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ARGUS US ELECTRICITY

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LAST UPDATED: SEPTEMBER 2022

The most up-to-date Argus US Electricity methodology is available on www.argusmedia.com

Introduction

Argus US Electricity is a daily report on physical electricity markets at more than 20 North American trading hubs (see *assessed markets table below*). For a full list of publication dates, see [Argus' publishing schedule](#).

Timing

Assessments reflect trade that was concluded, or could have been concluded, from the start of the trading day until 14:30 EST.

Peak and off-peak

Argus assesses the price of electricity to be delivered during peak or off-peak hours on business days. Peak hours vary by market (see *the assessment parameters table below*). All business day hours not defined as peak are off-peak.

Day-ahead assessments

Argus assesses day-ahead electricity prices for peak and off-peak hours.

Day-ahead assessments reflect the price of electricity to be delivered on the business day after the day of publication, with the exception that in western markets:

- day-ahead peak assessments published on Thursdays reflect the price of electricity to be delivered during peak hours on both Friday and Saturday
- day-ahead off-peak assessments published on Thursdays reflect the price of electricity to be delivered during off-peak hours on both Friday and Saturday
- day-ahead off-peak assessments published on Fridays reflect the price of electricity to be delivered throughout Sunday, and during off-peak hours on Monday
- day-ahead assessments made in the lead-up to public holidays may reflect delivery over multiple days, even if none of those days is a weekend day.

Western markets (volume-weighted averages)

Each of the following day-ahead markets is assessed by calculating a volume-weighted average of transactions, so long as Argus has been able to validate at least three transactions, each of at least 25MW:

- Mid-Columbia peak
- Mid-Columbia off-peak
- Palo Verde peak
- Palo Verde off-peak
- California-Oregon border (COB) peak
- California-Oregon border (COB) off-peak

- NB-15 peak
- NB-15 off-peak

If fewer than three transactions of at least 25MW have been validated, these markets will be assessed as follows:

Argus assesses a low, high, and midpoint for each market, where the low represents the lowest deal done, the high the highest, and the midpoint an average of the two. If only one transaction is validated, that transaction will set the midpoint. In the absence of confirmed trade, the low and the high will reflect the range within which trade could have occurred. Argus will determine that range with reference to one or more of:

- Hourly day-ahead prices published by the local independent system operator or regional transmission operator
- Price changes at nearby markets
- Historical correlations to nearby markets
- Natural gas, coal, and fuel oil prices
- Heat rates at local power plants
- Available transmission capacity
- Other market fundamentals, including anticipated weather conditions and known disruptions to power generation/transmission infrastructure

Non-western markets

For all day-ahead assessments other than those listed under "Western markets", Argus will determine the low-high range with reference to one or more of:

- Hourly day-ahead prices published by the local independent system operator or regional transmission operator
- Validated transactions
- Price changes at nearby markets
- Historical correlations to nearby markets
- Natural gas, coal, and fuel oil prices
- Heat rates at local power plants
- Available transmission capacity
- Other market fundamentals, including anticipated weather conditions and known disruptions to power generation/transmission infrastructure.

Calculated assessments

Argus calculates prices in certain markets using heat rates and gas prices. For details on which natural gas market corresponds with which electricity market, see the *Associated electricity markets, gas hubs table*.

Forward curves

See [Argus North American Electricity Forward Curves methodology](#).

| Assessed markets | | | |
|---------------------|---------------------------------|---|-------------------------|
| Market | Aka | Operator | Structure |
| East | | | |
| NY Zone-A | West | New York ISO | Nodal LMP |
| NY Zone-F | Capital | New York ISO | Nodal LMP |
| NY Zone-G | Lower Hudson Valley | New York ISO | Nodal LMP |
| NY Zone-J | New York City | New York ISO | Nodal LMP |
| PJM West | PJM Western Hub; PJM-W; Western | PJM Interconnection | Nodal LMP |
| NE Pool | ISO New England Internal Hub | ISO New England | Nodal LMP |
| South | | | |
| Ercot Houston | Houston | Electric Reliability Council of Texas (Ercot) | Zonal |
| Ercot North | North | Electric Reliability Council of Texas (Ercot) | Zonal |
| Ercot South | South | Electric Reliability Council of Texas (Ercot) | Zonal |
| Ercot West | West | Electric Reliability Council of Texas (Ercot) | Zonal |
| Entergy | Into Entergy | Midcontinent Independent System Operator (MISO) | Nodal LMP |
| Into Southern | Southern, SoCo, Into SoCo | Southern Company | Bilateral |
| Midcontinent | | | |
| Illinois MISO | | Midcontinent Independent System Operator (MISO) | Nodal LMP |
| Indiana | | Midcontinent Independent System Operator (MISO) | Nodal LMP |
| Michigan | | Midcontinent Independent System Operator (MISO) | Nodal LMP |
| Northern Illinois | NI Hub | PJM Interconnection | Nodal LMP |
| Ontario | | Ontario Independent Electricity System Operator | Nodal LMP |
| AEP Dayton | PJM AD, AD Hub | PJM Interconnection | Nodal LMP |
| SPP North | | Southwest Power Pool | Nodal LMP |
| SPP South | | Southwest Power Pool | Nodal LMP |
| West | | | |
| COB | California-Oregon Border | Local utilities balance market | Nodal LMP and bilateral |
| Four Corners | FC | Local utilities balance market | Nodal LMP and bilateral |
| Mead | | Local utilities balance market | Nodal LMP and bilateral |
| Mid-Columbia | Mid-C | Local utilities balance market | Bilateral |
| Mona | | Local utilities balance market | Nodal LMP and bilateral |
| NP-15 | North of Path 15, North Path | California Independent System Operator (CAISO) | Nodal LMP and bilateral |
| Palo Verde | PV | Various local utilities balance market | Nodal LMP and bilateral |
| SP-15 | South-of-Path 15, South Path | California Independent System Operator (CAISO) | Nodal LMP and bilateral |

