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ARGUS AIR DAILY

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LAST UPDATED: FEBRUARY 2017

The most up-to-date Argus Air Daily methodology is available on www.argusmedia.com

Methodology overview

Introduction

Argus Air Daily is a daily market report that publishes price assessments and index for SO₂, NO_x, US renewable energy certificate and North American greenhouse gas markets. It also publishes daily and weekly analyses of the environmental markets.

Argus holds as a guiding principle that our assessments should be the product of intelligence, skill and diligent investigation. Environmental markets need a measure of cross-validation and editorial scrutiny in order to support accurate and consistent price discovery suitable for use in contracts.

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 market values. As a result, the specific currencies, volume units, locations and other particulars of an assessment are determined by industry conventions.

In the environmental markets, Argus publishes daily and weekly 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 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 and location basis. 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 confirmation 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 confirming all market data used in determining price assessments, a degree of care equal to that applying to gathering and confirming transactions. The informa-

tion used to form an assessment could include deals done, bids, offers, tenders, spread trades, exchange trades, fundamental supply and demand information and other inputs.

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

Relative value transactions

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

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

Bids and offers

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

Comparative metrics

The relative values between compared commodities are readily discussed in the market and can be discovered through dialogue with market participants. These discussions are the precursor to negotiation and conclusion of transactions.

- Comparison to the same commodity in another market centre.
- Comparison to a more actively traded but slightly different specification commodity in the same market centre.
- Comparison to the same commodity traded for a different delivery timing.
- Comparison to the commodity’s primary feedstock or primary derived product(s).
- Comparison to trade in the same commodity but in a different modality (as in barge versus oceangoing vessel) or in a different total volume (as in full cargo load versus partial cargo load).

Transparency

Argus values transparency in energy markets. As a result, where available, 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 environmental market prices are published in the Argus Air Daily report. Subsets of these prices appear in other Argus market reports and newsletters, and form the Argus contribution to indexes it publishes. 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.

Argus reviews corrections for material effect on price data and the amount of time that has elapsed from the date of published price data before deciding whether to issue a correction. After 30 days, Argus is unlikely to make a correction to published data. Argus will not retroactively assess markets based on information learned after the assessments are published.

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 values, free from distortion and representative of 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 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, 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 US environmental markets coverage

The Argus Air Daily prices are intelligent assessments up until 5pm Eastern Time for all markets except California Carbon Allowances, which extend up until 6pm Eastern Time. The assessed daily price takes into account deals done in the previous 24 hours, bids, offers, spreads between current and future vintages/compliance years, and other market information gathered through a wide survey of participants. The assessment represents the range within which deals traded or could have traded at the close of the trading day for that particular vintage. In its publication and some data products, Argus provides the calculated midpoint or "price" for bid/ask ranges for the convenience of subscribers. This is the arithmetic mean of the bid and ask data, displayed and rounded to two decimal places.

SO₂ and NO_x

Argus produces a daily price assessment for current vintage SO₂ allowances created under the Clean Air Act Title IV Acid Rain Program. Each allowance represents a short ton of SO₂ emitted.

Argus also assesses the price of annual and ozone season NO_x allowances created by the Cross-State Air Pollution Rule (CSAPR). Each allowance is worth one short ton of NO_x emissions. The ozone

season CSAPR NO_x program runs from May-September each year. Argus also produces daily assessments for the CSAPR Group 1 and 2 SO₂ allowances that each represents a full short ton of SO₂ emitted.

For each SO₂ and NO_x assessment, Argus publishes monthly indexes. These indexes represent the arithmetic average of the daily "price" published for current vintage allowances for each day on which prices were published. Monthly indexes are published on the final trading day of each calendar month and a table of the most recent monthly index values is published each Friday.

For Acid Rain Program SO₂, Argus publishes weekly indexes on the last business day of each week. These indexes represent the arithmetic average of the daily "price" published for current vintage allowances for each day on which prices were published during that week.

Renewable energy certificates (RECs)

Argus publishes daily and weekly markets for compliance RECs.

Argus assesses the compliance markets in Massachusetts, Connecticut, New Jersey, Pennsylvania, Maryland, Texas and California. Argus also assesses PJM Class I RECs that qualify for use in New Jersey, Pennsylvania and Maryland.

Each REC represents 1MWh of renewable power.

