

# Shanghai Metals Market Price Assessment Methodology

## Cobalt sulphate

SMM Cobalt Sulphate Spot Prices

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### 1. Guidelines to SMM price assessment methodology

Shanghai Metals Market (“SMM”) is an independent service provider that does not participate in trades. SMM is a market observer that engages buyers and sellers in the commodities market. By consulting with industry independent participants, SMM drafts the methodology, examines and revises it regularly based on the specifications and terms of trade that are generally used in the market, with equal weighting given to transactions that meet the standards. SMM reserves the right to exclude any unreliable or unrepresentative price data from its price assessment, in line with this methodology and other related Benchmark governance policies and procedures. SMM believes the processes and procedures documented in their Methodologies represent the most accurate way of representing the underlying economic reality of the markets each Benchmark seeks to measure.

SMM price assessments refer to metals spot prices or price indices of both the Chinese and overseas markets reported by SMM on a daily basis. All SMM prices are published according to a set of defined methodologies, indicating how the prices are accessed and reported. These methodologies are published on our website [www.metal.com](http://www.metal.com) (English) or [www.smm.cn](http://www.smm.cn) (Chinese) or for all market participants to understand and refer to.

To reflect the actual trades in the spot market, SMM will update the methodology for SMM price assessments and publish all the revisions on our website [www.metal.com](http://www.metal.com) (English) or [www.smm.cn](http://www.smm.cn) (Chinese) 28 days ahead of the changes. For queries or suggestions on the methodology, please contact SMM customer services (please find contact information on the SMM official websites). **Please read this paragraph in conjunction with the SMM methodology review and changes policy, and the SMM Complaint Policy available at [www.metal.com](http://www.metal.com) (English) or [www.smm.cn](http://www.smm.cn) (Chinese).**

This document specifies the standards and management methods for the SMM cobalt sulphate spot price assessment. These standards are formulated to establish a transparent and verifiable SMM price setting mechanism and provide market participants with an important pricing indicator.

To ensure that SMM Benchmarks and indices are constructed, maintained and operated to the highest standards, the administrator of the SMM Benchmarks – Shanghai Metal Markets (“SMM” or “the Administrator”, herein known as “SMM”) employs a robust governance framework to manage and approve new Benchmarks and also approve changes to the methodologies of existing Benchmarks.

The SMM Benchmark Management Committee (“the Committee”) is responsible for all aspects of the design, management governance and calculation of the SMM

Benchmarks, and is responsible for approving all policies and procedures relating to the provision of the Benchmarks. The Committee will regularly - and no less frequently than annually - review the methodology and its evaluation and publication process. Additionally, the Committee will review the methodology and all other relevant policy and procedure documents in response to changes to market conditions or any aspect of the dynamics of the underlying market the Benchmarks seek to measure.

The Committee maintains oversight of the SMM Benchmark methodology and its compilation process, ensuring that SMM prices and indices reflect as closely as possible the objective conditions of physical markets of relevant commodities. The Committee will immediately point out any problem it finds, and propose external consultations and modifications to the existing methodologies or processes, in order to improve the quality of prices or indices published by SMM. The Committee can only propose changes to the methodologies and processes used in future Benchmark assessments, rather than modifying the already published prices or indices.

## **2. Guidelines to SMM cobalt sulphate spot price assessment**

China lacks cobalt ore resources and mainly relies on imports from Africa. Imported cobalt ore and intermediate cobalt products accounting for more than 80% of the total supply. Chinese-funded enterprises have stepped up their deployment in Africa and strategically locked cobalt raw materials. China's ability to control cobalt resources has become more robust, weakening the monopoly of foreign companies on cobalt raw materials and stabilizing cobalt raw material prices. Since the country's founding in 1949, China's cobalt industry has had a difficult beginning. However, the industry has been thriving and has become the world's largest supplier of refined cobalt since then. The 801 Factory (now Jiangxi Jiangdong Cobalt Co., Ltd.) was established in 1958 as the earliest domestic cobalt smelting enterprise invested by the Ministry of Metallurgy. China's cobalt industry was developing in a problematic exploration. Digital 3C products such as cell phones, laptops and tablet PCs have been introduced. Meanwhile, EVs have become popular because of people's environmental protection awareness. As a result, the demand for cobalt in China has gradually shifted from the traditional industry to the lithium battery industry, with demand from the lithium battery industry currently accounting for more than 75%.