| Associated electricity markets, gas hubs | |
|--|-------------------------------|
| Electricity market | Primary hubs |
| COB | PG&E Malin, Oregon |
| ERCOT Houston | Houston Ship Channel (All) |
| ERCOT North* | NGPL TexOk |
| ERCOT South | NGPL, TexOk zone |
| ERCOT West | Waha |
| Four Corners | El Paso, San Juan Basin |
| Illinois Hub | REX zone 3 |
| Indiana Hub | Chicago Citygates |
| Into Entergy | Henry Hub |
| Into Southern* | Transco zone 4 |
| Mead | Kern River, Delivered |
| Mid-C* | Northwest Sumas |
| Michigan Hub | Consumers Citygates |
| Mona | Opal |
| NE Pool* | Algonquin Citygates |
| New York Zone A* | TGP zone 4 200 line |
| New York Zone F | TGP zone 5 200 line delivered |
| New York Zone G | Iroquois zone 2 |
| New York Zone J | Transco zone 6 New York |
| Northern Illinois* | Chicago Citygates |
| NP15 | PG&E Citygates |
| Ontario | Dawn, Ontario \$/mmBtu |
| Palo Verde* | El Paso, South Mainline |
| PJM AD | Col Gas, Appalachia |
| PJM West* | TETCO M-3 |
| SP15 | SoCal Citygates |
| SPP North | NGPL, Midcontinent |
| SPP South | NGPL, TexOk zone |

*Indicates spark spread calculated for location

Heat rates and generation margins

Heat rates and spark spreads are calculated according to the following formulas. For details on which natural gas market corresponds with which electricity market (see the associated electricity markets and gas hubs table below).

Heat rate = (Day-ahead electricity/Day-ahead natural gas)*1,000
 Gas spark spread = Day-ahead electricity minus (Day-ahead natural gas * heating efficiency)
 Carbon-adjusted spark spread = Spark spread minus carbon cost.
 Coal spark spreads: see [Argus Coal Daily methodology](#).

Methodology rationale

Verification of transaction data
 Reporters carefully analyze all data submitted to the price assessment process. This data includes transactions, bids, offers, volumes, counterparties, 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.

| Assessment parameters | | |
|-----------------------|-------------|-------------|
| Assessment | Peak hours | Assessed in |
| East | | |
| NY Zone-A | 07:00-23:00 | \$/MWh |
| NY Zone-F | 07:00-23:00 | \$/MWh |
| NY Zone-G | 07:00-23:00 | \$/MWh |
| NY Zone-J | 07:00-23:00 | \$/MWh |
| PJM West | 07:00-23:00 | \$/MWh |
| NE Pool | 07:00-23:00 | \$/MWh |
| South | | |
| Ercot Houston | 06:00-22:00 | \$/MWh |
| Ercot North | 06:00-22:00 | \$/MWh |
| Ercot South | 06:00-22:00 | \$/MWh |
| Ercot West | 06:00-22:00 | \$/MWh |
| Entergy | 07:00-23:00 | \$/MWh |
| Into Southern | 06:00-22:00 | \$/MWh |
| Midcontinent | | |
| Illinois (MISO) | 07:00-23:00 | \$/MWh |
| Indiana | 07:00-23:00 | \$/MWh |
| Michigan | 07:00-23:00 | \$/MWh |
| Northern Illinois | 07:00-23:00 | \$/MWh |
| Ontario | 07:00-23:00 | C\$/MWh |
| AEP Dayton | 07:00-23:00 | \$/MWh |
| SPP North | 06:00-22:00 | \$/MWh |
| SPP South | 06:00-22:00 | \$/MWh |
| West | | |
| COB | 06:00-22:00 | \$/MWh |
| Four Corners | 06:00-22:00 | \$/MWh |
| Mead | 06:00-22:00 | \$/MWh |
| Mid-Columbia | 06:00-22:00 | \$/MWh |
| Mona | 06:00-22:00 | \$/MWh |
| NP-15 | 06:00-22:00 | \$/MWh |
| Palo Verde | 06:00-22:00 | \$/MWh |
| SP-15 | 06:00-22:00 | \$/MWh |

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 submitting the data. 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 (see above). 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 (see above). 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:

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 center.
- Comparison to a more actively traded but slightly different specification commodity in the same market center.
- 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 volume

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.

Methodology and specifications guide

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, 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 recognizes 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 program of training and oversight of reporters. This program 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 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 analyze 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

Providing data to Argus

Argus requests that data providers submit data from a risk office or non-commercial department separate from the trading floor. Reporting companies should follow the procedures set out below:

- Report complete trade data, advising Argus as soon as possible of any omissions or errors.
- Include in each transaction the delivery location of the trade, date, beginning and ending delivery date, volume, price and whether it was a buy or sell transaction. If possible, indicate counterparty and name of trading platform or broker. Argus understands that many contracts prohibit the disclosure of counterparty information.
- Report all fixed-price transactions, including day-ahead, balance of month and forward deals. Include all deals whether or not Argus assesses that hub.
- Send data to power@argusmedia.com and power@argusmyzen.co.uk by 4pm EST
- Clearly mark any financial deals as such.
- Provide the name and contact information for at least two representatives from the reporting office that can answer questions about the data submitted.

Double counting:

Because few data contributors provide counterparty information, Argus indexes may include both sides of the same transaction. If the industry starts reporting more counterparty information, Argus will be in a better position to remove duplicate trades from indexes.