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## ***ARGUS CRUDE***

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The most up-to-date Argus Crude 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 indicators of commodity market values, free from distortion and representative of spot market values. As a result, the specific currencies, volume units, locations and other particulars of an assessment are determined by industry consensus to facilitate seamless bilateral trade and Argus mirrors these industry conventions.

In the global crude markets, Argus reflects physical market prices employing a range of methodologies. These include time stamped bid/ask ranges, averages of deals done in a window, volume-weighted averages of deals done over the entire day as well as cumulative transaction averages across a month and cumulative daily averages. The rationale for each methodology will vary by market.

Argus often applies crude basis differentials to various prices – such as WTI and North Sea Dated – to arrive at fixed prices because this is a representative method of converting differential prices into fixed price assessments

When Argus uses a deals based approach for price identification deals must meet the minimum volume, delivery, timing, and specification requirements in our methodology and the deals must be bona fide. The same requirements apply to most volume-weighted averages.

The time period used to produce representative price indications is that which in the opinion of Argus, following consultation with market participants, can be used to produce a reliable indicator of physical market value.

Argus will announce its publishing schedule in a calendar located at [www.argusmedia.com](http://www.argusmedia.com). Argus may not assess prices on certain public holidays even when the exchanges are open, due to anticipated illiquidity in the cash spot markets.

### 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 when and where possible.

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. Should the number of entities providing market data repeatedly fall to a level that assessment quality may be affected, supervising editors will review the viability of the assessment.

For certain price assessments identified by local management, should more than 50pc of the market data upon which the assessment is based come from a single entity, then 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.

Argus has committed to deliver many of our final published prices to clients by a particular deadline each day. Because compiling and confirming transactions and other market data in advance of this deadline is a lengthy process, price assessment procedures must be concluded well before that deadline. As a result, Argus has instituted cut-off times for the submission of data by market participants. Argus will review all data received after the cut-off time and will make best efforts to include in the assessment process all verifiable transactions and market data received after the cut-off time but reserves the right to exclude any market data from the process if received after the cut-off time.

### 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:

1. Transactions
2. Bids and offers
3. 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 obtains, 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. This data includes transactions, bids, offers, volumes, counterparties, specifications and any other information that contributes materially to the determination of price. This high level

of care 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.

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 certain price assessments identified by local management, 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 arms-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.
- 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 behavior. 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 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 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.
- Analysis of prices in forward markets for physically deliverable commodity that allow extrapolation of value into the prompt timing for the commodity assessed.
- 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).

Throughout this methodology, Argus will explain, in more detail and on a market by market basis, the criteria and procedures that are used to make an assessment of market value by applying intelligent judgment.

## Volume minimums and transaction data thresholds

In establishing each methodology, Argus will list specific minimum volume for each assessment. Because of the varying transportation infrastructure found in all commodity markets, 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. 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 certain price assessments identified by local management, 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 and confidentiality

Argus values transparency in energy markets. As a result, we publish lists of deals in our reports that include price, basis, 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.

Argus asks for transaction counterparty names from contacts in order to confirm deals and to avoid double-counting in certain volume-weighted averages. In some markets, Argus does not publish counterparty names. In other markets, Argus does publish counterparty names in its reports.

## Basis differentials and absolute prices

In the global crude markets, prices are often negotiated bids, offers, and transaction values at differentials to futures prices or to reference prices. Argus fixed prices are derived by adding the assessed differentials to the reference price.

## 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.

## Publications and price data

Argus global crude prices are published in the Argus Crude report. The Argus Americas Crude report contains a subset of these prices. Other Argus publications also include some Argus Americas Crude pricing data. The price data is 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.

## 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:

1. A global price reporting manual describing among other things the guidelines for the exercise of judgment.
2. 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.
3. Experienced editors overseeing reporting teams are involved in daily mentoring and assisting in the application of judgment for illiquid markets.
4. 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 indicators of commodity market values, free from distortion and representative of spot market values. 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 physical 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
- 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 published in the relevant Argus report, to include a date for implementation, publication of stakeholders' comments that are not subject to confidentiality, and Argus' response to those comments.

### Updates to methodology

The Argus Crude methodology is constantly updated and revised. The latest available methodology (which may supersede the one you are reading) is available at [www.argusmedia.com](http://www.argusmedia.com).

## Overview (Argus Crude page 1)

Argus provides an overview of the day's crude market activity, highlighting changes in key crude prices and the price differences among the various regional crudes. The report discusses that day's market activity with particular reference to the main crude benchmark prices. The summary has a global scope, allowing readers to quickly understand the key market drivers.

## Pricing tables (Argus Crude page 1)

### North Sea, Russia-Caspian, Mediterranean and west Africa

The front page of Argus Crude contains duplicate assessments of the crude prices in the various regional sections. For the North Sea, Russian-Caspian (including fob netbacks) Mediterranean, and West Africa, prices are published as fixed price assessments and also shown as differentials to the benchmarks. The primary benchmark in the Atlantic Basin is Dated, but Dated itself is shown as a differential to the forward North Sea price (the "flat" price). The price methodology for these regions is described in the various regional sections below.

### Mideast Gulf

The Mideast Gulf table contains the price assessments made at 4:30pm Singapore time for front month Dubai, front month Oman, and the Abu Dhabi crude Murban.

The Dubai price is published as a fixed price assessment. The Oman price is published as a fixed price assessment and is also shown as a differential to Dubai swaps.

The Murban price is published as a fixed price assessment and also shown as a differential to the Abu Dhabi National Oil Company (Adnoc) OSP.

### Asia-Pacific

The Asia-Pacific table contains the price assessments made at 4:30pm Singapore time for Minas, Tapis and North West Shelf crudes.

The Indonesian Minas crude price is published as a fixed price assessment and as a differential to the Indonesian Crude Price (ICP).

Malaysian Tapis crude is published as a fixed price assessment and as a differential to the North Sea Dated and substitute Dated on UK holidays.

Australian North West Shelf condensate is published as a fixed price assessment and as a differential to North Sea Dated, and Substitute Dated on UK holidays (see Asia-Pacific section below).

ESPO Blend is published as a fixed price assessment and as a differential to Dubai swaps.

Sokol is published as a fixed price assessment and as a differential to Dubai swaps for the month of loading.

## US pipeline

The US pipeline table contains the prices for LLS, Mars and the *Argus Sour Crude Index™ (ASCI™)* benchmark, LLS, Mars and ASCI prices are published as fixed price assessments and as differentials to the front month Nymex WTI settlement price.

## Canada pipeline

The Canada pipeline table contains the prices for Canadian Synthetic and WCS, published as fixed price assessments.

## Americas cargoes

The Americas cargoes table contains the prices for Alaskan North Slope and Colombian Vasconia, published as fixed price assessments.

## Futures markets (Argus Crude page 2)

Argus Crude shows market information from four world futures markets which trade crude oil. These futures exchanges are the London-based IntercontinentalExchange's Brent contract (Ice Brent), the New York Mercantile Exchange's Light Sweet Crude contract (Nymex WTI), the Tokyo-based Tocom Mideast Gulf crude contract and the Dubai Mercantile Exchange's Oman contract.

Argus Crude publishes representative price and market information from the futures exchanges including the Open, High, Low and Settle prices and where possible the estimated volume of trade.

## Forward spreads (Argus Crude page 2)

*Argus Crude* shows the North Sea/Dubai spreads for three months forward, the WTI/North Sea spreads for four months forward and the WTI/Dubai spreads for three months forward, timestamped at 4:30pm London time.

## Forward markets (Argus Crude pages 2-4)

The forward markets tables show prices in the forward markets and the intermonth spreads between the different monthly prices. They also show various exchange of futures for physicals prices and exchanges for swaps prices. Various short-term swap price tables are shown. The section also contains pricing components that are used to calculate other Argus price assessments.

### North Sea forward Singapore close

The North Sea forward table for Singapore close shows prices for four months forward in the forward North Sea market at 4:30pm Singapore time. This market is the Brent forward market (with Forties, Oseberg, Ekofisk or Troll substitutability). It is called the North Sea forward market in Argus Crude to differentiate it from the 15-day Brent forward market that it replaced. This forward market trades in parallel to the Ice futures market in Brent as an over-the-counter market in Brent.



The contract trades at fixed prices and also in the form of inter-month spreads. *Argus* assesses the prices for the forward North Sea months by applying the intermonth spread assessments to the first-month North Sea forward price. *Argus* uses the EFP differential and the front-month Ice Brent futures to assess first-month forward North Sea, including expiry day, except for the last three sessions in the life of the front-month futures contract. On these sessions, *Argus* uses second-month Ice Brent futures and the corresponding EFP differential (see *Calculating North Sea Dated*).

### North Sea forward London close

The forward North Sea London close table duplicates the Dated price and also shows prices for four months forward in the forward North Sea market at 4:30pm London time. This market is the Brent forward market (with Forties, Oseberg, Ekofisk or Troll substitutionality). It is called North Sea forward in *Argus Crude* to differentiate it from the 15-day Brent forward market that it replaced. This forward market trades in parallel to the Ice futures market in Brent as an over-the-counter market in Brent. A weighted average of trade on the most liquid forward North Sea month is also the forward (or flat price) used in the calculation of the Dated assessment.

The forward North Sea market trades at fixed prices and also in the form of intermonth spreads. *Argus* assesses the price levels for these intermonth trades in the forward intermonths table on page 2 and uses these intermonth assessments to construct the fixed forward price assessments in the North Sea table.

The BFOE forward contract rolls on the last working day of the previous month, so the March 2015 forward contract will roll on 27 February. If this date falls on a weekend or holiday, then the roll date will fall on the previous workday. The last day of trade will be the first workday prior to the roll date.

### Dubai Singapore close

*Argus* quotes forward Dubai for four months forward at 4:30pm Singapore time. A more detailed explanation of the *Argus* Dubai methodology can be found in the Mideast Gulf section.

The components used in the calculation of the forward Dubai prices are the Dubai/Ice Brent EFS differentials, which *Argus* quotes for three months forward, and the Dubai Intermonths, which *Argus* quotes for three periods forward.

### Dubai London close

*Argus* quotes the forward Dubai price for four months forward. These prices are assessed at London 4:30pm and so differ from the Singapore 4:30pm assessments.

### Dated to Ice Brent frontline

*Argus* quotes prices for the Dated to Frontline (DFL) market which trades the difference between the Dated assessment and the frontline Ice assessment. *Argus* quotes this market for three months forward, two quarters and one year forward.

The front DFL month will roll either on 18th of the month or up to four days after the 18th of the month, depending on liquidity.

### WTI Cushing

WTI is assessed on a cash market basis at 1:30pm Houston time. These prices reflect an intelligent assessment of the bid/ask range at the time stamp. Cash WTI rolls on the fourth business day following the expiry of the front-month Nymex Light Sweet crude futures contract.

## North Sea (Argus Crude page 3)

The North Sea crude market is one of the most important oil markets in the world. For many years, the main North Sea crude price was the price of Brent Blend. This was the main price benchmark against which other crudes were valued. In addition to trading physical cargoes, and having other physical grades price against it, the Brent market developed a forward market and also a series of derivative markets, such as short-term contract for differences and long-term swaps. The Brent market is also the underlying market to London-based IntercontinentalExchange's Ice Brent futures contract.

But there was a problem with the Brent Blend benchmark. Production of Brent crude is in decline and the number of freely available cargoes for trade is declining even more rapidly. This means that the benchmark did not always reflect the consensus view of the prevailing market. Consequently, *Argus* developed the concept of a generic North Sea benchmark which involved broadening the base of liquidity that underpins the benchmark. The generic North Sea benchmarks in *Argus Crude* evolved over time — from the *Argus* North Sea Index to the *Argus* North Sea Reference Price — but eventually the generic benchmark became *Argus* North Sea Dated, a price derived from a methodology that involves five grades, Brent, Forties, Oseberg, Ekofisk and Troll. This price became known as Dated or North Sea Dated.

### Calculating North Sea Dated

*Argus* North Sea Dated is the market's implied value for the North Sea Dated price reference obtained by cross referencing forward trade, CFD trade and physical differentials for the five benchmark crudes within the 10 days-month ahead assessment period.

The building block from which the North Sea Dated assessment is derived is called the "flat" price or "forward" price. It is the price for Brent crude for loading in one (or possibly two) months time.

The forward price is the price for a month-ahead North Sea contract (Brent with Forties, Oseberg, Ekofisk or Troll substitutionality), a contract that trades forward in monthly delivery periods but which will mature into a physical obligation a month in advance of the cargo date nomination.

