

CRU Prices

Bauxite and Alumina

Methodology and

Definitions Guide

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Methodology and Definitions Guide – Bauxite and Alumina

1 Scope

This guide covers bauxite and alumina product prices in all geographical markets and should be read in conjunction with the *CRU Group Compliance Framework and Methodology Guide*. It details commodity-specific methodology which have precedence, with all other aspects covered by the Group methodology guide.

2 Methodology

Alumina – CRU-API

CRU Alumina Price Index (CRU-API)

The CRU-API (Australia FOB alumina) is a transaction-only weekly price benchmark. Use of transaction data alone as data inputs to this price ensures that it accurately reflects the actual spot market with no risk of information from sentiment, errant opinion, speculative or even confirmed but ultimately unexecuted bids and offers entering the published price.

This is appropriate for a price used extensively in physical contracts or in other accuracy-critical applications. The price is weekly as this allows for contracting on a number of price values through the month or equally a single or average monthly value, and/or timely identification of market trends, without compromising on liquidity. Liquidity is also enhanced by a normalisation process which allows for the submission of data which can be standardised to CRU's strict definition but is sourced from a wider array of actual trades.

Our methodology blends strict adherence to transaction data and other methodological rules with limited but necessary application of expert judgement, detailed below, in order to produce a price that benefits from rigour, and analyst expertise and discretion in equal measure.

Data providers

CRU-API price assessments are based on regular contact with a wide network of market participants including producers, buyers, traders at critical nodes in the supply chain, and shipping companies. This network is constantly reviewed and maintained to seek a balance of buyers and sellers.

Above and beyond the criteria stipulated in Section 3.4 of the *CRU Group Compliance Framework and Methodology Guide*, each data provider must exist on a list of approved data providers before their data can be considered for admission into published prices.

Data submitted and submission processes

All prices are based exclusively on transaction data (actual deals concluded) and to that extent there is no hierarchy of acceptable price types. CRU seeks to verify each deal with both parties but where this is not possible, a third or fourth party may be consulted. Information relating to bids/offers or an opinion of the prevailing market price can be submitted but such information will strictly not be used in the final CRU-API benchmark calculation.

Admissible price data is limited to transactions concluded at arms-length. This means the trade must be between companies who are substantially unrelated in ownership and/or where the transaction is not part of any arrangement to guarantee the long-term security of supply, such as an off-take agreement or participation in joint ventures in alumina supplying operations. This therefore necessarily excludes intra-company transfers, as well as shipments to or from joint-venture partners.

Data Providers provide CRU with one or more single price figures, each relating to an individual spot deal (a sale or a purchase) concluded between 14:00 on Thursday of the week prior to publication and 14:00 UK on the Thursday of publication. Data Providers also include information relating to vessel size, shipment date, volume and payment terms.

Industry participants can submit prices to CRU by telephone, email, private one-to-one instant messenger services or other private means of communication. Information must be submitted to CRU by 14:00 UK time on Thursday if it is to be eligible for admission to the weekly CRU-API published later the same day.

Final benchmark calculation

Normalisation

Data which meets the precise definition below is eligible for admission to the price without any transformation. Data which does not may still be eligible as an input to the price but would be subject to a normalisation process in order to adjust for Al_2O_3 content; incoterms; loading location; vessel size; grade; delivery date; duties or tariffs by the application of a premium or discount to an initial price given.

The value of this premium or discount is determined by applying one or more estimates of value-in-use or grade; ocean freight; tariff or trade costs adjustments. Parameters used to make these adjustments are held in CRU's internal Market Interaction Log, only accessible by CRU price assessors and are updated each week upon consultation with Data Providers and alumina market participants. Where seen, normalisation is usually limited to deriving FOB prices from netbacks on CIF sales based on estimated or actual freight rates. Decisions to normalise a price and/or choice of values used in the normalisation process are forms of expert judgement (see below).

Exclusion of outliers

An analyst may use expert judgement in the exclusion of a data point as an input to the calculation of the final price. In doing so they would consider the range and distribution of data collected in the same timeframe from other data providers; previous data received from the same data provider; non-price information received from the data provider; market state and direction information from any other source. Inclusion or exclusion of input data in the final price is explicit and recorded.

