



argusmedia.com

## ***ARGUS LNG DAILY***

### **Contents:**

Methodology overview	2
Introduction	5
Seaborne LNG	5
Asia-Pacific LNG price assessments	6
Europe LNG price assessments	6
US, west Africa and Trinidad and Tobago fob LNG price assessments	6
Latin America LNG price assessments	6
Argus LNG spot assessments timing	7
Front-month price assessments and indexes	7
ANEA™ forward assessments	7
Freight	8
LNG-gas price spreads	9
Long-term price assessments	10
Argus Japanese Crude Cocktail Index	11
Argus Japanese Crude Cocktail forward curve	11
Small-scale LNG	11
Competing fuel assessments	12
Argus Victoria Index (AVX)	12
Argus Wallumbilla Index (AWX)	13

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The most up-to-date Argus LNG Daily methodology is available on [www.argusmedia.com](http://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 LNG market, Argus publishes 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. In those methodologies, 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 LNG prices are published in the *Argus LNG Daily* report. 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](http://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](http://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 LNG Daily is a daily market and news report on the global LNG market.

The report covers the major, traded LNG markets, and produces assessments for these markets.

### Methodology

Argus LNG Daily is published every UK working day. A complete schedule of publication is available at [www.argusmedia.com](http://www.argusmedia.com). On Singapore holidays, Asian prices will be excluded from the LNG Daily report. On UK holidays, Asian prices will be distributed electronically the same day, and European prices will not be assessed.

Argus assesses physical prices in the global seaborne LNG market and in the northwest European small-scale LNG market.

Price assessments are based on two elements — a survey of market participants' view of prevailing prices and indicative bids and offers; and an average of confirmed trades that meet the defined specifications. The final price determined for the day is an average of the survey result and the trade value. In the absence of any relevant traded volumes, Argus will take the average of the indicative bids and offers available from its market survey in order to establish a mid-point price.

Argus applies editorial judgment to these surveys and will exclude prices that appear to be outside the consensus of the market. The daily survey of market participants strives to maintain a balance between buyers, sellers, trading companies and brokers. Argus will contact and accept market data from all credible market sources including front and back office of market participants and brokers.

Information on transactions, bids and offers that lie outside the delivery and cargo size specifications outlined below will be normalised and taken into account, but information that lies within the listed specifications of the assessment will be given more weight.

## Seaborne LNG

**Unit:** Argus LNG price assessments are published in \$/mn Btu, unless otherwise specified below.

**Cargo size:** Standard 135,000-185,000m<sup>3</sup> vessels. Transactions for tankers outside of the specified range — smaller vessels below 135,000m<sup>3</sup> and larger Q-Flex (210,000m<sup>3</sup>) and Q-Max (260,000m<sup>3</sup>) tankers — will be included in the assessment only after normalisation to the standard cargo size.