For the current vintage of each daily REC assessment, Argus publishes monthly indexes. These indexes represent the arithmetic average of the daily "price" published for current vintage allowances for each day on which prices were published. Monthly indexes are published on the final trading day of each calendar month and a table of the most recent monthly index values is published each Friday.

California Carbon Allowances

Argus publishes daily price assessments for forward trade agreements and futures for California Carbon Allowances (CCA) to be delivered in December of the current vintage year and following year. Argus also publishes a prompt-month CCA assessment for current vintage year allowances. Each CCA is worth one metric tonne of CO₂ equivalent (CO₂e).

For the prompt month and the current vintage year December-delivery CCA assessment, Argus publishes monthly indexes. These indexes represent the arithmetic average of the daily "price" published for current vintage allowances for each day on which prices were published. Monthly indexes are published on the final trading day of each calendar month and a table of the most recent monthly index values is published each Friday.

Argus publishes a volume-weighted average of all current compliance period December delivery trades reported and confirmed each day, along with a monthly cumulative volume-weighted average. Argus includes trades transacted from 6am-6pm ET on the day of publication in the daily volume-weighted average. The monthly volume weighted average includes trade at all hours.

Argus publishes the low and high price of the range of trade, the volume-weighted average price, the volume and the number of transactions. The volume is expressed in metric tonnes and the prices in \$/mt. The volume-weighted average is calculated by dividing the total value of all conforming trades by their total volume in metric tonnes. The daily volume-weighted average is left blank on days when no trades are reported.

$$\text{Volume-Weighted Average} = \frac{\text{Sum (Price x Volume)}}{\text{Sum (Volume)}}$$

California carbon in fuel pricing

Argus assesses the cost of compliance with California's cap-and-trade program for gasoline and diesel distributors on a per-gallon basis.

All calculations are based on Argus' front-month CCA assessment and carbon intensities from EPA MM-1 table as incorporated and implemented by the California Air Resources Board's reporting rules. Gasoline calculations assume a 10pc ethanol content. Argus CCA indexes are calculated as a monthly average of the respective summer-grade gasoline value.

Quebec carbon in fuel pricing

Argus publishes price indexes showing the cost of compliance with Quebec's cap-and-trade program for gasoline and diesel on a per-liter basis. The Quebec program is linked with California's program and allowances from the two are fully fungible. Quebec Carbon Allowances thus have the same compliance value and price as California Carbon Allowances when traded in the secondary market.

Like California, Quebec's program does not cover gasoline and diesel until 1 January 2015, but Argus is publishing these figures early based on current carbon allowance pricing to illustrate the cost of carbon on these fuels for entities preparing to be covered by the program. These price series are based on the secondary market price for CCAs to be delivered in the prompt month.

The emissions factors used in these series are published in table 30-1 of Quebec's Regulation respecting mandatory reporting of certain emissions of contaminants into the atmosphere. The series take the prompt month price for allowances and converts it in the per-liter compliance cost for gasoline and diesel. The gasoline series repre-

sents a liter with 5pc ethanol, while the diesel series assumes a liter of pure diesel. The prevailing US-Canadian exchange rate is also taken into account.

Quebec GHG emissions factors			
	Emission factor		E5
	t CO2e/kiloliter	t/liter	t CO2e/liter
Automotive gasoline	2.361	0.002361	0.002243
Diesel	2.790	0.002790	na

In addition to the daily pricing for these series Argus will publish the monthly average price on the last business day of the month.

California Carbon Offsets

Argus publishes weekly spot price assessments for carbon offsets issued by the California Air Resources Board that can be used for compliance with its cap-and-trade program. Argus assesses the prices of offsets that are sold with a guarantee against invalidation risk (golden offsets) as well as offsets that have no guarantee but a three-year invalidation window. Each California Carbon Offset is worth one metric tonne of CO2e, and covered entities can use them for up to 8pc of their compliance obligation in the program.