Price determination in an illiquid market

In the case that there are no submissions that meet, or after normalisation can meet, the definition below in any weekly time period, the prior week's published CRU-API price will be rolled over and used as the final benchmark value for the new week. In the case of low market liquidity but where a single admissible data point has been received, this single data point would be the sole determinant of the value of the price in the relevant week and therefore any variation from the previous week's price level.

Expert judgement

Expert judgement may apply to decisions on whether price data submitted relates to actual deals concluded; if the deal is executed at arms-length; if normalisation of price data submitted is required; the means of any normalisation, and; the inclusion of a data point in calculation of the final price (exclusion of outliers).

Expert judgement is usually limited to gauging premium or discounts associated with smaller sized shipments below 25,000 tonnes, premium or discount associated with LC at sight payment terms, and trades reported on a delivered basis that are converted to incoterms-FOB. Expert judgement is also applied to assessing whether an alumina cargo is purchased by a region that is associated with a premium due to additional factors such as sanctions, or distressed in nature, and its use and application is detailed in the written analysis in the CRU *Bauxite and Alumina Monitor*.

An analyst will consult with one or more colleagues before any application of expert judgement if in any doubt or where collective input would improve the quality of a judgement.

Consistency in the application of expert judgement is achieved through a combination of selection, formal and informal training and review, supervisions and control processes as detailed in section 2.5 of the *Group Compliance Framework and Methodology Guide*.

Verification

Input data points, calculations and the final price for publication are checked and verified by a second analyst at each critical stage (i.e. where there is scope for error) in the process from data collection to final publication, and this verification is documented including the identity of the verifier.

The final CRU-API is calculated as the volume-weighted average of eligible data points (i.e. from data submitted in applicable time window and meeting the definition below including after any normalisation). Where admissible information relating to both sides of a deal is obtained, the transaction will only be counted once to avoid overweighing this deal in the final price.

Final benchmark publication

CRU-API is published each Thursday at 16:00 UK in the CRU *Bauxite and Alumina Monitor*, associated *Bauxite and Alumina Price Basket*, via FTP data feeds and available in DataLab.

Alumina – Atlantic Basis and China

CRU Atlantic Basis Price and CRU China Alumina Basket Prices

These are weekly price benchmarks. Transaction data is prioritised as an input to this price to help ensure it accurately reflects the actual spot market.

The price is weekly as this allows for contracting on a number of price values through the month or equally a single or average monthly value, and/or timely identification of market trends, without compromising on liquidity which a more frequent assessment might. Liquidity is also enhanced by a normalisation process which allows for the submission of data which can be standardised to CRU's strict definition but is sourced from a wider array of actual trades.

Our methodology blends strict adherence to methodological rules with limited but necessary application of expert judgement, detailed below, in order to produce a price that benefits from rigour, and analyst expertise and discretion in equal measure. In the absence of alumina spot transactions in the Atlantic, CRU's Atlantic Basis Price assessment reflects Data Provider feedback on the perceived Atlantic price differential or premium to the Pacific (Alumina Price Index).

Data providers

Price assessments are based on regular contact with a wide network of market participants including producers, buyers, traders at critical nodes in the supply chain, and shipping companies. This network is constantly reviewed and maintained to seek a balance of buyers and sellers.

Data submitted and submission processes

Transaction data is prioritised as an input and to that extent the hierarchy of acceptable price types follows that described in Section 3.1 of the *Group Compliance Framework and Methodology Guide*. CRU seeks to verify any deal with both parties but where this is not possible, a third or fourth party may be consulted. Information relating to bids/offers or an opinion of the prevailing market price can be submitted and may be used in the final benchmark calculation.

Admissible price data is limited to that concluded at arms-length. This means the trade must be between companies who are substantially unrelated in ownership and/or where the transaction is not part of any arrangement to guarantee the long-term security of supply, such as an off-take agreement or participation in joint ventures in alumina supplying operations. This therefore necessarily excludes intra-company transfers, as well as shipments to or from joint-venture partners.