Asia-Pacific LNG price assessments		
Assessment	Included geographies	Assessments published
<b>Northeast Asia des (ANEA™)</b>	Japan, South Korea, Taiwan, China	2nd - 5th half-months forward
<b>Japan, South Korea, Taiwan des</b>	Japan, South Korea, Taiwan	2nd - 5th half-months forward
<b>China des</b>	China	2nd - 5th half-months forward
<b>India des</b>	India	2nd - 5th half-months forward
<b>Middle East des</b>	Egypt, Jordan, Kuwait, Dubai	2nd - 5th half-months forward
<b>Argus Middle East-India (MEI) index™</b>	The average of the daily Middle East des and India des price assessments	2nd - 5th half-months forward
<b>Southeast Asia des (ASEA)*</b>	Thailand, Indonesia, Malaysia, Singapore	2nd - 5th half-months forward
<i>Derived from the implied fob price of Middle Eastern and Australian LNG based on Argus assessments of delivered prices to other Asia-Pacific destinations and appropriate, destination-specific shipping costs.</i>		
<b>Australia fob*</b>	Australia	2nd half-month forward
<i>Derived from the delivered price of LNG to Asia-Pacific markets less appropriate freight costs</i>		
<b>Australia fob Gladstone*</b>	Gladstone, Australia	2nd half-month forward
<i>Derived from the delivered price of LNG to Asia-Pacific markets less appropriate freight costs between Gladstone and Tokyo. The price is published weekly in US dollars per million Btu and Australian dollars per gigajoule.</i>		
<b>Australia fob Gladstone oil indexed*</b>	Gladstone, Australia	2nd half-month forward
<i>Derived from an oil-indexed LNG price less appropriate freight costs between Gladstone and Tokyo. The oil-indexed component is calculated as 14.85pc of the latest available Argus Japanese Crude Cocktail Index (Argus JCC) plus 50¢/mnn Btu. See the <a href="#">Argus Crude methodology</a> for more information on the Argus JCC Index. The price is published weekly in US dollars per million Btu and Australian dollars per gigajoule.</i>		
<b>Middle East fob (Asia-Pacific bound)*</b>		2nd half-month forward
<i>Derived from the delivered price of LNG to Asian markets less appropriate freight costs.</i>		
<b>Kamchatka fob</b>	Kamchatka, Russia	Prompt
<i>Derived from the delivered price of LNG to Asia-Pacific markets less appropriate ARV freight costs</i>		
Europe LNG price assessments		
Assessment	Included geographies	Assessments published
<b>Northwest Europe des</b>	UK, Belgium, Netherlands, French Atlantic	2nd - 4th half-months forward
<b>Northwest Europe fob (reload)</b>	UK, Belgium, Netherlands, French Atlantic	2nd - 4th half-months forward
<b>Iberian peninsula des</b>	Spain, Portugal	2nd - 4th half-months forward
<b>Iberian peninsula fob (reload)</b>	Spain, Portugal	2nd - 4th half-months forward
<b>Italy des</b>	Italy	2nd - 4th half-months forward
<b>Greece des</b>	Greece	2nd - 4th half-months forward
<b>Turkey des</b>	Turkey	2nd - 4th half-months forward
<b>Middle East fob (Europe bound)*</b>		2nd half-month forward
<i>Derived from the delivered price of LNG to European markets less appropriate freight costs.</i>		
<b>Murmansk fob</b>	Murmansk, Russia	Prompt
<i>Derived from the delivered price of LNG to Asia-Pacific markets less appropriate ARV freight costs</i>		
US, west Africa and Trinidad and Tobago fob LNG price assessments		
Assessment	Included geographies	Assessments published
<b>Argus Gulf Coast fob (AGC)</b>	US Gulf coast	1st - 6th months forward
<b>West Africa fob (AWAF)</b>	Angola, Equatorial Guinea, Nigeria	2nd - 4th half-months forward
<b>Trinidad and Tobago fob</b>	Trinidad and Tobago	2nd - 4th half-months forward
<b>Argus Atlantic basin fob</b>		2nd - 4th half-months forward
<i>The average of daily West Africa fob (AWAF), Iberian peninsula fob and northwest Europe fob assessments</i>		
Latin America LNG price assessments		
Assessment	Included geographies	Assessments published
<b>Argentina des*</b>	Argentina	2nd half-month forward
<i>Derived from freight costs and the Argus price assessments: Middle East fob (Asia-Pacific bound), Middle East fob (Europe bound), Trinidad and Tobago fob, US Gulf Coast fob (USGC fob), West Africa (AWAF)</i>		
<b>Brazil des*</b>	Brazil	2nd half-month forward
<i>Derived from freight costs and the Argus price assessments: Middle East fob (Asia-Pacific bound), Middle East fob (Europe bound), Trinidad and Tobago fob, US Gulf Coast fob (USGC fob), West Africa (AWAF)</i>		
<b>Chile des*</b>	Chile	2nd half-month forward
<i>Derived from freight costs and the Argus price assessments: Middle East fob (Asia-Pacific bound), Middle East fob (Europe bound), Trinidad and Tobago fob, US Gulf coast fob (USGC fob), West Africa (AWAF)</i>		
<b>Mexico (Gulf) des*</b>	Mexico Gulf facilities	2nd half-month forward
<i>Derived from freight costs and the Argus price assessments: Middle East fob (Asia-Pacific bound), Middle East fob (Europe bound), Trinidad and Tobago fob, US Gulf Coast fob (USGC fob), West Africa (AWAF)</i>		
<b>Mexico (Pacific) des*</b>	Mexico Pacific facilities	2nd half-month forward
<i>Derived from freight costs and the Argus price assessments: fob Indonesia (Asia-Pacific bound) - derived from the Argus Northeast Asia des (ANEA™) assessment and freight costs, fob Peru (Asia-Pacific bound) - derived from the Argus Northeast Asia des (ANEA™) assessment and freight costs, fob Peru (Iberian peninsula bound) - derived from the Argus Iberian peninsula des (ANEA™) assessment and freight costs, US Gulf coast fob (USGC fob)</i>		

\*Note: two variants are published for each marked price, using standard round-trip freight costs and using ARV voyage costs. See the voyage costs section for more information on voyage cost calculations and assumptions.