Due to the limited technical barrier threshold of cobalt salt production, cobalt sulphate manufacturers sprang up in 2017 to increase market supply under the expectation of good new energy vehicle terminal consumption. The average start-up rate remained above 75% level throughout 2017. 2019, in response to the growth of demand, small and medium-sized smelting capacities in Jiangxi, Sichuan and Guangdong regions have been launched, and small and medium-sized factories mostly recycled their raw materials. In 2020, large cobalt salt factories in Jiangxi and Zhejiang expanded new projects and increased production capacity.

### **2.1 Definition, Background and significance**

China is the world's largest supplier of refined cobalt, and China has a pivotal position in the world cobalt market. With the development of new energy vehicles, domestic cobalt sulphate, ternary precursors and materials enterprises have

increased their supporting expansion capacity. Changes in spot cobalt sulphate prices in China's domestic market directly impact global spot cobalt sulphate prices, and the "China factor" has become increasingly important when analyzing the world cobalt sulphate supply and demand. Therefore, there is an urgent need to compile and publish a cobalt sulphate spot price that can fully reflect the domestic market to objectively, truly and timely reflect the supply and demand situation of China's cobalt sulphate spot market. Therefore the SMM cobalt sulphate spot price was born. Through the analysis of this price, the pattern of cobalt sulphate spot price changes and its causes are discovered, thus providing a reference basis for scientific decision-making by enterprises, research institutions and government departments in the cobalt sulphate industry.

The SMM Cobalt Sulphate spot price is assessed and reported based on the methodology defined in this document. As a benchmark, it can be referred to by both parties of Cobalt Sulphate spot transaction as their settlement price. The prices reflect the most tradable levels of spot cobalt sulphate, delivered to factory, at the time of publication on each complete trading day. It is assessed based on transactions that happened in the nationwide market, including expenses such as transportation costs, taxes, and capital costs.

Significance of publishing SMM cobalt sulphate spot price:

- Establishing China cobalt sulphate spot price information database
- Comprehensively and systematically monitor and reflect the trend of cobalt sulphate spot price and market situation in China
- It is conducive to the monitoring and management of the cobalt sulphate spot market by the government administration and serves as an essential basis for the formulation of relevant industry policies
- Increase the influence and discourse power of China's cobalt sulphate spot price
- Provide a decision-making basis for cobalt sulphate spot producers, trading enterprises, downstream users and other enterprises
- Provide price information for cobalt sulphate spot import and export enterprises
- Further establish Shanghai Nonferrous Metals Network's leading position in price information of the cobalt sulphate industry in China

## **2.2 Introduction of price assessment**

SMM collects data information used to evaluate Cobalt Sulphate spot prices by means of standard acquisition (that is, the collection of raw data information that complies with the SMM Data Standards Policy), from including the bid and offer of the buyer and seller that were not traded on the same day, and the actually traded price of spot transaction provided by the price submitters. The amount of each transaction that can be deemed as the standard Cobalt Sulphate prices or trades in the price collection will be not less than 30 mt in physical volume. Data collection, assessment (calculation) and daily management of SMM Cobalt Sulphate spot prices are conducted by SMM Operational teams (consists of 2 price analysts and a price manager).

The price published by SMM is intended to reflect the real transactable value of a commodity in a time point or period during the day. As such, where a confirmed deal is done for the same specification and loading range as confirmed bids and

offers, and when all are declared to the market simultaneously, the deal will take precedence over the bids and offers. During the assessment process, we may consider other information. However, actual transactions, bids and offers will always take precedence.