Data Providers provide CRU with one or more single price figures, relating to spot market activity between 14:00 on Thursday of the week prior to publication and 14:00 UK on the Thursday of publication.

Industry participants can submit prices to CRU by telephone, email, private one-to-one instant messenger services or other private means of communication. Information must be submitted to CRU by 14:00 UK time on Thursday if it is to be eligible for admission to the weekly price published later the same day.

Final benchmark calculation

Normalisation

Data which meets the precise definitions below is eligible for admission to the price without any transformation. Data which does not may still be eligible as an input to the price but would be subject to a normalisation process in order to adjust for Al₂O₃ content; incoterms; loading location; vessel size; grade; delivery date, duties or tariffs by the application of a premium or discount to an initial price given.

The value of this premium or discount is determined by applying one or more estimates of value-in-use or grade; ocean freight; tariff or trade costs adjustments. Parameters used to make these adjustments are held in CRU's internal Market Interaction Log, accessible to CRU's price assessors, and are updated each week upon consultation with Data Providers and alumina market participants. Where seen, normalisation is usually limited to deriving FOB prices from netbacks on CIF sales based on estimated or actual freight rates. Decisions to normalise a price and/or choice of values used in the normalisation process are forms of expert judgement (see below).

Exclusion of outliers

An analyst may use expert judgement in the exclusion of a data point as an input to the calculation of the final price. In doing so they would consider the range and distribution of data collected in the same timeframe from other data providers; previous

data received from the same data provider; non-price information received from the data provider; market state and direction information from any other source.

Price determination in an illiquid market

In the case that there are no submissions that meet, or after normalisation can meet, the definition below in any weekly time period, the prior week's published price will be rolled over and used as the final benchmark value for the new week. In the case of low market liquidity but where a single admissible data point has been received, this single data point would be the sole determinant of the value of the price in the relevant week and therefore any variation from the previous week's price level.

Expert judgement

Expert judgement may apply to decisions on the weighting of price types used in the calculation of the final price; if price information relates to spot market activity executed at arms-length; if normalisation of price data submitted is required; the means of any normalisation, and; the inclusion of a data point in calculation of the final price (exclusion of outliers).

Expert judgement is usually limited to gauging premium or discount associated with smaller sized shipments below 25,000 tonnes, premium or discount associated with LC at sight payment terms, and trades reported on a delivered basis that are converted to incoterms-FOB. Expert judgement is also applied to assessing whether an alumina cargo is purchased by a region that is associated with a premium due to additional factors such as sanctions, and its use and application is detailed in the written analysis in the CRU *Bauxite and Alumina Monitor*.

An analyst will consult with one or more colleagues before any application of expert judgement if in any doubt or where collective input would improve the quality of a judgement.

Consistency in the application of expert judgement is achieved through a combination of selection, formal and informal training and review, supervisions and control processes as detailed in section 2.5 of the *Group Compliance Framework and Methodology Guide*.

Verification

Input data points, calculations and the final price for publication are checked and verified by a second analyst at certain critical stage (i.e. where there is scope for error) in the process from data collection to final publication.

The final price is calculated from eligible data points (i.e. from data submitted in applicable time window and meeting the definition below including after any normalisation), using subjective analyst weighting applied to any price points.

Final benchmark publication

Prices are published each Thursday at 16:00 UK in the CRU *Bauxite and Alumina Monitor*, associated *Bauxite and Alumina Price Basket*, via FTP data feeds and available on DataLab.

Bauxite

CRU's bauxite price assessments are based on a combination of primary research and trade data, which are adjusted based on freight rates, caustic soda prices and value in use. The prices published are a 30-day trailing average of imports to China. Every price published by a CRU aluminium raw materials team assessor is reviewed by at least one other colleague before publication.

Information on prices is gathered and normalised to a benchmark specification of 50% available alumina, 5% reacting silica, on a dry tonnes basis, using CRU's industry leading bauxite and alumina cost model. Prices are published weekly on Thursday evening at 5pm GMT.