### Argus LNG spot assessments timing

Each calendar month is divided into two halves, which roll on the first and sixteenth day of the month, with the exception of February, which rolls on the first and fifteenth of the month.

Asia-Pacific LNG des prices are assessed for four forward half-month periods each day.

European LNG des prices are assessed for three half-month periods each day.

Except for the US, Atlantic basin fob prices are assessed for three half-month periods each day.

US Gulf Coast export prices are assessed and published in two ways. The Argus Gulf Coast (AGC) assessments are for six forward calendar months, which roll on the first day of the month.

A series of indicative US Gulf Coast fob long-term price assessments is also published, based on Henry Hub natural gas prices (see section below for more detail on long-term price assessments).

These two series of price assessments employ different methodologies and may produce different prices for the same forward time period.

For all markets, deals reported for delivery/loading before the start of the first assessment period or after the end of the last assessment period will not normally be included.

Generic forward period description			
Time periods	European assessments	Asia-Pacific assessments	Atlantic basin fob assessments
Date of assessment (current half month)			
First half-month forward			
Second half-month forward	Second half-month forward	Second half-month forward	Second half-month forward
Third half-month forward	Third half-month forward	Third half-month forward	Third half-month forward
Fourth half-month forward	Fourth half-month forward	Fourth half-month forward	Fourth half-month forward
Fifth half-month forward		Fifth half-month forward	

Example: 10 April 2012			
Time periods	European assessments	Asia-Pacific assessments	Atlantic basin fob assessments
10 Apr (1-15 Apr)			
16-30 Apr			
1-15 May	Second half-month forward	Second half-month forward	Second half-month forward
16-31 May	Third half-month forward	Third half-month forward	Third half-month forward
1-15 Jun	Fourth half-month forward	Fourth half-month forward	Fourth half-month forward
16-30 Jun		Fifth half-month forward	

**Timestamp for Asia-Pacific and Middle East assessments:** Bids, offers and trades assessed throughout the day up until and including 4:30pm, Singapore time/5:30pm, Japan time.

**Timestamp for European, west Africa, Trinidad and Tobago and US Gulf Coast assessments:** Bids, offers and trades assessed throughout the day up until and including 4:30pm, UK time.

### Front-month price assessments and indexes

Argus also publishes front-month prices and indexes.

#### Front-month price assessments

The front-month price is the average of the two component half-month assessments. For example, on 15 January, the front-month is February, the average of the first- and second-half February assessments. On 16 January, the front-month is March, the average of the first- and second-half March assessments.

#### Front-month indexes

Argus front-month indexes are the rolling average of front-month price assessments. Indexes follow the same schedule as the underlying price assessments.

#### Front-month prices and indexes are published for

- China des
- northeast Asia des (ANEA)
- India des
- Middle East des
- west Africa fob (AWAF)
- Trinidad and Tobago fob
- northwest Europe des
- northwest Europe fob (reload)
- Iberian peninsula des
- Iberian peninsula fob (reload)
- Turkey des
- Greece des
- Italy des
- southeast Asia des (ASEA)

### ANEA™ forward assessments

ANEA forward price assessments are for physically delivered LNG. Prices are assessed each day for six forward months and four forward quarters. Contracts roll following the timing of Argus spot LNG assessments, as described above.

The first ANEA forward month price assessment is for two months forward of the date of assessment during the first half of the month and for the third month forward of the date of assessment during the second half of the month.

The first ANEA forward quarter price assessment rolls on the first day after the middle of the month before the start of delivery. For example, the first-quarter contract will last be assessed on the 15th of December.

## Freight

Argus LNG Daily includes several assessments and calculated values of LNG freight, including the Argus Round Voyage Rates that define the charter and fuel costs of specific benchmark routes.

### Argus Round Voyage Rates

Argus publishes LNG freight Round Voyage Rates in \$/day for benchmark routes for tri-fuel/dual-fuel diesel electric (TFDF/DFDE) vessels as described below.

The Argus Round Voyage Rate is the amount payable by the charterer to the shipowner, expressed in \$/day. The rate excludes any canal fees.

Argus will consider for inclusion in the assessment lumpsum values, round-voyage day rates, and their components, including laden and ballast day rates and ballast fuel cost rates as described below.

Argus Round Voyage Rates are published for the following routes:

- ARV1: Australia-Northeast Asia (21 days round trip)
- ARV2: USGC-Northwest Europe (28 days round trip)
- ARV3: USGC-Northeast Asia (51 days round trip)

Round-trip durations include two days spent in port on the laden leg.

