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ARGUS BATTERY MATERIALS

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Methodology overview

Methodology rationale

Argus strives to construct methodologies that reflect the way the market trades. Argus aims to produce price assessments which are reliable and representative indicators of commodity market values and are free from distortion. As a result, the specific currencies, volume units, locations and other particulars of an assessment are determined by industry conventions.

In the battery materials markets, Argus publishes physical market prices in the open market as laid out in the specifications and methodology guide. Argus uses the trading period deemed by Argus to be most appropriate, in consultation with industry, to capture market liquidity.

In order to be included in the assessment process, deals must meet the minimum volume, delivery, timing and specification requirements in our methodology. In illiquid markets, and in other cases where deemed appropriate, Argus assesses the range within which product could have traded by applying a strict process outlined later in this methodology.

Survey process

Argus price assessments are informed by information received from a wide cross section of market participants, including producers, consumers and intermediaries. Argus reporters engage with the industry by proactively polling participants for market data. Argus will contact and accept market data from all credible market sources including front and back office of market participants and brokers. Argus will also receive market data from electronic trading platforms and directly from the back offices of market participants. Argus will accept market data by telephone, instant messenger, email or other means.

Argus encourages all sources of market data to submit all market data to which they are a party that falls within the Argus stated methodological criteria for the relevant assessment. Argus encourages all sources of market data to submit transaction data from back office functions.

Throughout all markets, Argus is constantly seeking to increase the number of companies willing to provide market data. Reporters are mentored and held accountable for expanding their pool of contacts. The number of entities providing market data can vary significantly from day to day based on market conditions.

For certain price assessments identified by local management, if more than 50pc of the market data involved in arriving at a price assessment is sourced from a single party the supervising editor will engage in an analysis of the market data with the primary reporter to ensure that the quality and integrity of the assessment has not been affected.

Market data usage

In each market, Argus uses the methodological approach deemed to be the most reliable and representative for that market. Argus will utilise various types of market data in its methodologies, to include:

- Transactions
- Bids and offers
- Other market information, to include spread values between grades, locations, timings, and many other data.

In many markets, the relevant methodology will assign a relatively higher importance to transactions over bids and offers, and a relatively higher importance to bids and offers over other market information. Certain markets however will exist for which such a hierarchy would produce unreliable and non-representative price assessments, and so the methodology must assign a different relative importance in order to ensure the quality and integrity of the price assessment. And even in markets for which the hierarchy normally applies, certain market situations will at times emerge for which the strict hierarchy would produce non-representative prices, requiring Argus to adapt in order to publish representative prices.

Verification of transaction data

Reporters carefully analyse all data submitted to the price assessment process. These data include transactions, bids, offers, volumes, counterparties, specifications and any other information that contributes materially to the determination of price. This high level of care described applies regardless of the methodology employed. Specific to transactions, bids, and offers, reporters seek to verify the price, the volume, the specifications, location basis, and counterparty. In some transactional average methodologies, reporters also examine the full array of transactions to match counterparties and arrive at a list of unique transactions. In some transactional average methodologies, full details of the transactions verified are published electronically and are accessible by subscribers. The deals are also published in the daily report.

Several tests are applied by reporters in all markets to transactional data to determine if it should be subjected to further scrutiny. If a transaction has been identified as failing such a test, it will receive further scrutiny. For assessments used to settle derivatives and for many other assessments, Argus has established internal procedures that involve escalation of inquiry within the source's company and escalating review within Argus management. Should this process determine that a transaction should be excluded from the price assessment process, the supervising editor will initiate approval and, if necessary, documentation procedures.

Primary tests applied by reporters

- Transactions not transacted at arm's length, including deals between related parties or affiliates.
- Transaction prices that deviate significantly from the mean of all transactions submitted for that day.
- Transaction prices that fall outside of the generally observed lows and highs that operated throughout the trading day.
- Transactions that are suspected to be a leg of another transaction or in some way contingent on an unknown transaction.
- Single deal volumes that significantly exceed the typical transaction volume for that market.
- Transaction details that are identified by other market participants as being for any reason potentially anomalous and perceived by Argus to be as such.

- Transaction details that are reported by one counterparty differently than the other counterparty.
- Any transaction details that appear to the reporter to be illogical or to stray from the norms of trading behaviour. This could include but is not limited to divergent specifications, unusual delivery location and counterparties not typically seen.
- Transactions that involve the same counterparties, the same price and delivery dates are checked to see that they are separate deals and not one deal duplicated in Argus records.

Secondary tests applied by editors for transactions identified for further scrutiny

Transaction tests

- The impact of linkage of the deal to possible other transactions such as contingent legs, exchanges, options, swaps, or other derivative instruments. This will include a review of transactions in markets that the reporter may not be covering.
- The nature of disagreement between counterparties on transactional details.
- The possibility that a deal is directly linked to an offsetting transaction that is not publicly known, for example a “wash trade” which has the purpose of influencing the published price.
- The impact of non-market factors on price or volume, including distressed delivery, credit issues, scheduling issues, demurrage, or containment.