California carbon-adjusted spark spreads

Argus publishes calendar year carbon-adjusted marginal heat rates, spark spreads and the carbon cost per MWh of running power plants at the SP-15 and NP-15 power zones in California during peak times. The greenhouse gas emissions rate used is 0.053165 metric tonnes CO2 equivalent per mmBtu of natural gas burned. Argus also publishes the carbon costs of importing power into the state from the Western Electric Coordinating Council balancing area. Argus publishes the carbon costs for importing power from Asset-Controlling Suppliers once they have applied to regulators and been given an emissions rate by the Air Resources Board. This currently includes the Bonneville Power Administration and Powerex, the energy marketing arm of BC Hydro.

$$\text{Carbon-adjusted marginal heat rate} = \frac{\text{(Peak SP-15 day-ahead)}}{\text{(SoCal Gas Co day-ahead)} + \text{(CCA Year 1 x GHG emissions rate)}}$$

$$\text{Carbon-adjusted spark spreads} = \text{(Peak SP-15 day-ahead)} - \text{(Heat Rate x (GHG emissions rate x CCA Year 1 + SoCal Gas Co day-ahead))}$$

Argus SO2 and NOx allowance assessments						
Instrument	Description	Administering agency	Roll date	Delivery timing	Quotation	Publishing schedule
Cross-State Air Pollution Rule Group 1 SO2 allowances for year 1	SO2 allowances for Group 1 states as established under 40 CFR 51, 52, 72, 78 and 97	US Environmental Protection Agency	2 Mar	1 Mar	\$/short ton	Daily
Cross-State Air Pollution Rule Group 2 SO2 allowances for year 1	SO2 allowances for Group 2 states as established under 40 CFR 51, 52, 72, 78 and 97					
SO2 US allowances for year 1	Title IV Acid Rain allowances as defined by US EPA at 40 CFR 72.2 and elsewhere					
Cross-State Air Pollution Rule Annual NOx allowances for year 1	Annual NOx allowances as established under 40 CFR 51, 52, 72, 78 and 97					
Cross-State Air Pollution Rule Seasonal NOx allowances for year 1	Seasonal NOx allowances as established under 40 CFR 51, 52, 72, 78 and 97		1 Dec	30 Nov		

Argus RECs markets assessments						
Instrument	Description	Administering agency	Roll date	Delivery timing	Quotation	Publishing schedule
Massachusetts Class I REC for years 1-2	Primarily solar, wind, tidal or other sustainable energy as defined by Massachusetts General Law ch. 225 CMR Section 14	Massachusetts Energy and Environmental Affairs	16 Jun	15 Jun	\$/MWh	Daily
Massachusetts Solar REC for year 1	In-state solar facilities as defined by Massachusetts General Law ch. 240 CMR Section 63					Daily
Connecticut Class I REC for years 1-2	Primarily solar, wind, biomass or hydro as defined at Conn. Gen. Stat. §16-245 (a)	Connecticut Department of Public Utility Control	16 Jun	15 Jun		Daily
Connecticut Class III REC for year 1-2	Primarily waste heat recovery as defined at Conn. Gen. Stat. §16-243(q)					Weekly
New Jersey Class I REC for years 1-2	Primarily solar, wind or other sustainable energy as defined at NJ State Code §14:8-1.2, §14:8-2.2 & §14:8-2.5 §14:8-2.9 & §48:3-50 et seq.	NJ Board of Public Utilities Clean Energy Program	2 Oct	1 Oct		Daily
New Jersey Class II REC for years 1-2	Primarily solar, wind or other sustainable energy as defined at NJ State Code §14:8-1.2, §14:8-2.2 & §14:8-2.5 §14:8-2.9 & §48:3-50 et seq.					Weekly
New Jersey Solar REC for years 1-2	Solar carve-out as defined at NJ State Code §14:8-1.2 §14:8-2.2 §14:8-2.3 & §48:3-50 et seq.					Daily
Pennsylvania Solar REC for year 1	Solar photovoltaic generation as defined at 73 Pennsylvania Commonwealth Statutes § 1648.1 et seq.	Pennsylvania Public Utilities Commission	2 Sep	1 Sep		Daily
Pennsylvania Tier I REC for year 1	Tier I Pennsylvania Commonwealth Statutes 73 § 1648.1 et seq. and 66 § 2814					Daily
Texas compliance REC for year 1	Primarily solar, wind, biomass or hydro as defined at Texas Utilities Code § 39.904	Texas Public Utilities Commission	1 Apr	31 Mar		Weekly
PJM tri-qualified Class I REC for year 1	RECs from generation that qualifies for compliance with the Pennsylvania, New Jersey and Maryland Class 1 renewable portfolio standard requirements.	RECs must comply with the requirements in each of the three states	1 Jun	31 May	Daily	
Maryland Tier I REC for year 1	Primarily wind, biomass, biomethane or other sustainable energy as defined by Maryland Public Utility Companies Code § 7-701 et seq.	Maryland Public Service Commission	1 Apr	31 Mar	Daily	
California category 3 REC for year 1	Primarily biomass, solar thermal, photovoltaic, wind or other renewable energy as defined by California Public Resources Code § 25740 et seq & California Public Utilities Code § 399.11 et seq.	California Public Utilities Commission and California Energy Commission	1 Apr	Transaction-specific	Weekly	