Argus Round Voyage Rates are published daily.

Argus Round Voyage Rates are assessed throughout the day up to and including 4:30pm, UK time.

### Laden leg day rate

Argus assesses laden vessel chartering rates for the outbound leg of round-trip voyages originating east and west of Suez in \$/d for tri-fuel/dual-fuel diesel electric (TFDF/DFDE), steam turbine and two-stroke propelled vessels as described below.

Laden freight rates are assessed based on a survey of active market participants. For all rates, vessels are assumed to be cold for single-cargo fixture.

Laden freight rates are assessed throughout the day of publication up to and including 4:30pm, UK time.

### Spot

Spot laden vessel chartering rates are assessed and published daily for fixtures beginning between five days after the date of assessment and the end of the following calendar month.

### Forward

Forward laden vessel chartering rates are assessed and published weekly, on the last publication day of the week for fixtures beginning during the named month.

Prices are assessed for 12 calendar months forward. Forward freight rates roll on the 16th day of the month, with the exception of February, which rolls on the 15th of the month.

### Ballast leg day rate

Argus assesses weekly ballast spot vessel chartering rates for the return leg of round-trip voyages originating east and west of Suez in \$/d for tri-fuel/dual-fuel diesel electric (TFDF/DFDE) vessels as described below.

Ballast freight rates are assessed weekly based on a survey of active market participants. For all rates, vessels are assumed to be cold for single-cargo fixture beginning between five days after the date of assessment and the end of the following calendar month.

Ballast leg day rates are assessed and published as a percent of the cost of the corresponding laden leg day rate.

Ballast leg day rates are assessed on the day of publication up to and including 4:30pm, UK time. Ballast leg day rates are assessed and published on Fridays, or the last publication date before Friday if Friday is a UK holiday.

### Ballast fuel cost

Argus assesses weekly ballast fuel cost percentages for the return leg of round-trip voyages originating east and west of Suez in \$/d for tri-fuel/dual-fuel diesel electric (TFDE/DFDE) vessels as described below.

Ballast fuel costs are assessed weekly based on a survey of active market participants.

Ballast fuel costs are assessed and published as a percent of the cost of fuel used on the return leg of a round trip voyage and are the amount refunded to the shipowner by the charterer.

For example, a ballast fuel cost of 75pc indicates that the charterer will refund the shipowner (or increase the lumpsum payment to the shipowner by) 75pc of the value of the fuel consumed on the return leg of a round trip voyage.

Ballast fuel costs are assessed on the day of publication up to and including 4:30pm, UK time. Ballast leg day rates are assessed and published on Fridays, or the last publication date before Friday if Friday is a UK holiday.

## Vessels

### Tri-fuel/dual-fuel diesel electric (TFDE/DFDE)

**Vessel size:** 155,000-165,000m<sup>3</sup>

**Typical boil off:** 0.1-0.125pc

Dual-fuel diesel electric (DFDE) vessels are considered part of the TFDE assessment

Ice-class carriers are excluded from the assessment

### Steam turbine

**Vessel size:** 135,000-155,000m<sup>3</sup>

### Two-stroke propelled

**Vessel size:** 170,000-180,000m<sup>3</sup>

## Freight indexes

Argus freight indexes are the rolling average of freight rate assessments published during the calendar month. The final indexes should be taken as those published on the last publication day of the month.

## Voyage costs

Argus publishes freight costs for common voyages based on daily spot LNG vessel chartering rates and accompanying shipping-related costs in \$/mn Btu.

For each route two voyage costs are calculated, one for a standard full-cost round trip, and another using Argus Round Voyage rates (ARV).

In a standard round trip, the charterer pays the daily spot charter rate and fuel costs for both the outbound and the return leg of the journey.

In an ARV voyage, the charterer pays for a proportion of the daily charter rate and fuel costs, in line with Argus assessments of the ballast bonus paid to the shipowner. These proportions may exceed 100pc if the charterer reimburses the shipowner for prepositioning costs.

For a standard round trip, the following assumptions apply:

- daily spot LNG vessel chartering rates for east and west of Suez voyages based on 155,000-165,000m<sup>3</sup> DFDE/TFDE vessels
- daily boil-off rate of 0.1pc/d based on 98pc vessel capacity utilisation
- an average 50pc of fuel consumption based on daily bunker consumption of 122 t/d based on local rates
- an average of 50pc of LNG fuel consumption based on the boil-off rate
- voyage times based on a laden leg speed of 19.5 knots
- Suez or Panama Canal costs, where applicable.

