



argusmedia.com

ARGUS BITUMEN

Contents:

Methodology overview	2
Introduction	5
Bitumen price assessments	5
Argus Bitumen Indexes	6
Grades and specifications	7
Data collection	7
Non-bitumen oil price assessments	7
Currency conversions	8
Freight assessments	8
Bitumen economics	8

LAST UPDATED: AUGUST 2020

The most up-to-date Argus Bitumen Methodology is available on www.argusmedia.com

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 bitumen 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, Argus Open Markets™ (AOM™) and directly from the back offices of market participants. Argus will accept market data by telephone, instant messenger, email, AOM 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 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.

Minimum transaction thresholds	
Assessment	Aggregate minimum volume
fob Singapore (ABX 1)	10,000t
fob South Korea (ABX 2)	10,000t

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 bitumen prices are published in the Argus Bitumen 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.

Introduction

Argus Bitumen is a weekly report on the domestic and exports markets for bitumen, also known as asphalt. It features price assessments, market commentary, market news, and bitumen production economics. The report is published on a Friday, with the exception of some public holidays. For a full list of publication dates, see Argus' [publication schedule](#).

Bitumen price assessments

Bitumen price assessments are of open market, arms length deals. For a detailed definition of arms length, see the [Argus Global Compliance Policy](#).

Unless otherwise noted, assessments are of the range of spot prices since the last publication. The low-high price range is the prevailing range of transacted prices. Argus will take into account deals confirmed by one or both counterparties. Deals must be considered representative to be considered for inclusion in the assessment process. Argus may exclude deals from the published assessment.

Domestic and delivered-by-truck

Domestic and delivered-by-truck price assessments are of trade in one or more grades of bitumen within a defined geographic region. For detailed parameters, see the assessments and specifications table at the end of this document. Domestic price assessments are of trade in which ownership of the product is transferred upon delivery to the buyer's truck, typically at a truck-loading point. Delivered-by-truck assessments are of trade in which ownership of the product is transferred upon delivery, typically by truck, to the buyer's specified worksite.

Argus assesses and publishes these prices each week, regardless of the frequency at which refineries may set domestic prices, based on information from a variety of sources including refineries and other market participants.

In the absence of confirmed trade, assessments are of the range in which trade could have occurred. Argus will determine that range with reference to one or more of:

- sellers' offer levels
- sellers' postings
- discounts to offer levels/postings that sellers typically offer their customers
- the price at which buyers tell Argus they would be willing to buy
- the price buyers say they have been quoted by their supplier(s)
- the price at which local, state, provincial, or federal authorities contract product by tender
- price changes in local residual fuel oil markets
- price changes at competing or nearby bitumen markets
- delivered-to-site prices, where the assessment is on an ex-works basis
- transportation costs

Chinese prices: Contract and posted

Argus publishes posted and contract prices for bitumen sold at Chinese refinery loading racks. Posted prices are the refineries' official sales prices. Contract prices are the prices at which most buyers are able to purchase product. Some buyers may also be able to purchase product at discounts to contract prices.

Waterborne

Waterborne price assessments are of trade in a defined volume of one or more bitumen grades, where ownership is transferred upon delivery from or to vessels at terminals within a defined region, and

within a defined timeframe. For detailed parameters, see the assessments and specifications table at the end of this document.

In the absence of confirmed waterborne trade, assessments are of the range in which spot trade could have occurred. Argus will determine that range with reference to one or more of:

- fob markets, where the assessment is for cif/cfr trade
- cif/cfr markets, where the assessment is for fob trade
- bitumen freight rates (see below)
- changes in the price of high-sulphur fuel oil and Ice Brent crude since the last publication
- price changes at competing or nearby bitumen markets
- consensus among participants in that market

Bitumen trade at outright prices or as a differential to high-sulphur fuel oil or Ice Brent crude will be considered for inclusion in the assessment of European, Moroccan and Ivory Coast waterborne bitumen prices. Trade at a differential to high-sulphur fuel oil or crude will be converted to outright prices for inclusion in the assessment using the traded differentials and the prevailing price of the underlying commodity at the time.