Source tests

- The credibility of the explanation provided for the outlying nature of the transaction.
- The track record of the source. Sources will be deemed more credible if they
 - Regularly provide transaction data with few errors.
 - Provide data by Argus’ established deadline.
 - Quickly respond to queries from Argus reporters.
 - Have staff designated to respond to such queries.
- How close the information receipt is to the deadline for information, and the impact of that proximity on the validation process.

Assessment guidelines

When insufficient, inadequate, or no transaction information exists, or when Argus concludes that a transaction based methodology will not produce representative prices, Argus reporters will make an assessment of market value by applying intelligent judgment based on a broad array of factual market information. Reporters must use a high degree of care in gathering and validating all market data used in determining price assessments, a degree of care equal to that applying to gathering and validating transactions. The information used to form an assessment could include deals done, bids, offers, tenders, spread trades, exchange trades, fundamental supply and demand information and other inputs.

The assessment process employing judgment is rigorous, replicable, and uses widely accepted valuation metrics. These valuation metrics mirror the process used by physical commodity traders to internally assess value prior to entering the market with a bid or offer. Applying these valuation metrics along with sound judgment

significantly narrows the band within which a commodity can be assessed, and greatly increases the accuracy and consistency of the price series. The application of judgment is conducted jointly with the supervising editor, in order to be sure that guidelines below are being followed. Valuation metrics include the following:

Relative value transactions

Frequently transactions occur which instead of being an outright purchase or sale of a single commodity, are instead exchanges of commodities. Such transactions allow reporters to value less liquid markets against more liquid ones and establish a strong basis for the exercise of judgment.

- Exchange one commodity for a different commodity in the same market at a negotiated value.
- Exchange delivery dates for the same commodity at a negotiated value.
- Exchange a commodity in one location for the same commodity at another location at a negotiated value.

Bids and offers

If a sufficient number of bids and offers populate the market, then in most cases the highest bid and the lowest offer can be assumed to define the boundaries between which a deal could be transacted.

Comparative metrics

- The relative values between compared commodities are readily discussed in the market and can be discovered through dialogue with market participants. These discussions are the precursor to negotiation and conclusion of transactions.
- Comparison to the same commodity in another market centre.
- Comparison to a more actively traded but slightly different specification commodity in the same market centre.
- Comparison to the same commodity traded for a different delivery timing.
- Comparison to the commodity’s primary feedstock or primary derived product(s).
- Comparison to trade in the same commodity but in a different modality (as in barge versus oceangoing vessel) or in a different total volume (as in full cargo load versus partial cargo load).

Volume minimums and transaction data thresholds

Argus typically does not establish thresholds strictly on the basis of a count of transactions, as this could lead to unreliable and non-representative assessments and because of the varying transportation infrastructure found in all commodity markets. Instead, minimum volumes are typically established which may apply to each transaction accepted, to the aggregate of transactions, to transactions which set a low or high assessment or to other volumetrically relevant parameters.

For price assessments used to settle derivatives, Argus will seek to establish minimum transaction data thresholds and when no such threshold can be established Argus will explain the reasons. These thresholds will often reflect the minimum volumes necessary to produce a transaction-based methodology, but may also establish minimum deal parameters for use by a methodology that is based primarily on judgment.

Should no transaction threshold exist, or should submitted data fall below this methodology's stated transaction data threshold for any reason, Argus will follow the procedures outlined elsewhere in this document regarding the exercise of judgment in the price assessment process.

Transparency

Argus values transparency in energy markets. As a result, where available, we publish lists of deals in our reports that include price, basis, counterparty and volume information. The deal tables allow subscribers to cross check and verify the deals against the prices. Argus feels transparency and openness is vital to developing confidence in the price assessment process.

Swaps and forwards markets

Argus publishes forward assessments for numerous markets. These include forward market contracts that can allow physical delivery and swaps contracts that swap a fixed price for the average of a floating published price. Argus looks at forward swaps to inform physical assessments but places primary emphasis on the physical markets.

Publications and price data

Argus battery materials prices are published in the Argus Battery Materials report. Subsets of these prices appear in other Argus market reports and newsletters in various forms. The price data are available independent of the text-based report in electronic files that can feed into various databases. These price data are also supplied through various third-party data integrators. The Argus website also provides access to prices, reports and news with various web-based tools. All Argus prices are kept in a historical database and available for purchase. Contact your local Argus office for information. A publication schedule is available at www.argusmedia.com

Corrections to assessments

Argus will on occasion publish corrections to price assessments after the publication date. We will correct errors that arise from clerical mistakes, calculation errors, or a misapplication of our stated methodology. Argus will not retroactively assess markets based on new information learned after the assessments are published. We make our best effort to assess markets based on the information we gather during the trading day assessed.

Ethics and compliance

Argus operates according to the best practices in the publishing field, and maintains thorough compliance procedures throughout the firm. We want to be seen as a preferred provider by our subscribers, who are held to equally high standards, while at the same time maintaining our editorial integrity and independence. Argus has a strict ethics policy that applies to all staff. The policy can be found on our website at www.argusmedia.com. Included in this policy are restrictions against staff trading in any energy commodity or energy related stocks, and guidelines for accepting gifts. Argus also has strict policies regarding central archiving of email and instant messenger communication, maintenance and archiving of notes, and archiving of spreadsheets and deal lists used in the price assessment process. Argus publishes prices that report and reflect prevailing levels for open-market arms length transactions (please see the [Argus Global Compliance Policy](#) for a detailed definition of arms length).