If bunker fuel prices are unavailable, the latest available prices will be used in calculating voyage costs.

For an ARV voyage, the following assumptions apply:

- daily spot LNG vessel chartering rates for east and west of Suez voyages based on 155,000-165,000m<sup>3</sup> DFDE/TFDE vessels
- a daily boil-off rate of 0.1pc/d based on 98pc vessel capacity utilisation
- a heel of 1pc of the vessel's capacity is retained
- only boil off is consumed for propulsion
- vessels consume on the ballast leg the same quantity of LNG as was consumed on the laden leg
- voyage times based on a laden-leg speed of 18 knots and a ballast-leg speed of 16 knots
- journey times are increased by a buffer, or "sea margin", of 6pc
- Suez or Panama Canal costs, where applicable.

Freight costs are published for each pairing of exporter and importer in the table below, with the exception of the northwest Europe-Milford Haven and Singapore-Singapore routes.

Export and import points used in freight publication	
Exporter	Importer
Angola	Ain Sukhna and Aqaba
Bintulu and Tangguh	Aliaga
Bonny	Altamira
Bontang	Dahej and Qasim
Dampier	Escobar
Gladstone	Incheon
Northwest Europe	Jebel Ali and Mina al-Ahmadi
PNG	Manzanillo
Ras Laffan and Das Island	Map ta Phut
Sakhalin	Milford Haven
Singapore	Pecem
Spain	Quintero
Trinidad and Tobago	Shenzen and Taipei
US Gulf coast	Singapore
	Tokyo

## LNG-gas price spreads

Argus publishes a series of price spreads between global LNG and European pipeline gas markets.

Price spreads are calculated against the Argus assessments of the UK NBP and Dutch TTF gas markets for the following LNG price assessments:

- northeast Asia des (ANEA)
- China des
- India des
- Middle East des
- Argus Middle East-India (MEI) index

Price spreads are also published comparing the Argus Gulf Coast (AGC) fob LNG assessment with NBP forward-month prices.

See the [Argus European Natural Gas methodology](#).

## Timing

Asian and Middle Eastern LNG prices are assessed in half-month periods. When possible, these half-month assessments are averaged to create a full forward-month period for use in calculating a spread to European pipeline gas markets, which trade in full calendar months. When LNG prices for a full calendar month cannot be calculated, the spread will be published as the difference between the half-month LNG price assessment and the full-month pipeline gas market price.

See the Argus LNG spot assessments timing section above for more details about contract timings.

Argus Gulf Coast (AGC) fob LNG prices are assessed in full calendar months and the published spreads are the difference between monthly price assessments of US Gulf coast LNG and UK NBP gas. Six forward months are published.

## Long-term price assessments

### Summary

Argus publishes forward assessments of loaded and delivered prices under long-term contracts.

These assessments are produced using formulas researched by Argus and applied to the price of underlying natural gas and oil futures markets as outlined below.

The formulas governing these forward assessments are intended to be broadly representative of recent long-term contract structures and are designed to provide a forward view of the relative competitiveness of long-term LNG pricing in traded wholesale markets.

The formulas are updated on a continuing basis to reflect evolving price formation mechanisms in long-term LNG pricing.

### Timing

LNG forward prices are calculated and published in arrears, using the most recent available settlement prices of the underlying gas and oil futures.

For example, on 20 November 2014, the indicative US Gulf coast fob and oil-linked Japan des prices will be published for 19 November 2014.

These forward price series are published according to the UK publication calendar, which is available at [www.argusmedia.com](http://www.argusmedia.com), except that for days on which the underlying futures markets are closed, prices will not be published.

### Markets covered

#### Indicative US Gulf coast fob

**Location:** US Gulf coast liquefaction projects

**Underlying market prices:** Henry Hub natural gas

**Contract structure:** Henry Hub futures \* premium + fixed cost

**Periods assessed:** 70 forward months, 22 forward quarters, 10 forward seasons and five forward calendar years. Summer is defined as the six months from 1 April to 30 September and winter is defined as the six months from 1 October to 31 March the following year.

A subset of forward prices are published in the print addition of Argus LNG daily, and all are available electronically.

#### Oil-linked Japan LNG des

**Location:** Japanese receiving terminals

**Underlying market prices:** Brent crude

**Contract structure:** Brent futures \* 14pc + 80¢/mn Btu

**Periods assessed:** 70 forward months, 22 forward quarters, 10 forward seasons and five forward calendar years. Summer is defined as the six months from 1 April to 30 September and winter is defined as the six months from 1 October to 31 March the following year.

