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ARGUS GLOBAL ENERGY CERTIFICATES

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LAST UPDATED: AUGUST 2024

The most up-to-date Argus Global Energy Certificates methodology is available on
www.argusmedia.com

Methodology overview

Methodology rationale

Argus strives to construct methodologies that reflect the way the market trades. Argus aims to produce price assessments which are reliable and representative indicators of commodity market values and are free from distortion. As a result, the specific currencies, volume units, locations and other particulars of an assessment are determined by industry conventions.

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

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

Survey process

Argus price assessments are informed by information received from a wide cross section of market participants, including producers, consumers and intermediaries. Argus reporters engage with the industry by proactively polling participants for market data. Argus will contact and accept market data from all credible market sources including front and back office of market participants and brokers. Argus will also receive market data from electronic trading platforms and directly from the back offices of market participants. Argus will accept market data by telephone, instant messenger, email or other means.

Argus encourages all sources of market data to submit all market data to which they are a party that falls within the Argus stated methodological criteria for the relevant assessment. Argus encourages all sources of market data to submit transaction data from back office functions.

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

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

Market data usage

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

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

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

Verification of transaction data

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

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

Primary tests applied by reporters

- Transactions not transacted at arm's length, including deals between related parties or affiliates.
- Transaction prices that deviate significantly from the mean of all transactions submitted for that day.
- Transaction prices that fall outside of the generally observed lows and highs that operated throughout the trading day.
- Transactions that are suspected to be a leg of another transaction or in some way contingent on an unknown transaction.
- Single deal volumes that significantly exceed the typical transaction volume for that market.
- Transaction details that are identified by other market participants as being for any reason potentially anomalous and perceived by Argus to be as such.

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

Secondary tests applied by editors for transactions identified for further scrutiny

Transaction tests

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

Source tests

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

Assessment guidelines

When insufficient, inadequate, or no transaction information exists, or when Argus concludes that a transaction based methodology will not produce representative prices, Argus reporters will make an assessment of market value by applying intelligent judgement 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 judgement 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 judgement 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 judgement is conducted jointly with the supervising editor, in order to be sure that guidelines below are being followed. Valuation metrics include the following:

Relative value transactions

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

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

Bids and offers

If a sufficient number of bids and offers populate the market, then in most cases the highest bid and the lowest offer can be assumed to define the boundaries between which a deal could be transacted.

Comparative metrics

- The relative values between compared commodities are readily discussed in the market and can be discovered through dialogue with market participants. These discussions are the precursor to negotiation and conclusion of transactions.
- Comparison to the same commodity in another market centre.
- Comparison to a more actively traded but slightly different specification commodity in the same market centre.
- Comparison to the same commodity traded for a different delivery timing.
- Comparison to the commodity’s primary feedstock or primary derived product(s).
- Comparison to trade in the same commodity but in a different modality (as in barge versus oceangoing vessel) or in a different total volume (as in full cargo load versus partial cargo load).

Volume minimums and transaction data thresholds

Argus typically does not establish thresholds strictly on the basis of a count of transactions, as this could lead to unreliable and non-representative assessments and because of the varying transportation infrastructure found in all commodity markets. Instead, minimum volumes are typically established which may apply to each transaction accepted, to the aggregate of transactions, to transactions which set a low or high assessment or to other volumetrically relevant parameters.

For price assessments used to settle derivatives, Argus will seek to establish minimum transaction data thresholds and when no such threshold can be established Argus will explain the reasons. These

thresholds will often reflect the minimum volumes necessary to produce a transaction-based methodology, but may also establish minimum deal parameters for use by a methodology that is based primarily on judgement.

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 judgement in the price assessment process.

Transparency

Argus values transparency in energy markets. As a result, where available, we publish lists of deals in our reports that include price, basis, counterparty and volume information. The deal tables allow subscribers to cross check and verify the deals against the prices. Argus feels transparency and openness is vital to developing confidence in the price assessment process.