**Please read this paragraph with the SMM Benchmark Guidelines on Hierarchy of Data Inputs available at [www.metal.com](http://www.metal.com) (English) or [www.smm.cn](http://www.smm.cn) (Chinese).**

## **2.3 Source of raw price data**

### **2.3.1 Collecting from price data submitters**

Please note that the following standards and procedures need to be read together with **the Submitter Exclusion or Inclusion policy available at [www.metal.com](http://www.metal.com) (English) or [www.smm.cn](http://www.smm.cn) (Chinese).**

#### **2.3.1.1 Criteria for price data submitters**

SMM will select representative market participants from the industry chain as targeted price submitters for SMM Cobalt Sulphate spot prices assessment (data providers, including smelters and downstream companies).

SMM will take reasonable care to determine and verify the authenticity and reliability of price provider. The procedure SMM adopts is designed to minimise the risk of using any abnormal price data and oppose any manipulation of the Benchmark.

The SMM policy includes, but is not limited to, steps to take as follows:

- Collect relevant public domain documents (such as business licenses) for each price submitter and verify the authenticity of the documents.
- Ensure that each price submitter engages in the transaction, procurement, sales or production of the Cobalt Sulphate industry chain.
- Ensure that each employee designated as the contact person of the price submitter can have direct access to relevant data in the company, and have the necessary authority and ability to submit the data to the price analyst of SMM in a timely manner and in accordance with the SMM Benchmark Submitter Code of Conduct.
- Invite other reputable market participants to help verify the credibility of price submitters.

#### **2.3.1.1.1 Criteria for smelters**

- Smelters should have Cobalt Sulphate capacity of above 600 mt in metal content on an annualized basis; conduct standardized transactions smoothly across channels with stable sales performance; possess operational integrity, and enjoy good reputation in the market, in the view of SMM.
- Smelters should provide objective and honest feedback on their Cobalt Sulphate production and sales, including output, operating rate, quality of the product, sales price, sales volume, buyers and inventory, and be able to engage with SMM Operational Teams in accordance with the SMM Benchmark Submitter Code of Conduct.
- Smelters should have a sound understanding of and insight into the macro economy, spot market situation and trades of the Cobalt Sulphate market, and be able to engage with SMM Operational Teams in accordance with the

## SMM Benchmark Submitter Code of Conduct.

### **2.3.1.1.2 Criteria for downstream users**

- Downstream users should have an annual cobalt sulphate purchasing volume of above 500 mt in metal content; conduct standardised transactions smoothly across channels with stable purchasing performance; possess operation integrity, influence and reputation in the market.
- Downstream users should provide an objective and honest feedback on their procurement, including quality of the product, purchase prices and volumes, procurement sources, and inventory, and be able to engage well with SMM Operational Teams in accordance with the SMM Benchmark Submitter Code of Conduct.
- Downstream users should have a sound understanding of and insight of the macro economy, keeping up with the latest updates of trading in the Cobalt Sulphate market, and be able to engage well with SMM Operational Teams in accordance with the SMM Benchmark Submitter Code of Conduct.

### **2.3.1.2 Formation and adjustment of the price submitter list**

SMM selects price contributing companies based on the above criteria to produce a stable list. SMM signs a formal agreement with each price contributing company to ensure the accuracy and timeliness of the data provided as well as protect confidential information of the price submitter.

SMM delegates specific price analysts to collect transaction data and data related market information from price submitters. SMM will continue to evaluate every price submitter based on criteria above and make amendments to the lists for price contributing companies based on the results of evaluations. When a company fails to meet the criteria, it would be required to rectify within a limited period. If it refuses to rectify or fails to meet the criteria after within 30 days from the date of issue of the rectification notice, SMM will revoke its qualification for price contributing companies.

### **2.3.1.3 Process of price data collection**

SMM's Operational Teams will collect cobalt sulphate spot transaction data from price submitters by means of phone, fax, email, QQ, WeChat and other forms of communication.

The data will include traded prices within the day, traded prices in the prior day that were not included in the price assessment, and the most likely traded prices, bids and offers. All communication content on instant messengers, WeChat messaging and emails as well as face-to-face communication will be recorded, while phone communication via phone calls will also be recorded in summary and input into the database. Price data must be a typical, repeatable transaction between unaffiliated market participants (completely financially and legally independent).