Consistency in the assessment process

Argus recognises the need to have judgment consistently applied by reporters covering separate markets, and by reporters replacing existing reporters in the assessment process. In order to ensure this consistency, Argus has developed a programme of training and oversight of reporters. This programme includes:

- A global price reporting manual describing among other things the guidelines for the exercise of judgment
- Cross-training of staff between markets to ensure proper holiday and sick leave backup. Editors that float between markets to monitor staff application of best practices
- Experienced editors overseeing reporting teams are involved in daily mentoring and assisting in the application of judgment for illiquid markets
- Editors are required to sign-off on all price assessments each day, thus ensuring the consistent application of judgment.

Review of methodology

The overriding objective of any methodology is to produce price assessments which are reliable and representative indicators of commodity market values and are free from distortion. As a result, Argus editors and reporters are regularly examining our methodologies and are in regular dialogue with the industry in order to ensure that the methodologies are representative of the market being assessed. This process is integral with reporting on a given market. In addition to this ongoing review of methodology, Argus conducts reviews of all of its methodologies and methodology documents on at least an annual basis.

Argus market report editors and management will periodically and as merited initiate reviews of market coverage based on a qualitative analysis that includes measurements of liquidity, visibility of market data, consistency of market data, quality of market data and industry usage of the assessments. Report editors will review:

- Appropriateness of the methodology of existing assessments
- Termination of existing assessments
- Initiation of new assessments.

The report editor will initiate an informal process to examine viability. This process includes:

- Informal discussions with market participants
- Informal discussions with other stakeholders
- Internal review of market data

Should changes, terminations, or initiations be merited, the report editor will submit an internal proposal to management for review and approval. Should changes or terminations of existing assessments be approved, then formal procedures for external consultation are begun.

Changes to methodology

Formal proposals to change methodologies typically emerge out of the ongoing process of internal and external review of the methodologies. Formal procedures for external consultation regarding material changes to existing methodologies will be initiated with an announcement of the proposed change published in the relevant Argus report. This announcement will include:

- Details on the proposed change and the rationale
- Method for submitting comments with a deadline for submissions
- For prices used in derivatives, notice that all formal comments will be published after the given consultation period unless submitter requests confidentiality.

Argus will provide sufficient opportunity for stakeholders to analyse and comment on changes, but will not allow the time needed to follow these procedures to create a situation wherein unrepresentative or false prices are published, markets are disrupted, or market participants are put at unnecessary risk. Argus will engage with industry throughout this process in order to gain acceptance of proposed changes to methodology. Argus cannot however guarantee universal acceptance and will act for the good order of the market and ensure the continued integrity of its price assessments as an overriding objective.

Following the consultation period, Argus management will commence an internal review and decide on the methodology change. This will be followed by an announcement of the decision, which will be published in the relevant Argus report and include a date for implementation. For prices used in derivatives, publication of stakeholders' formal comments that are not subject to confidentiality and Argus' response to those comments will also take place.

Argus Battery Materials

Argus Battery Materials

Argus Battery Materials provides price assessments for the global markets in lithium, cobalt, nickel and other metals relevant to the production of batteries.

Average price indexes

In addition to outright prices, the service provides month-to-date and final-month average indexes.

Indexes are calculated by summing the value of published assessments and dividing by the number of assessments published in a given month. The final index value for a given month is the average calculated on the final day of assessment of that month. The report shows the evolution of the current-month index, as well as the final index value for the previous month.

Timing and indexation

Argus Battery Materials contains twice-weekly, weekly and monthly assessments. Those assessments are republished in the Argus Database and available electronically for each publication date. For example, a weekly price assessed on Wednesdays will be republished on Thursday and on each subsequent publication date until the next day of assessment, in this example, the following Wednesday.

Users are advised that the published month-to-date and final indexes may differ from those calculated using Argus or third-party tools, because of this daily republication of price assessments.

Publication schedule

Argus may not publish certain assessments on public holidays and may publish others on the business day before or after the holiday depending on frequency, market and location of the assessment. Argus does not publish battery materials coverage on Saturday or Sunday, even when those days are treated as working days in the market being reported.

Chinese twice weekly prices are not assessed on public holidays in China, and are uploaded to the Argus database as unchanged. Weekly Chinese price assessments are made the working day before Chinese public holidays.

European twice weekly prices are not assessed on UK public holidays and no uploads are made.

Weekly US prices are assessed and uploaded on the working day after US public holidays.

Argus Battery Materials is not published on UK public holidays. A publication schedule is available at www.argusmedia.com

Assessment process

Price assessments are based on data and information gathered by specialist market reporters by telephone, email and instant messaging. Reporters contact a wide cross-section of market participants, including producers, consumers, marketers, traders and other intermediaries. As many participants as possible are contacted. Where relevant, Argus may also take into account information from exchanges, government agencies and trade associations.