Bitumen prices are published as an outright price range as well as differentials to the average of published Argus high-sulphur fuel oil assessments in the week of publication and the average of published Ice Brent one-minute marker prices in the week of publication. See the [Argus European Products methodology](#) for a description of Argus high-sulphur fuel oil price assessments.

Argus Bitumen Indexes

Argus Bitumen includes the Argus Asia Bitumen Indexes — the ABX 1 fob Singapore and ABX 2 fob South Korea indexes — and the Argus fob Mediterranean (Augusta) index.

Argus Asia Bitumen Indexes

The ABX 1 fob Singapore index is the midpoint of the fob Singapore price assessment, and the ABX 2 fob South Korea index is the midpoint of the fob South Korea price assessment. The midpoint is the average of the published low and high prices rounded to the nearest 10¢/t.

Cargoes

Singapore

Pen grade 60/70 and 80/100

Prices are in US dollars/tonne

The pricing period is for loading 30-40 days forward.

Size is standardised to 3,000-5,000t.

The basis is fob Singapore. Locations include Bukom, Pulau Merlimau, Pulau Ayer Chawan, Tanjong Langsat, Kemaman and Malacca.

The assessment time is 2:00-4:00pm Singapore time

South Korea

Pen grade 60/80 and 80/100

Prices are in US dollars/tonne.

The pricing period is for loading 21-30 days forward.

Size is standardised to 3,000-5,000t.

The basis is fob South Korea. Locations include Ulsan, Onsan, Yosu and Kunsan

The assessment time is 2:00-4:00pm Singapore time

ABX specification Pen Grade 60/70		
Test description	Test method (ASTM)	Pen 60/70
Density @ 25°C	D70	1.00-1.05
Penetration @ 25°C	D5	60-70
Flash point	D92	232min
Solubility in trichloroethylene	D2042	99.0min
Softening point	D36	46
Ductility @ 25°C, 5cm/min	D113	100min
Wax content	DIN 12606	2.0-2.2
Drop in penetration after heating / AKA penetration of residue	D6/D5	75min
Loss of heating	D6	0.5max

ABX specification Pen grade 60/80		
Test Description	Test method (ASTM)	Pen 60/80
Density @ 25°C	D70	1.00min
Penetration @ 25°C	D5	60-80
Flash point	D92	232min
Solubility in trichloroethylene	D2042	99min
Softening point	D36	44
Ductility @ 25°C, 5cm/min	D113	100min
Wax content	DIN 12606	2.0-2.2
Drop in penetration after heating / AKA penetration of residue	D6/D5	
Loss of heating	D6	

ABX specification Pen grade 80/100		
Test Description	Test method (ASTM)	Pen 80/100
Density @ 25°C	D70	1.01-1.05
Penetration @ 25°C	D5	80-100
Flash point	D92	232 min
Solubility in trichloroethylene	D2042	99.0 min
Softening point	D36	43
Ductility @ 25°C, 5cm/min	D113	100 min
Wax content	DIN 12606	2.0-2.2
Drop in penetration after heating / AKA penetration of residue	D6/D5	57 min

ABX monthly indexes

ABX 1 and ABX 2 monthly average indexes are calculated and published on the last Friday of the calendar month and are the average of weekly indexes since the last monthly index was published.

If the last Friday of the month is not an Argus Bitumen publishing day, monthly indexes will be calculated and published on the last Argus working day in Singapore before the last Argus working day in London.

If the last Friday of the month is not an Argus working day in Singapore, the weekly and monthly indexes will be assessed on the last Singapore working day of the week and published in the next issue of Argus Bitumen.

Argus fob Mediterranean (Augusta) index

Cargo size: 2,000-7,000t

Timing: for loading 5-30 days forward

Prices are assessed and published as outright, in \$/t.

