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ARGUS BENZENE DAILY

Contents:

Methodology overview	2
Benzene and styrene market prices	5
Confidentiality	5
Definition of trading day	5
Benzene markets	6
Styrene markets	7
Weekly and monthly averages	8
Related markets	8

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The most up-to-date Argus Benzene Daily Methodology and Specification Guide methodology is available on www.argusmedia.com

Methodology overview

Methodology rationale

Argus strives to construct methodologies that reflect the way the market trades. Argus aims to produce price assessments which are reliable 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 conventions.

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

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

Survey process

Argus price assessments are informed by information received from a wide cross-section of market participants, including producers, consumers and intermediaries. Argus reporters engage with the industry by proactively polling participants for market data. Argus will contact and accept market data from all credible market sources including front and back office of market participants and brokers. Argus will also receive market data from electronic trading platforms. Argus 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 fall within the Argus stated methodological criteria for the relevant assessment. Argus encourages all sources of market data to submit transaction data from back office functions.

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

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

Market data usage

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

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

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

Verification of transaction data

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

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

Primary tests applied by reporters

- Transactions not transacted at 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 and perceived by Argus to be as such.

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

Secondary tests applied by editors for transactions identified for further scrutiny

Transaction tests

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

Source tests

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

Assessment guidelines

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

The assessment process employing judgment is rigorous, replicable, and uses widely accepted valuation metrics. These valuation metrics mirror the process used by physical commodity traders

to internally assess value prior to entering the market with a bid or offer. Applying these valuation metrics along with sound judgment significantly narrows the band within which a commodity can be assessed, and greatly increases the accuracy and consistency of the price series. The application of judgment is conducted jointly with the supervising editor, in order to be sure that guidelines below are being followed. Valuation metrics include the following:

Relative value transactions

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

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

Bids and offers

If a sufficient number of bids and offers populate the market, then 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 a 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).

Volume minimums and transaction data thresholds

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

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

Minimum transaction thresholds

Commodity	Location	Minimum Transaction Thresholds	
		Low/high minimum volume	VWA aggregate minimum volume
Benzene northwest Europe (cif ARA)	ARA	1,000t	3,000t
Benzene northeast Asia (fob South Korea)	South Korea	3,000t	3,000t

Transparency

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.

Swaps and forwards markets

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

Publications and price data

Argus benzene and styrene prices are published in the Argus Benzene Daily Summary. Subsets of these prices appear in other Argus market reports and newsletters in various forms. The price data are available independent of the text-based report in electronic files that can feed into various databases. These price data are also supplied through various third-party data integrators. The Argus website also provides access to prices, reports and news with various web-based tools. All Argus prices are kept in a historical database and available for purchase. Contact your local Argus office for information.

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 the 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.

If transaction information is submitted in error, and the company submitting informs Argus of the error within 24 hours of the original submission, Argus will make best efforts to correct the price data. After 24 hours, Argus will review both the material effect that the correction will have on the price data and the amount of time that has elapsed from the date of the published price data before deciding whether to issue a correction. After 30 days, Argus is unlikely to make a correction based on information submitted in error, and data submitters are not expected to file corrections to submitted data.

Ethics and compliance

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

Consistency in the assessment process

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

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

Review of methodology

The overriding objective of any methodology is to produce price assessments which are reliable indicators of commodity market val-

ues, 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
- For prices used in derivatives, notice that all formal comments will be published after the given consultation period unless submitter requests confidentiality

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

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

Benzene and styrene market prices

Argus publishes prices that report and reflect prevailing levels for open-market arms length transactions. Price assessments include market information over the course of the trading day.

Various methodological approaches are employed in reporting benzene and styrene markets to produce the most representative price assessments. These include volume-weighted averages of deals done, lows and highs of deals done, and other methods.

In illiquid markets, Argus assesses the range within which benzene and styrene could have traded, based on bids and offers through the entire day, movements of similar or related grades, and extensive polling of market participants. Formula-priced deals and market fundamentals also inform assessments but a primary emphasis is placed on the physical markets.

To be included in the price formation process, deals must meet the strict delivery, timing, and specification requirements in the methodology, and must be executed at arms length between a willing buyer and seller.

Confidentiality

Argus asks for counterparties from contacts in order to confirm trades and to avoid double-counting in volume-weighted averages. But Argus does not publish counterparty names in the benzene and styrene markets. Many companies have existing confidentiality agreements with counterparties and can only reveal trade information to Argus if confidentiality is maintained.