*Argus* identifies the "flat" price from a volume weighted average of North Sea forward trade (partial and full cargo) reported to *Argus* as having transacted between 4:29 and 4:30pm London time. The transaction data threshold in the identification of the North Sea forward physical flat price is 100,000 bl. This has been established

Argus North Sea Dated calculation

| Today's date                                      | CFDs          |       |       |                   |          | Brent        |               | Forties     |               | Oseberg     |               |             |                 | Ekofisk                   |               |             |                 | Troll                     |               |             |
|---|---------------|-------|-------|-------------------|----------|--------------|---------------|-------------|---------------|-------------|---------------|-------------|-----------------|---------------------------|---------------|-------------|-----------------|---------------------------|---------------|-------------|
|   | Forward N Sea | Aug   | 53.41 | Anticipated Dated | Day Date | Days forward | Dated related | Aug related | Dated related | Aug related | Dated related | Aug related | Quality Premium | Including Quality Premium | Dated related | Aug related | Quality Premium | Including Quality Premium | Dated related | Aug related |
| 25 May 2017                                       |               |       |       |                   |          |              |               |             |               |             |               |             |                 |                           |               |             |                 |                           |               |             |
| <b>Current CFD week</b>                           |               |       |       |                   |          |              |               |             |               |             |               |             |                 |                           |               |             |                 |                           |               |             |
| <b>22-May 26-May</b>                              |               |       |       |                   |          |              |               |             |               |             |               |             |                 |                           |               |             |                 |                           |               |             |
| 22-May  | 0.00          |       |       | 53.41             | Mon      | 22-May       | -3            |             |               |             |               |             |                 |                           |               |             |                 |                           |               |             |
| 23-May  | 0.00          |       |       | 53.41             | Tue      | 23-May       | -2            |             |               |             |               |             |                 |                           |               |             |                 |                           |               |             |
| 24-May  |               |       |       | 53.41             | Wed      | 24-May       | -1            |             |               |             |               |             |                 |                           |               |             |                 |                           |               |             |
| 25-May  | 0.00          |       |       | 53.41             | Thu      | 25-May       | 0             |             |               |             |               |             |                 |                           |               |             |                 |                           |               |             |
| 26-May  | 0.00          |       |       | 53.41             | Fri      | 26-May       | 1             |             |               |             |               |             |                 |                           |               |             |                 |                           |               |             |
| <b>1st CFD week</b>                               |               |       |       |                   |          |              |               |             |               |             |               |             |                 |                           |               |             |                 |                           |               |             |
| <b>29-May 02-Jun</b>                              |               |       |       |                   |          |              |               |             |               |             |               |             |                 |                           |               |             |                 |                           |               |             |
| 29-May  | -0.87         |       |       | 52.54             | Mon      | 29-May       | 4             |             |               |             |               |             |                 |                           |               |             |                 |                           |               |             |
| 30-May  | -0.87         |       |       | 52.54             | Tue      | 30-May       | 5             |             |               |             |               |             |                 |                           |               |             |                 |                           |               |             |
| 31-May  | -0.87         |       |       | 52.54             | Wed      | 31-May       | 6             |             |               |             |               |             |                 |                           |               |             |                 |                           |               |             |
| 01-Jun  | -0.87         |       |       | 52.54             | Thu      | 01-Jun       | 7             |             |               |             |               |             |                 |                           |               |             |                 |                           |               |             |
| 02-Jun  | -0.87         |       |       | 52.54             | Fri      | 02-Jun       | 8             |             |               |             |               |             |                 |                           |               |             |                 |                           |               |             |
| <b>2nd CFD week</b>                               |               |       |       |                   |          |              |               |             |               |             |               |             |                 |                           |               |             |                 |                           |               |             |
| <b>05-Jun 09-Jun</b>                              |               |       |       |                   |          |              |               |             |               |             |               |             |                 |                           |               |             |                 |                           |               |             |
| 05-Jun  | -0.81         | 52.60 | 52.60 | Mon               | 05-Jun   | 11           | 0.15          | 52.75       | 0.15          | 52.75       | 0.60          | 53.20       | 0.64            | 52.56                     | 0.35          | 52.95       | 0.31            | 52.64                     | 1.15          | 53          |
| 06-Jun  | -0.81         | 52.60 | 52.60 | Tue               | 06-Jun   | 12           | 0.15          | 52.75       | 0.15          | 52.75       | 0.60          | 53.20       | 0.64            | 52.56                     | 0.35          | 52.95       | 0.31            | 52.64                     | 1.15          | 53          |
| 07-Jun  | -0.81         | 52.60 | 52.60 | Wed               | 07-Jun   | 13           | 0.15          | 52.75       | 0.15          | 52.75       | 0.60          | 53.20       | 0.64            | 52.56                     | 0.35          | 52.95       | 0.31            | 52.64                     | 1.15          | 53          |
| 08-Jun  | -0.81         | 52.60 | 52.60 | Thu               | 08-Jun   | 14           | 0.15          | 52.75       | 0.15          | 52.75       | 0.60          | 53.20       | 0.64            | 52.56                     | 0.35          | 52.95       | 0.31            | 52.64                     | 1.15          | 53          |
| 09-Jun  | -0.81         | 52.60 | 52.60 | Fri               | 09-Jun   | 15           | 0.15          | 52.75       | 0.15          | 52.75       | 0.60          | 53.20       | 0.64            | 52.56                     | 0.35          | 52.95       | 0.31            | 52.64                     | 1.15          | 53          |
| <b>3rd CFD week</b>                               |               |       |       |                   |          |              |               |             |               |             |               |             |                 |                           |               |             |                 |                           |               |             |
| <b>12-Jun 16-Jun</b>                              |               |       |       |                   |          |              |               |             |               |             |               |             |                 |                           |               |             |                 |                           |               |             |
| 12-Jun  | -0.85         | 52.56 | 52.56 | Mon               | 12-Jun   | 18           | 0.15          | 52.71       | 0.10          | 52.66       | 0.60          | 53.16       | 0.64            | 52.52                     | 0.35          | 52.91       | 0.31            | 52.60                     | 1.15          | 53          |
| 13-Jun  | -0.85         | 52.56 | 52.56 | Tue               | 13-Jun   | 19           | 0.15          | 52.71       | 0.03          | 52.59       | 0.60          | 53.16       | 0.64            | 52.52                     | 0.35          | 52.91       | 0.31            | 52.60                     | 1.15          | 53          |
| 14-Jun  | -0.85         | 52.56 | 52.56 | Wed               | 14-Jun   | 20           | 0.15          | 52.71       | 0.03          | 52.59       | 0.60          | 53.16       | 0.64            | 52.52                     | 0.35          | 52.91       | 0.31            | 52.60                     | 1.15          | 53          |
| 15-Jun  | -0.85         | 52.56 | 52.56 | Thu               | 15-Jun   | 21           | 0.15          | 52.71       | 0.03          | 52.59       | 0.60          | 53.16       | 0.64            | 52.52                     | 0.35          | 52.91       | 0.31            | 52.60                     | 1.15          | 53          |
| 16-Jun  | -0.85         | 52.56 | 52.56 | Fri               | 16-Jun   | 22           | 0.15          | 52.71       | -0.05         | 52.51       | 0.60          | 53.16       | 0.64            | 52.52                     | 0.35          | 52.91       | 0.31            | 52.60                     | 1.15          | 53          |
| <b>4th CFD week</b>                               |               |       |       |                   |          |              |               |             |               |             |               |             |                 |                           |               |             |                 |                           |               |             |
| <b>19-Jun 23-Jun</b>                              |               |       |       |                   |          |              |               |             |               |             |               |             |                 |                           |               |             |                 |                           |               |             |
| 19-Jun  | -0.84         | 52.57 | 52.57 | Mon               | 19-Jun   | 25           | 0.15          | 52.72       | 0.00          | 52.57       | 0.60          | 53.17       | 0.64            | 52.53                     | 0.35          | 52.92       | 0.31            | 52.61                     | 1.15          | 53          |
| 20-Jun  | -0.84         | 52.57 | 52.57 | Tue               | 20-Jun   | 26           | 0.15          | 52.72       | 0.00          | 52.57       | 0.60          | 53.17       | 0.64            | 52.53                     | 0.35          | 52.92       | 0.31            | 52.61                     | 1.15          | 53          |
| 21-Jun  | -0.84         | 52.57 | 52.57 | Wed               | 21-Jun   | 27           | 0.15          | 52.72       | 0.10          | 52.67       | 0.60          | 53.17       | 0.64            | 52.53                     | 0.35          | 52.92       | 0.31            | 52.61                     | 1.15          | 53          |
| 22-Jun  | -0.84         | 52.57 | 52.57 | Thu               | 22-Jun   | 28           | 0.15          | 52.72       | 0.10          | 52.67       | 0.60          | 53.17       | 0.64            | 52.53                     | 0.35          | 52.92       | 0.31            | 52.61                     | 1.15          | 53          |
| 23-Jun  | -0.84         | 52.57 | 52.57 | Fri               | 23-Jun   | 29           | 0.15          | 52.72       | 0.10          | 52.67       | 0.60          | 53.17       | 0.64            | 52.53                     | 0.35          | 52.92       | 0.31            | 52.61                     | 1.15          | 53          |
| <b>5th CFD week</b>                               |               |       |       |                   |          |              |               |             |               |             |               |             |                 |                           |               |             |                 |                           |               |             |
| <b>26-Jun 30-Jun</b>                              |               |       |       |                   |          |              |               |             |               |             |               |             |                 |                           |               |             |                 |                           |               |             |
| 26-Jun  | -0.80         |       | 52.61 | Mon               | 26-Jun   | 32           |               |             |               |             |               |             |                 |                           |               |             |                 |                           |               |             |
| 27-Jun  | -0.80         |       | 52.61 | Tue               | 27-Jun   | 33           |               |             |               |             |               |             |                 |                           |               |             |                 |                           |               |             |
| 28-Jun  | -0.80         |       | 52.61 | Wed               | 28-Jun   | 34           |               |             |               |             |               |             |                 |                           |               |             |                 |                           |               |             |
| 29-Jun  | -0.80         |       | 52.61 | Thu               | 29-Jun   | 35           |               |             |               |             |               |             |                 |                           |               |             |                 |                           |               |             |
| 30-Jun  | -0.80         |       | 52.61 | Fri               | 30-Jun   | 36           |               |             |               |             |               |             |                 |                           |               |             |                 |                           |               |             |
| <b>6th CFD week</b>                               |               |       |       |                   |          |              |               |             |               |             |               |             |                 |                           |               |             |                 |                           |               |             |
| <b>03-Jul 07-Jul</b>                              |               |       |       |                   |          |              |               |             |               |             |               |             |                 |                           |               |             |                 |                           |               |             |
| 03-Jul  | -0.75         |       | 52.66 | Mon               | 03-Jul   | 39           |               |             |               |             |               |             |                 |                           |               |             |                 |                           |               |             |
| 04-Jul  | -0.75         |       | 52.66 | Tue               | 04-Jul   | 40           |               |             |               |             |               |             |                 |                           |               |             |                 |                           |               |             |
| 05-Jul  | -0.75         |       | 52.66 | Wed               | 05-Jul   | 41           |               |             |               |             |               |             |                 |                           |               |             |                 |                           |               |             |
| 06-Jul  | -0.75         |       | 52.66 | Thu               | 06-Jul   | 42           |               |             |               |             |               |             |                 |                           |               |             |                 |                           |               |             |
| 07-Jul  | -0.75         |       | 52.66 | Fri               | 07-Jul   | 43           |               |             |               |             |               |             |                 |                           |               |             |                 |                           |               |             |
| Anticipated Dated average for 10 days month ahead |               |       |       |                   |          |              |               |             |               |             |               |             |                 |                           |               |             |                 |                           |               |             |
| Aug N Sea -0.83                                   |               |       |       |                   |          |              |               |             |               |             |               |             |                 |                           |               |             |                 |                           |               |             |
| Dated Component 52.58                             |               |       |       |                   |          |              |               |             |               |             |               |             |                 |                           |               |             |                 |                           |               |             |
| Brent to Dated 0.15                               |               |       |       |                   |          |              |               |             |               |             |               |             |                 |                           |               |             |                 |                           |               |             |
| Forties to Dated 0.08                             |               |       |       |                   |          |              |               |             |               |             |               |             |                 |                           |               |             |                 |                           |               |             |
| Oseberg to Dated 0.60                             |               |       |       |                   |          |              |               |             |               |             |               |             |                 |                           |               |             |                 |                           |               |             |
| Ekofisk to Dated 0.35                             |               |       |       |                   |          |              |               |             |               |             |               |             |                 |                           |               |             |                 |                           |               |             |
| Troll to Dated 1                                  |               |       |       |                   |          |              |               |             |               |             |               |             |                 |                           |               |             |                 |                           |               |             |
| N Sea Aug -0.68                                   |               |       |       |                   |          |              |               |             |               |             |               |             |                 |                           |               |             |                 |                           |               |             |
| N Sea Aug -0.75                                   |               |       |       |                   |          |              |               |             |               |             |               |             |                 |                           |               |             |                 |                           |               |             |
| N Sea Aug -0.67                                   |               |       |       |                   |          |              |               |             |               |             |               |             |                 |                           |               |             |                 |                           |               |             |
| N Sea Aug 0.32                                    |               |       |       |                   |          |              |               |             |               |             |               |             |                 |                           |               |             |                 |                           |               |             |

following consultation with market participants. In the event of there being less than 100,000 bl of North Sea forward traded in the time period, Argus will establish the flat price as a function of the value of an exchange of futures for physical (EFP) contract and the prevailing Ice Brent futures price.

If Argus assesses the flat price of the forward contracts using an EFP differential and a representative Ice Brent futures value then the EFP is monitored throughout the day and then assessed at 4:30pm London time. The Ice 1 minute marker based on trade at 4:29-4:30pm London time is assumed to be a representative value for the futures contract unless Argus deems otherwise. Argus will deem it otherwise if the Ice 1 minute marker does not appear to be a representative value.

When Argus uses the EFP to assess the flat price Argus uses the EFP differential and the front-month Ice Brent futures. In the last three sessions in the life of the front-month futures contract Argus uses second-month Ice Brent futures and the corresponding EFP differential.

The North Sea crude prices used in the Dated methodology are assessed either against the anticipated value of Dated or against the flat (forward) price depending on which formulas are under discussion by the market. The market often uses the anticipated Dated value as a reference because it is common that crude grades will price against the value of Dated at the date of loading. The market anticipates the value of Dated, for risk management purposes, by trading contracts for difference (CFDs) between the forward price and the anticipated value of Dated. Argus can construct the market's perceived value of Dated several weeks

forward from these CFD prices. Argus uses these CFD values to publish an Anticipated Dated value which is an average of the prices 10 days-month ahead as anticipated by the market for Dated.

Prices for the five leading grades of North Sea crude, Brent, Forties, Oseberg, Ekofisk and Troll, are valued either against the forward (or flat) price of Brent or against the anticipated Dated value at the time of loading. Argus will use one or both of these sets of differentials to construct the prices for Brent, Forties, Oseberg, Ekofisk and Troll in the 10 days-month ahead forward period. A quality premium will be deducted from the prices for Ekofisk and Oseberg in the 10 days-month ahead forward period, starting with cargoes loading from June 2013 onwards.

A North Sea Dated month-ahead calendar is available online, illustrating the start and the end of the North Sea Dated assessment period and the cargo loading dates that may be delivered to settle forward contracts on each working day of the year. [Click here](#) to view the calendar.

**Ekofisk and Oseberg quality premiums**

Argus will publish quality premiums for Oseberg and Ekofisk for cargoes loading from June 2013 onwards. The quality premiums will be taken into account in the Argus North Sea Dated assessment process.