Underlying price assessments are normalised to a fob Augusta basis using a weekly assessment of freight costs between the country of loading and Tunis/Rades, Mohammedia or Alexandria, and of those regional centres to Augusta.

- The fob Italy assessment will be considered as loading at Livorno and will be normalised to Augusta using the difference between Livorno-Tunis/Rades and Augusta-Tunis/Rades freight costs
- The fob Spain assessment will be considered as loading at Tarragona and will be normalised to Augusta using the difference between Tarragona-Mohammedia and Augusta-Mohammedia freight costs
- The fob Greece assessment will be considered as loading at Agio and will be normalised to Augusta using the difference between Agio-Alexandria and Augusta-Alexandria freight costs

Grades and specifications

Bitumen grades specified in the assessments and specifications table at the end of this document are typically expected to meet the following quality criteria:

Penetration of 100g needle for five seconds °C, mm

	Min	Max
Pen 35/50	35	50
Pen 40/50	40	50
Pen 40/60	40	60
Pen 50/70	50	70
Pen 60/70	60	70
Pen 70/100	70	100
Pen 80/100	80	100
Pen 100/160	100	160
Pen 150/200A	150	200
Pen 160/220	150	220
AH-70	60	80
AH-90	80	100
AH-100	90	110
AH-110	100	120
AH-130	120	140
AH-140	130	150
AH-180	170	190
70-A	60	80
70-B	60	80
90-A	80	100
90-B	80	100

Viscosity at 60°C, min (Pa s)

Class 170	170
Class 320	320
Viscosity at 60°C (Poise)	
AC-30	3,000 ± 600

Viscosity at 60°C, min (Pa s)

	Softening point, °C		Penetration at 0°C		Penetration at 25°C		Penetration at 46°C	
	Min	Max	Min	Max	Min	Max	Min	Max
Roofing flux Type III								
	85	96	6		15	35		90
Roofing flux Type IV								
	99	107	6		12	25		75

Data collection

Argus' reporters survey key industry participants to uncover relevant market information. Argus uses the telephone and various electronic mail and messaging services to acquire information. Market surveys are balanced and conducted by well-trained specialist reporters. Argus will contact and accept market data from all credible market sources including front and back office of market participants and brokers.

Many companies can only reveal trade information to the press if confidentiality is maintained. In some markets, Argus does not publish counterparty names. Maintaining confidentiality allows Argus to gather more information and create more robust assessments.

Non-bitumen oil price assessments

Argus Bitumen includes "week-range" price assessments for non-bitumen commodities, including fuel oil, gasoil, and crude. These are based on assessments published in four daily products reports — Argus European Products, Argus US Products, Argus Asia-Pacific Products and Argus Crude.

The week-range low is the lowest of all daily lows published in the relevant daily report since Argus Bitumen was last published. The high is the highest of all daily highs published in the relevant daily report since Argus Bitumen was last published.

If the daily report publishes only a midpoint for the relevant assessment, the week-range low is the lowest of all daily midpoints published in the relevant daily report since Argus Bitumen was last published. The week-range high is the highest of all daily midpoints published in the relevant daily report since Argus Bitumen was last published.

Northwest Europe

- Urals cif Rotterdam
- Fuel oil 3.5%S, fob NWE RMG barge
- Fuel oil straight-run 0.5% NWE fob barge
- Fuel oil straight-run M-100 NWE cif cargo
- Vacuum gasoil (VGO) 0.5%S NWE cif cargo

Mediterranean

- Basrah Light fob Sidi Kerir
- Urals Med Aframax

- Iran Heavy fob Sidi Kerir
- Fuel oil 3.5% West Med fob
- Vacuum gasoil (VGO) 0.5% West Med cif

Asia

- Dubai month 1
- Basrah Light fob Iraq
- Banoco Arab Medium month 1
- Fuel oil HS 180cst cargo fob Singapore
- Fuel oil HS 380cst cargo fob Singapore
- Gasoil 0.5% fob Singapore

For daily crude and product report methodologies, see

- [Argus European Products](#)
- [Argus US Products](#)
- [Argus Asia-Pacific Products](#)
- [Argus Crude](#)

Currency conversions

Argus converts currencies based on the average of exchange rates on each business day up to and including the business day before the day of publication. For details of the currency in which individual assessments are originally made, see the tables below.