SMM's Operational Teams conform to the code of conduct when reporting. They will report to their manager about any threat by market participants that could undermine or influence the assessment during the price collection process.

Price data provided by the submitters to SMM should include at least the following kinds of information. SMM analysts should encourage the price submitter to report as much detailed information as possible, not just the minimum requirements specified:

### **Product specification**

Cobalt sulphate that meets the requirements set by GB/T 26523-2011,  $\text{Co} \geq 20.5\%$ . Please refer to the attached document **GB/T 26523-2011 cobalt sulphate** for more details.

### **Major producers**

For details on major producers of cobalt sulphate, please see 2.5.2.

### **Traded prices/bids/offers**

In the form of specific prices or a price range that reflects the tradable levels, unit: 10,000 yuan/mt.

### **Volume**

In normal market transactions, a single transaction is based on a minimum volume of 30 mt and a maximum volume of 200 mt, both in physical content. The standard is subject to adjustment when trading liquidity is thin due to force majeure.

### **Delivery location**

Mainstream trading hubs in China. Delivered to factory on the transaction day.

### **Payment terms**

Payment terms under negotiated agreements, such as bank transfer, acceptance of bills, etc.

### **2.3.2 Collecting price data from other submitters**

SMM's policy on collecting market information and data is that SMM welcomes all information from various sources or organisations, as long as the data submitter provides them for good faith and authentic purposes. However, the data submitter is required to accept the SMM code of conduct on data submitters. SMM does not accept instant messaging requests from unidentified individuals. SMM price analysts are required to confirm the identity of market participants at least in accordance with the procedures specified in 2.3.1.1 before conducting instant messaging communication with the data submitter.

## **2.4 Detailed formation process and related regulations**

### **2.4.1 Data collection**

SMM price analysts will collect price data and information based on the standards mentioned above. And a preliminary raw dataset is finally generated.

Based on the priority order of traded price, quote/bid, expected price and cross-validated price, SMM analysts will collect no less than 4 pieces of price information each day. In case that the price data of higher priority is insufficient, the price data of lower priority will be adopted.

### **2.4.2 Data normalisation**

SMM price analysts will normalise the preliminary data results, and the finalised prices will be in the form of a price range that reflects the actual traded level or the most likely trade price. The price range for SMM cobalt sulphate is usually less than 5,000 yuan/mt.

#### Normalisation of trading volume

For actual traded prices with trading volumes greater than 200 mt or less than 30 mt (in physical content), they are deemed as abnormal data and will be given the lowest priority in the price assessment in case that the available price information is sufficient.

When the available price information is insufficient, the abnormal situation will be given priority next to the quote/bid and expected price. In extreme cases that only one deal is made in the market, the abnormal situation will be given priority before the expected price and after the quote/bid.

#### Normalisation of delivery methods

For transactions in cash or with a payment period, SMM will normalise the prices in accordance with the bank acceptance rate. For transactions in special periods, SMM will take into account factors such as logistics and freight.

The price data will be recorded both electronically and in writing. All electronic and written records are archived by analysts and kept at least five years in a secure network environment and physical environment. **For more details, please refer to the SMM Recordkeeping Policy available at [www.metal.com](http://www.metal.com) (English) or [www.smm.cn](http://www.smm.cn) (Chinese).**

### **2.4.3 Information data analysis, verification and screening**

SMM will always do its best to confirm bids, offers and deals information with related parties. SMM will perform multi-party verification on information provided by the buyers/sellers with their counterparties, and will cross-validate with other relevant participants if the buyers and sellers are unable or unwilling to provide the information.