For NP-15, day-ahead power prices at that node are used along with the day-ahead PG&E Citygates gas price.

California Low-Carbon Fuel Standard credits

Argus provides a daily spot price assessment of California Low-Carbon Fuel Standard (LCFS) credits for prompt delivery. The LCFS program requires producers and importers of transport fuels to lower the carbon intensity of their fuels 10pc by 2020 from 2010 levels and is part of the state's suite of measures to reduce greenhouse gas emissions.

Argus also publishes a cumulative month-to-date volume-weighted

average of all reported Low-Carbon Fuel Standard credit trades for delivery within two months at the end of each week and on the last business day of the month. The month-to-date volume-weighted average is left blank when no trades have been reported in the month. LCFS credits are generated by selling low-carbon intensity fuels for use in California, such as biofuels, natural gas or electricity. Fuel producers are rewarded with LCFS credits by the California Air Resources Board for the amount their fuel's carbon intensity is below that year's target. Each credit represents a metric tonne reduction in carbon intensity and prices are expressed as \$/mt.

Regulated parties are subject to annual compliance periods from 1 January to 31 December from 2011 onward. Compliance reports are

California GHG emissions factors					
	Carbon dioxide t CO2e/bl	Methane t CO2e/bl	Nitrous oxide t CO2e/bl	Total t CO2e/USG	E10 t CO2e/USG
Summer Carbob					
Regular	0.3686	0.0005	0.00596	0.00893	0.0080584
Midgrade	0.3677	0.0005	0.00596	0.008908571	0.0080391
Premium	0.367	0.0005	0.00596	0.008891905	0.0080241
Winter Carbob					
Regular	0.3676	0.0005	0.00596	0.00890619	0.0080369
Midgrade	0.3676	0.0005	0.00596	0.00890619	0.0080369
Premium	0.3679	0.0005	0.00596	0.008913333	0.0080434
Biofuels					
Ethanol	na	0.000925	0.008046	0.000213595	
Distillate					
Ultra-low sulfur diesel	0.4296	0.00005	0.000298		0.01024

Argus California carbon assessments						
Instrument	Description	Administering agency	Roll date	Delivery timing	Quotation	Publishing schedule
California Carbon Allowances for years 1-2	Greenhouse gas emissions allowances as defined under California Code of Regulations sections 95820 and 95821	California Air Resources Board	1 Jan	31 Dec	\$/metric tonne	Daily
California Carbon Allowances for month	Greenhouse gas emissions allowances as defined under California Code of Regulations sections 95820 and 95821		3 business days before last business day of month	Within 30 days		
Daily volume-weighted average California Carbon Allowances for year 1	California greenhouse gas allowances as defined under California Code of Regulations sections 95820 and 95821		26 Dec	31 Dec		
Monthly cumulative volume-weighted average California Carbon Allowances for year 1	California greenhouse gas allowances as defined under California Code of Regulations sections 95820 and 95821		26 Dec	31 Dec		
California Low-Carbon Fuel Standard credits prompt	California Low-Carbon Fuel Standard credits as defined under California Code of Regulations sections 95481 and 95485		29 Apr	30 Apr		

due with the California Air Resources Board the following year at the end of April, and fuel producers have until then to purchase LCFS credits generated in the previous year to reconcile shortfalls.

LCFS carbon-intensity point premium

These data series take the per metric tonne price of LCFS credits and translate it into standard units for the liquid fuels market to reflect the premium, or price per carbon-intensity (CI) point for each USG of ethanol and biodiesel.

The series are based on the energy density per US gallon of each fuel. The premium is calculated by multiplying the LCFS credit value by the difference between the CI of the fuel and the LCFS target for the year.