A subset of forward prices are published in the print addition of Argus LNG daily, and all are available electronically.

#### Generic oil-linked LNG des

Argus also publishes a series of oil-linked price formulas representative of pricing structures common to long-term LNG pricing.

These series provide a view of the forward value of such contracts for delivery during the month specified.

Prices are calculated using an average of Ice Brent crude futures prices multiplied by a coefficient. Several variations of both the crude price averaging mechanism and the applied coefficient are published electronically. A sub-set of these prices is published in the Argus LNG Daily report.

Prices are published for delivery on a calendar month basis. A sub-set of forward prices is published in the print edition of Argus LNG Daily, and all are available electronically.

Oil-linked long-term contract structures are composed of two parts, an explanation of the construction of the oil-price average and a coefficient, commonly referred to as a "slope".

The construction of the oil-price average is expressed as three figures, for example 601, representing the number of months over which the oil price is averaged, the delay, or lag, in months between the end of the oil price average period and the delivery period for the LNG, and the number of months of delivery for which the average oil price pertains.

#### Argus produces prices for

- 601 – six-month average, no lag, for one month of delivery
- 301 – three-month average, no lag, for one month of delivery
- 311 – three-month average, one-month lag, for one month of delivery
- 101 – one-month average, no lag, for one month of delivery

For each 601, 301, 311, and 101 structure, Argus publishes the following percentage slopes: 10pc, 10.5pc, 11pc, 11.5pc, 12pc, 12.5pc, 13pc, 13.5pc, 14.pc, 14.5pc.

#### The use of underlying oil prices

Because indexes use past oil prices to determine future LNG prices, Argus uses a mix of final settlement and daily futures prices in the calculation of long-term price indexes. The examples and illustration below explain both the timing of the underlying oil prices used in calculating the various indexes and whether a final settlement or daily futures price is used in the calculation.

**Example:** on 9 December 2016, Argus publishes a 601, 10.5pc index price for delivery in April 2017.

The six relevant months of oil pricing are for October 2016-March 2017, inclusive. Oil prices used in this calculation are from the previous date of publication, in this case, 8 December.

Because the October 2016-January 2017 Brent futures contracts have all expired by this date, Argus uses the final settlement values for each month. And as trade in the Brent futures markets for February and March 2017 is still active, daily settlement values are used in the formula for those months.

An average of those six oil prices (four final and two daily settlements) is created, and multiplied by 10.5pc, resulting in the day's 610 10.5pc oil-indexed LNG price.

**Example:** on 9 December 2016, Argus publishes a 601, 10.5pc index price for delivery in April 2018.

The six relevant months of oil pricing are for October 2017-March 2018, inclusive. Oil prices used in this calculation are from the previous date of publication, in this case, 8 December.

Because trade in the Brent futures markets for October 2017-March 2018 is still active, daily settlement values are used in the formula for all months required by the calculation.

An average of those six oil prices (all daily settlements) is created, and multiplied by 10.5pc, resulting in the day's 610 10.5pc oil-indexed LNG price for April 2018

**Example:** on 9 December 2016, Argus publishes a 311, 10.5pc index price for delivery in April 2017.

The three relevant months of oil pricing are for December 2016-February 2017 (three months of oil prices, with one-month lag between the oil-pricing period and the LNG delivery date).

Because the December 2016 and January 2017 Brent futures contracts have expired by this date, Argus uses the final settlement values for each month. And as trade in the Brent futures markets for February 2017 is still active, the daily settlement values are used in the formula for that month.

An average of three oil prices (two final and one daily settlement) is created, and multiplied by 10.5pc, resulting in the day's 311 10.5pc oil-indexed LNG price for April 2017.

9 December 2016: LNG for delivery in April 2017							
	Oct 16	Nov 16	Dec 16	Jan 17	Feb 17	Mar 17	Apr 17
601	Final settlement	Final settlement	Final settlement	Final settlement	Daily settlement	Daily settlement	LNG delivery
311			Final settlement	Final settlement	Daily settlement	One-month lag	LNG delivery

9 December 2016: LNG for delivery in April 2018							
	Oct 17	Nov 17	Dec 17	Jan 18	Feb 18	Mar 18	Apr 18
601	Daily settlement	LNG delivery					

### Periods assessed

71 forward months, 21 forward quarters, 10 forward seasons and five forward calendar years. Summer is defined as the six months from 1 April to 30 September and winter is defined as the six months from 1 October to 31 March the following year.