Argus will publish the relevant quality premiums for Oseberg and Ekofisk on the first publishing day of each month, starting 1 May 2013. The quality premium will be applied to cargoes loading in the following month. For example, the quality premium announced on 1 May 2013 will be applied to June loading cargoes.



The quality premium for Oseberg will be calculated at 60pc of the difference between Oseberg and the most competitive benchmark grade in the second month prior to the month of loading.

The quality premium for Ekofisk will be calculated at 60pc of the difference between Ekofisk and the most competitive benchmark grade in the second month prior to the month of loading.

The relevant quality premiums will be deducted from Oseberg and Ekofisk assessments for cargoes loading from June 2013 onwards as they are captured within the Argus 10 days-month ahead forward period. An average of the prices in the 10 days-month ahead forward period will be used to determine the Oseberg (with quality premium applied) and Ekofisk (with quality premium applied) components as well as the Brent, Forties and Troll components in the Argus North Sea Dated methodology. The lowest of the Brent, Forties, Oseberg (with quality premium applied), Ekofisk (with quality premium applied) and Troll components will set the Dated price.

For cargoes loading before January 2018, if the quality premium for Oseberg or Ekofisk falls below 25¢/bl, no quality premium will be applied.

**North Sea Dated (with no quality premium applied)**

Argus will continue to run a price series based on the North Sea Dated methodology above but without any quality premium being applied until further notice. This price series will be called Argus Dated BFOE and can be found on p4 of the Argus Crude Report.

**Forties sulphur de-escalator**

Argus publishes a sulphur de-escalator for Forties crude. Argus does not apply this sulphur de-escalator to its North Sea Dated calculation or to its assessment of Forties crude. The sulphur de-escalator is calculated according to the formula laid out in the standard traded contract, which is currently Shell's Suko-90 contract. According to this contract, the sulphur de-escalator is applied at a rate of \$0.15/bl for every 0.1pc of sulphur above the 0.6pc standard.

The 10 days-month ahead average is determined by industry convention.

This methodological approach used by Argus is also utilised by all active participants in the North Sea market to identify the value of

Dated. Argus identifies CFD and EFP values by using an assessment of a reasonable bid and offer range at the close of market.

Argus assesses the physical grade differential for each day of the 10 days-month ahead assessment period for Brent, Forties, Oseberg, Ekofisk and Troll. Argus identifies the physical price differentials at 4:30pm for each loading date which has market depth at 4:30pm and will use information gathered throughout the day to make inferred price assessments for every other loading day of the 10 days-month ahead assessment period. Argus will take into account price movements beyond the assessment period when the bulk of trade in a given month moves beyond these parameters. The lowest average of the daily assessments for the five crudes in the North Sea Dated methodology will then set the North Sea Dated value.

Argus uses the Argus North Sea Dated Calculation spreadsheet (see above) to construct the North Sea Dated assessment. The spreadsheet illustrates how Argus assesses prices for each of the Brent, Forties, Oseberg, Ekofisk and Troll crude grades on each individual working day in the 10 days-month ahead assessment period. The spreadsheet shows how Argus takes into account market structure when transactions for loading dates in the 10 days-month ahead assessment period occur in close time proximity.

Argus will ensure that confirmed market information will be placed on the Argus Crude Oil Bulletin Board during the day, and guarantees to do this in a timely manner.

Argus uses inferred price assessments based on information gathered throughout the day because there is insufficient market activity at 4:30pm to construct a bid/offer price for every grade for each loading day within the price assessment period. Argus does not rigidly use the highest bid at 4:30pm for a single loading date in the 10 days-month ahead assessment period to set the prices for all dates in this assessment period. Using highest bids for a single loading day may lever the entire 10 days-month ahead assessment period in a manner that is not considered representative by the market. Neither does Argus weight the assessment according to transactions at any particular time during the day, nor does it average transactions to identify a price level for North Sea Dated.

The North Sea Dated assessment is the benchmark price against which other grades of crude oil are assessed in the Atlantic basin.

| North Sea assessments   |              |                   |   |                             |            |
|-------------------------|--------------|-------------------|---|-----------------------------|------------|
| Grade                   | Typical °API | Typical Sulphur % | Basis/Location  | Timing                      | Cargo size |
| Dated                   |              |                   | fob Sullom Voe, Hound Point, Teesside, UK or Sture terminal | Loading 10 days-month ahead | 600,000 bl |
| Brent                   | 37.9         | 0.45              | fob Sullom Voe  | Loading 10 days-month ahead | 600,000 bl |
| Forties                 | 40.3         | 0.56              | fob Hound Point, UK   | Loading 10 days-month ahead | 600,000 bl |
| Oseberg                 | 39.6         | 0.20              | fob Sture terminal  | Loading 10 days-month ahead | 600,000 bl |
| Ekofisk                 | 37.5         | 0.23              | fob Teesside, UK  | Loading 10 days-month ahead | 600,000 bl |
| Troll                   | 35.9         | 0.14              | fob Mongstad terminal                                       | Loading 10 days-month ahead | 600,000 bl |
| Statfjord cif Rotterdam | 39.1         | 0.22              | cif Rotterdam   | Loading 10 days-month ahead | 855,000 bl |
| Statfjord fob platform  | 39.1         | 0.22              | fob platform  | Loading 10 days-month ahead | 855,000 bl |
| Gulfaks cif Rotterdam   | 36.2         | 0.26              | cif Rotterdam   | Loading 10 days-month ahead | 855,000 bl |
| Gulfaks fob platform    | 36.2         | 0.26              | fob platform  | Loading 10 days-month ahead | 855,000 bl |
| Flotta                  | 36.9         | 0.82              | fob Flotta terminal   | Loading 10 days-month ahead | 650,000 bl |

## North Sea assessments

**Dated** or **North Sea Dated** is set by the lowest of the Brent, Forties, Oseberg (with quality premium applied), Ekofisk (with quality premium applied) and Troll components. Consequently it is not the price of a grade of crude but a benchmark established through a methodology. Therefore it has no API density or sulphur specification.

The prices for the various grades of crude oil are established by adding the current Dated price to the current market differential for that grade of crude. Argus assesses the grade differentials during the course of the day with a cutoff time at 4:30pm London time. Formulas for Dated-related crudes are an indication of the differential to Dated around bill of lading assessed as achievable on the day of the report. Argus does not consider ship-to-ship transfers when assessing the grade differentials.

Argus also publishes the component values for Brent, Forties, Oseberg (with quality premium applied), Ekofisk (with quality premium applied) and Troll that are used to calculate the price of Dated. It is the lowest of these four components that sets the price of Dated. The component values for these crudes are not necessarily the same as the prices for these crudes, as the grade prices are calculated by adding the market premium for the grade to the current Dated value.

The **Brent** assessment is the price of Brent Blend, a North Sea crude. The value of Brent is calculated by applying the market differential of Brent to the current Dated value. The prevailing market differential is also published separately.

The **Forties** assessment is the price of Forties Blend, a North Sea crude. The value of Forties is calculated by applying the market differential of Forties to the current Dated value. The prevailing market differential is also published separately.

The **Oseberg** assessment is the price of Oseberg, a North Sea crude. The value of Oseberg is calculated by applying the market differential of Oseberg to the current Dated value. The prevailing market differential is also published separately.

The **Ekofisk** assessment is the price of Ekofisk, a North Sea crude. The value of Ekofisk is calculated by applying the market differential of Ekofisk to the current Dated value. The prevailing market differential is also published separately.

The **Troll** assessment is the price of Troll, a North Sea crude. The value of Troll is calculated by applying the market differential of Troll to the current Dated value. The prevailing market differential is also published separately.

The **Statfjord cif Rotterdam** assessment is the price of Statfjord, a North Sea crude. The value of Statfjord cif Rotterdam is calculated by applying the market differential of Statfjord cif Rotterdam to the current Dated value. The prevailing market differential is also published separately. Statfjord is an offshore crude loaded at the platform rather than at an onshore terminal.

The **Statfjord fob platform** assessment is the price of Statfjord, a North Sea crude. The value of Statfjord fob platform is calculated by applying the market differential of Statfjord fob platform to the current Dated value. The prevailing market differential is also published separately. No modifications are made to the prevailing premium or discount in respect of freight arrangements.

The **Gulfaks cif Rotterdam** assessment is the price of Gulfaks, a North Sea crude. The value of Gulfaks cif Rotterdam is calculated by applying the market differential of Gulfaks cif Rotterdam to the current Dated value. The prevailing market differential is also published separately. Gulfaks is an offshore crude loaded at the platform rather than at an onshore terminal.

The **Gulfaks fob platform** assessment is the price of Gulfaks, a North Sea crude. The value of Gulfaks fob platform is calculated by applying the market differential of Gulfaks fob platform to the current Dated value. The prevailing market differential is also published separately. No modifications are made to the prevailing premium or discount in respect of freight arrangements.

The **Flotta Gold** assessment is the price of Flotta Gold, a North Sea crude. The value of Flotta Gold is calculated by applying the market differential of Flotta Gold to the current Dated value. The prevailing market differential is also published separately.

### North Sea EFP

Argus quotes the North Sea EFP, or the exchange of futures for physical price, which is the traded differential between 600,000 bl of Ice Brent futures and an equivalent volume of equivalent month North Sea forward contracts.

### Ice Bwave

Argus also shows the Bwave price for three months forward. This is a weighted average of trade on the Ice Brent contract on the previous working day as calculated by the IntercontinentalExchange. It is used as a component in the Saudi Aramco formula for crude sales into Europe. Argus shows the Saudi Formula Base price which is derived from the Bwave that is the underlying price in its sales formula to European customers. The same formula is used by Kuwait and Iran in sales to European customers.

### Ice minute markers

Argus shows the Ice 1 minute marker price which is a weighted average of trade on the Ice Brent contract between 4:29 and 4:30pm for two months forward as calculated by the IntercontinentalExchange.

### Dated CFDs

Argus quotes prices for North Sea Dated CFDs, timestamped at 12:00pm and at 4:30pm London time. These are contracts for difference (or short-term swaps) for Dated against forward North Sea contracts. These North Sea Dated CFD prices are expressed as differentials to forward North Sea for six weekly periods forward.

### Intermonths

The forward North Sea market rarely trades at fixed prices. Instead, most trade is in the form of intermonth trades. Argus assesses the

price levels for these intermonth trades in the forward intermonths table and uses these intermonth assessments to construct the fixed forward price assessments in the North Sea table on page 3.

### North Sea calculations

The North Sea calculations table shows how the component parts of Dated are used to derive the benchmark price.

**North Sea basis (flat price)** is a weighted average of forward North Sea trade in the minute leading up to 4:30pm London time. In the absence of reported trade, the Ice Brent, or Ice Brent NX, minute marker and an EFP are used.

**Anticipated Dated** was previously called Argus Synthetic BFO. It is an average of the prices 10 days-month ahead that are anticipated by the market for Dated as derived from the CFD market.

The **Brent, Forties, Oseberg (with quality premium applied), Ekofisk (with quality premium applied) and Troll components** are the average prices 10 days-month ahead using the Argus Dated methodology. The lowest of these components sets Argus Dated (see *Calculating North Sea Dated*).

### Argus alternative Dated illustrations

Argus publishes a number of alternative Dated illustrations: **Argus Dated Average** (an average of the Brent, Forties, Oseberg, Ekofisk and Troll components), **Argus Dated BFOE** (equivalent to *Argus North Sea Dated* with no quality premiums applied), **Argus Dated BFO** (set by the lowest priced of the Brent, Forties and Oseberg components), and **Argus Dated FOE** (set by the lowest priced of the Forties, Oseberg and Ekofisk components).

### Argus North Sea Reference Price

Argus also publishes a second North Sea generic price called the **Argus North Sea Reference Price**. This was a precursor to Argus Dated. The Argus North Sea Reference Price uses a forward curve similar to Anticipated Dated called Synthetic Brent.

The *Argus North Sea Reference Price* is based on a weighted average of adjusted North Sea crude assessments. The North Sea crude assessments are standardised using the Argus Synthetic Brent assessment, which is calculated from the market relevant Argus North Sea forward price adjusted by the average value of the second and third week CFD (contract for differences) value as published in Argus Crude. This average is weighted between the second and third week according to the number of working days in the second and third weeks that fall 15 to 19 days ahead of the current date. The weighted average of the North Sea crude assessments (Forties, Flotta Gold, Ekofisk, Statfjord and Oseberg prices) used in the Argus North Sea Reference Price is composed of the following ratio:

|             | Ratio | Approx % |
|-------------|-------|----------|
| Forties     | 25    | 26.32    |
| Flotta Gold | 5     | 5.26     |
| Ekofisk     | 15    | 15.79    |
| Oseberg     | 15    | 15.79    |
| Statfjord   | 35    | 36.84    |

The assessments for these crudes are calculated by applying the differential of the market value of the crude against the *Argus Synthetic Brent* price.

The **Argus Synthetic Brent** assessment is calculated from the relevant Argus North Sea forward price adjusted by the average value of the second and third week CFD (contract for difference) value as published in Argus Crude. It is a component of the Argus North Sea Reference Price.

### Russia-Caspian (Argus Crude page 5)

Argus assesses the price for a variety of Russian and Caspian crudes transported by ship to Rotterdam and Augusta, Italy, and by pipeline to central Europe. Argus also calculates netback values to the loading terminals for several crudes.

Russian and Caspian crude prices are calculated using the differentials to the current Dated price. The methodology behind the Dated assessment can be found in the North Sea section and on the [www.argusmedia.com](http://www.argusmedia.com). The grade differentials are assessed during the course of the day with a cut off at 5:30pm London time. The current differentials and current Dated assessments are added together to generate the grade assessment.

Argus conducts quarterly surveys of market participants and surveyors as well as using quality certificates for loaded cargoes to ascertain average Urals gravity and sulphur content over the quarter. The average arrived at by this method will be applied to crude loading in the following quarter.

Urals (Russian Export Blend) cif assessments assume an EU-standard double-hulled vessel.

The timing of the price assessments varies according to quotation. Check Russian-Caspian assessments table below for each assessment's timing period.

### Russian-Caspian assessments

The **Urals NWE** assessment is the price of Urals, or Russian export blend crude. The value of Urals NWE is calculated by applying the market differential of Urals cif northwest Europe to the Dated value. The prevailing market differential is also published separately.