Carbon intensities are denominated in grams of CO2 equivalent per megajoule. The carbon intensities and energy densities of the fuels are set in California's regulation and through producer-specific applications to the California Air Resources Board.

The formula for calculating the LCFS premium per carbon intensity point is:

$$\begin{aligned}
 &(\$LCFS/metric\ tonne) / 1,000,000 = (\$LCFS/g) \\
 &(\$LCFS/g) * (Energy\ Density/MJ) = (\$LCFS/CI\ point)
 \end{aligned}$$

LCFS deficit costs for gasoline and diesel

These data series show the compliance costs incurred by obligated parties under the LCFS when they have to buy LCFS credits to cover the deficits generated by selling gasoline and diesel in the market.

The gasoline series assumes 10pc of the gallon is ethanol, which does not generate credits or deficits, while the rest is Carbob. The diesel series represents a pure gallon of ultra-low sulfur diesel.

Carbon intensities are denominated in grams of CO2 equivalent per megajoule. The carbon intensities, LCFS targets and energy densities for Carbob and diesel are set in California's regulation.

The formula for calculating the LCFS premium per carbon intensity point is:

$$\begin{aligned}
 &(\$LCFS/metric\ tonne) / 1,000,000 = (\$LCFS/g) \\
 &((\$LCFS/g) * (Fuel\ Carbon\ intensity/g - LCFS\ target/g)) * (Fuel\ Energy\ Density/MJ) = (\$LCFS/USG)
 \end{aligned}$$

Oregon Low-Carbon Fuel Standard credits

Argus publishes a weekly spot price assessment of Oregon Low-Carbon Fuel Standard (LCFS) credits for prompt delivery. LCFS credits are generated by selling low-carbon intensity fuels for use in Oregon, such as biofuels, compressed natural gas, or electricity. Fuel producers are awarded LCFS credits for the amount that their fuel's carbon intensity is below that year's target.

Each credit represents a one metric tonne reduction in carbon intensity. Prices are assessed weekly on Friday and are of the prevailing price in the market at 5pm Washington DC time, although market activity earlier in the week will be taken into account. Assessments are published in \$/t.

RGGI CO2

Argus assesses prices for CO2 allowances traded in the Regional Greenhouse Gas Initiative (RGGI), a nine-state CO2 trading program in the northeast. The states covered under this program are: Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New York, Rhode Island and Vermont.

Argus assesses spot and December-delivery RGGI CO2 prices for the current compliance period.

Argus also calculates a daily and monthly volume-weighted average price of transactions of the December-delivery contract reported during the trading session. Argus includes trades transacted from 8am-5pm ET on the day of publication in the daily volume-weighted average. The monthly volume weighted average includes trade at all hours.

When no trades are reported during a trading session, Argus publishes the daily price as the daily VWA. When there has been no trading activity reported during the current month, Argus publishes a null value for the monthly VWA.

Argus RGGI CO ₂ allowance assessments						
Instrument	Description	Administering agency	Roll date	Delivery timing	Quotation	Publishing schedule
RGGI CO ₂ US allowance prompt	Spot delivery RGGI CO ₂ , a limited authorization under the CO ₂ Budget Trading Program to emit up to one ton of CO ₂	RGGI Inc.	2 Mar in the year following the end of a compliance period	1 Mar in the year following the end of a compliance period	\$/short ton	Daily
RGGI CO ₂ US allowance year	December delivery RGGI CO ₂		1 Jan	31 Dec		

Argus RGGI CO ₂ volume weighted averages		
Instrument	Description	Publishing schedule
RGGI CO ₂ US allowance VWA year	VWA of RGGI CO ₂ December delivery trades in daily trading session	Daily
RGGI US allowance MTD VWA year	VWA of RGGI US December delivery trades in the month	

Argus Alberta Carbon Offset assessments							
Instrument	Description	Administering agency	Roll date	Delivery timing	Quotation	Publishing schedule	
Alberta agricultural tillage offset credits for year 1	Greenhouse gas emissions offsets as defined under Alberta's tillage system management quantification protocol	Alberta Environment	1 Apr	31 Mar	Canadian \$/metric tonne	Weekly	
Alberta renewable energy offset credits for year 1	Greenhouse gas emissions offsets as defined under Alberta's renewable energy use and quantification protocols						

For the December-delivery RGGI CO₂ assessment, Argus publishes weekly and monthly indexes. These indexes represent the arithmetic average of the daily "price" published for current vintage allowances for each day on which prices were published during that week.