Argus welcomes transaction data and survey input from all market participants and strongly encourage full disclosure of all relevant details of all deals concluded. All information received is crosschecked and tested against other market information. Any anomalies are excluded.

When gathering data on transactions, reporters seek to obtain the price level, volume, specifications and delivery terms. Reported trades are tested against wider market conditions and must be deemed repeatable in order to be included in the assessment. Reporters apply a series of primary and where appropriate secondary tests when verifying trades. For example, transactions which are priced significantly above or below the prevailing market may be excluded from the assessment process.

Spot transactions can vary in size between markets, and the significance of a particular spot trade to the price assessment process must be gauged in light of trade patterns in the relevant market and prevailing market conditions.

Assessing illiquid markets

Where possible, assessments are based on verified and repeatable spot trades. In illiquid market conditions, with a lack of verified spot trades, reporters apply intelligent judgment to form assessments based on bids and offers and/or other relevant market information including a market survey of participants' view of where price levels would stand if trade were to take place.

Bids and offers must be considered repeatable for inclusion in the assessment process, and are tested against the wider market through contact with as many market participants as possible.

Additional information that may be taken into account when there are no verified spot trades during the assessment period includes:

- Bids and offers
- Market participants' view of prevailing price levels
- Verified trades in related and/or correlated markets
- Tenders
- Exchange prices
- Other relevant information including supply and demand fundamentals, and current market trends.

Reporters must use a high degree of care in gathering and validating all market data used in determining price assessments, a degree of care equal to that applying to gathering and validating transactions.

Basis of assessment

Price assessments are for spot physical material for prompt delivery, defined as delivery within four weeks. Product specifications for each assessment, such as currency, unit of trade and quality, follow recognised industry standards such as norms published by the Minor Metals Trade Association and other widely used specifications.

Price assessments are published as low-high ranges.

Assessments are for material certified as conflict free using recognised traceability systems in compliance with relevant legislation, and delivered to the market through legal routes, with relevant export taxes paid.

Fob China assessments are basis export duty paid, including any export taxes levied by China, and VAT. Fob China prices are not inclusive of any import duty charged by the importing country. China domestic prices are basis ex-works, VAT paid, unless otherwise stated. European prices are basis in-warehouse Rotterdam, duty unpaid, unless otherwise stated. Fob US prices in-warehouse are inclusive of duties.

In most cases, information relating to material that falls outside of the stated specifications will not be used in the assessment process. Exceptions may be made if an acceptable and appropriate normalisation process can be applied.

In markets where liquidity is split across several locations, verified spot trades may be normalised to a single reference hub, for example by making adjustments for transportation costs, where appropriate and in line with market practice. See below for a full list of product specifications.

Ex-works US dollar conversions

Argus converts several ex-works price assessments to US dollar, VAT excluded prices by removing value-added tax from the relevant ex-works assessment and applying an exchange rate to create a \$/kg or \$/lb price.

Converted prices are calculated for:

- Lithium carbonate min 99.5pc (\$/kg)
- Lithium hydroxide min 56.5pc (\$/kg)
- Cobalt sulphate min 20.5pc (\$/lb)

Timing of assessment

The frequency and timing of each assessment are specified in the tables below.

In each market, information received after 5pm local time on the day of assessment may not be included in the assessment process. The exception is the cobalt hydroxide min 30% cif China assessment, which has a 5pm London time cut off for market information.

Battery cathodes

Battery cathode prices are an average of the elemental value of lithium, nickel, cobalt, manganese and aluminium weighted by the chemical composition of the cathode, as researched and updated periodically by Argus. Each price is broadly defined by the balance of elements in the cathode. Specific ratios used in each calculation are listed below.

Underlying Argus assessments are converted to pure metal values based on the published price and the specification of each.

- lithium hydroxide ex-works China spot (the lithium component for all but the LFP calculation)
- lithium carbonate ex-works China spot (the lithium component the LFP calculation)
- nickel sulphate ex-works China spot
- manganese sulphate battery grade ex-works China spot
- cobalt sulphate ex-works China spot
- aluminium LME 3 months official prompt price (previous day)
- iron ore fines 62pc Fe (ICX) cfr Qingdao
- phosphoric acid cfr India quarter

Weightings are reviewed bi-annually and may be updated at any time, following consultation.

Month-to-date and monthly average prices are also published.

Battery cathode weightings (per kWh)

	NCM111	NCM523	NCM622	NCM811	NCA	LFP
Lithium	0.15	0.15	0.15	0.15	0.15	0.15
Nickel	0.39	0.6	0.7	1	1	
Manganese	0.36	0.35	0.21	0.11		
Cobalt	0.39	0.25	0.19	0.1	0.1	
Aluminium					0.01	
Iron						1.1
Phosphorous						0.61

Black mass

Calculated elemental values

Black mass prices are an average of the elemental value of lithium, nickel and cobalt weighted by the chemical composition of the product, less production costs and multiplied by a recovery rate, as researched and updated periodically by Argus. Each price is broadly defined by the balance of elements in the product. Specific ratios used in each calculation are listed below.