Freight assessments

Freight rate assessments reflect the cost of spot chartering a vessel to load 10-25 days from the date of publication. Argus bases bitumen freight rate assessments on a survey of market participants, including charterers, ship owners, and shipbrokers.

See the table below for route and cargo size information.

Bitumen economics

Argus assesses bitumen's value as a fuel oil blendstock in Singapore and the Mediterranean. Calculations assume a bitumen density of 6.17 bl/t

Bitumen's value as a fuel oil blendstock is calculated as follows, where **f** is fuel oil, **h** is heating oil, and **bv** is blendstock value:

$$bv (\$/t) = 7.2f (\$/bl) - 1.6h (\$/bl)$$

Bitumen freight rates

Rate	Cargo/ Drum	Size
Asia-Pacific bitumen freight		
Singapore-east Australia	Cargo	5,000-10,000t
Singapore-west Australia	Cargo	5,000-10,000
Singapore-Gresik, Indonesia	Cargo	3,000-5,000t
Singapore-south China	Cargo	3,000-5,000t
Singapore-east China	Cargo	3,000-5,000t
Thailand-south China	Cargo	1,500-5,000t
Thailand-east China	Cargo	1,500-5,000t
Thailand-east Australia	Cargo	5,000-10,000t
Thailand-west Australia	Cargo	5,000-10,000t
Taiwan-Ho Chi Minh, Vietnam	Cargo	1,500-5,000t
Taiwan-Haiphong, Vietnam	Cargo	1,500-5,000t
South Korea-east China	Cargo	3,000-5,000t
South China-Haiphong, Vietnam	Cargo	1,500-5,000t
Mideast Gulf to India freight rates		
Bandar Abbas-Nhava Sheva	Drum	180kg drum in 20ft container
Bandar Abbas-Mundra	Drum	180kg drum in 20ft container
Bandar Abbas-Haldia	Drum	180kg drum in 20ft container
Bandar Abbas-Mundra	Cargo	3,000-6,000t
Bandar Abbas-Karwar	Cargo	3,000-6,000t
Bandar Abbas-Kakinada	Cargo	6,000-9,000t
Bandar Abbas-Haldia	Cargo	6,000-9,000t
Mediterranean cargo freight rates		
Aspropyrgos-Corinth-Agio Theodori-Gebze-Mersin	Cargo	2,000-7,000t
Tarragona-Ghazaouet	Cargo	2,000-7,000t
Livorno-Tunis/Rades	Cargo	2,000-7,000t
Aspropyrgos-Corinth-Agio Theodori-Alexandria	Cargo	2,000-7,000t
Augusta-Mohammedia	Cargo	2,000-7,000t
Tarragona-Mohammedia	Cargo	2,000-7,000t
Augusta-Alexandria	Cargo	2,000-7,000t
Augusta-Tunis/Rades	Cargo	2,000-7,000t
Northwest Europe freight rates		
Rotterdam-Thames	Cargo	2,000-7,000t
Hamburg-Thames	Cargo	2,000-7,000t
Klaipeda-Thames	Cargo	2,000-7,000t
La Coruna-Thames	Cargo	2,000-7,000t
Mideast Gulf to Africa freight rates		
Bandar Abbas/Jebel Ali-Mombasa	Drum	180-185kg drums in 20ft container
Bandar Abbas/Jebel Ali-Dar es Salaam	Drum	180-185kg drums in 20ft container
Bandar Abbas/Jebel Ali-Djibouti	Drum	180-185kg drums in 20ft container
Sub-Saharan Africa freight rates		
Abidjan-Lagos-Warri-Port Harcourt	Cargo	2,000-7,000t
Abidjan-Takoradi-Tema	Cargo	2,000-7,000t
Tarragona-Lagos-Warri-Port Harcourt	Cargo	2,000-7,000t