The **Urals Med 80,000t** assessment is the price of Urals, or Russian export blend crude. The value of Urals Med is calculated by applying the market differential of Urals cif Augusta to the current Dated value. The prevailing market differential is also published separately. The Urals cif Augusta assessment reflects the market price of 80,000t cargoes. Preloaded cargoes will be considered in the Urals Med 80,000t assessment, if a buyer accepts a preloaded cargo as meeting its requested loading dates.

The **Urals Med 140,000t** assessment is the price of Urals, or Russian export blend crude. The value of Urals Med is calculated by applying the market differential of Urals cif Augusta to the current

Dated value. The prevailing market differential is also published separately. The Urals cif Augusta assessment reflects the market price of 140,000t cargoes. Preloaded cargoes will be considered in the Urals Med 140,000t assessment, if a buyer accepts a preloaded cargo as meeting its requested loading dates.

The **Siberian Light** assessment is the price of Siberian Light, a Russian export blend. The value of Siberian Light is calculated by applying the market differential of Siberian Light cif Augusta to the current Dated value. The prevailing market differential is also published separately.

The **CPC Blend** assessment is the price of CPC Blend, a Kazakh export blend. The value of CPC Blend is calculated by applying the market differential of CPC Blend cif Augusta to the current Dated value. The prevailing market differential is also published separately. The **Tengiz** assessment is the price of Tengiz, a Kazakh crude. The value of Tengiz is calculated by applying the market differential of Tengiz cif Augusta to the current Dated value. The prevailing market differential is also published separately. In the absence of trade, Tengiz is assessed in relation to CPC Blend.

The **BTC** assessment is the price of BTC origin crude. BTC is the Baku-Tbilisi-Ceyhan pipeline which has its terminal at Ceyhan, Turkey. The value of the BTC crude is calculated by applying the market differential of BTC cif Augusta to the current Dated value. The prevailing market differential is also published separately.

The **Azeri Light** assessment is the price of Azeri Light, a crude from Azerbaijan. The value of Azeri Light is calculated by applying the market differential of Azeri Light cif Augusta to the current

Dated value. The prevailing market differential is also published separately. In the absence of trade, Azeri Light is assessed in relation to BTC.

The **Urals fob Primorsk** netback is calculated from the price of Urals NWE, netted back to Primorsk. The Urals Primorsk fob netback is derived from the Urals cif northwest Europe assessment netted back for freight, insurance and ice/towage fees. The freight cost is for 100,000t vessels and is assessed daily based on spot freight rates from the Argus Freight report (see [Argus Freight methodology](#)). The ice/towage fees are calculated in roubles/GT and converted into dollars/bl. Insurance costs are calculated as a percentage of the outright cif price. The netback does not include transportation losses, ballast, port demurrage, commissions, bank loan expenses or market structure. The netback also does not include the additional fixed rate differential added for voyages within the Baltic and North Sea Sulphur Oxide Emissions Control Area (SECA) as mentioned by Worldscale. There is a "Rotterdam charge" added to the freight cost, assuming standard cargo sizes of 100,000t and vessels with gross tonnage of 60,000GT.

The **Urals fob Ust-Luga** netback is calculated from the price of Urals NWE, netted back to Ust-Luga. The Urals Ust-Luga fob netback is derived from the Urals cif northwest Europe assessment netted back for freight, insurance and ice/towage fees. The freight cost is for 100,000t vessels and is assessed daily based on spot freight rates from the Argus Freight report (see [Argus Freight methodology](#)). The ice/towage fees are calculated in roubles/GT and converted into dollars/bl. Insurance costs are calculated as a percentage of the outright cif price. The netback does not include transportation losses, ballast, port demurrage, commissions,

| Russian-Caspian assessments     |              |                   |                        |   |                                     |                   |
|---------------------------------|--------------|-------------------|------------------------|---|-------------------------------------|-------------------|
| Grade                           | Typical °API | Typical Sulphur % | Conversion factor t/bl | Basis/Location                            | Timing                              | Cargo size        |
| Urals northwest Europe          | 30.46        | 1.53              | 7.1996                 | cif northwest Europe                      | Loading 10-25 days ahead            | 100,000t          |
| Urals Med 80,000t               | 30.55        | 1.51              | 7.2036                 | cif Augusta, Italy                        | Loading 10-25 days ahead            | 80,000t           |
| Urals Med 140,000t              | 30.55        | 1.51              | 7.2036                 | cif Augusta, Italy                        | Loading 10-25 days ahead            | 140,000t          |
| Siberian Light                  | 34.29        | 0.53              | 7.3699                 | cif Augusta, Italy                        | Loading 10-25 days ahead            | 75,000t           |
| CPC Blend                       | 46.20        | 0.53              | 7.8993                 | cif Augusta, Italy                        | Loading 10-30 days ahead            | 80,000t -135,000t |
| BTC                             | 36.57        | 0.16              | 7.4712                 | cif Augusta, Italy                        | Loading 15-35 days ahead            | 80,000t-135,000t  |
| Tengiz                          | 47.46        | 0.47              | 7.9553                 | cif Augusta, Italy                        | Loading 10-30 days ahead            | 80,000t           |
| Azeri Light                     | 34.90        | 0.14              | 7.3970                 | cif Augusta, Italy                        | Loading 15-35 days ahead            | 80,000t-135,000t  |
| Urals fob Primorsk              | 30.46        | 1.53              | 7.1996                 | fob Primorsk, Baltic                      |                                     | 100,000t          |
| Urals fob Ust-Luga              | 30.61        | 1.68              | 7.2063                 | fob Ust-Luga, Baltic                      |                                     | 100,000t          |
| Urals fob Novorissiysk 80,000t  | 30.55        | 1.51              | 7.2036                 | fob Novorissiysk, Black Sea               |                                     | 80,000t           |
| Urals fob Novorissiysk 140,000t | 30.55        | 1.51              | 7.2036                 | fob Novorissiysk, Black Sea               |                                     | 140,000t          |
| Urals cif Black Sea 80,000t     | 30.42        | 1.48              | 7.1978                 | cif Black Sea                             |                                     | 80,000t           |
| CPC Terminal                    | 46.20        | 0.53              | 7.8993                 | fob CPC terminal                          |                                     | 135,000t          |
| BTC                             | 36.57        | 0.16              | 7.4712                 | fob Ceyhan                                |                                     | 80,000t           |
| Azeri Light                     | 34.90        | 0.14              | 7.3970                 | fob Supsa                                 |                                     | 80,000t           |
| Druzhiba Slovakia               | 30.61        | 1.68              | 7.2063                 | fit Budkovce (for Slovak delivery)        | Delivered during the previous month | 10,000t tranche   |
| Druzhiba Hungary                | 30.61        | 1.68              | 7.2063                 | fit Feneshlitke (for Hungarian delivery)  | Delivered during the previous month | 10,000t tranche   |
| Druzhiba Poland                 | 30.61        | 1.68              | 7.2063                 | fit Adamowa Zastawa (for Polish delivery) | Delivered during the previous month | 10,000t tranche   |
| Druzhiba Germany                | 30.61        | 1.68              | 7.2063                 | fit Adamowa Zastawa (for German delivery) | Delivered during the previous month | 10,000t tranche   |

bank loan expenses or market structure. The netback also does not include the additional fixed rate differential added for voyages within the Baltic and North Sea Sulphur Oxide Emissions Control Area (SECA) as mentioned by Worldscale. There is a “Rotterdam charge” added to the freight cost, assuming standard cargo sizes of 100,000t and vessels with gross tonnage of 60,000GT.

The **Urals 80,000t fob Novorossiysk** netback is calculated from the price of Urals Med, netted back to Novorossiysk. The Urals Novorossiysk fob netback is derived from the Urals cif Mediterranean assessment netted back for freight, insurance and demurrage costs. The freight cost is for 80,000t vessels and is assessed daily based on spot freight rates from the Argus Freight report (see [Argus Freight methodology](#)). Insurance costs are calculated as a percentage of the outright cif price. Demurrage costs are assessed daily and multiplied by the number of days delay in both directions, north bound and south bound, in the Turkish Straits above two days. The netback does not include transportation losses, ballast, port demurrage, commissions, bank loan expenses or market structure.

The **Urals 140,000t fob Novorossiysk** netback is calculated from the price of Urals Med, netted back to Novorossiysk. The Urals Novorossiysk fob netback is derived from the Urals cif Mediterranean assessment netted back for freight, insurance and demurrage costs. The freight cost is for 140,000t vessels and is assessed daily based on spot freight rates from the Argus Freight report (see [Argus Freight methodology](#)). Insurance costs are calculated as a percentage of the outright cif price. Demurrage costs are assessed daily and multiplied by the number of days delay in both directions, north bound and south bound, in the Turkish Straits above two days. The netback does not include transportation losses, ballast, port demurrage, commissions, bank loan expenses or market structure.

The **Urals 80,000t cif Black Sea** netback is calculated from the Urals fob Novorossiysk netback index with added freight costs to the Black Sea ports of Constantza/Media (Romania) and Burgas (Bulgaria). The Urals Novorossiysk fob netback is derived from the Urals cif Mediterranean assessment netted back for freight, insurance and demurrage costs. The freight cost is for 80,000t vessels and is assessed daily based on Black Sea-Med spot freight rates from the Argus Freight report applied to average flat rate for Novorossiysk-Constantza and Novorossiysk-Burgas routes (see [Argus Freight methodology](#)). Insurance costs are calculated as a percentage of the cif Black Sea price. The netback does not include transportation losses, ballast, port demurrage, commissions, bank loan expenses or market structure.

The **CPC Blend fob Terminal** netback is calculated from the price of CPC Blend, netted back to the CPC terminal near Novorossiysk, adjusted for other costs. The CPC Terminal fob netback is derived from the CPC Blend cif Augusta assessment netted back for freight, insurance and demurrage costs. The freight cost is for 135,000t vessels and is assessed daily based on spot freight rates from the Argus Freight report (see [Argus Freight methodology](#)). Insurance costs are calculated as a percentage of the outright cif price. Demurrage costs are assessed daily and multiplied by the number of days delay in both directions, north bound and south bound, in the

Turkish Straits above two days. The netback does not include transportation losses, ballast, port demurrage, commissions, bank loan expenses or market structure. There is a CPC Terminal discount on the freight cost, which is regularly adjusted.

The **BTC fob Ceyhan** quotation is an assessment but in the absence of strong trading indications will be based on a BTC fob netback derived from the BTC cif Augusta assessment netted back for freight and insurance costs. The freight cost will be for 80,000t vessels and will be assessed daily based on spot freight rates from the Argus Freight report (see [Argus Freight methodology](#)). Insurance costs are calculated as a percentage of the outright cif price.

The **Azeri Light fob Supsa** netback is calculated from the price of Azeri Light, netted back to Supsa, adjusted for other costs. The Azeri Light fob netback is derived from the Azeri Light cif Augusta assessment netted back for freight, insurance and demurrage costs. The freight cost is for 80,000t vessels and is assessed daily based on spot freight rates from the Argus Freight report (see [Argus Freight methodology](#)). Insurance costs are calculated as a percentage of the outright cif price. Demurrage costs are assessed daily and multiplied by the number of days delay in the Turkish Straits above two days. The netback does not include transportation losses, ballast, port demurrage, commissions, bank loan expenses or market structure.

#### Russia-Caspian retrospective assessments

These assessments are based on the publication date's North Sea Dated added to the average of the fob differentials published over the retrospective period during which cargoes for loading that day are likely to have traded. They give the approximate price that a cargo loading on the day of publication could be expected to achieve.

The **Urals fob Primorsk retrospective** assessment is based on the publication date's North Sea Dated added to the average of the Urals fob Primorsk differentials for working days in a 10-25 day period before the publication date.

The **Urals fob Ust-Luga retrospective** assessment is based on the publication date's North Sea Dated added to the average of the Urals fob Ust-Luga differentials for working days in a 10-25 day period before the publication date.

The **Urals fob Novorossiysk (80kt) retrospective** assessment is based on the publication date's North Sea Dated added to the average of the Urals fob Novorossiysk differentials for working days in a 10-25 day period before the publication date.

The **CPC Blend fob CPC Terminal retrospective** assessment is based on the publication date's North Sea Dated added to the average of the CPC Blend fob CPC Terminal differentials for working days in a 10-30 day period before the publication date.

#### Druzhba pipeline prices

Argus publishes monthly price assessments for inland deliveries of Russian Urals crude to refineries in eastern Europe by the Druzhba (Friendship) pipeline. Prices reflect competitive spot and term deals between the last Russian seller and the first independent buyer —



trader or refiner. Argus establishes a buy-sell range based on the lowest price level of the market. Prices on the Druzhba line are usually established in the first week of a month for the past month's supplies.

**Monthly price assessments** are derived retrospectively from prices agreed between buyers and sellers to determine the differential to North Sea Dated based on formulas linking Druzhba and seaborne Urals prices. The monthly differentials emerge at the beginning of the following month. So the July differentials to Dated for Druzhba appear at the beginning of August. Argus assesses the low and high differential to Dated for different locations on the Druzhba pipeline, based on the lowest and highest trades for a given month. These are combined with an average of Dated values over the appropriate month to give an outright price.

**The Druzhba Slovakia assessment** is the price of Urals fit Budkovec for delivery to Slovakia along the Druzhba pipeline at first point of export. The value of Druzhba Slovakia is calculated by applying a low and high differential of Druzhba Slovakia to the Dated value for the previous month. The prevailing market differentials are also published separately.

**The Druzhba Hungary assessment** is the price of Urals fit Fenyéslitke for delivery to Hungary along the Druzhba pipeline at first point of export. The value of Druzhba Hungary is calculated by applying a low and high differential of Druzhba Hungary to the Dated value for the previous month. The prevailing market differentials are also published separately.

**The Druzhba Poland assessment** is the price of Urals fit Adamowo for delivery to Poland along the Druzhba pipeline at first point of export. The value of Druzhba Poland is calculated by applying a low and high differential of Druzhba Poland to the Dated value for the previous month. The prevailing market differentials are also published separately.

**The Druzhba Germany assessment** is the price of Urals fit Adamowo for delivery to Germany along the Druzhba pipeline at first point of export. The value of Druzhba Germany is calculated by applying a low and high differential of Druzhba Germany to the Dated value for the previous month. The prevailing market differentials are also published separately.