SMM will exclude any questionable, irreproducible or apparently abnormal quote and transaction in the price evaluation process, and note the reason for removal in the original data set, which will also be kept at least five years. For instance, SMM ensures that only transactions and quotes made between financially and legally independent parties will be included in the price evaluation process. SMM price analysts will compare and analyse data submitted by SMM price submitters, verifying whether the prices show trends that run counter to the wider market. The cases include but are not limited to:

- Traded prices are significantly higher due to the inclusion of special circumstances or special services
- A company's quotes are intentionally higher due to a special sales plan or policy of the company
- A company's bids reflect its prospects for the market price and is intentionally made public in advance

SMM analysts will investigate into the data submitted once any abnormal condition is detected. They will contact the price submitter to verify the accuracy, applicability and completeness of the data. If it is confirmed that errors, such as input errors, are made in the submission process, SMM price analysts will correct the error and conduct verification and screening. If no mistakes are found in the data submission process, it could be concluded that the data submitted is disqualified and has to be removed from the original data set. The finalized price assessment is in the form of a price range.

Minimal subjective judgment from analysts is required in the SMM price evaluation process. The established standards and procedures will be applied to manage the actions taken by SMM price analysts in screening the collected data, and to evaluate the data included in the price assessment is valid or if the abnormal data has been excluded. **For more details, please refer to the SMM Guidelines for the Exercise of Expert Judgment available at [www.metal.com](http://www.metal.com) (English) or [www.smm.cn](http://www.smm.cn) (Chinese)**

The experience of SMM price analysts in the cobalt sulphate trading market is to ensure that only data that meets clear methodological requirements can be included in the price evaluation process. After screening the original data set and removing disqualified data, SMM price analysts will not have any subjective judgment about the normalised data or the price assessments.

The SMM Benchmark Management Committee regularly reviews the implementation of these procedures to ensure compliance with its published standards. To attain the highest possible standards, SMM price analysts are trained and regularly appraised in their respective markets in which they are responsible for assessing prices. This ensures that SMM analysts follow the requirements of the methodology in a consistent manner.

#### **2.4.4 Special circumstances**

SMM reserves the right to exercise judgments when trading liquidity is thin. We will make the assessments based on the economy, relationships between products, transportation and forward market if there is a lack of credible or verifiable market information, so as to make sure that the data samples used to evaluate the spot prices are sufficient and accurate. **For more details, please refer to the SMM Illiquid Market Management Policy and SMM Expert Judgment Policy available at [www.metal.com](http://www.metal.com) (English) or [www.smm.cn](http://www.smm.cn) (Chinese).**

In addition, SMM will also make a price assessment when there is no or only one offer or bid, or when the price difference between offers and bids is too big to assess a tradable price. In these cases, the price range of the previous day will be taken into consideration.

SMM will not set the minimum trading volume data in the cobalt sulphate price assessment as sparse deals are sometimes heard in the market.



### **2.4.5 Price publication**

The SMM cobalt sulphate spot price assessment is published on the SMM websites at [www.metal.com](http://www.metal.com) (English) or [www.smm.cn](http://www.smm.cn) (Chinese).

The time of the price publication may also be affected by emergencies and force majeure factors, such as power outages and natural disasters. In such cases, SMM will make every effort to inform the market of the delayed publication schedule as soon as possible. **For more details, please refer to the SMM Disaster Recovery Procedures available at [www.metal.com](http://www.metal.com) (English) or [www.smm.cn](http://www.smm.cn) (Chinese).**

Price information published by SMM is available to subscribers of SMM services and is entitled to copyright protection. Without a clear agreement with SMM, no third party may distribute the information or use it for commercial interests.

### **2.4.6 Modification of published prices**

If there are any errors (mistake in calculation or errors caused by incorrect operations) after the price is published, SMM will immediately issue a correction statement to reflect the correct price. **For more details, please refer to the SMM Error Correction Policy available at [www.metal.com](http://www.metal.com) (English) or [www.smm.cn](http://www.smm.cn) (Chinese).**

## **2.5 Review of key points**

### **2.5.1 Product specification**

Cobalt sulphate that meets the requirements set by GB/T 26523-2011, Co $\geq$ 20.5%. Please refer to the attached document *GB/T 26523-2011 cobalt sulphate* for more details.

### **2.5.2 Reference volume**

SMM sets the typical transaction size that reflects market circulation at 30-200 mt in physical content.

### **2.5.3 Delivery**

Delivered to factory on the transaction day, by air or trucks.