Assessments and specifications						
Domestic prices, ex-works	Location	Grades included	Price type	Currency/ unit	Timing	Volume
Northwest and central Europe bitumen						
Domestic prices, ex-works						
Southern UK £/t	ex-works south of Severn in west, south of and including Norfolk in east, south of and including Northamptonshire in centre	Pen 40/60, Pen 50/70 Pen 100/160	Outright price	£/t	current week	na
Rotterdam, Netherlands	ex-works Rotterdam	Pen 50/70, Pen 70/100	Outright price	€/t	current week	na
Antwerp, Belgium	ex-works Antwerp	Pen 50/70, Pen 70/100	Outright price	€/t	current week	na
Northern Germany	ex-works Brunsbuttel, Hamburg-Harburg, Heide	Pen 50/70, Pen 70/100	Outright price	€/t	current week	na
Northeast Germany	ex-works Leuna, Schwedt	Pen 50/70, Pen 70/100	Outright price	€/t	current week	na
Southern Germany	ex-works Vohburg-Neustadt	Pen 50/70, Pen 70/100	Outright price	€/t	current week	na
Southwest Germany	ex-works Karlsruhe	Pen 50/70, Pen 70/100	Outright price	€/t	current week	na
Western Germany	ex-works Godorf	Pen 50/70, Pen 70/100	Outright price	€/t	current week	na
Hungary	ex-works Szazhalombatta, Zalaegerszeg	Pen 50/70, Pen 70/100	Outright price	€/t	current week	na
Romania	ex-works Vega-Ploesti, Floresti, Mangalia, Constanta, Galati, Brasov	Pen 50/70, Pen 70/100	Outright price	€/t	current week	na
Czech Republic	ex-works Litvinov	Pen 50/70, Pen 70/100	Outright price	€/t	current week	na
Export prices, ex-works						
Poland-Germany (truck)	Poland ex-domestic refineries/terminals delivered Germany	Pen 50/70, Pen 70/100	Outright price	€/t	current week	na
Czech Republic-Germany (truck)	Czech Republic ex-domestic refineries/terminals delivered Germany	Pen 50/70, Pen 70/100	Outright price	€/t	current week	na
Poland-Romania (truck)	Poland ex-domestic refineries/terminals delivered Romania	Pen 50/70, Pen 70/100	Outright price	€/t	current week	na
Hungary-Romania (truck)	Hungary ex-domestic refineries/terminals delivered Romania	Pen 50/70, Pen 70/100	Outright price	€/t	current week	na
Rotterdam (cargo)	fob Rotterdam	Pen 50/70, Pen 70/100	Outright price, diff to NWE fuel oil 3.5%S RMG barge, diff to Ice Brent minute marker	\$/t	5-30 days forward	2,000-7,000t
Domestic prices, delivered						
Southern UK £/t	delivered south of Severn in west, south of and including Norfolk in east, south of and including Northamptonshire in centre	Pen 40/60, Pen 50/70 Pen 100/160	Outright price	£/t	current week	na
Brussels	delivered Brussels metropolitan area	Pen 50/70, Pen 70/100	Outright price	€/t	current week	na
Northern France	delivered north of river Loire in west, north of Orleans in east	Pen 35/50, Pen 50/70	Outright price	€/t	current week	na
Central France	delivered north of, and including Auvergne, south of river Loire in west, south of Orleans in east	Pen 35/50, Pen 50/70	Outright price	€/t	current week	na