## Mediterranean (Argus Crude page 7)

Argus assesses a variety of sweet and sour grades of crude in the Mediterranean. The crudes chosen are not only those for which there is open spot market activity but also those that allow price comparisons on sulphur and other specifications. The published prices are not meant to be official selling prices. Official selling prices will also be published in Argus Crude and clearly labelled as such.

Mediterranean crude prices are calculated using the differentials to the current North Sea Dated price. The methodology behind the Dated assessment can be found in the North Sea section and on [www.argusmedia.com](http://www.argusmedia.com). The grade differentials are assessed during

the course of the day with a cut off time at 5:30pm London time. The current differentials and current Dated assessments are added together to generate the grade assessment.

The timing of the price assessments is for an average price in the period 10-25 days ahead except for Saharan Blend, which is for an average of 15-35 days ahead.

### Mediterranean assessments

The value of **Saharan Blend**, an Algerian crude, fob Arzew, is calculated by applying the market differential of Saharan Blend to the current Dated value. The prevailing market differential is also published separately.

The value of **Zarzitine**, an Algerian crude, fob Tunisia, is calculated by applying the market differential of Zarzitine to the current Dated value. The prevailing market differential is also published separately.

The value of **Es Sider**, a Libyan crude, fob Libya, is calculated by applying the market differential of Es Sider to the current Dated value. The prevailing market differential is also published separately. In the absence of trade, the differential will be left unchanged.

The value of **Kirkuk**, an Iraqi crude, fob Ceyhan, is calculated by applying the market differential of Kirkuk to the current Dated value. In the absence of trade, the Kirkuk assessment will be left unchanged.

The value of **Basrah Light**, an Iraqi crude, cif Augusta, is calculated by applying the market differential of Basrah Light cif Augusta to the current Dated value. The prevailing market differential is also published separately.

The value of **Basrah Light**, an Iraqi crude, fob Sidi Kerir, is calculated by applying the market differential of Basrah Light to the current Dated value. The prevailing market differential is also published separately.

The value of **Basrah Heavy**, an Iraqi crude, cif Augusta, is calculated by applying the market differential of Basrah Heavy cif Augusta to the current Dated value. The prevailing market differential is also published separately.

The value of **Iran Light**, an Iranian crude, fob Sidi Kerir is assessed using the official formula price, the prevailing Dated-to-Frontline (DFL) value (the difference between North Sea Dated and Ice Brent futures on a calendar month basis) for the appropriate month and changes in the value of the Mediterranean Urals 80,000t quote. The prevailing market differential to the Dated value is also published separately.

The value of **Iran Heavy**, an Iranian crude, fob Sidi Kerir, is assessed using the official formula price, the prevailing Dated-to-Frontline (DFL) value (the difference between North Sea Dated and Ice Brent futures on a calendar month basis) for the appropriate month and changes in the value of the Mediterranean Urals 80,000t quote. The prevailing market differential to the Dated value is also published separately.



The value of **Suez Blend**, an Egyptian crude, fob Ras Shukeir, is assessed using the official formula price and changes to the Mediterranean Urals 80,000t quote. The prevailing market differential to the Dated value is also published separately.

### Official formula prices

Argus also publishes official formula prices for crude from Algeria, Syria and Libya. These are expressed as differentials to Dated or Urals in the Mediterranean for a given loading month and are set by national oil companies.

| Mediterranean assessments |              |                   |                 |                          |                 |
|---------------------------|--------------|-------------------|-----------------|--------------------------|-----------------|
| Grade                     | typical °API | Typical Sulphur % | Basis/ Location | Timing                   | Cargo size      |
| Saharan Blend             | 46.0         | 0.10              | fob Arzew       | Loading 15-35 days ahead | 80,000-130,000t |
| Zarzitine                 | 42.8         | 0.06              | fob La Skhirra  | Loading 10-25 days ahead | 80,000-130,000t |
| Es Sider                  | 36.2         | 0.49              | fob Libya       | Loading 10-25 days ahead | 80,000-130,000t |
| Kirkuk                    | 36.0         | 2.00              | fob Ceyhan      | Loading 10-25 days ahead | 80,000-130,000t |
| Basrah Light              | 30.0         | 2.92              | cif Augusta     | Loading 10-25 days ahead | 80,000-130,000t |
| Basrah Light              | 30.0         | 2.92              | fob Sidi Kerir  | Loading 10-25 days ahead | 80,000-130,000t |
| Basrah Heavy              | 23.55        | 4.2               | cif Augusta     | Loading 20-45 days ahead | 1mn-2mn bl      |
| Iran Light                | 33.7         | 1.50              | fob Sidi Kerir  | Loading 10-25 days ahead | 80,000-130,000t |
| Iran Heavy                | 30.7         | 1.80              | fob Sidi Kerir  | Loading 10-25 days ahead | 80,000-130,000t |
| Suez Blend                | 30.4         | 1.65              | fob Ras Shukeir | Loading 10-25 days ahead | 80,000-130,000t |

### West Africa (Argus Crude page 8)

Argus assesses a variety of west African crudes. The crudes chosen are not only those for which there is open spot market activity but also those that allow price comparisons among the various grades. The published prices are not meant to be official formula prices. Official formula prices will also be published in Argus Crude and clearly labelled as such.

West African crude prices are calculated using the differentials to the current North Sea Dated price. The methodology behind the Dated assessment can be found in the North Sea section and on [www.argusmedia.com](http://www.argusmedia.com). The grade differentials are assessed during the course of the day with a cut off time at 5:30pm London time. The current differentials and current Dated assessments are added together to generate the grade assessment. The timing of the Nigerian price assessments is for an average price in the period 20-45 days ahead. The timing of the Angolan price assessments is for an average price in the period 25-60 days ahead.

### West Africa assessments

The value of **Agbami**, a Nigerian crude, is calculated by applying the market differential of Agbami to the current Dated value. The prevailing market differential is also published separately.

The value of **Amenam**, a Nigerian crude, is calculated by applying the market differential of Amenam to the current Dated value. The prevailing market differential is also published separately.

The value of **Bonga**, a Nigerian crude, is calculated by applying the market differential of Bonga to the current Dated value. The prevailing market differential is also published separately.

The value of **Bonny Light**, a Nigerian crude, is calculated by applying the market differential of Bonny Light to the current Dated value. The prevailing market differential is also published separately.

The value of **Brass River**, a Nigerian crude, is calculated by applying the market differential of Brass River to the current Dated value. The prevailing market differential is also published separately.

The value of **Erha**, a Nigerian crude, is calculated by applying the market differential of Erha to the current Dated value. The prevailing market differential is also published separately.

The value of **Escravos**, a Nigerian crude, is calculated by applying the market differential of Escravos to the Dated value. The prevailing market differential is also published separately.

The value of **Forcados**, a Nigerian crude, is calculated by applying the market differential of Forcados to the current Dated value. The prevailing market differential is also published separately.

The value of **Qua Iboe**, a Nigerian crude, is calculated by applying the market differential of Qua Iboe to the current Dated value. The prevailing market differential is also published separately.

The value of **Usan**, a Nigerian crude, is calculated by applying the market differential of Usan to the current Dated value. The prevailing market differential is also published separately.

The value of **Cabinda**, an Angolan crude, is calculated by applying the market differential of Cabinda to the current Dated value. The prevailing market differential is also published separately.

The value of **Dalia**, an Angolan crude, is calculated by applying the market differential of Dalia to the current Dated value. The prevailing market differential is also published separately.

The value of **Girassol**, an Angolan crude, is calculated by applying the market differential of Girassol to the current Dated value. The prevailing market differential is also published separately.

The value of **Hungo**, an Angolan crude, is calculated by applying the market differential of Hungo to the current Dated value. The prevailing market differential is also published separately.

The value of **Kissanje**, an Angolan crude, is calculated by applying the market differential of Kissanje to the current Dated value. The prevailing market differential is also published separately.

The value of **Nemba**, an Angolan crude, is calculated by applying the market differential of Nemba to the current Dated value. The prevailing market differential is also published separately.

The value of **Zafiro**, a crude from Equatorial Guinea, is calculated by applying the market differential of Zafiro to the current Dated value. The prevailing market differential is also published separately.

The value of **Jubilee**, a Ghanaian crude, is calculated by applying the market differential of Jubilee to the current Dated value. The prevailing market differential is also published separately.

The value of **Doba**, a Chadian crude, is calculated by applying the market differential of Doba to the current Dated value. The prevailing market differential is also published separately.

### Nigerian official formula prices

Argus also publishes official formula prices for crude from Nigeria. These are expressed as differentials to Dated for a given loading month and are set by Nigeria's national oil company NNPC.

| West Africa assessments |              |                   |                                |                          |            |
|-------------------------|--------------|-------------------|--------------------------------|--------------------------|------------|
| Grade                   | typical °API | typical Sulphur % | Basis/Location                 | Timing                   | Cargo size |
| Agbami                  | 47.2         | 0.05              | fob Nigeria                    | Loading 20-45 days ahead | 950,000 bl |
| Amenam                  | 40.8         | 0.093             | fob Nigeria                    | Loading 20-45 days ahead | 950,000 bl |
| Bonga                   | 29.11        | 0.292             | fob Nigeria                    | Loading 20-45 days ahead | 950,000 bl |
| Bonny Light             | 34.5         | 0.14              | fob Nigeria                    | Loading 20-45 days ahead | 950,000 bl |
| Brass River             | 36.5         | 0.13              | fob Nigeria                    | Loading 20-45 days ahead | 950,000 bl |
| Erha                    | 33.7         | 0.1798            | fob Nigeria                    | Loading 20-45 days ahead | 950,000 bl |
| Escravos                | 34           | 0.15              | fob Nigeria                    | Loading 20-45 days ahead | 950,000 bl |
| Forcados                | 30           | 0.15              | fob Nigeria                    | Loading 20-45 days ahead | 950,000 bl |
| Qua Iboe                | 36.6         | 0.13              | fob Nigeria                    | Loading 20-45 days ahead | 950,000 bl |
| Usan                    | 30.6         | 0.23              | fob Nigeria                    | Loading 20-45 days ahead | 1mn bl     |
| Cabinda                 | 32.5         | 0.13              | fob Angola                     | Loading 25-60 days ahead | 950,000 bl |
| Dalia                   | 23.7         | 0.49              | fob Angola                     | Loading 25-60 days ahead | 950,000 bl |
| Girassol                | 31           | 0.33              | fob Angola                     | Loading 25-60 days ahead | 950,000 bl |
| Hungo                   | 27.4         | 0.65              | fob Angola                     | Loading 25-60 days ahead | 950,000 bl |
| Kissanje                | 30.7         | 0.36              | fob Angola                     | Loading 25-60 days ahead | 950,000 bl |
| Nemba                   | 38.7         | 0.19              | fob Angola                     | Loading 25-60 days ahead | 950,000 bl |
| Zafiro                  | 29.5         | 0.26              | fob offshore Equatorial Guinea | Loading 25-60 days ahead | 950,000 bl |
| Jubilee                 | 36.4         | 0.26              | fob Ghana                      | Loading 25-60 days ahead | 950,000 bl |
| Doba                    | 25.1         | 0.08              | fob offshore Cameroon          | Loading 25-60 days ahead | 950,000 bl |

### Mideast Gulf (Argus Crude page 9)

#### Mideast Gulf assessments

##### Dubai

Argus assesses the price of physical Dubai crude for four forward months. Front-month physical Dubai is for cargoes loading two months from the date of publication. For example, on 21 September, the front month is November and prices are published for crude loading in November, December, January and February. On 1 October, the front month becomes December and prices are published for crude loading in December, January, February and March.

The physical price of Dubai crude is assessed using two or three components, depending on the forward month being assessed — the price of Ice Brent futures, the price of Brent-Dubai exchange of futures for swaps (EFS) and the price spreads between forward months in the Dubai swaps market.

This approach reflects the way in which the market manages Dubai price exposure by linking the price of Dubai crude to one of the world's most liquid exchange-traded futures contracts, Ice Brent, and the active trade in Brent-Dubai EFS and Dubai swaps.

Two of the components of the physical Dubai price assessment are assessed by Argus reporters — the price of the Brent-Dubai EFS contract at 4.30pm Singapore time, and the price spreads between forward months in the Dubai swaps market at 4.30pm Singapore time.

The Ice Brent futures price component is the Ice Brent 4.30pm Singapore one-minute marker, a weighted average of trades done for the month of loading during a one-minute period from 16:29:00 to 16:30:00 local Singapore time.

Typically, and due to the relative liquidity of the underlying Brent-Dubai EFS and Dubai swaps markets, the physical Dubai price for the third forward month (four months from the date of publication) is assessed using the corresponding Ice Brent futures price and the Brent-Dubai EFS price. The physical Dubai price for the first, second and fourth forward months are assessed using the physical Dubai price for the third forward month and the price of spreads between forward months in the Dubai swaps market.

#### Example (forward month three):

On 21 September: The Ice Brent futures price for November minus the Brent-Dubai EFS price for November results in the Dubai swap price for November. Dubai swaps are settled against prices for cargoes loading two months after the date of trade.

In this example, the Brent-Dubai EFS is an exchange of a November Brent futures contract for a November Dubai swaps contract that will settle against the price of physical delivery two months later, in January.

| Forward month 3 (January) |          |             |
|---------------------------|----------|-------------|
| Component                 | Timing   | Price \$/bl |
| Ice Brent                 | November | 47.76       |
| EFS                       | November | -1.76       |
| Dubai swap                | November | 46.00       |
| Dubai physical assessment | January  | 46.00       |

Therefore, the price of physical Dubai crude loading in January is the Ice Brent futures price for November minus the Brent-Dubai EFS price for November.