Definition of trading day

Argus defines the trading day by determining at what times the market can be said to contain a fair number of willing buyers and sellers. Outside of these time boundaries, markets are typically too illiquid to produce representative price indications and deals. These boundaries can vary in different markets, and are under continuous review to maintain the accuracy of the assessments.

See the trading day definitions in the specification sections below.

Benzene markets

US

US benzene prices are for delivery at the named location during the named month and conform to the following specifications.

Location/basis: ddp Houston/Texas City, fob US Gulf coast and ddp Lower Mississippi River

Quality: ASTM 2359 compliant

Trading day: 8am-5:30pm Houston time

Minimum trade size: 10,000bl

Location definitions:

- ddp: delivered, duty paid
- fob: free on board
- Houston/Texas City: Terminals at either Houston or Texas City
- USGC: Terminals along the US Gulf, excluding Mississippi River terminals
- Lower Mississippi River: Terminals along the Mississippi, not upriver of Baton Rouge

Four price series are published for each location:

- Low: the lowest price traded, or in the absence of trade, the lowest price that could have been traded
- High: the highest price traded, or in the absence of trade, the highest price that could have been traded
- Mean: the mean of the low and high price assessments described above
- Volume-weighted average (VWA): a volume-weighted average of transactions meeting the criteria listed above. If Argus validates less than 30,000 bl of trade, the VWA defaults to the mean price described above

Note: If a single trade meeting the specifications and aggregate volume is reported, that trade can set the low, high, mean and VWA price for a given market. On days in which the market moves significantly over the course of the day, but on which only one trade has been reported, the trade may set the low or high price assessment, with bids and offers used to assess the other.

Timing and roll date

Prices are assessed for three forward months for ddp Houston/Texas City. Prices are assessed for two forward months for fob US Gulf coast and ddp Lower Mississippi River.

Prompt month assessments roll off and the next month becomes prompt five calendar days before the end of the month. For example, on 25 April, April is the prompt month, but May becomes the prompt month on 26 April.

Northwest Europe

Northwest Europe benzene prices are a volume-weighted average of validated deals transacted during the trading day on the day of publication. Trades are for delivery at the named location during the prompt month and conform to the following specifications.

Location: ARA

Basis: cif

Timing: 5-30 days forward

Trading day: 9am CET-6pm CET

Minimum trade size: 1,000 metric tonnes

Minimum aggregate volume: 3,000 metric tonnes

Specification: BASF 2005 specification or similar

If Argus validates less than 3,000 metric tonnes of trade, or if there are no validated trades or a single validated trade the published price will be the mean of an assessed low-high range. The range is the lowest and highest prices that traded or could have traded on the day of publication.

Transactions that are completed on a UK public holiday that is not also a holiday in continental Europe, when no daily assessment is published, will be considered for inclusion in the following day's assessment.

Timing and roll date

Prompt month assessments roll off and the next month becomes prompt five calendar days before the end of the month. For example, on 25 April, April is the prompt month, but May becomes the prompt month on 26 April. Price assessments are published for the prompt month and one forward month.

Roll date: five working days before the end of the month

Northeast Asia

Prices are assessed on the basis of trades, bids and offers reported during the day of publication.

In the absence of trades, the published price range will be formed based on bids and offers in the market at 5pm Singapore time.

In the absence of trades or bids and offers, published prices will take into account indications of buying and selling prices in the market and other market information including but not limited to movements in European and US benzene prices, styrene monomer (SM) prices in Asia, crude and naphtha prices, the trend in other aromatics markets and supply and demand fundamentals.

fob South Korea

Price assessments are published for five forward half months and two forward calendar months

Location: South Korea

Timing: half months roll on the first publishing day after the first and 15th of the calendar month

Trading day: 9am-5pm Singapore time

Minimum trade size: 3,000 metric tonnes

Specification: ASTM 2359

Example:

On Friday, 16 September, Argus will publish assessments for

- the second half of October
- the first half of November
- the second half of November
- the first half of December
- the second half of December

Calendar month prices are the average of relevant half-month assessments. In the above example, calendar-month prices would be published for November and December.

Argus fob Korea marker

The Argus fob Korea marker is an arithmetic average of the mid-point of the published price assessments for the first four published half-month assessments.

cfr China

Prompt prices are published

Location: China

Timing: 15-45 days forward

Trading day: 9am-5pm Singapore time

Minimum trade size: 3,000 metric tonnes

Specification: ASTM 2359

Netback calculations are not included in the price assessment process

Sinopec China ex-works

Sinopec listed prices on an ex-works basis would be updated as and when the producer announces new prices.