Underlying Argus assessments are converted to pure metal values based on the published price and the specification of each.

- lithium hydroxide min 56.5% ex-works China spot (the lithium component for all but the LFP and LCO calculation)
- lithium carbonate min 99.5% ex-works China spot (the lithium component for the LFP and LCO calculation)
- nickel LME cash official
- cobalt (Electrolytic metal) min 99.8% ex-works China spot

Weightings are reviewed biannually and may be updated at any time, following consultation. Month-to-date and monthly average prices are also published.

Black mass weightings

	NCM111	NCM523	NCM622	NCM811	LFP	LCO
Lithium	0.07	0.07	0.07	0.07	0.07	0.07
Nickel	0.205	0.3125	0.375	0.52		0.1
Cobalt	0.205	0.125	0.125	0.065		0.6

Payable and transaction prices

Argus also publishes payable indicators for black mass NCM assessed monthly as a percentage of the relevant Argus nickel, lithium and cobalt assessments and transaction prices calculated weekly using the payable indicator and the latest underlying Argus nickel, lithium and cobalt prices.

Antimony

Except where noted (*) Argus also publishes month-to-date and monthly averages. See the [Argus Non-Ferrous Markets methodology](#).

China

- Ingot min 99.65% ex-works China*
- Ingot min 99.65% fob China
- min 99.85% ex-works China*
- Trioxide min 99.5% ex-works China*
- Trioxide min 99.5% fob China
- Trioxide min 99.8% ex-works China*
- Trioxide min 99.8% fob China

Rotterdam

- Regulus grade II min 99.65% Sb du Rotterdam
- Regulus trioxide grade min 99.65% Sb du Rotterdam

US

- min 99.65% cif US

Cadmium

Except where noted (*) Argus also publishes month-to-date and monthly averages. See the [Argus Non-Ferrous Markets methodology](#).

China

- min 99.99% ex-works China*
- Oxide min 99.5% ex-works China*

India

- min 99.95% cif India
- min 99.99% cif India

Rotterdam

- min 99.95% du Rotterdam
- min 99.99% du Rotterdam

US

- min 99.95% fob US warehouse
- min 99.99% fob US warehouse

US lithium

Assessed based on trade, bid, offer and other market information including but not limited to the effect on price of duties and tariffs, freight and related costs and wider market trends that emerge through ongoing conversation with the industry. Market information about product of divergent specifications may be considered for inclusion in the assessment if deemed relevant to the prevailing market price. See the specifications details below.

Manganese

Except where noted (*) Argus also publishes month-to-date and monthly averages. See the [Argus Non-Ferrous Markets methodology](#).

China

- Briquette 97% Mn fob China
- Briquette min 97% Mn ex-works China*
- Dioxide min 91% alkaline battery grade ex-works China excl. VAT USD/t*
- Dioxide min 91% alkaline battery grade ex-works China*
- Dioxide min 91% carbon battery grade ex-works China excl. VAT USD/t*
- Dioxide min 91% carbon battery grade ex works China*
- Sulphate min 32% Mn battery grade ex works China*

Nickel

Except where noted (*) Argus also publishes month-to-date and monthly averages. Unless noted, see the [Argus Non-Ferrous Markets methodology](#).

China

- Ore min 1.8% Ni fca China*
- Philippine ore min 1.3% Ni cif China
- Cathode full plate premium cif Shanghai*
- Full plate premium ex-warehouse Shanghai, Jinchuan-produced
- Full plate premium ex-warehouse Shanghai, imported
- Mixed hydroxide precipitate (MHP) payable indicator 30-40% cif China
- Matte payable indicator 70% min cif China
- Mixed hydroxide precipitate (MHP) 37% Ni cif China
- Matte 70% Ni cif China
- Nickel pig iron min 10% ex-works China*
- Sulphate min 22% cif China
- Sulphate min 22% ex-works China*
- Sulphate min 22% ex-works China excl. VAT USD/t*

Indonesia

See the [Argus Indonesian Nickel Index \(INI\) Report methodology](#).

- Indonesian Nickel Index NPI 10-14% fob Indonesia main port
- Indonesian Nickel Index MHP nickel payable 37% min fob Indonesia main port
- Indonesian Nickel Index MHP cobalt payable 2-5% min fob Indonesia main port
- Indonesian Nickel Index matte 70% fob Indonesia main port

Rotterdam

- Briquette in-warehouse Rotterdam transaction*
- Briquette min 99.8% in-warehouse Rotterdam*
- Cathode 4x4 in-warehouse Rotterdam transaction*
- Cathode 4x4inch premium in-warehouse Rotterdam
- Cathode full plate in-warehouse Rotterdam transaction
- Cathode full plate premium in-warehouse Rotterdam

US

- Briquette del US
- Cathode 1x1inch premium (small lots) del US*
- Cathode 1x1inch premium (truckloads) del US*
- Cathode 4x4inch (truckloads) del US transaction*
- Cathode 4x4inch premium (small lots) del US
- Cathode 4x4inch premium (truckloads) del US
- Nickel-cobalt refinery scrap cobalt contained del US processor*
- Nickel-cobalt refinery scrap nickel contained del US processor*

Silicon

Except where noted (*) Argus also publishes month-to-date and monthly averages. See the [Argus Non-Ferrous Markets methodology](#).