#### Example (forward months one, two and four):

On 21 September: The physical Dubai price for the third forward month (January) was \$46/bl as explained above. Argus reporters

assessed the following inter-month spreads between Dubai swaps prices

November/December -1.35  
 December/January -0.82  
 January/February -0.74

which allow for the calculation of physical Dubai prices for November, December and February.

| Forward month 1 (November) |                   |       |
|----------------------------|-------------------|-------|
| Component                  | Timing            | Price |
| Dubai physical             | December          | 45.18 |
| Intermonth spread          | November/December | -1.35 |
| Dubai physical assessment  | November          | 43.83 |
| Forward month 2 (December) |                   |       |
| Component                  | Timing            | Price |
| Dubai physical             | January           | 46.00 |
| Intermonth spread          | December/January  | -0.82 |
| Dubai physical assessment  | December          | 45.18 |
| Forward month 4 (February) |                   |       |
| Component                  | Timing            | Price |
| Dubai physical             | January           | 46.00 |
| Intermonth spread          | January/February  | 0.74  |
| Dubai physical assessment  | February          | 46.74 |

**Oman**

Argus assesses the price of physical Oman crude for three forward months. Front-month physical Oman is for cargoes loading two months from the date of publication. For example, on 21 September, the front month is November and prices are published for crude loading in November, December and January. On 1 October, the front month becomes December and prices are published for crude loading in December, January and February.

The physical price of Oman crude is assessed relative to the anticipated official selling price from the Ministry of Oil and Gas (MOG), which is itself based on the price of DME Oman futures.

Argus adds to the DME Oman futures price a market differential for full cargoes, to reflect physical OTC market prices.

| Oman     |                                   |                    |                           |
|----------|-----------------------------------|--------------------|---------------------------|
| Month    | Differential to DME Oman futures* | DME Oman futures † | Oman Physical assessment‡ |
| November | 0.06                              | 44.58              | 44.64                     |
| December | 0.06                              | 45.41              | 45.47                     |
| January  | 0.06                              | 46.28              | 46.34                     |

\*Assessed by Argus †Exchange settlement ‡Assessed market differential + DME Oman futures

**Murban, Das and Upper Zakum**

Argus assesses the prices of Murban, Das and Upper Zakum relative to the spread between historic Dubai prices and the latest retroactive official selling price (OSP) for each grade, the front-month Dubai swaps price and the currently traded market premium or discount to the anticipated OSP for each grade.

**Example**

On 21 September:

- The most recent OSP for the grade is for August, at \$48.85/bl and the OSP was \$1.16/bl above the front-month Dubai price assessment published in August
- The current market differential of Murban to the anticipated October Murban OSP is assessed at 10¢/bl
- The front-month Dubai swaps contract is assessed at \$46/bl.

| Murban    |                 |                               |                          |                  |                                   |                    |
|-----------|-----------------|-------------------------------|--------------------------|------------------|-----------------------------------|--------------------|
| Component | Most recent OSP | Most recent OSP-Dubai spread* | Dubai front-month swaps† | Anticipated OSP‡ | Current spot differential to OSP‡ | Murban assessment# |
| Month     | August          | August                        | November                 | November         | November                          | November           |
| Price     | 48.85           | 1.16                          | 46.00                    | 47.16            | 0.10                              | 47.26              |

\*The Dubai component of this spread is the average of the front-month assessment published in August †Assessed by Argus ‡OSP-Dubai spread + Dubai front-month assessment #Anticipated OSP + current spot market differential

**Exception**

Because official selling prices are typically published early in the month, the calculation changes for the first three days of any calendar month. On those days, Argus assesses the difference between the market's expectation of the forthcoming OSP and the corresponding historic Dubai price assessment, and applies that differential to the second forward Dubai swaps assessment, effectively shifting the above example forward by one month.

**Qatar Land and Qatar Marine**

Argus assesses the prices of Qatar Land and Qatar Marine relative to the spread between historic Dubai prices and the latest retroactive official selling price (OSP) for each grade, the front-month Dubai swaps price and the currently traded market premium or discount to the anticipated OSP for each grade.

**Example**

On 21 September:

- The most recent OSP for the grade is for August, at \$46.95/bl and the OSP was 74¢/bl below the front-month Dubai price assessment published in August
- The current market differential for Qatar Marine to the anticipated November Qatar Marine OSP is assessed at -95¢/bl
- The front-month Dubai swaps contract is assessed at \$46/bl

The assessments reflect cargoes loading two months from the date of publication.

| Qatar Land |                 |                               |                          |                  |                                   |                          |
|------------|-----------------|-------------------------------|--------------------------|------------------|-----------------------------------|--------------------------|
| Component  | Most recent OSP | Most recent OSP-Dubai spread* | Dubai front-month swaps† | Anticipated OSP‡ | Current spot differential to OSP‡ | Qatar Marine assessment# |
| Month      | August          | August                        | November                 | November         | November                          | November                 |
| Price      | 46.95           | -0.74                         | 46.00                    | 45.26            | -0.95                             | 44.31                    |

\*The Dubai component of this spread is the average of the front-month assessment published in June †Assessed by Argus ‡OSP-Dubai spread + Dubai front-month assessment #Anticipated OSP + current spot market differential

## Al-Shaheen

Argus assesses the price of Al-Shaheen relative to the market differential of Al-Shaheen to Dubai swaps for the month of loading.

### Example

On 21 September:

- The market differential of Al-Shaheen to the front-month Dubai swaps price is -\$2.83/bl
- The front-month Dubai swaps contract is assessed at \$46/bl

| Al-Shaheen |              |   |                        |
|------------|--------------|---|------------------------|
| Component  | Dubai swaps* | Al-Shaheen differential to Dubai swaps* | Al-Shaheen assessment† |
| Month      | November     | November                                | November               |
| Price      | 46.00        | -2.83                                   | 43.17                  |

\*Assessed by Argus †Dubai swaps + Al-Shaheen differential assessment

## Banoco Arab Medium

Argus assesses the prices of Banoco Arab Medium relative to the latest forward official formula price (OFF) for Arab Medium, the front-month Dubai swaps and Oman futures prices and the currently traded market premium or discount to the anticipated OFF for Arab Medium.

### Example

On 21 September:

- The most recent Saudi OFF for Arab Medium is for October and was published at \$1.30/bl below the average of front-month Dubai and front-month Oman price assessments. *Note the Saudi OFF is published as a differential, rather than an outright price*
- The current market differential for Banoco Arab Medium to the anticipated November Arab Medium OFF is assessed at -70¢/bl
- The Dubai front-month swaps contract (for November) is assessed at \$46/bl
- The Oman front-month futures price (for November) is \$44.58/bl
- The Dubai/Oman front-month average is therefore \$45.29/bl

The assessments reflect cargoes loading two months from the date of publication.

| Banoco Arab Medium |                 |                          |                               |                                 |                                     |                    |
|--------------------|-----------------|--------------------------|-------------------------------|---------------------------------|-------------------------------------|--------------------|
| Component          | Most recent OFF | Dubai front-month swaps* | DME Oman front-month futures† | Dubai/Oman front-month average‡ | Current Banoco differential to OFF† | Banoco assessment# |
| Month              | October         | November                 | November                      | November                        | November                            | November           |
| Price              | -1.30           | 46.00                    | 44.58                         | 45.29                           | -0.70                               | 43.29              |

\*Assessed by Argus †DME Oman front-month futures settlement ‡Average of Dubai and Oman front-month prices #Anticipated OFF+ current Banoco spot market differential

## Basrah Light and Basrah Heavy

Argus assesses the prices of Basrah Light and Basrah Heavy relative to the latest forward official formula price (OFF), the front-month Dubai swaps and Oman futures prices and the currently traded market premium or discount to the anticipated OFF for each grade.

### Example

On 21 September:

- The most recent OFF for the Basrah Light is for October and was published at \$1.95/bl below the average of front-month Dubai and front-month Oman price assessments. *Note the OFF is published as a differential, rather than an outright price*
- The current market differential for Basrah Light to the anticipated November Basrah Light OFF is assessed at 6¢/bl
- The Dubai front-month swaps contract (for November) is assessed at \$46/bl
- The Oman front-month futures price (for November) is \$44.58/bl
- The Dubai/Oman front-month average is therefore \$45.29/bl

The assessments reflect cargoes for Asia-Pacific destinations loading two months from the date of publication.

| Basrah Light |                 |                          |                               |                                 |  |                          |
|--------------|-----------------|--------------------------|-------------------------------|---------------------------------|--|--------------------------|
| Component    | Most recent OFF | Dubai front-month swaps† | DME Oman front-month futures* | Dubai/Oman front-month average‡ | Current Basrah Light differential to Basrah Light OSP† | Basrah Light assessment# |
| Month        | October         | November                 | November                      | November                        | November   | November                 |
| Price        | -1.95           | 46.00                    | 44.58                         | 45.29                           | 0.06   | 43.40                    |

\*Assessed by Argus \*DME Oman front-month futures settlement ‡Average of Dubai and Oman front-month prices #Anticipated OFF+ current Basrah spot market differential

## Qatari DFC and LFC

Argus assesses the prices of Qatari deodorised field condensate (DFC) and low sulphur condensate (LSC) relative to the spread between the spot market premium or discount to Dubai front-month swaps prices.

### Example

On 21 September:

- The current market differential for DFC fob Qatar is assessed at 65¢/bl
- The Dubai front-month swaps contract is assessed at \$46/bl

The assessments reflect cargoes loading two months from the date of publication.

| Qatari DFC |  |                          |                        |
|------------|--|--------------------------|------------------------|
| Component  | Current DFC differential to Dubai front month swaps* | Dubai front month swaps† | Qatari DFC assessment‡ |
| Month      | November   | November                 | November               |
| Price      | 0.65   | 46.00                    | 46.65                  |

\*The Oman/Dubai component of this spread is the average of the front-month assessment published in August †Assessed by Argus

| Mideast Gulf assessments |              |                   |  |                  |            |
|--------------------------|--------------|-------------------|--|------------------|------------|
| Grade                    | Typical °API | Typical sulphur % | Basis/location                         | Timing           | Cargo size |
| Dubai                    | 31.0         | 2.04              | fob Dubai                              | Month of loading | 400,000 bl |
| Oman                     | 33.3         | 1.06              | fob Oman                               | Month of loading | 500,000 bl |
| Murban                   | 40.4         | 0.79              | fob UAE                                | Month of loading | 500,000 bl |
| Das                      | 39.2         | 1.30              | fob UAE                                | Month of loading | 500,000 bl |
| Upper Zakum              | 34.0         | 1.95              | fob UAE                                | Month of loading | 500,000 bl |
| Qatar Land               | 41.1         | 1.22              | fob Qatar                              | Month of loading | 500,000 bl |
| Qatar Marine             | 36.2         | 1.60              | fob Qatar                              | Month of loading | 500,000 bl |
| Al-Shaheen               | 30.3         | 1.9               | fob Qatar                              | Month of loading | 600,000 bl |
| Banoco A M               | 31.8         | 2.45              | fob Bahrain                            | Month of loading | 500,000 bl |
| Basrah Light             | 30.0         | 2.92              | fob Iraq for Asia-Pacific destinations | Month of loading | 2mn bl     |
| Basrah Heavy             | 23.55        | 4.20              | fob Iraq for Asia-Pacific destinations | Month of loading | 2mn bl     |
| Qatari DFC               | 55           | 0.74              | fob Qatar                              | Month of loading | 500,000 bl |
| Qatari LSC               | 59.05        | 0.098             | fob Qatar                              | Month of loading | 500,000 bl |

## Asia-Pacific (Argus Crude page 10)

Argus assesses the price for a variety of Asia-Pacific crude grades. Argus assessments of Asia-Pacific crudes consist of a fixed-price or formula assessment and a differential assessment. All of these price assessments are made with a cut off of 4:30pm Singapore time, with the exception of those grades assessed on a North Sea Dated basis.

For those grades assessed relative to North Sea Dated, the differentials are assessed with a cut off of 4.30pm Singapore time, while the underlying North Sea Dated price is assessed at 4.30pm London time. The methodology behind the Dated assessment can be found in the North Sea section and on [www.argusmedia.com](http://www.argusmedia.com).

### Asia-Pacific assessments

#### Indonesia

Argus publishes assessments for Indonesian grades based on spot deals and market information for cargoes loading 15-45 days from the publication date.

The final price of **Minas** is assessed by determining the Minas spread to Ice Brent futures or to North Sea Dated. In addition to this final price, Argus also shows the current market premium/discount for Minas to the Indonesian Crude Price (ICP). The Minas base price is the price left when this market premium/discount is removed from the final Minas price.

The **Duri** assessment is based on an assessment of the spread between the grade and Minas. In the absence of specific market discussion, Argus will take into account the spread between the Minas and Duri ICP and activity on grades of similar quality.

The **Cinta** assessment is based on an assessment of the spread between the grade and Minas. In the absence of specific market discussion, Argus will take into account the spread between the Minas and Cinta ICP and activity on grades of similar quality.

The **Widuri** assessment is based on an assessment of the spread between the grade and Minas. In the absence of specific market discussion, Argus will take into account the spread between the Minas and Widuri ICP and activity on grades of similar quality.

The **Senipah** assessment is based on an assessment of the spread between the grade and Minas. In the absence of specific market discussion, Argus will take into account the spread between the Minas and Senipah ICP and activity on grades of similar quality.

The **Attaka** assessment is based on an assessment of the spread between the grade and Minas. In the absence of specific market discussion, Argus will take into account the spread between the Minas and Attaka ICP and activity on grades of similar quality.

The **Ardjuna** assessment is based on an assessment of the spread between the grade and Minas. In the absence of specific market discussion, Argus will take into account the spread between the Minas and Ardjuna ICP and activity on grades of similar quality.

The **Belida** assessment is based on an assessment of the spread between the grade and Minas. In the absence of specific market discussion, Argus will take into account the spread between the Minas and Belida ICP and activity on grades of similar quality.

#### Vietnam

Argus publishes assessments for Vietnamese grades based on spot deals and market information for cargoes loading 15-45 days from the publication date.

The **Bach Ho** assessment is calculated by applying the grade's differential relative to North Sea Dated to the same day's North Sea Dated value. The Bach Ho spot market premium/discount is also published separately. The market premium/discount is assessed with a cut off of 4:30pm Singapore time. In the absence of specific market discussion, Argus may look at other Vietnamese grades of similar quality, to assess the Bach Ho spot market premium/discount.