### **2.5.4 Payment terms**

Bank acceptance

### **2.5.5 Delivery site**

Buyer's factory/warehouse

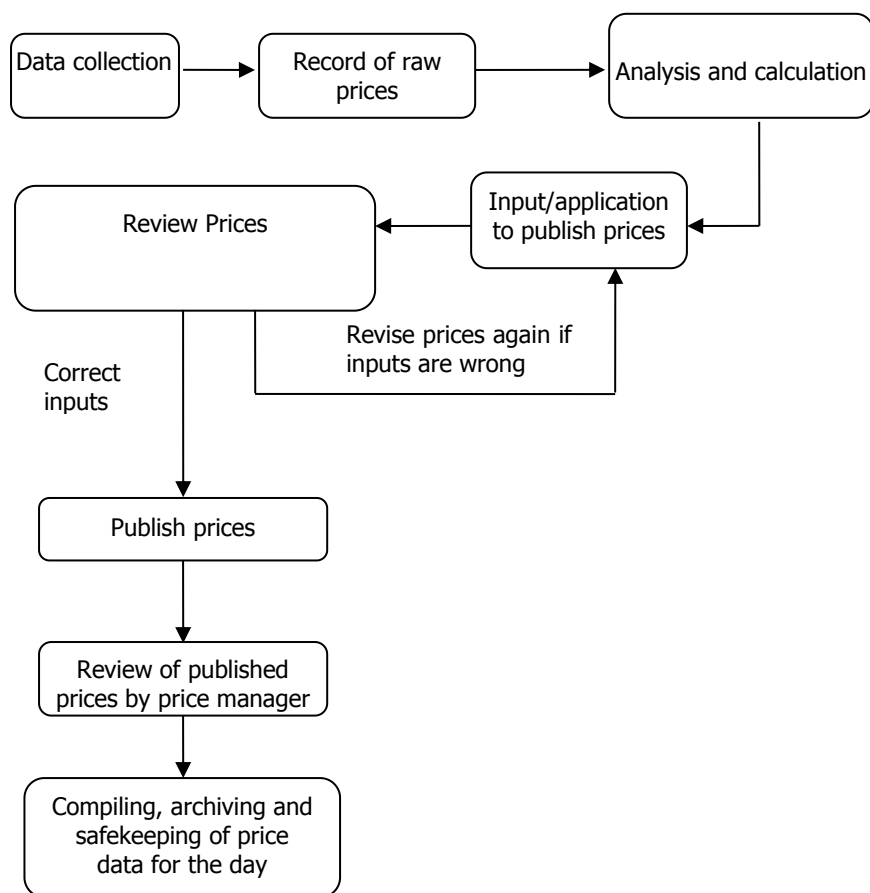
### **2.5.6 Unit of pricing**

10,000 yuan/mt

### **2.5.7 Format of publishing**

The prices are published as a price range, including 13% VAT.

## **2.6 Price assessment process**



SMM strictly controls the submission collection process, and only considers transactions, offers and bids that follow standard contract terms. SMM not only collects the submitted trade price, but also on any significant additional information. If necessary, SMM can require the submitter to provide relevant documents to judge the fulfillment of the contract and to verify the validity of data.

## 2.7 Adjustment to the price assessment methodology

SMM updates our methodologies on a regular basis to reflect a constantly changing metals trading market. Amendments will be made based on feedback by market participants, and an internal check will be also made regularly. We will follow the external consultation workflow to amend discrepancies in the methodology that may be less time-sensitive. Major revisions and updates will be published 28 days ahead of the changes, to seek opinions from market participants, unless there are unavoidable and unpreventable circumstances such as natural disasters, war or bankruptcy of the exchange, which will shorten the period. SMM promises to carefully look into any feedback to the adjustment of the price methodologies, and will amend the methodologies under certain circumstances even if some market participants do not approve of the changes. We will arrange an official consultation of the cobalt sulphate spot price assessment at least once a year. Dates of the most recent and the next session are at the start of this document. **For more details, please refer to the SMM Methodology Review and changes Policy, available at [www.metal.com](http://www.metal.com) (English) or [www.smm.cn](http://www.smm.cn) (Chinese).**