Frequency

The final price assessment date is on Thursdays, when all prices are updated in our Bauxite and Alumina Monitor and Bauxite and Alumina Weekly services. Prices published on Thursdays reflect the normalised average (weighted mean) and value in use adjusted transactions concluded in the industry over the seven days prior, minus 30 days, prior to publication.

Assessment Method

CRU analysts use Chinese customs data, combined with telephone and email, to collect market intelligence as well as to verify the information received.

Price assessments reflect actual transactions concluded and information is gathered through consultations with Chinese customs data, producers, buyers, traders and shipping companies.

Sizes and specifications

Transaction sizes may vary by shipment as recorded by Chinese customs data. In the case of shipments transacted on an FOB basis, vessel sizes are accounted for in the calculation of bringing the bauxite to the receiving Qingdao port in Shandong province, China.

Timing

Price assessments reflect transactions for a product that has arrived in a Shandong port and which has been processed by relevant customs authorities, within the period of assessment.

3 Definitions

Alumina

CRU-API - Australia FOB

DataLab name:	Alumina, CRU Alumina Price Index; Australia, FOB
Material:	>98.5% Al ₂ O ₃
Price basis:	FOB
Credit/payment terms:	Transactions consider 0-30 days credit terms as standard. For longer credit periods transactions are normalised to payment 30 days after bill of lading date.
Packaging:	Bulk
Loading location:	Normalised to Port of Bunbury
Type:	Spot sales
Currency:	US\$
Weight unit:	Metric tonne
Size:	Normalised to bulk vessels carrying 30,000 tonnes of alumina
Timing:	Typically 30 days forward.
Pricing:	Reflects typical metallurgical grade alumina.
Duties/tariffs:	Where applicable in normalisation process.

Atlantic Basis Price - Brazil FOB

DataLab name:	Alumina, CRU Atlantic Basis Price; Brazil, FOB
Material:	>98.5% Al ₂ O ₃
Price basis:	FOB
Credit/payment terms:	Transactions consider 0-30 days credit terms as standard. For longer credit periods transactions are normalised to payment 30 days after bill of lading date.
Packaging:	Bulk
Loading location:	Normalised to Port of de Vila do Conde (Barcarena)
Type:	Spot sales and tenders
Currency:	US\$
Weight unit:	Metric tonne
Size:	Normalised to bulk vessels carrying 30,000 tonnes of alumina
Timing:	Typically 30 days forward.
Pricing:	Reflects typical metallurgical grade alumina.
Duties/tariffs:	Where applicable in normalisation process.

Domestic China (various)

CRU China Alumina Basket Price

DataLab name:	Alumina, CRU China Basket Price; China EXW
Material:	>98.5% Al ₂ O ₃
Price basis:	FOB
Credit/payment terms:	Transactions consider 0-30 days credit terms as standard.
Packaging:	Bulk
Loading location:	Factory gate in Henan, Shandong, Shanxi, Guizhou, and Guangxi provinces.
Type:	Spot sales
Currency:	RMB
Weight unit:	Metric tonne
Size:	Variable.
Timing:	Variable.
Pricing:	Reflects typical metallurgical grade alumina.
Duties/tariffs:	Not applicable
Frequency:	Weekly

Henan >98.5% EXW

DataLab name:	Alumina, >98.5%, Spot price; China, Henan, EXW
Material:	>98.5% Al ₂ O ₃
Price basis:	FOB
Credit/payment terms:	Transactions consider 0-30 days credit terms as standard.
Packaging:	Bulk
Loading location:	Factory gate in Henan, Shandong, Shanxi, Guizhou, and Guangxi provinces.
Type:	Spot sales
Currency:	RMB
Weight unit:	Metric tonne
Size:	Variable.
Timing:	Variable.
Pricing:	Reflects typical metallurgical grade alumina.
Duties/tariffs:	Not applicable
Frequency:	Weekly