China

- 3-3-0-3 min 99% Si dat Chinese ports*
- 3-3-0-3 min 99% Si fob China

Europe

- 2-2-0-2 min 99.5% Si fca Europe works
- 3-3-0-3 min 99% Si fca Europe works

Vanadium

Except where noted (*) Argus also publishes month-to-date and monthly averages. See the [Argus Non-Ferrous Markets methodology](#).

China

- pentoxide 98% V2O5 ex-works China*
- Pentoxide 98% V2O5 fob China

Rotterdam

- Pentoxide fused flake min 98% du Rotterdam (per lb V2O5)

Related markets

Argus Battery Materials includes prices for caustic soda, petroleum coke, phosphoric acid and sulphuric acid, republished from other Argus services.

Caustic soda

- 50pc China domestic week 1

See the [Argus Chlor-Alkali and Derivatives methodology](#)

Petroleum coke

- China fob anode grade calcined 3.0% sulphur month
- China fob anode grade green 2.0% sulphur month
- China fob anode grade green 3.0% sulphur month

See the [Energy Argus Petroleum Coke methodology](#)

Phosphoric acid

- cfr India quarter

See the [Argus Phosphates methodology](#)

Sulphuric acid

- cfr China contract
- fob China spot

See the [Argus Sulphuric Acid methodology](#)

Black mass

Assessment	Grade	Basis	Location	Duties/Tariffs	Minimum lot size	Form	Currency /unit	Timing	Assessment frequency
China									
NCM nickel payable indicator ddp China (pc Argus nickel sulphate ex-works China)	black mass with metal content of 3-5% of lithium, 5-10% of cobalt and 10-25% of nickel. Minimum total cobalt and nickel content of 20%	ddp	China	duty paid	20t	powder	pc	prompt	monthly (first Wednesday)
Assessed and published as a per cent of the published Argus nickel sulphate min 22% ex-works China assessment									
NCM nickel payable ddp China transaction	Calculated as the Argus black mass NCM nickel payable indicator ddp China assessment * the Argus nickel sulphate min 22% ex-works China assessment								
NCM lithium payable indicator ddp China (pc Argus lithium carbonate ex-works China)	black mass with metal content of 3-5% of lithium, 5-10% of cobalt and 10-25% of nickel. Minimum total cobalt and nickel content of 20%	ddp	China	duty paid	20t	powder	pc	prompt	monthly (first Wednesday)
Assessed and published as a per cent of the published Argus lithium carbonate min 99.5% ex-works China assessment									
NCM lithium payable ddp China transaction	Calculated as the Argus black mass NCM lithium payable indicator ddp China assessment * the Argus lithium carbonate min 99.5% ex-works China assessment								
NCM cobalt payable indicator ddp China (pc Argus cobalt sulphate ex-works China)	black mass with metal content of 3-5% of lithium, 5-10% of cobalt and 10-25% of nickel. Minimum total cobalt and nickel content of 20%	ddp	China	duty paid	20t	powder	pc	prompt	monthly (first Wednesday)
Assessed and published as a per cent of the published Argus cobalt sulphate min 20.5% ex-works China assessment									
NCM cobalt payable ddp China transaction	Calculated as the Argus black mass NCM cobalt payable indicator ddp China assessment * the Argus cobalt sulphate min 20.5% ex-works China assessment								

Cobalt

Assessment	Grade	Basis	Location	Duties/Tariffs	Minimum lot size	Form	Currency /unit	Timing	Assessment frequency
China									
(Electrolytic metal) min 99.8% ex-works China	cobalt 99.8% minimum	ex-works	China	no	1t (+/-2%)	cut cathode	Yn/kg	prompt	twice weekly (Tu/Th)
Chloride min 24% ex-works China	cobalt 24% minimum	ex-works	China	no	1t (+/-2%)	powder	Yn/t	prompt	twice weekly (Tu/Th)
Powder min 99.8% ex-works China	cobalt 99.8% minimum	ex-works	China	no	1t (+/-2%)	powder	Yn/kg	prompt	weekly (Tu)
Hydroxide min 30% cif China	cobalt 30-35% minimum	cif	China	duty paid	10t metal equivalent	powder	\$/lb	prompt	twice weekly (Tu/Th)
Hydroxide payable indicator min 30% cif China (pc Argus cobalt metal, Chinese origin)	cobalt 30-35% minimum	cif	China	duty paid	10t metal equivalent	powder	pc	within 45 days	twice weekly (W/F)
Assessed and published as a per cent of the low end of the published Argus cobalt min 99.8% cut cathode du Rotterdam assessment									
Hydroxide payable indicator min 30% cif China (pc Argus cobalt sulphate)	cobalt 30-35% minimum	cif	China	duty paid	10t metal equivalent	powder	pc	within 45 days	weekly (Th)
Assessed and published as a per cent of the low end of the published Argus cobalt sulphate min 20.5% ex-works China assessment									
Mixed hydroxide precipitate (MHP) cobalt payable indicator 2-5% Co, cif China (pc Argus cobalt metal, Chinese origin)	cobalt 2-5% minimum, nickel 30-40%	cif	China	duty unpaid	5t metal equivalent	powder	pc	within 45 days	weekly (W)
Assessed and published as a per cent of the low end of the published Argus cobalt min 99.8% cut cathode du Rotterdam assessment									
Oxide 72% ex-works China	cobalt 72% minimum	ex-works	China	no	1t (+/-2%)	powder	Yn/kg	prompt	twice weekly (Tu/Th)
Oxide min 60% ex-works China	cobalt 60% minimum	ex-works	China	no	100kg	powder	Yn/kg	prompt	twice weekly (Tu/Th)
Sulphate min 20.5% ex-works China	cobalt 20.5% minimum	ex-works	China	no	1t (+/-2%)	powder	Yn/t	prompt	twice weekly (Tu/Th)
Sulphate min 20.5% ex-works China (USD/lb, ex-VAT)	cobalt 20.5% minimum	ex-works	China	no	1t (+/-2%)	powder	\$/lb	prompt	twice weekly (Tu/Th)

