly owned by the LME's parent Hong Kong Exchanges and Clearing Group ("HKEX") and its role will be to take transaction information relating to participating companies who are willing for their anonymised data to be used[19] from the Metalshub platform, apply appropriate methodology and expert judgment as required, and to publish the premium figures on a regular basis. CPAL will also be able to publish market analysis, journalistic content and market briefings and education pieces.

As part of this, market participants will be able to engage with CPAL to provide certain inputs in relation to the calculation of the premia. However, CPAL will always give precedence to transactions from the Metalshub platform – and the easiest way for participants to contribute to price discovery will be to transact some amount of metal on that platform. More broadly, the administrator would be responsible for the overarching rules, policies and processes of the sustainability premia markets.

CPAL is incorporated in Dubai, in the United Arab Emirates. The establishment of this new subsidiary underscores HKEX and LME ambitions in expanding their commodities business in this strategically important region, helping to drive greater connectivity between China and fast-growing markets in the Middle East.

Most importantly, CPAL will own, operate and evolve the hybrid pricing methodology outlined above. However, recognising the market preference to make ongoing progress in respect of this initiative, in advance of CPAL's launch, the LME has today released a consultation on a draft pricing methodology for enhanced sustainability premia. The paper will be open until 28 November 2025 and the LME (on behalf of CPAL) would welcome engagement on that topic. Full details are available in the consultation document available on the LME website https://www.lme.com/Sustainability-and-Physical-Markets/Sustainability.

6 Evolution over time

The LME recognises that the hybrid methodology it has outlined in this roadmap represents a new approach to price discovery. It anticipates that as the operation of this methodology progresses, adjustments will need to be made as the LME, Metalshub, and CPAL collaborate to deliver the best possible service to the market.

As well as operational enhancements, the LME also acknowledges the importance of mapping a route forward where the premium sustainability thresholds can be adjusted (subject to proper process) based on industry feedback, or indeed the ever-changing evolution of sustainability expectations (from consumers) and technological processes (from producers). This is particularly true in respect of carbon emissions, which will need to reduce over time to support the industry in meeting science-based targets in line with the Paris Agreement. The LME notes that – for example – IZA's average footprint can reduce on an annual basis. However, it may be appropriate for the LME to embed a more formal expectation of reductions to these thresholds, including a potential glide path and timeline. The LME recognises that while price discovery requires thresholds, even those already producing below the thresholds can still work to deliver improvements. This will remain an ongoing topic of conversation with the market.

There are also potential enhancements over time in respect of the recognition of additional nuance; in particular, whether the pricing could be made reflective of sustainability-related performance on a spectrum, rather than a single point assessment, or reflective of progress over time. This topic is especially pertinent in

[19] Recognising the importance of data confidentiality, participating companies will be asked to confirm they are willing for their transaction data to be shared for the purposes of price discovery. Terms and conditions around this will be discussed with such companies bilaterally, including anonymisation. However, at the heart of this proposition is the understanding that the industry as a whole is in favour of visible sustainable metals premia – and, accordingly, that there will be a shared interest in enabling the production of such prices.

relation to emissions where companies producing metal considerably below the LME's threshold would reasonably look to achieve a premium above that of metal at or just below the threshold.

Another area of development is the potential expansion of this hybrid pricing methodology to other nascent contracts which do not yet (or may not ever) have the underlying liquidity to support a full exchange-traded contract, but where centralised pricing could add value to the market. The LME has had initial conversations on this possibility in respect of scrap premia, but is conscious of the applicability in a number of additional areas such as regional premia, and critical minerals for which centralised pricing is not currently available.

On a similar note, the LME has also been asked if the sustainability premia will be tradeable or hedgeable, and it believes that once there are reliable indices published by the pricing administrator it would be straightforward for the LME to then list futures contracts which would settle to the sustainable premia prices, and which could then be used for trading and hedging.