## Argus Japanese Crude Cocktail Index

Argus LNG Daily includes the Argus Japanese Crude Cocktail Index, a US dollar per barrel crude oil import price based on data published by the Customs and Tariff Bureau of Japan's Ministry of Finance.

See the [Argus Crude methodology](#).

## Argus Japanese Crude Cocktail forward curve

Argus LNG Daily includes derived forward prices for 24 forward months of the Argus Japanese Crude Cocktail Index. The first 12 forward months are published in the print edition of Argus LNG Daily. All 24 forward months are available electronically.

Prices are calculated and published in \$/bl each day based on a regression analysis of three benchmark crude grades adjusted in recognition of Japan's varying slate of crude imports.

JCC forward prices carry a 4.30pm Singapore timestamp on the day of publication and are not published on UK or Singapore holidays. A publication schedule is available at [www.argusmedia.com](http://www.argusmedia.com). The first forward month published is two calendar months forward from the day of publication. Argus JCC forward prices roll on the first publication day of the calendar month.

## Small-scale LNG

The Argus northwest Europe small-scale LNG free on truck (fot) assessment is the month-ahead price of LNG loaded on trucks in northwest Europe.

The price is assessed and published both as an outright free on truck price in €/MWh and as a differential to the TTF, excluding truck-loading fees — effectively an in tank price for truck loading.

Argus will consider for inclusion in the assessment prices expressed as outright values or as a differential to any reasonable basis price that Argus can convert to an outright price and TTF differential. Floating-price market information will be converted, if required, as of the day of trade, or in the absence of timing information, using the relevant Argus assessment published on Thursday.

Argus surveys market participants to create a regional average truck-loading cost. That regional average is published in the report in €/MWh and is used in the conversion of market information between free-on-truck and TTF differential in the absence of a terminal-specific loading cost.

### Frequency

Argus publishes the northwest Europe small-scale LNG price assessment every Thursday, taking into account trades that have taken place throughout the week, as well as market participants' view of prevailing prices and indicative bids and offers on the day of publication.

The cut off time for submitting prices is 4.30pm London time every Thursday.

## Trading Locations

### Northwest Europe FOT

**UK:** Isle of Grain

**Belgium:** Zeebrugge

**Netherlands:** Rotterdam

**France:** Dunkirk

## Loading period

Argus assesses the price for loading on a month-ahead basis. In May, Argus will assess the price of LNG to be loaded in June.

## Contract roll date

The northwest Europe assessment rolls on the first Thursday of each month. Argus takes into account trades for the second forward month contract in the week leading up to the roll date.

For example, on Thursday, 1 November, the assessment takes into account December trades that have taken place from Friday, 26 October to Thursday, 1 November.

## Cargo size

The standard truck cargo size is 17-23t of LNG. Trade for cargoes outside of the specified range will be included in the assessment only after normalisation to the standard cargo size.

## Competing fuel assessments

Argus LNG Daily includes a number of natural gas and oil price assessments.

- Argus Japan Crude Cocktail Index (Argus JCC) — see the [Argus Crude methodology](#)
- European natural gas prices — see the [Argus European Natural Gas methodology](#)
  - NBP: three forward months, three forward quarters, three forward seasons and three forward years (\$/mn Btu)
  - Zeebrugge front-month (\$/mn Btu and a weekly snapshot in €/MWh and \$/t marine gasoil (MGO) equivalent)
  - TTF front-month (\$/mn Btu and a weekly snapshot in €/MWh and \$/t marine gasoil (MGO) equivalent)
  - Peg Nord front-month
  - PSV front-month
  - AOC front-month
- Nymex Henry Hub front-month — see <http://www.cmegroup.com/> for more details
- Marine fuels (a weekly snapshot is published in €/MWh and \$/t marine gasoil (MGO) equivalent)
  - Gasoil bunker Rotterdam prompt — see the [Argus Marine Fuels methodology](#)
  - Gasoil diesel 10ppm German NWE barge prompt — see the [Argus European Products methodology](#)
  - Fuel oil bunker 380 cst Rotterdam prompt — see the [Argus Marine Fuels methodology](#)

## Argus Victoria Index (AVX)

### Summary

The AVX index is the price of gas traded on Australia's Victorian Declared Transmission System (DTS) for month-ahead delivery on a weekly basis.

### Methodology of assessment

Price assessments are based on two elements — a survey of market participants' view of prevailing prices and indicative bids and offers, and a volume-weighted average of verified trades. The final price determined for the week is an average of the survey result and trade value.