Shanxi >98.5% EXW

DataLab name:	Alumina, >98.5%, Spot price; China, Shanxi, EXW
Material:	>98.5% Al ₂ O ₃
Price basis:	FOB
Credit/payment terms:	Transactions consider 0-30 days credit terms as standard.
Packaging:	Bulk
Loading location:	Factory gate in Henan, Shandong, Shanxi, Guizhou, and Guangxi provinces.
Type:	Spot sales
Currency:	RMB
Weight unit:	Metric tonne
Size:	Variable.
Timing:	Variable.
Pricing:	Reflects typical metallurgical grade alumina.
Duties/tariffs:	Not applicable
Frequency:	Weekly

Guangxi >98.5% EXW

DataLab name:	Alumina, >98.5%, Spot price; China, Guangxi, EXW
Material:	>98.5% Al ₂ O ₃
Price basis:	FOB
Credit/payment terms:	Transactions consider 0-30 days credit terms as standard.
Packaging:	Bulk
Loading location:	Factory gate in Henan, Shandong, Shanxi, Guizhou, and Guangxi provinces.
Type:	Spot sales
Currency:	RMB
Weight unit:	Metric tonne
Size:	Variable.
Timing:	Variable.
Pricing:	Reflects typical metallurgical grade alumina.
Duties/tariffs:	Not applicable
Frequency:	Weekly

Guizhou >98.5% EXW

DataLab name:	Alumina, >98.5%, Spot price; China, Guizhou, EXW
Material:	>98.5% Al ₂ O ₃
Price basis:	FOB

Credit/payment terms:	Transactions consider 0-30 days credit terms as standard.
Packaging:	Bulk
Loading location:	Factory gate in Henan, Shandong, Shanxi, Guizhou, and Guangxi provinces.
Type:	Spot sales
Currency:	RMB
Weight unit:	Metric tonne
Size:	Variable.
Timing:	Variable.
Pricing:	Reflects typical metallurgical grade alumina.
Duties/tariffs:	Not applicable
Frequency:	Weekly

Shandong >98.5% EXW

DataLab name:	Alumina, >98.5%, Spot price; China, Shandong, EXW
Material:	>98.5% Al ₂ O ₃
Price basis:	FOB
Credit/payment terms:	Transactions consider 0-30 days credit terms as standard.
Packaging:	Bulk
Loading location:	Factory gate in Henan, Shandong, Shanxi, Guizhou, and Guangxi provinces.
Type:	Spot sales
Currency:	RMB
Weight unit:	Metric tonne
Size:	Variable.
Timing:	Variable.
Pricing:	Reflects typical metallurgical grade alumina.
Duties/tariffs:	Not applicable
Frequency:	Weekly

Bauxite – [Discontinued]

Bauxite Price Index for Gibbsite (BPI-G) – China CIF

Material:	Gibbsite, 50% available alumina, 5% reactive silica, on a dry tonnes basis
Price basis:	Qingdao CIF
Credit/payment terms:	Variable
Packaging:	Bulk
Discharge location:	Normalised to Qingdao Port, Shandong
Type:	Bundled spot and contract sales
Currency:	US\$
Weight unit:	Metric tonne
Size:	Variable, accounted for in freight costs for FOB normalisation to CIF terms.
Timing:	30-day trailing average of arrival in China and processing through customs.
Pricing:	Reflects metallurgical grade bauxite on a dry tonnes basis, with 50% available alumina and 5% reactive silica at low-temperature processing temperatures.
Duties/tariffs:	Where applicable

Glossary of abbreviations

INCO TERM RULES FOR ANY MODE OR MODES OF TRANSPORT:

EXW – Ex-Works
FCA – Free Carrier
CPT – Carriage Paid To
CIP – Carriage and Insurance Paid To
DAT – Delivered at Terminal
DAP – Delivered at Place
DDP – Delivered Duty Paid

INCO TERM RULES FOR SEA AND INLAND WATERWAY TRANSPORT:

FAS – Free Alongside Ship
FOB – Free On Board
CFR – Cost and Freight
CIF – Cost Insurance and Freight

COUNTRY ABBREVIATIONS USED:

We use ISO 3166 alpha-2 standard country codes