Monthly indexes are published on the final trading day of each calendar month and a table of the most recent monthly index values is published each Friday.

Alberta carbon offsets

Argus publishes a weekly price for Alberta Carbon Offsets issued to projects developed in the province under government-approved protocols. Each Alberta offset credit is worth 1 metric tonne.

Argus assesses prices for offsets issued under the agricultural tillage protocols and renewable energy protocols, which are currently attracting the most market interest. An alternative compliance payment at C\$15/mt effectively serves as a price cap for Alberta offsets.

International CO₂

Argus assesses prices for Certified Emission Reductions (CERs) generated under the Kyoto protocol's Clean Development Mechanism (CDM).

The assessments in Argus Air Daily reflect the secondary trading market for the December delivery date for the current year. Prices are quoted in euros/metric tonne of CO₂ equivalent (€/t CO₂e).

Argus also publishes the spread between CERs and EU Emissions Trading Scheme Allowances (EUA) as defined in the European commission directive 2003/87/EC of 13 October 2003 which established the EU's greenhouse gas emission trading program. The spread represents the current value of the price differential between CERs and EUAs for December of the current year in €/t CO₂e.

Argus Air Daily monthly indexes			
Index	Quotation	Publication schedule	
SO ₂ US pre-CAIR monthly index	\$/allowance	Last business day of each month	
SO ₂ US monthly index	\$/allowance		
Cross-State Air Pollution Rule Group 1 SO ₂ allowances monthly index	\$/short ton		
Cross-State Air Pollution Rule Group 2 SO ₂ allowances monthly index	\$/short ton		
Cross-State Air Pollution Rule Annual NO _x allowances monthly index	\$/short ton		
Cross-State Air Pollution Rule Seasonal NO _x allowances monthly index	\$/short ton		
CAIR NO _x US annual monthly index	\$/short ton		
Massachusetts Class I monthly index	\$/MWh		
Massachusetts Solar monthly index	\$/MWh		
Connecticut Class I monthly index	\$/MWh		
Connecticut Class III monthly index	\$/MWh		
New Jersey Class I monthly index	\$/MWh		
New Jersey Class II monthly index	\$/MWh		
New Jersey Solar monthly index	\$/MWh		
Pennsylvania Solar monthly index	\$/MWh		
Pennsylvania Tier I monthly index	\$/MWh		
Maryland Tier I monthly index	\$/MWh		
Ohio non-solar monthly index	\$/MWh		
Texas Compliance REC monthly index	\$/MWh		
Green-e voluntary half-year 1 monthly index	\$/MWh		
Green-e voluntary half-year 2 monthly index	\$/MWh		
California Carbon Allowance monthly index	\$/metric tonne		
RGGI CO ₂ US allowance year monthly index	\$/short ton		
California Carbon Allowance index - regular Carbob gasoline monthly index	€/USG		
California Carbon Allowance index - midgrade Carbob gasoline monthly index	€/USG		
California Carbon Allowance index - premium Carbob gasoline monthly index	€/USG		
California Carbon Allowance index - Carb diesel monthly index	€/USG		
Quebec Carbon Allowance index - gasoline monthly index	C€/l		
Quebec Carbon Allowance index - diesel monthly index	C€/l		

Transactions and allowance transfers

Argus collects details on transactions completed in the over-the-counter market for RGGI CO₂, SO₂, NO_x, RECs, LCFS, CCOs and CCAs. The deals are collected from brokers, traders and back offices in the emissions market, and they are published in the Deals Done table in Argus Air Daily each publishing day. These deals will include over-the-counter trades, trades that are cleared through an exchange, along with trades executed purely on the Intercontinental Exchange and Chicago Mercantile Exchange.

Separately, EPA publishes transfers of SO₂ and NO_x allowances that are registered in its tracking system each business day. Argus publishes the transfers that occurred between non-affiliated companies or organizations the day prior to the Argus Air Daily publication date, including the vintage of the allowances and the number that were transferred.

Argus Air Daily weekly indexes		
Index	Quotation	Publication schedule
SO ₂ US weekly index	\$/allowance	Last business day of each week
NO _x US annual weekly index	\$/short ton	
RGGI CO ₂ US allowance year weekly index	\$/short ton	