In the absence of any relevant traded volumes, Argus takes the average of the indicative bids and offers available from its market survey in order to establish a mid-point price.

Argus applies editorial judgment to these surveys and excludes prices that appear to be outside the consensus of the market. The daily survey of market participants maintains a balance between buyers, sellers, trading companies and brokers.

### Frequency of indexes

Argus produces the AVX index every Friday, taking into account trades that have taken place throughout the week, as well as market participants' view of prevailing prices and indicative bids and offers on the day that the indexes are produced. The cut off time for submitting prices is 3pm Singapore time every Friday.

### Trading locations

The AVX index reflects the value of gas across the whole of the Victorian DTS, enabling Argus to capture the maximum amount of trading activity. The AVX index takes into account gas trading at the following locations:

- Longford
- Vic Hub
- BassGas
- LNG storage facility (Dandenong)
- Iona
- Otway
- SEA Gas
- Culcairn

### Delivery period

Argus assesses the value of gas for delivery on a month-ahead basis. In May, Argus will assess the value of gas to be delivered throughout June.

### Contract roll date

The AVX index rolls on the first Friday of each month. Argus takes into account trades for the second forward month contract in the week leading up to the roll date. For example, on Friday 1 November, the index takes into account December trades that have taken place in the period from Monday 28 October to Friday 1 November.

### Gas specification

The AVX index takes into account trades where the Australian Wobbe Index of 46-52 MJ/m<sup>3</sup> applies, in accordance with Australian Standard AS 4564. The AVX index only takes into account trades relating to firm gas supply.

### Minimum trade volumes

Argus excludes traded volumes of less than 100GJ when assessing the Victoria prices.

### Normalisation charges

Argus applies a normalisation charge to trades done to reflect the cost of injecting gas at different locations on the Victorian DTS. APA Gas Net published the injection tariffs listed in the table below in July 2013. These tariffs are only applied on the top 10 peak days of the year. In 2012, peak day volumes accounted for 6pc of overall volumes. Argus therefore applies a normalisation charge equivalent to 6pc of the relevant injection tariff to every deal included in the index, as per the following table:

Injection charges \$/GJ – applied to top 10 peak days annually by APA Gas Net						
Longford	Culcairn	Iona	Pakenham	Vic Hub	SEA Gas	Otway Gas
2.1473	1.7425	2.1273	0.3466	2.1473	2.1273	2.1273
Normalisation Charge \$/GJ						
0.1288	0.1046	0.1276	0.0208	0.1288	0.1276	0.1276

## Argus Wallumbilla Index (AWX)

### Summary

The AWX index is the price of gas traded at Wallumbilla in southeast Queensland, Australia for month-ahead delivery on a weekly basis.

### Methodology of assessment

Price assessments are based on two elements — a survey of market participants' view of prevailing prices and indicative bids and offers, and a volume-weighted average of verified trades. The final price determined for the week is an average of the survey result and the trade value.

In the absence of any relevant traded volumes, Argus takes the average of the indicative bids and offers available from its market survey in order to establish a mid-point price.

Argus applies editorial judgment to these surveys and excludes prices that appear to be outside the consensus of the market.

The daily survey of market participants maintains a balance between buyers, sellers, trading companies and brokers. Frequency of indexes Argus produces the AWX index every Friday, taking into account trades that have taken place throughout the week, as well as market participants' view of prevailing prices and indicative bids and offers on the day that the indexes are produced. The cut off time for submitting prices is 3pm Singapore time every Friday.

### Trading locations

The AWX index reflects the value of gas at Wallumbilla in southeast Queensland. The index takes into account gas trading at the following interconnection points:

- Roma-Brisbane Pipeline (RBP)
- Queensland Gas Pipeline (QGP)
- South West Queensland Pipeline (SWQP)

### Delivery period

Argus assesses the value of gas for delivery on a month-ahead basis. In May, Argus will assess the value of gas to be delivered throughout June.

### Contract roll date

The AWX index rolls on the first Friday of each month. Argus takes into account trades for the second forward month contract in the week leading up to the roll date. For example, on Friday 1 November, the index takes into account December trades that have taken place in the period from Monday 28 October to Friday 1 November.

### Gas specification

The AWX index takes into account trades where the Australian Wobbe Index of 46-52 MJ/m<sup>3</sup> applies, in accordance with Australian Standard AS 4564. The AWX index only takes into account trades relating to firm gas supply.

### Minimum trade volumes

Argus excludes traded volumes of less than 1TJ when assessing the Wallumbilla prices.