The **Sutu Den** assessment is calculated by applying the grade's differential relative to North Sea Dated to the same day's North Sea Dated value. The Sutu Den spot market premium/discount is also published separately. The market premium/discount is assessed with a cut off of 4:30pm Singapore time. In the absence of specific market discussion, Argus may look at other Vietnamese grades of similar quality, to assess the Sutu Den spot market premium/discount.

#### Malaysia

Argus publishes assessments for Malaysian grades based on spot deals and market information for cargoes loading 30-60 days from the publication date.

The **Tapis** assessment is calculated by applying the grade's differential relative to North Sea Dated based on a market consensus to the same day's North Sea Dated value. The differential is assessed with a cut off of 4:30pm Singapore time and applied to North Sea Dated, which becomes available after 4:30pm London time. On days when North Sea Dated is



unavailable due to a UK public holiday, Argus will use a substitute North Sea Dated price (see below for the relevant methodology).

The **Kikeh** assessment is calculated by applying the grade's differential relative to North Sea Dated based on a market consensus to the same day's North Sea Dated value. The differential is assessed with a cut off of 4:30pm Singapore time and applied to North Sea Dated, which becomes available after 4:30pm London time. On days when North Sea Dated is unavailable due to a UK public holiday, Argus will use a substitute North Sea Dated price (see below for the relevant methodology).

The **Kimanis** assessment is calculated by applying the grade's differential relative to North Sea Dated based on a market consensus to the same day's North Sea Dated value. The differential is assessed with a cut off of 4:30pm Singapore time and applied to North Sea Dated, which becomes available after 4:30pm London time. On days when North Sea Dated is unavailable due to a UK public holiday, Argus will use a substitute North Sea Dated price (see below for the relevant methodology).

The **Labuan** assessment is calculated by applying the grade's differential relative to North Sea Dated based on a market consensus to the same day's North Sea Dated value. The differential is assessed with a cut off of 4:30pm Singapore time and applied to North Sea Dated, which becomes available after 4:30pm London time. On days when North Sea Dated is unavailable due to a UK public holiday, Argus will use a substitute North Sea Dated price (see below for the relevant methodology).

The **Miri** assessment is calculated by applying the grade's differential relative to North Sea Dated based on a market consensus to the same day's North Sea Dated value. The differential is assessed with a cut off of 4:30pm Singapore time and applied to North Sea Dated, which becomes available after 4:30pm London time. On days when North Sea Dated is unavailable due to a UK public holiday, Argus will use a substitute North Sea Dated price (see below for the relevant methodology).

### Australia and PNG

Argus publishes assessments for Australian and PNG grades based on spot deals and market information for cargoes loading 30-60 days from the publication date.

PNG's **Kutubu Light** assessment is calculated by applying the grade's differential relative to North Sea Dated to the same day's North Sea Dated value. The differential is based on a market consensus, assessed with a cut off of 4:30pm Singapore time, and applied to North Sea Dated, which becomes available after 4:30pm London time. On days when North Sea Dated is unavailable due to a UK public holiday, Argus will use a substitute North Sea Dated price (see below for the relevant methodology).

The **Cossack** assessment is calculated by applying the grade's differential relative to North Sea Dated based on a market consensus to the same day's North Sea Dated value. The differential is assessed with a cut off of 4:30pm Singapore time and applied to

North Sea Dated, which becomes available after 4:30pm London time. On days when North Sea Dated is unavailable due to a UK public holiday, Argus will use a substitute North Sea Dated price (see below for the relevant methodology). In the absence of specific market discussion, Argus will also take into account the spread between the Tapis APPI-linked Cossack price and North Sea Dated.

The **North West Shelf** condensate assessment is calculated by applying the grade's differential relative to North Sea Dated based on a market consensus to the same day's North Sea Dated value. The differential is assessed with a cut off of 4:30pm Singapore time and applied to North Sea Dated, which becomes available after 4:30pm London time. On days when North Sea Dated is unavailable due to a UK public holiday, Argus will use a substitute North Sea Dated price (see below for the relevant methodology).

The **Enfield** assessment is calculated by applying the grade's differential relative to North Sea Dated based on a market consensus to the same day's North Sea Dated value. The differential is assessed with a cut off of 4:30pm Singapore time and applied to North Sea Dated, which becomes available after 4:30pm London time. On days when North Sea Dated is unavailable due to a UK public holiday, Argus will use a substitute North Sea Dated price (see below for the relevant methodology).

The **Vincent** assessment is calculated by applying the grade's differential relative to North Sea Dated based on a market consensus to the same day's North Sea Dated value. The differential is assessed with a cut off of 4:30pm Singapore time and applied to North Sea Dated, which becomes available after 4:30pm London time. On days when North Sea Dated is unavailable due to a UK public holiday, Argus will use a substitute North Sea Dated price (see below for the relevant methodology).

The **Pyrenees** assessment is calculated by applying the grade's differential relative to North Sea Dated based on a market consensus to the same day's North Sea Dated value. The differential is assessed with a cut off of 4:30pm Singapore time and applied to North Sea Dated, which becomes available after 4:30pm London time. On days when North Sea Dated is unavailable due to a UK public holiday, Argus will use a substitute North Sea Dated price (see below for the relevant methodology).

The **Van Gogh** assessment is calculated by applying the grade's differential relative to North Sea Dated based on a market consensus to the same day's North Sea Dated value. The differential is assessed with a cut off of 4:30pm Singapore time and applied to North Sea Dated, which becomes available after 4:30pm London time. On days when North Sea Dated is unavailable due to a UK public holiday, Argus will use a substitute North Sea Dated price (see below for the relevant methodology).

### Sudan

Argus assessments of Sudanese crudes consist of a market differential to North Sea Dated and an outright price calculated by applying the differential to North Sea Dated.



Argus will publish assessments for Sudanese grades based on spot deals and market information for 600,000-1mn bl cargoes loading 15-45 days from the publication date. The cut off time for Sudanese assessments is 4:30pm Singapore time.

The **Nile Blend** assessment is calculated by applying the differential of Nile Blend relative to North Sea Dated based on a market consensus to the same day's North Sea Dated value. The differential is assessed with a cut off of 4:30pm Singapore time and applied to North Sea Dated, which becomes available after 4:30pm London time.

On days when North Sea Dated is unavailable due to a UK public holiday, Argus will use a substitute North Sea Dated price (see above for the relevant methodology).

The **Dar Blend** assessment is calculated by applying the differential of Dar Blend relative to North Sea Dated based on a market consensus to the same day's North Sea Dated value. The differential is assessed with a cut off of 4:30pm Singapore time and applied to North Sea Dated, which becomes available after 4:30pm London time.

On days when North Sea Dated is unavailable due to a UK public holiday, Argus will use a substitute North Sea Dated price (see above for the relevant methodology).

**Substitute Dated**

Substitute Dated replaces North Sea Dated as the base price for Cossack, North West Shelf condensate, Enfield, Vincent, Nile Blend and Dar Blend on the few days each year when the Asian crude oil markets are operating, but a public holiday in the UK means that London will not produce a North Sea Dated price.

Substitute Dated is calculated at 4.30pm Singapore time. Substitute Dated comprises the Ice Brent 4.30pm Singapore one-minute marker plus or minus a differential representing the difference between the Brent futures market and the physical North Sea market.

This differential is calculated in the following manner: Argus takes the most recently available North Sea Dated price assessed in London, then it subtracts the London Ice Brent one-minute marker from that same day.

**For example:** Dated on 24 December was \$72/bl and the Ice Brent 4.30pm London one-minute marker was \$70/bl – a difference of \$2/bl. To calculate Substitute Dated on 26 December, when Singapore is working but London is not, Argus will add this \$2/bl difference to the Ice Brent 4.30pm Singapore one-minute marker (\$69/bl) to give a Substitute Dated price of \$71/bl.

The market differentials for North West Shelf condensate, Enfield, Nile Blend and Dar Blend will then be added to this Substitute Dated price in line with their respective methodologies.

**US crude cfr China**

Argus calculates the delivered price to China of WTI Houston, a marker for light sweet crude, Mars, a marker for medium sour crude

and WCS Houston, a marker for heavy sour crude, to facilitate the comparison between values of US crude exports and other grades to Asian markets. Delivered prices are calculated by adding the USGC-China 270,000t freight rate and export terminal costs to the underlying price of WTI Houston, Mars and WCS Houston. Argus periodically reviews the export cost used in calculating these delivered prices.

See the [Argus Freight methodology](#) for more information on the assessment of USGC-China 270,000t freight, and the [Argus Americas Crude methodology](#) for more information on the WTI Houston and WCS Houston price assessments.

**US Gulf coast markers for Asia-Pacific**

Argus calculates an Asian-timestamp price of WTI Houston, WTI Midland, LLS (Light Louisiana Sweet) and Mars to allow for a comparison at the same point in time of US Gulf coast markers with the price of Middle Eastern and Asia-Pacific grades and benchmarks.

Argus also publishes differentials between these four Asian-timestamped US crude prices and Dubai swaps, aligning prices across markets and helping participants hedge more accurately their exposure to US crude exports.

Argus Asian-timestamp WTI Houston, WTI Midland, LLS and Mars are built upon the previous day's Argus volume-weighted average price of each of the four underlying grades. To those assessments is added the difference between the previous day's WTI futures settlement price and the WTI futures Singapore marker on the day of publication.

See the [Argus Americas Crude](#) methodology for more information on the WTI Houston, WTI Midland, LLS and Mars price assessments.

For example, on 12 May, the Asian-timestamp WTI Midland July price assessment is calculated as:

| Asian-timestamp July WTI Midland example                        |              |                                  |
|---|--------------|----------------------------------|
|   | Date         | Price                            |
| July WTI Midland assessment                                     | 11 May       | \$47.42/bl                       |
| July WTI futures settlement                                     | 11 May       | \$48.20/bl                       |
| July WTI futures Singapore marker                               | 12 May       | \$48.13/bl                       |
| July WTI futures Singapore marker - July WTI futures settlement | 12 May-11May | -7¢/bl (\$48.13/bl - \$48.20/bl) |
| July WTI Midland, Asian timestamp                               | 12 May       | \$47.35/bl (\$47.42/bl - 7¢/bl)  |

**Timing**

Argus publishes Asian-timestamp WTI Houston, WTI Midland, LLS and Mars price assessments for two forward months, according to the calendar used for North American spot trade, which differs from the calendar used in the WTI futures market.

For three trading days in each calendar month, spot trade in WTI Houston, WTI Midland, LLS and Mars continues, while WTI futures have rolled to the next month. On those days, Argus will use the nearest WTI futures contract as the basis for calculation of the

Asian-timestamp price for both the first and second months of each of the four grades. After those three days and for the rest of the calendar month, Argus will revert to the calculation of the Asian timestamp for each month based on the corresponding WTI futures contract.

For example, for most trading days in May, Argus publishes a June and July Asian-timestamp WTI Houston price based on June and July WTI futures prices. For three trading days in May, there will no longer be a June WTI futures price while there will continue to be a June WTI Houston price, and on those days Argus will continue to publish a June and July Asian-timestamp WTI Houston price, both based on the July WTI futures price.

For the differential of each of the four grades to Dubai swaps, Argus will always use the comparison between the monthly contracts that are two calendar months ahead of the date of publication, in line with the trading calendar for the Asian market, as in the following example for 12 May:

| Dubai differential example   |        |                                 |
|--|--------|---------------------------------|
|  | Date   | Price                           |
| July Asian-timestamp WTI Midland                                   | 12 May | \$47.35/bl                      |
| July Dubai swaps   | 12 May | \$50/bl                         |
| July WTI Midland, Asian timestamp differential to July Dubai swaps | 12 May | -\$2.65/bl (\$47.35/bl-\$50/bl) |

Argus will not publish Asian-timestamp US Gulf coast markers on US holidays and Singapore holidays, matching the publication calendars for Argus North American crude prices and for the CME's WTI futures Singapore marker.

On the first working day after US holidays, Argus will calculate the Asian timestamp prices by using the last published WTI Houston, WTI Midland, LLS and Mars prices and applying the difference between that day's WTI futures settlement and the WTI futures Singapore marker on the day of publication.

### Argus Condensate Index

The Argus Condensate Index (ACI) represents the daily value of condensates in Asia-Pacific, and will be derived from either Qatari Deodorized Field Condensate (DFC) or Australian North West Shelf (NWS) condensate, which are the two most liquid condensate streams in the region. The ACI will be set by the lowest price of either DFC or NWS, on a delivered Singapore basis.

The price of DFC for the ACI will be derived by taking the Ice Brent futures price at 4:30pm Singapore time and subtracting the exchange-of-futures-for-swaps (EFS) value for the corresponding month. The market differential for DFC spot cargoes relative to front-line Dubai assessments will then be added together with the freight costs from Qatar to Singapore. The freight rate is for very large crude carrier (VLCC) vessels and is assessed daily.

In more detail: August DFC will be August Ice Brent at 4:30pm Singapore time minus the August EFS at 4:30pm Singapore time plus the August DFC spot differential plus freight.

The price of NWS condensate for the ACI will be derived by taking the Ice Brent futures price at 4:30pm Singapore time and adding the relevant Dated-to-front-line (DFL) value. The market differential for NWS condensate spot cargoes relative to North Sea Dated and the freight cost for a dirty Aframax vessel from northwestern Australia to Singapore are then added. The freight rate is assessed daily.

In more detail: August NWS will be August Ice Brent at 4:30pm Singapore time plus the July DFL value plus the August NWS condensate spot differential plus freight.

## Russia Asia-Pacific (Argus Crude page 11)

### ESPO Blend

The **ESPO Blend** assessment is the price of crude from the East Siberia-Pacific Ocean (ESPO) pipeline, loading at the port of Kozmino in the Russian Far East. The outright price of ESPO Blend is calculated by applying the daily volume-weighted average market differential for cargoes of ESPO Blend fob Kozmino to the relevant Dubai swaps assessment. To calculate the volume-weighted average market differential, Argus will multiply the differential for each cargo times the volume of that cargo, add the resulting values for all cargoes together, and then divide that total by the combined volume of all cargoes considered for the assessment on that day.

Where market sources provide Argus with a range rather than a specific price, Argus will use editorial judgement to assess the value of the cargo, which will then be included in the volume-weighted average.