This could also represent a step towards the LME evolving the contract specifications of its core physically settled contracts, to incorporate a broader range of sustainability credentials than currently covered by the existing responsible sourcing and ISO requirements. The LME remains alert to the risk of moving too precipitously on this, given the risks of potential disruption to its core contracts if amended too early and with insufficient qualifying metal to provide appropriate liquidity (as outlined above). However, it does also acknowledge that the market expectation in respect of sustainability on these contracts will continue to develop, and will monitor this evolution carefully to ensure that it can appropriately reflect any changes at the appropriate moment.

7 Link to critical minerals

The critical minerals agenda is clearly crucial for many governments, and the LME has been approached on several occasions to provide pricing structures to support critical mineral agendas.

Understandably, a key focus of any given government's critical minerals strategy will be security of supply – and this may require decisions about sourcing from specific supplier countries, and not from others. The lack of homogeneity in the assessment of what constitutes a critical raw material across jurisdictions is further complicated by the fact that methods of implementation of critical raw material policies also vary, for example – domestic investment vs substitution. Because the LME is a global market (and, as set out above, the sustainability premium market would also be designed to allow global access), it is unlikely that the LME's market structure would be able to help with this specific requirement.

But more broadly, the LME would argue that there is a strong correlation between sustainable metal, and security of supply. This is because the (in particular) low-carbon metal production is broadly distributed across the world, aligned with the distribution of (in particular) hydroelectric power sources. Furthermore, it is very difficult for any one country to attempt to "flood the market" in sustainable metal production, because of the significant lead times and investment required to bring new sustainable production on-stream.

As such, to the extent that purchasing nations commit to purchasing sustainable metal, this naturally requires a balance of producing geographies – which itself drives a diverse international supply chain, providing precisely the security and lack of single-geography reliance which critical minerals supply policies seek to achieve (together with the obvious benefits of a more sustainable supply chain).

8 Benefits to market participants

Based on its discussions to date with a broad range of market participants, the LME understands that the provision of reliable sustainability premia will enable the market to have a more consistent view on the value of sustainable metal. This will provide the following benefits:

- **For buyers and sellers** – provide an observable reference for buyers and sellers entering into supply transactions for premium sustainable metals. It is important to note that the LME would not anticipate that there would be any material change to current industry contracting behaviours – even with the availability of sustainability premia, producers and consumers would likely still look to achieve the best bilateral pricing in the market, based on the precise specifications of the metal. The LME expects that the vast majority of sourcing will continue to take place through the highly effective current market processes. As long as a representative "balancing" quantity transacts through the spot market, the premium price discovery mechanism will still operate as intended.
- **For investors / finance providers** – deliver a degree of reassurance that investment in sustainable metals projects will lead to a visible premium for the sale of metal from the financed project.
- **For governments and supra-national organisations** – provide data to inform policies on sustainability, critical minerals and supply chain security, and assist in developing a coherent vision for an approach to sustainability in transition minerals supply chains.
- **For the LME** – maintain the value of its pricing to the market. If solutions of this nature are not available, then there is a danger that the base LME price will become less relevant for those market participants who are interested in sustainable metals. As such, the LME's ability to discover sustainability premia (which will themselves be calculated as a premium to the base LME price) will defend and grow the value of those LME base prices.

9 Next steps

The LME is extremely grateful for all the market interaction to date and trusts that this roadmap sets out a clear path forward.

The LME welcomes all bilateral or group feedback and discussion on its proposal, in the first instance, the LME would ask all interested market participants to engage on the pricing methodology discussion paper released in parallel with this paper by emailing the LME at discussionpaper@lme.com. Full details can be found https://www.lme.com/Sustainability-and-Physical-Markets/Sustainability.

Following the conclusion of the Discussion Paper feedback period, the LME remains committed to ongoing dialogue with the market. Any participant wishing to arrange further discussions or seeking clarification is invited to contact spmdevelopment@lme.com.

10 Disclaimer

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