East China ex-tank

Prompt prices are published

Location: east China

Timing: 0-15 days forward

Minimum trade size: 500-1,000 metric tonnes

Specification: ASTM 2359

Trading day: 9am-5pm Singapore time

Styrene markets**US**

US styrene prices are a volume-weighted average of validated deals transacted during the trading day on the day of publication. Trades are for loading at the named location during the named month and conform to the following specifications.

Location: US Gulf coast (Texas and Louisiana waterborne cargoes)

Basis: fob

Timing: during the named calendar month

Trading day: 8am-5:30pm CST

Minimum trade size: 1,500 metric tonnes

Minimum aggregate volume: 3,000 metric tonnes

Specification: ASTM D-2827

If the aggregate volume of validated trade falls below 3,000t, Argus will make an intelligent assessment of the styrene price for delivery during the named month, in line with the assessment guidelines listed above.

Timing and roll date

Prices are assessed for two forward months.

Prompt month assessments roll off and the next month becomes prompt five calendar days before the end of the month. For example, on 25 April, April is the prompt month, but May becomes the prompt month on 26 April.

Northwest Europe

Northwest Europe styrene prices are a volume-weighted average of validated deals transacted during the trading day on the day of publication. Trades are for delivery at the named location during the named month and conform to the following specifications.

Location: ARA

Basis: fob

Timing: any dates, calendar month

Trading day: 9am-6pm CET

Minimum trade size: 1,000 metric tonnes

Minimum aggregate volume: 3,000 metric tonnes

Specification: ASTM D-2827

If Argus validates less than 3,000 metric tonnes of trade, or if there are no validated trades or a single validated trade the published price will be the mean of an assessed low-high range. The range is the lowest and highest prices that traded or could have traded on the day of publication.

Timing and roll date

Prompt month assessments roll off and the next month becomes prompt on the first business day following 19th of month.

For example, on 19 April, April is the prompt month, but May becomes the prompt month on 20 April. Price assessments are published for the prompt month and one forward month.

Asia-Pacific

The price assessment for cfr east China styrene is an average of two elements — a survey of market participants and a volume-weighted average of validated deals transacted during the trading day on the day of publication. Trades are for delivery at the named location during the named month and conform to the following specifications.

Location: east China

Basis: cfr

Timing: 10-35 days forward

Trading day: 9am-5pm Singapore time

Minimum trade size: 2,000 metric tonnes

Minimum aggregate volume: 6,000 metric tonnes

Specification: ASTM D-2827

Timing and roll date

Prices are assessed for two forward months. Prompt month assessments roll on the first business day following the 15th of month.

Weekly and monthly averages

Argus also publishes weekly and monthly averages in some benzene and styrene markets:

WTD — a week-to-date average of the daily price assessments. The weekly average from the previous week is also published and is equal to the weekly average on the last working day of the previous week.

MTD — a month-to-date average of the daily price assessments. The MTD average is calculated in line with the trading month, and follows the relevant rolling schedule as outlined above.

The monthly average from the previous month is also published and is equal to the monthly average on the last working day of the previous month.

Related markets

Argus Benzene Daily also includes reference prices for crude oil, refined products and natural gas.

US

Nymex natural gas: see www.cmegroup.com

Nymex WTI crude: see www.cmegroup.com

Gasoline 87 USGC five-day average: an average of price assessments published in Argus US Products. See the [Argus US Products methodology](#)

Europe

North Sea dated crude: see the [Argus Crude methodology](#)

Naphtha 65 para barge fob northwest Europe: see the [Argus European Products methodology](#)

Eurobob oxy gasoline northwest Europe barge five-day average: an average of price assessments published in Argus European Products. See the [Argus European Products methodology](#)

Gasoline 10ppm non-oxy northwest Europe cif cargo: see the [Argus European Products methodology](#)

NBP natural gas: see the [Argus European Natural Gas methodology](#)

Asia Pacific

Naphtha Japan c+f: see the [Argus Asia-Pacific Products methodology](#)

Gasoline 92r Singapore: see the [Argus Asia-Pacific Products methodology](#)

Naphtha fob India – see the [Argus Asia-Pacific Products methodology](#)

Dubai front-month crude – see the [Argus Crude methodology](#)