Assessments and specifications						
Domestic prices, ex-works	Location	Grades included	Price type	Currency/unit	Timing	Volume
Mediterranean bitumen						
Domestic prices, ex-works						
Italy	ex-works Italy	Pen 50/70, Pen 70/100	Outright price	€/t, inc tax	current week	na
Southern France (delivered)	ex-works South of Auvergne	Pen 35/50, Pen 50/70	Outright price	€/t	current week	na
Northeast Spain	ex-works Bilbao, La Coruna	Pen 35/50, Pen 50/70	Outright price	€/t	current week	na
Southwest Spain	ex-works Puertollano, Tarragona, Huelva	Pen 35/50, Pen 50/70	Outright price	€/t	current week	na
Izmit, Turkey	ex-works Izmit	Pen 50/70, Pen 70/100	Outright price	TL/t, \$/t (converted)	current week	na
Izmir, Turkey	ex-works Izmir	Pen 50/70, Pen 70/100	Outright price	TL/t, \$/t (converted)	current week	na
Batman, Turkey	ex-works Batman	Pen 50/70, Pen 70/100	Outright price	TL/t, \$/t (converted)	current week	na
Kirikkale, Turkey	ex-works Kirikkale	Pen 50/70, Pen 70/100	Outright price	TL/t, \$/t (converted)	current week	na
Export prices, fob \$/t						
Italy	fob Livorno, Ravenna, Augusta, Falconara, Taranto	Pen 35/50, Pen 40/50, Pen 50/70, Pen 60/70, Pen 70/100	Outright price, diff to West Med fuel oil 3.5% 0.991 fob, diff to Ioe Brent minute marker	\$/t	5-30 days forward	2,000-7,000t
Greece	fob Aspropyrgos, Agio Theodori	Pen 35/50, Pen 40/50, Pen 50/70, Pen 60/70, Pen 70/100	Outright price, diff to West Med fuel oil 3.5% 0.991 fob, diff to Ioe Brent minute marker	\$/t	5-30 days forward	2,000-7,000t
Spain	fob Tarragona, Huelva, Cartagena	Pen 35/50 Pen 40/50, Pen 50/70, Pen 60/70	Outright price, diff to West Med fuel oil 3.5% 0.991 fob, diff to Ioe Brent minute marker	\$/t	5-30 days forward	2,000-7,000t
Albania	fob Vlore, Durres	Pen 50/70	Outright price, diff to West Med fuel oil 3.5% 0.991 fob, diff to Ioe Brent minute marker	\$/t	5-30 days forward	2,000-7,000t
Delivered cargo prices, cfr						
Alexandria, Egypt*	cfr Alexandria	Pen 60/70	Outright price	\$/t	10-35 days forward	2,000-7,000t
*Note: Greece export prices delivered to Egypt calculated as: fob Mediterranean high-sulphur fuel oil cargoes plus/minus fob export premium/discount of the Greece bitumen export price plus freight to Alexandria from Aspropyrgos/Corinth						
Gebze-Mersin, Turkey*	cfr Mersin, Gebze	Pen 40/50	Outright price	\$/t	10-35 days forward	2,000-7,000t
*Note: Greece export prices delivered to Turkey calculated as: fob Mediterranean high-sulphur fuel oil cargoes plus/minus fob export premium/discount of the Greece bitumen export price plus freight to Mersin/Gebze from Aspropyrgos/Corinth						
Ghazaouet, Algeria*	cfr Ghazaouet	Pen 40/50	Outright price	\$/t	10-35 days forward	2,000-7,000t
*Note: The Spain export price delivered to Algeria calculated as: fob Mediterranean high-sulphur fuel oil cargoes plus/minus fob export premium/discount of the Spain bitumen export prices plus freight to Ghazaouet from Tarragona						