Swaps and forwards markets

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

Publications and price data

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

A publication schedule is available at www.argusmedia.com

Corrections to assessments

Argus will on occasion publish corrections to price assessments after the publication date. We will correct errors that arise from clerical mistakes, calculation errors, or a misapplication of our stated methodology. Argus will not retroactively assess markets based on new information learned after the assessments are published. We make our best effort to assess markets based on the information we gather during the trading day assessed.

Ethics and compliance

Argus operates according to the best practices in the publishing field, and maintains thorough compliance procedures throughout the firm. We want to be seen as a preferred provider by our subscribers, who are held to equally high standards, while at the same time maintaining our editorial integrity and independence. Argus has a strict ethics policy that applies to all staff. The policy can be found on our website at www.argusmedia.com. Included in this

policy are restrictions against staff trading in any energy commodity or energy related stocks, and guidelines for accepting gifts. Argus also has strict policies regarding central archiving of email and instant messenger communication, maintenance and archiving of notes, and archiving of spreadsheets and deal lists used in the price assessment process. Argus publishes prices that report and reflect prevailing levels for open-market arms length transactions (please see the Argus Global Compliance Policy for a detailed definition of arms length).

Consistency in the assessment process

Argus recognises the need to have judgement 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 judgement
- 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 judgement for illiquid markets
- Editors are required to sign-off on all price assessments each day, thus ensuring the consistent application of judgement.

Review of methodology

The overriding objective of any methodology is to produce price assessments which are reliable and representative indicators of commodity market values and are free from distortion. As a result, Argus editors and reporters are regularly examining our methodologies and are in regular dialogue with the industry in order to ensure that the methodologies are representative of the market being assessed. This process is integral with reporting on a given market. In addition to this ongoing review of methodology, Argus conducts reviews of all of its methodologies and methodology documents on at least an annual basis.

Argus market report editors and management will periodically and as merited initiate reviews of market coverage based on a qualitative analysis that includes measurements of liquidity, visibility of market data, consistency of market data, quality of market data and industry usage of the assessments. Report editors will review:

- Appropriateness of the methodology of existing assessments
- Termination of existing assessments
- Initiation of new assessments.

The report editor will initiate an informal process to examine viability. This process includes:

- Informal discussions with market participants
- Informal discussions with other stakeholders
- Internal review of market data

Should changes, terminations, or initiations be merited, the report editor will submit an internal proposal to management for review and approval. Should changes or terminations of existing assessments be approved, then formal procedures for external consultation are begun.

Changes to methodology

Formal proposals to change methodologies typically emerge out of the ongoing process of internal and external review of the methodologies. Formal procedures for external consultation regarding material changes to existing methodologies will be initiated with an announcement of the proposed change published in the relevant Argus report. This announcement will include:

- Details on the proposed change and the rationale
- Method for submitting comments with a deadline for submissions
- For prices used in derivatives, notice that all formal comments will be published after the given consultation period unless submitter requests confidentiality.

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

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

Argus Global Energy Certificates

Argus Global Energy Certificates publishes prices of electricity and gas guarantees of origin, news, market commentary and analysis.

The report is published weekly on Friday. A publication schedule is available at www.argusmedia.com.

The latest daily electricity guarantee of origin and weekly gas guarantee of origin price assessments are published in Friday's print report. Daily and weekly prices are available via Argus Direct, data feeds and other digital channels.

International renewable energy certificates (I-RECs)

International renewable energy certificates (I-RECs) are a voluntary scheme under which certificates are issued to document the origin of electricity from specified sources as defined in The International Attribute Tracking Standard.

Price assessments are the fair value at the stated time for each of the listed technologies, countries and currencies.