Tetroxide min 73% ex-works China	cobalt 73% minimum	ex-works	China	no	1t (+/-2%)	powder	Yn/kg	prompt	twice weekly (Tu/Th)
Europe									
min 99.8% Chinese origin cut cathode du Rotterdam	cobalt 99.8% minimum	in-warehouse	Rotterdam	duty unpaid	1t (+/-2%)	cut cathode	\$/lb	prompt	daily
min 99.8% alloy grade du Rotterdam	cobalt 99.8% minimum	in-warehouse	Rotterdam	duty unpaid	1t (+/-2%)	cut cathode, rounds	\$/lb	prompt	daily
min 99.8% standard grade du Rotterdam	cobalt 99.8% minimum	in-warehouse	Rotterdam	duty unpaid	1t (+/-2%)	broken cathode, briquettes	\$/lb	prompt	daily
US									
min 99.8% alloy grade fob US warehouse	cobalt 99.8% minimum	fob ware-house	US	duty paid	1t min, 20t max	cut or broken cathode, briquette	\$/lb	within 30 days	weekly (Tu)
min 99.8% standard grade in warehouse US	cobalt 99.8% minimum	in-warehouse	US	duty paid	1t min, 20t max	cut or broken cathode, briquette	\$/lb	within 30 days	weekly (Tu)
Lithium									
Concentrate (spodumene) 6% Li2O cif China	Li2O 6.2% maximum, 5.5% minimum (normalised to 6pc)	cif	China	duty unpaid	1,000t	powder	\$/t	prompt	weekly (Tu)
Concentrate (spodumene) 6% Li2O fob Australia	Li2O 6.2% maximum, 5.5% minimum (normalised to 6pc)	fob	Australia	duty unpaid	1,000t	powder	\$/t	prompt	weekly (Tu)
Calculated as a netback from the lithium concentrate (spodumene) 6% Li2O cif China assessment using a freight rate assessed weekly in discussion with market participants.									
Concentrate (spodumene) 5-5.5% Li2O cif China	Li2O 5-5.5%	cif	China	duty unpaid	1,000t	powder	\$/t	prompt	weekly (Tu)
Concentrate (spodumene) 5-5.5% Li2O fob Australia	Li2O 5-5.5%	fob	Australia	duty unpaid	1,000t	powder	\$/t	prompt	weekly (Tu)
Calculated as a netback from the lithium concentrate (spodumene) 5-5.5% Li2O cif China assessment using a freight rate assessed weekly in discussion with market participants.									
Concentrate (spodumene) 5.5% Li2O fob southern Africa	Li2O 5.5% minimum	fob	southern Africa	duty unpaid	1,000t	powder	\$/t	prompt	monthly (first publishing day)
Concentrate (spodumene) 2-4% Li2O fob southern Africa	Li2O 4% maximum, 2% minimum	fob	southern Africa	duty unpaid	1,000t	powder	\$/t	prompt	monthly (first publishing day)
Carbonate 99.5% ex-works China	lithium carbonate 99.5% minimum	ex-works	China	inc VAT	30t	powder, packaged in barrel/bag	Yn/t	prompt	daily
Carbonate 99.5% ex-works China (USD/kg, ex-VAT)	lithium carbonate 99.5% minimum	ex-works	China	less VAT	30t	powder, packaged in barrel/bag	\$/kg	prompt	daily
Carbonate 99.5% cif China	lithium carbonate 99.5% minimum	cif	China	duty paid	30t	powder, packaged in barrel/bag	\$/kg	prompt	twice weekly (Tu/Th)
Hydroxide 56.5% ex-works China	lithium hydroxide monohydrate 56.5% minimum	ex-works	China	inc VAT	10t	powder, packaged in barrel/bag	Yn/t	prompt	daily
Hydroxide 56.5% ex-works China (USD/kg, ex-VAT)	lithium hydroxide monohydrate 56.5% minimum	ex-works	China	less VAT	10t	powder, packaged in barrel/bag	\$/kg	prompt	daily
Hydroxide 56.5% fob China	lithium hydroxide monohydrate 56.5% minimum	fob	China	duty paid	10t	powder, packaged in barrel/bag	\$/kg	prompt	twice weekly (Tu/Th)
Carbonate 99.5% cif Japan/Korea	lithium carbonate 99.5% min, sodium 0.065% max, chloride 0.015% max, iron 0.001% max, water wt 0.6% max, sulphate 0.050% max	cif	Japan/Korea	duty unpaid	5t	powder, packaged in barrel/bag	\$/t	prompt	weekly (Tu)
Hydroxide 56.5% cif Japan/Korea	lithium hydroxide 56.5% min, CO2 0.35% max, chloride 0.002% max, sulphur 0.10% max, calcium 15 wppm, iron 5ppm, sodium 20ppm	cif	Japan/Korea	duty unpaid	5t	powder, packaged in barrel/bag	\$/t	prompt	weekly (Tu)
Carbonate 99.5% in-warehouse Rotterdam	lithium carbonate 99.5% min, sodium 0.065% max, calcium 0.040% max, chloride 0.015% max, iron 0.001% max, water wt 0.6% max, sulphate 0.050% max	in-warehouse	Rotterdam	duty paid	5t	powder, packaged in barrel/bag	\$/t	prompt	weekly (Tu)