Assessments and specifications						
Domestic prices, ex-works	Location	Grades included	Price type	Currency/unit	Timing	Volume
Rades, Tunisia*	cfr Rades, Gabes	Pen 50/70	Outright price	\$/t	10-35 days forward	2,000-7,000t
<i>*Note: Italy export prices delivered to Tunisia calculated as: fob Mediterranean high-sulphur fuel oil cargoes plus/minus fob export premium/discount of the Italy bitumen export price plus freight to Rades/Gabes from Livorno</i>						
Sub-Saharan Africa bitumen prices						
Domestic prices, ex-works						
South Africa*	ex-works Durban, Cape Town, Sasolburg	Pen 35/50, Pen 50/70, Pen 70/100	Outright price	R/t	current week	na
<i>*Note: includes spot bitumen pricing at refineries or terminals</i>						
Import/export prices						
Ivory Coast, fob Abidjan (export, cargo)	fob Abidjan	Pen 60/70	Outright price, diff to West Med fuel oil 3.5% 0.991 fob, diff to Ice Brent minute marker	\$/t	5-30 days forward	2,000-7,000t
Nigeria, cfr Lagos (import, cargo)*	cfr Lagos, Warri, Port Harcourt, Calabar	Pen 60/70	Outright price	\$/t	10-35 days forward	2,000-7,000t
<i>*Note: The average of Spain and Ivory Coast export prices delivered to Nigeria calculated as: fob Mediterranean high-sulphur fuel oil cargoes plus/minus fob export premium/discount of Spain, Ivory Coast bitumen export prices plus freight to Logos/Port Harcourt/Warri from Tarragona/Abidjan</i>						
Ghana, cfr Takoradi-Tema (import, cargo)*	cfr Takoradi, Tema	Pen 60/70	Outright price	\$/t	10-35 days forward	2,000-7,000t
<i>*Note: Ivory Coast export prices delivered to Ghana calculated as: fob Mediterranean high-sulphur fuel oil cargoes plus/minus fob export premium/discount of the Ivory Coast bitumen export price plus freight to Tema/Takoradi from Abidjan</i>						
Kenya, cfr Mombasa (import, drums)*	cfr Mombasa	Pen 60/70	Outright price	\$/t	10-40 days forward	1,500-5,000t
<i>*Note: Iran drum export prices delivered to Kenya calculated as: fob Iran (drums) price plus freight to Mombasa from Bandar Abbas/Jebel Ali</i>						
Tanzania, cfr Dar es Salaam (import, drums)*	cfr Dar es Salaam	Pen 60/70	Outright price	\$/t	10-40 days forward	1,500-5,000t
<i>*Note: Iran drum export prices delivered to Tanzania calculated as: fob Iran (drums) price plus freight to Dar es Salaam from Bandar Abbas/Jebel Ali</i>						
Asia bitumen prices						
Domestic prices, ex-works						
South Korea	ex-works Ulsan, Onsan, Yeosu, Daesan	Pen 60/70, Pen 60/80, Pen 80/100	Outright price	\$/t, W/t (converted)	current week	na
Mumbai, India	ex-works Mumbai	VG10, VG30 (bulk and packaged grades)	Outright price	Rs/t, \$/t (converted)	current week	na
Mumbai, India (drums)	ex-works Mumbai	VG10, VG30 (bulk and packaged grades)	Outright price	Rs/t, \$/t (converted)	current week	na
Thailand	ex-works Rayong, Siracha, Mab ta Phut	Pen 60/70	Outright price	\$/t, Bt/t (converted)	current week	14t or 20t
Indonesia	ex-works Cilacap	Pen 60/70	Outright price	Rp/t, \$/t (converted)	current week	na
Singapore	ex-works Bukom, Pulau Merlimau, Pulau Ayer Chawan	Pen 60/70	Outright price	\$/t, S\$/t (converted)	current week	18-20t