I-REC assessments			
Country	Technology	Currency/Unit	Assessment time
Brazil	wind, solar, hydro	R/MWh, \$/MWh	Wednesday, 4pm Sao Paolo time
Chile	wind, solar, hydro	Ps/MWh, \$/MWh	Wednesday, 4pm Sao Paolo time
Mexico	wind, solar, hydro	Ps/MWh, \$/MWh	Wednesday, 4pm Sao Paolo time
Turkey	wind, solar, hydro, biomass	TL/MWh, \$/MWh	Thursday, 5.30pm London time
China	wind, solar, hydro	Yn/MWh, \$/MWh	Thursday, 5.30pm Beijing time
India	wind, solar, hydro	Rs/MWh, \$/MWh	Thursday, 5pm Mumbai time
Malaysia	hydro, solar	Ringgit/MWh, \$/MWh	Thursday, 5pm Singapore time
Thailand	wind, solar, hydro	Bt/MWh, \$/MWh	Thursday, 5pm Singapore time
Vietnam	wind, solar, hydro	D/MWh, \$/MWh	Thursday, 5pm Singapore time
UAE	solar	Dh/MWh, \$/MWh	Thursday, 5pm Abu Dhabi time

Contract specifications and delivery timings

Delivery timing: the year of generation for which the I-REC applies

Minimum size: 1GWh

Contracts assessed: previous year and current year

US renewable energy certificates (RECs)

US renewable energy certificates are defined by the year in which the electricity was generated. Prices are published weekly for:

- Green-e National (two vintage years)
- Green-e Texas (two vintage years)

See the [Argus Air Daily methodology](#).

European electricity guarantee of origin (GOOs)

Guarantees of origin (GOOs) are a voluntary scheme under which certificates are issued to document the origin of electricity produced from specified sources as regulated in Article 15 of the European Directive 2009/28/EC. To be considered consumed or used by an electricity consumer or utility, a GOO must be cancelled in a national electronic certificate registry.

Spot trading involves buying and selling of GOOs generated at any point during the 12 months before the date of trade. Calendar year contracts specify the generation period.

Price assessments are published for Nordic unsupported hydro-power GOOs, European unsupported or supported wind GOOs, European unsupported GOOs from any renewable source and European unsupported or supported solar GOOs.

Nordic hydropower GOO price assessments are for GOOs issued for hydropower generation in Denmark, Sweden, Norway and Finland. European GOO price assessments are for GOOs issued for products generated in countries with European Energy Certificate System (EECS) certification.

End-of-day price assessments are compiled between 4.00pm and 5.30pm London time and are an assessment of the fair value of a given product at the market close, as signalled by the cessation of trading in the over-the-counter (OTC) market. End-of-day price assessments are published as a best buy and sell price (also referred to as the highest bid and lowest offer), the midpoint of which represents the assessment of the contract's value at the market close.

Annual indexes

Running yearly averages of published daily assessments beginning each January, in line with the timing of the current-year vintage.

Guarantee of origin indexes are published for

- Nordic hydropower
- European wind
- European solar
- European any renewable

Contract specifications and delivery timings

Currency/unit: €/MWh

Delivery timing: the year of generation for which the GOO applies

Minimum size: 1GWh

Contracts assessed: previous year, current year and four years ahead.

UK electricity guarantee of origin (Regos)

UK renewable energy guarantees of origin (Regos) are a voluntary scheme under which certificates are issued to document the origin of electricity produced from specified sources as regulated in the Electricity (Guarantees of Origin of Electricity Produced from Renewable Energy Sources) Regulations 2003 and the Electricity (Guarantees of Origin of Electricity Produced from Renewable Energy Sources) Regulations (Northern Ireland) 2003 (together, the "GOO Regulations").

Regos are issued by compliance periods, which run from April to March, and can be traded up to and including 30 June in the same year in which the compliance period ends. Argus price assessments follow the same schedule.

Price assessments are compiled weekly between 4.00pm and 5.30pm London time on Thursday and are an assessment of the fair value of a given product at the market close, as signalled by the cessation of trading in the over-the-counter (OTC) market.

Annual indexes

Running yearly averages of published weekly assessments beginning each April, in line with the timing of the current compliance period.

UK guarantee of origin indexes are published for

- non-biomass
- biomass

Contract specifications and delivery timings

Currency/unit: £/MWh

Delivery timing: the compliance period for which the Rego applies

Minimum size: 1GWh

Contracts assessed: current compliance period and three compliance periods ahead.