Hydroxide 56.5% in-warehouse Rotterdam	lithium hydroxide 56.5% min, CO2 0.35% max, chloride 0.002% max, sulphur 0.10% max, calcium 15 wppm, iron 5ppm, sodium 20ppm	in-warehouse	Rotterdam	duty paid	5t	powder, packaged in bag/drum	\$/t	prompt	weekly (Tu)
Cathode active material lithium iron phosphate (LFP) ex-works China	lithium 3.9%-5.0%	ex-works	China	inc VAT	30t	powder	Yn/t	prompt	weekly (W)
Cathode active material lithium iron phosphate (LFP) excl. VAT USD/kg	lithium 3.9%-5.0%	ex-works	China	less VAT	30t	powder	\$/kg	prompt	weekly (W)
Carbonate 99.5% fob Argentina	lithium carbonate 99.5% minimum	fob	Argentina	duty unpaid	30t	powder, packaged in barrel/bag	\$/kg	prompt	weekly (Tu)
Calculated as a netback from the lithium carbonate 99.5% minimum cif China assessment using a freight rate assessed monthly in discussion with market participants and associated costs.									
Carbonate (technical grade) 99% ddp US	lithium carbonate 99% minimum	ddp	US	duty paid	5t	powder, packaged in barrel/bag	\$/kg	prompt	weekly (Tu)
Carbonate (battery grade) 99.5% ddp US	lithium carbonate 99.5% minimum	ddp	US	duty paid	5t	powder, packaged in barrel/bag	\$/kg	prompt	weekly (Tu)
Hydroxide 56.5% ddp US	lithium hydroxide 56.5% minimum	ddp	US	duty paid	5t	powder, packaged in barrel/bag	\$/kg	prompt	weekly (Tu)
Graphite									
Graphite flake 95% ex-works China	carbon 95% minimum, mesh size -100	ex-works	China	inc VAT	40t	powder	Yn/t	prompt	weekly (Tu)
Graphite flake 95% fob China	carbon 95% minimum, mesh size -100	fob	China	duty paid	40t	powder	\$/t	prompt	weekly (Tu)
Graphite flake 94% ex-works China	carbon 94% minimum, mesh size -100	ex-works	China	inc VAT	40t	powder	Yn/t	prompt	weekly (Tu)
Graphite flake 94% fob China	carbon 94% minimum, mesh size -100	fob	China	duty paid	40t	powder	\$/t	prompt	weekly (Tu)
Graphite flake 94% ex-works China (USD/t, ex-VAT)	carbon 94% minimum, mesh size -100	ex-works	China	less VAT	40t	powder	\$/t	prompt	weekly (Tu)
Graphite flake 90% ex-works China	carbon 90% minimum, mesh size -100	ex-works	China	inc VAT	40t	powder	Yn/t	prompt	weekly (Tu)
Spherical graphite 99.95% ex-works China	carbon 99.95% minimum, granularity 17µm maximum	ex-works	China	inc VAT	1t	granule	Yn/t	prompt	weekly (Tu)
Spherical graphite 99.95% fob China	carbon 99.95% minimum, granularity 17µm maximum	fob	China	inc VAT	1t	granule	\$/t	prompt	weekly (Tu)
Manganese									
Dioxide min 91% LMO battery grade ex works China	Manganese dioxide 91% minimum used in lithium manganate battery	ex-works	China	inc VAT	1t	powder	Yn/t	prompt	weekly (Tu)
Dioxide min 91% LMO battery grade ex works China (USD/t, ex-VAT)	Manganese dioxide 91% minimum used in lithium manganate battery	ex-works	China	less VAT	1t	powder	\$/t	prompt	weekly (Tu)