Assessments and specifications						
Domestic prices, ex-works	Location	Grades included	Price type	Currency/unit	Timing	Volume
Singapore-Malaysia ex-ref	ex-works Bukom, Pulau Merlimau, Pulau Ayer Chawan	Pen 60/70	Outright price	\$/t	current week	23-30t
Japan	ex-works Yokkaichi, Sendai, Negishi, Mizushima, Marifu, Oita	Pen 60/80	Outright price	¥/t, \$/t (converted)	current week	500t and 1,500t
Waterborne, fob						
<i>Note: In an illiquid market Argus may assess the price range based on ongoing negotiations/discussions between refiners and buyers in the current assessed week.</i>						
Iran	fob Bandar Abbas	Pen 60/70, Pen 80/100	Outright price	\$/t	5-40 days forward	1,500-5,000t
Iran (drums)	fob Bandar Abbas	Pen 60/70, Pen 80/100	Outright price	\$/t	5-40 days forward	1,500-5,000t
Bahrain	fob Sitra	Pen 60/70	Outright price	\$/t	21-30 days forward	1,500-5,000t
Mideast Gulf index	The low end of the published range is calculated as the lower of the midpoints of the fob Iran and fob Bahrain price assessments. The high end of the published range is calculated as the higher of the midpoints of the fob Iran and fob Bahrain price assessments					
Singapore	fob Bukom, Pulau Merlimau, Pulau Ayer Chawan, Tanjung Langsat, Kemaman, Malacca	Pen 60/70, Pen 80/100	Outright price	\$/t	30-40 days forward	3,000-5,000t
Singapore (drums)	fob Bukom, Pulau Merlimau, Pulau Ayer Chawan, Kemaman	Pen 60/70	Outright price	\$/t	30-40 days forward	1,500-5,000t
Thailand	fob Rayong, Siracha and Mab ta Phut	Pen 60/70	Outright price	\$/t	21-30 days forward	3,000-5,000t
South Korea	fob Ulsan, Onsan, Yeosu, Kunsan	"Pen 60/80, Pen 80/100"	Outright price	\$/t	21-30 days forward	3,000-5,000t
Taiwan	fob Mailiao	Pen 60/70	Outright price	\$/t	21-30 days forward	1,500-5,000t
Waterborne, cfr						
<i>Note: In an illiquid market Argus may assess the price range based on ongoing negotiations/discussions between refiners and buyers in the current assessed week.</i>						
North China coast	cfr Tianjin, Rizhao	Pen 60/80, Pen 80/100	Outright price	\$/t	21-30 days forward	1,500-5,000t
East China Coast	cfr Nanjing, Changzhou, Jiangyin, Shanghai, Ningbo	Pen 60/80, Pen 80/100	Outright price	\$/t	21-30 days forward	1,500-5,000t
South China Coast	cfr Fuzhou, Dongguan, Guangzhou, Shantou, Maoming, Qinzhou	Pen 60/80, Pen 80/100	Outright price	\$/t	21-30 days forward	1,500-5,000t
Northern Vietnam (drums)*	cfr Haiphong	Pen 60/80, Pen 80/100	Outright price	\$/t	21-30 days forward	1,500-5,000t
Southern Vietnam (drums)*	cfr Ho Chi Minh	Pen 60/80, Pen 80/100	Outright price	\$/t	21-30 days forward	1,500-5,000t
<i>*Note: typical drum size is 180-200kg or 42-55 gallons</i>						
Australia import cargo prices						
Thailand fob (Class 170)	fob Rayong and Mab ta Phut	C 170	Outright price	\$/t	21-30 days forward	4,000-7,000t
Thailand fob (Class 320)	fob Rayong and Mab ta Phut	C 320	Outright price	\$/t	21-30 days forward	4,000-7,000t
Singapore fob (Class 170)	fob Pulau Ayer Chawan, Tanjung Langsat	C 170	Outright price	\$/t	30-40 days forward	5,000-8,000t
Singapore fob (Class 320)	fob Pulau Ayer Chawan, Tanjung Langsat	C 320	Outright price	\$/t	30-40 days forward	5,000-8,000t