To be considered for inclusion in the assessment, trade must be for spot loading of crude by the producer or by a term-contract holder selling crude into the spot market on a fob Kozmino basis. For the avoidance of doubt, subsequent trade of crude that has already traded in the spot market will not be included in the assessment.

ESPO Blend trading begins 30–75 days before cargo loading dates. For example, cargoes loading from mid-November to mid-December could trade from early September until early October, although discussion usually begins after loading schedules are issued and tenders awarded in late September.

Argus will roll over the Dubai basis month when the bulk of deals done on the day are done for the first time on that basis. Any trade after this rollover that is based on a different Dubai basis month will then be converted to its equivalent value against the current month by using published Dubai inter-month spreads applicable on the day the deal was done.

The Argus assessment of ESPO Blend reflects the market price of 100,000-270,000t cargoes loading 30-75 days ahead of the publication date.

The cut-off time for ESPO Blend deals to be taken into account for the day's assessment will be 4:30pm Singapore time. Any deals completed after this pricing timestamp will be considered on the next day

of publication of Argus Crude. Argus will also exclude from the day's assessment any deals for which validation is not available by 8:00pm Singapore time, and will consider them, once validated, in the next day's assessment, together with any fresh deals, using a volume-weighted average. In the event that validation is still unavailable by 8:00pm Singapore time on the day after the deal was concluded, Argus will consider validated deals two publication days after the deal was concluded, provided there are no newer deals in that period, including the day when the deal was done. Any newer validated deals will supersede two-day-old deals. Argus will disregard any information on deals three publication days old or older. On days when Argus moves the assessment time for Dubai crude forward to 12:30pm Singapore time because of an upcoming holiday, it will also use a cut-off time of 12:30pm Singapore time for any ESPO Blend deals. Validation on these days should be available before 4:00pm Singapore time for Argus to consider these deals for that day's assessment. Otherwise, they will be considered in the next day of publication as stated above.

### ESPO Blend differentials

Argus publishes the differential of the outright ESPO Blend price assessment to the relevant Dubai swaps price assessment and to the front-month Ice Brent minute-marker at 4:30pm Singapore time. Whenever the timing of the relevant Dubai swaps price assessment differs from the timing of the Ice Brent front-month contract, Argus will calculate an ESPO Blend value that corresponds to the timing of the Ice Brent front-month contract for the purpose of publishing an ESPO Blend-Ice Brent differential that reflects the monthly trading cycle of ESPO cargoes.

In this case, the ESPO Blend value is calculated by adding the appropriate Dubai intermonth spread to the outright ESPO Blend price assessment, producing an ESPO Blend price that corresponds with the timing of the Ice Brent front-month contract.

For example, on 5 September, the ESPO Blend market was trading as a differential to October Dubai swaps, while the Ice Brent front-month market was for November. To publish an ESPO Blend-Ice Brent differential, a November ESPO Blend value is calculated as follows:

| ESPO Blend-Ice Brent differential |                                 |                        |                           |                             | \$/bl   |
|-----------------------------------|---------------------------------|------------------------|---------------------------|-----------------------------|---|
| Component                         | ESPO Blend assessment midpoint* | Ice Brent front month† | Dubai intermonth spread*‡ | ESPO Blend calculated value | ESPO Blend-Ice Brent front month differential |
| Month                             | October                         | November               | December/January          | November                    | November                                      |
| Price                             | 45.66                           | 46.31                  | +0.15                     | 45.81                       | -0.50   |

\*assessed by Argus †Ice Brent 4:30pm Singapore minute marker ‡the intermonth spread of physical Dubai crude prices. Dubai swaps are for delivery two months after the list month

### Sakhalin Island

Argus assessments of crudes from Sakhalin Island in Russia consist of a market differential to Dubai swaps for the month of loading and an outright price calculated by applying the differential to Dubai swaps for the month of loading. Argus will publish assessments for Sakhalin grades based on spot deals and market information for 700,000 bl cargoes loading two months ahead of the publication date. The cut off time for Sakhalin Island assessments is 4:30pm Singapore time.

### Sakhalin Island assessments

The **Sokol** assessment is the price of Sokol, a crude from Sakhalin Island in Russia. The value of Sokol is calculated by applying the market differential of Sokol cfr Yosu to Dubai swaps for the month of loading. The prevailing market differential is also published separately. Sokol deals done at differentials to an average of Oman-Dubai assessments for the month of loading will be converted to the equivalent of a differential to Dubai by using an assessment of the Oman-Dubai spread. Argus uses the market's assessment of the relevant Oman-Dubai spread for this conversion.

The **Sakhalin Blend** assessment is the price of Sakhalin Blend, a crude from Sakhalin Island in Russia. The value of Sakhalin Blend is calculated by applying the market differential of Sakhalin Blend cfr Yosu to Dubai swaps for the month of loading. The prevailing market differential is also published separately. The cut-off time for the Sakhalin Island assessments is 4:30pm Singapore time.

### Cif basis Singapore assessments

The **BTC Blend cif basis Singapore** assessment is calculated by adding a freight component to the BTC fob Ceyhan assessment. The freight cost is for 135,000t vessels and is assessed daily based on spot Med/Black Sea-East freight rates from the Argus Freight report.

The **Urals Black Sea cif basis Singapore** assessment is calculated by adding a freight component to the Urals fob (140kt) Novorossiysk netback. The freight cost is for 135,000t vessels and is assessed daily based on spot Med/Black Sea-East freight rates from the *Argus Freight report*.

| Asia-Pacific, Sudan, ESPO Blend, Sakhalin Island assessments |              |                   |                      |                          |                      |
|--|--------------|-------------------|----------------------|--------------------------|----------------------|
| Grade  | Typical °API | Typical sulphur % | Basis/ Location      | Timing                   | Cargo size           |
| Minas  | 35           | 0.08              | fob Indonesia        | Loading 15-45 days ahead | 100,000 - 200,000 bl |
| Duri   | 21.5         | 0.20              | fob Indonesia        | Loading 15-45 days ahead | 100,000 - 200,000 bl |
| Cinta  | 32.7         | 0.12              | fob Indonesia        | Loading 15-45 days ahead | 100,000 - 200,000 bl |
| Widuri   | 33.3         | 0.07              | fob Indonesia        | Loading 15-45 days ahead | 100,000 - 200,000 bl |
| Senipah  | 51           | 0.03              | fob Indonesia        | Loading 15-45 days ahead | 250,000 bl           |
| Attaka   | 43           | 0.09              | fob Indonesia        | Loading 15-45 days ahead | 100,000 - 200,000 bl |
| Ardjuna  | 37           | 0.09              | fob Indonesia        | Loading 15-45 days ahead | 100,000 - 200,000 bl |
| Belida   | 45           | 0.02              | fob Indonesia        | Loading 15-45 days ahead | 100,000 - 200,000 bl |
| Bach Ho  | 39           | 0.04              | fob Vietnam          | Loading 15-45 days ahead | 450,000 - 600,000 bl |
| Sutu Den   | 35.8         | 0.051             | fob Vietnam          | Loading 15-45 days ahead | 450,000 - 600,000 bl |
| Tapis  | 46           | 0.02              | fob Malaysia         | Loading 30-60 days ahead | 450,000 - 600,000 bl |
| Kikeh  | 36.74        | 0.06              | fob Malaysia         | Loading 30-60 days ahead | 600,000 bl           |
| Kimanis  | 38.61        | 0.06              | fob Malaysia         | Loading 30-60 days ahead | 600,000 bl           |
| Labuan   | 29.92        | 0.028             | fob Malaysia         | Loading 30-60 days ahead | 300,000 - 600,000 bl |
| Miri Light   | 29.79        | 0.0771            | fob Malaysia         | Loading 30-60 days ahead | 300,000-600,000 bl   |
| Kutubu Light   | 45           | 0.04              | fob Papua New Guinea | Loading 30-60 days ahead | 500,000 - 650,000 bl |
| Cossack  | 48           | 0.04              | fob Australia        | Loading 30-60 days ahead | 500,000 - 650,000 bl |
| NW Shelf   | 60           | 0.01              | fob Australia        | Loading 30-60 days ahead | 500,000 - 650,000 bl |
| Enfield  | 22           | 0.12              | fob Australia        | Loading 30-60 days ahead | 500,000 - 650,000 bl |
| Vincent  | 18.5         | 0.55              | fob Australia        | Loading 30-60 days ahead | 500,000 - 650,000 bl |
| Pyrenees   | 19           | 0.21              | fob Australia        | Loading 30-60 days ahead | 400,000 - 450,000 bl |
| Van Gogh   | 17           | 0.37              | fob Australia        | Loading 30-60 days ahead | 500,000 - 650,000 bl |
| Nile Blend   | 32.76        | 0.045             | fob Bashayer, Sudan  | Loading 15-45 days ahead | 600,000 - 1mn bl     |
| Dar Blend  | 26.4         | 0.116             | fob Bashayer, Sudan  | Loading 15-45 days ahead | 600,000 - 1mn bl     |

**Asia-Pacific, Sudan, ESPO Blend, Sakhalin Island assessments**

| Grade          | Typical °API | Typical sulphur % | Basis/ Location | Timing                   | Cargo size       |
|----------------|--------------|-------------------|-----------------|--------------------------|------------------|
| ESPO Blend     | 36.07        | 0.48              | fob Kozmino     | Loading 30-75 days ahead | 100,000-270,000t |
| Sokol          | 35.54        | 0.27              | cfr Yosu        | Month of loading         | 700,000 bl       |
| Sakhalin Blend | 44.00        | 0.16              | cfr Yosu        | Month of loading         | 700,000 bl       |

**Freight**

Argus Crude includes freight rates in \$/bl for 100,000t of crude from Kozmino republished from Argus Freight.

Kozmino-Yosu  
Kozmino-north China  
Kozmino-Chiba  
Kozmino-Singapore

See the [Argus Freight methodology](#).

**Official formula prices (Argus Crude page 12)**

Argus publishes official formula prices for crude from Saudi Arabia, Iran, Yemen, Kuwait, Iraq and Dubai. These are expressed as differentials to various benchmarks for a given loading month and are set by national oil companies.

**Official selling prices (Argus Crude page 12)**

Argus publishes official selling prices for crude from Abu Dhabi, Qatar, Oman, Indonesia, Malaysia and Brunei. These are expressed as outright prices for a given loading month and are set by national oil companies.

**Reference prices (Argus Crude page 12)**

Argus publishes the Opec Reference Basket monthly average price.

**Argus Japanese Crude Cocktail Index (Argus JCC)**

The Argus Japanese Crude Cocktail Index (Argus JCC) is an oil price index calculated and published by Argus that represents the price, in US dollars per barrel, of Japan's monthly crude imports.

**Basis**

The Argus Japanese Crude Cocktail Index is created by Argus based on data published by the Customs and Tariff Bureau of Japan's Ministry of Finance.

Argus calculates and publishes the Argus Japanese Crude Cocktail Index in US dollars per barrel based on Japanese import volumes and costs published by the ministry.

The ministry publishes preliminary data, followed a month later by fixed data. Argus uses the fixed data to derive the Argus Japanese Crude Cocktail Index.

**Timing**

The Argus Japanese Crude Cocktail Index is calculated and published on the day the ministry releases the fixed monthly import cost data or on the next Argus Crude publication date, should the ministry data be released on a day Argus Crude is not published. See <http://www.argusmedia.com/Methodology-and-Reference/Publishing-Schedule> for the Argus Crude publishing schedule.

The publication schedule of the ministry data is typically published in February for the upcoming fiscal year (April-March).

The underlying data are typically released by the ministry with a delay of at least two months.

For example, on 15 September, Argus published the Argus Japanese Crude Cocktail Index for June.

**Volume and currency conversion**

Import costs are released by the finance ministry in Japanese Yen and import volumes in kilolitre. Argus converts these figures into a US dollar per barrel price.

The conversion of the volume units is based on an assumption that one kilolitre equals 6.2898 bl.

Argus uses a proprietary weighted currency rate to convert the ministry data to US dollars.

**Americas (Argus Crude pages 13-17)**

For information on Argus Americas crude assessments, please see the [Argus Americas Crude](#) and [ASCI](#) methodologies.

**Daily netbacks (Argus Crude page 21)**

Argus publishes daily simple and complex refinery netbacks for a number of different crude grades in northwest Europe, Singapore and the US Gulf. For information on the daily netbacks, please see the [Argus Netback Model](#) methodology.

**Argus intra-day North Sea forward physical crude assessments**

On Ice front-month Brent futures expiry days, Argus publishes intra-day North Sea forward physical crude assessments for the corresponding expiring month at the following timestamps: 10:30, 12:30, 14:30, 16:30, 19:30 London time.

The 19:30 assessment will be done at 18:30 London time when the Ice Brent settlement takes place an hour earlier than usual in Lon-

don because of an early US switch to Daylight Saving Time. The methodology for identifying these price assessments is as follows:

*Argus* bases its front-month North Sea forward physical crude assessments on a volume-weighted average of outright North Sea forward trade in the minute leading up to each timestamp.

In the absence of outright trade, *Argus* will base its assessment on a formula comprising the second-month exchange of futures for physical (EFP) differential, the North Sea forward physical front-month to second-month (intermonth) differential and a representative second-month Ice Brent futures value. Outright North Sea forward physical bids and offers will be taken into account if they fall within a range derived from the bid-offer spread on the second-month EFP market, the bid-offer spread of the North Sea forward physical intermonth market, and a representative second-month Ice Brent futures value.

The North Sea forward physical assessments are assessed individually, as follows:

The front-month North Sea forward physical value is assessed using a volume-weighted average of trade taking place in the minute leading up to the timestamp and reported to *Argus* no more than 10 minutes after the timestamp.

The second-month Ice Brent futures value is assessed using trade in the minute leading up to the timestamp, or if there is no activity, the last trade before the timestamp.

For the EFP and North Sea forward physical intermonth values, *Argus* takes into account reported trade or indications leading up to the timestamp. If there is a period without reported trade or indications, *Argus* will base its assessments on activity in the preceding period.

No minimum transaction data threshold exists for these assessments as, in the absence of outright trade, *Argus* will make its assessment in accordance with the above methodology.

These assessments, including the 16:30 London time assessment for North Sea Dated, are different and distinct from the assessments published in the *Argus Crude* report.