Spanish domestic guarantees of origin (GOOs)

Spanish domestic electricity guarantees of origin are issued and regulated by the Spanish National Markets and Competition Commission (CNMC). Requests for the cancellation or transfer of GOOs in the national electronic certificate registry for a calendar year must be submitted by 10 March of the following year as defined under Circular 1/2018.

Prices are published for the current year and one forward year, and are assessed weekly on Thursday. The roll date from forward year to current year will be the first Thursday after 10 March.

Price assessments are compiled weekly between 4.00pm and 5.30pm London time on Thursday and are an assessment of the fair value of a given product at the market close, as signalled by the cessation of trading in the over-the-counter (OTC) market. End-of-day price assessments are published as a best buy and sell price (also referred to as the highest bid and lowest offer), the midpoint of which represents the assessment of the contract's value at the market close.

Annual indexes

Running yearly averages of published weekly assessments beginning after 10 March each year, in line with the timing of the current-year vintage.

Spanish domestic GOO prices are published for

- Spain domestic any renewable

Contract specifications and delivery timings

Currency/unit: €/MWh

Delivery timing: the year of generation for which the GOO applies

Minimum size: 1GWh

Contracts assessed: current year and one year ahead

Renewable gas guarantees of origin

Renewable gas guarantees of origin (RGGOs) are issued to document the origin of network-injected biomethane produced from specified sources as defined and certified by national certification schemes. To be considered consumed or used by a consumer or utility, an RGGO must be retired by a national electronic certificate registry.

Price assessments are published for Danish, Dutch and UK supported renewable gas guarantees of origin.

Danish RGGOs are regulated by Section 36 of the Gas Supply Act (Act No 126 of 6 February 2020 on the supply of natural gas with subsequent amendments) and Executive Order No 1216 of 7 June 2021 on guarantees of origin for electricity, gas, district heating and cooling from renewable energy sources. To be considered for inclusion in the assessment, waste-derived RGGOs must be accompanied by and crop-based RGGOs must be unaccompanied by RED-compliant certification issued by a European Commission-approved auditing body. Danish RGGOs are for subsidised biomethane.

Dutch RGGOs are certified by local issuing body Vertogas for grid-injected biomethane that is subsidised under the sustainable energy SDE schemes as administered by the Netherlands Enterprise Agency. To be considered for inclusion in the assessment, waste-derived RGGOs must be accompanied by and crop-based RGGOs must be unaccompanied by RED-compliant certification issued by a European Commission-approved auditing body.

UK RGGOs are certified under the Green Gas Certification Scheme (GGCS) or Biomethane Certification Scheme (BMCS) systems, are for subsidised biomethane and are unaccompanied by RED-compliant certification issued by a European Commission-approved auditing body.

Calendar year vintages specify the generation period. Price assessments are published for crop-based and waste-based biomethane.

Prices are assessed each Thursday — or on the last publishing day before, if Thursday is a holiday — and are an assessment of the fair value of a given product at the market close, as signalled by the cessation of trading in the over-the-counter (OTC) market. Market information about trades, bids or offers made after 16:30 UK time on the day of assessment may not be considered for inclusion in the assessment.

End-of-day price assessments are published as a best buy and sell price (also referred to as the highest bid and lowest offer), the midpoint of which represents the assessment of the contract's value at the market close.

Prices are published in €/MWh for Denmark and the Netherlands, and in £/MWh for the UK.

Contract specifications and delivery timings

Delivery timing: the year of production (vintage) for which the RGGO applies

Minimum size: 1MWh

Contracts assessed: previous year, current year and one year ahead

Feedstocks assessed: crop-based; waste-based

Argus Global Compliance Carbon Index

The Argus Global Compliance Carbon Index (AGCCI) is a daily average of Argus price assessments for compliance carbon markets, weighted by regional CO2 emissions.

See the [Argus Air Daily methodology](#).

Argus Global Green Power Index

The Argus global green power index is a daily average of Argus price assessments for energy attribute certificates for renewable electricity weighted by regional renewable electricity generation.

See the [Argus Air Daily methodology](#).