European Daily Carbon Markets methodology

Methodology last updated: 27 January 2014

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Introduction to European Daily Carbon Markets (EDCM)

European Daily Carbon Markets (EDCM) contains independent price assessments (EUA, CER and ERU permits) for the mature EU Emissions Trading System (ETS) market, as well as in-depth analysis on price drivers, authoritative commentary on each day's trading activity and daily news. Coverage for some permits stretches back as far as 2006, and a comprehensive price history database is available for this report. EDCM is published every English working day in the evening as a PDF, with data also available through an FTP feed.

General methodology

ICIS continuously develops, reviews and revises its methodologies in consultation with industry participants. Product specifications and trading terms and conditions used are intended to reflect typical working practices prevalent in the industry.
ICIS publishes market assessments based on information continuously gathered from market participants about spot transactions, spot bid and offer levels, contract price negotiations, prices of related commodities and relevant freight costs.

ICIS does not make retrospective adjustments or changes to price assessments based on information received after publication time in all cases, or after any cut-off point specified in individual methodology documents.

ICIS regards all arm's-length transactions which meet its specification criteria as carrying equal weight.

ICIS uses proprietary models where necessary to normalise data to the typical specifications for cargo size and date ranges given for each commodity.

Some ICIS assessments are the product of calculation alone, for example in markets where insufficient market activity takes place to permit price assessment, or where a market habitually itself sets prices according to a formula. Such calculated assessments are noted as such in their detailed methodology specifications.

ICIS endeavours to cross-check all the transaction information it gathers. ICIS will not use information for assessment purposes where such checks call into doubt the accuracy of the original information, or where a transaction appears to have occurred under circumstances that render it non-repeatable or otherwise markedly unusual.

Rationale for carbon methodology

All ICIS carbon prices contained in EDCM are intended to provide a reliable and accurate measure of market value on the over-the-counter traded markets. In order to do this, ICIS has adopted an assessment methodology which is a reliable measure of market value in both active and illiquid markets.

Assessment

For markets at all stages of development, ICIS deems its assessment methodology to be appropriate. This methodology is designed to discover the tradable value of a commodity at a particular point in time. It is particularly useful in allowing a comparison in value across various geographies and for various delivery periods.

Assessments in EDCM are made at the close of the trading day, as this is the time at which most companies need to mark their positions to market and finalise their trading positions.

The Bid and Offer range published in ICIS assessments represents the highest buyer's bid and the lowest seller's offer at the relevant closing time of each market. Some companies choose to use the midpoint between this bid and offer as the best indicator of market value.

Primary price references published in EDCM are as follows:

Market	Assessments	Units quoted
EU ETS	**EUA** (Spot; Year; Year + 1; Year + 2; Year + 3) *UN issued* **CER** (Spot; Year; Year + 1; Year + 2) **ERU** (Spot; Year)	€/tonne of CO2 equivalent (tCO2e)

Recent changes to this methodology

Date	Price reference	Change
20 December 2013	n/a	Adds detail.
14 August 2013	EUAs, CERs	Updated secondary data information, after BlueNext closed
4 March 2013	EUAAs	Removed

Price assessments – General definitions

Price assessments published in EDCM represent ICIS' close-of-day bid-offer ranges for carbon in the EU ETS. The closing figure specifically represents the traded value of contracts between 16:00 and 17:00 London time for this report.

ICIS contacts active market participants daily for pricing information, typically between 16:00 and 17:30 London time. Price assessments published in EDCM are formulated by ICIS at the conclusion of this process and represent ICIS' close-of-day bid-offer ranges for carbon allowances, more commonly known as EUAs, as well as offsets, known as CERs and ERUs, for delivery in holding registry accounts in December of each quoted yearly contract. The spot contract price represents ICIS' close-of-day bid-offer ranges for EUAs, CERs and ERUs with quasi-immediate (same day or Day+1) delivery in holding registry accounts.

Closing prices are assessed at 16:00 -17:00 London time on all English working days, except on the final working day immediately preceding 25 December and 1 January each year, when these prices are assessed at 12:00 London time.

Assessments are based on bids and offers widely available to the market at the ICIS closing times above.

"Bid" is deemed to be the highest price bid by buyers at the close of business on the trading day in question.

"Offer" is deemed to be the lowest price offered by sellers at the close of business on the trading day in question.

Units: All prices are in tonnes of carbon dioxide equivalent (tCO2e), with one EUA equivalent to one tCO2e.

Price assessments – Guidelines for the exercise of judgement

ICIS gives priority to the highest bid and the lowest offer in its assessment process.
ICIS first attempts to establish a firm bid/offer spread as the basis for all of its assessments. ICIS also discovers transaction information. This transaction information is used as supporting evidence to establish market value. Where this transaction information is within the established bid/offer spread it may also be used to narrow the ICIS assessment bid/offer spread. Where no confirmed transaction or bid and offer information is available at the time ICIS assesses the market, it will use other types of market information to assess value.

The most regular form of alternative market information used to make assessments is the value of spreads, either between contracts for different delivery periods or between contracts of different permits for the same delivery period.

Where transaction information is available at the assessment time, it may be superseded by market spread information in instances where the transaction is deemed not to be repeatable. ICIS may make this judgement in cases where there is no bid/offer information immediately following the transaction to

support a movement in value. It may also make this judgement where a single deal at the closing assessment time falls outside of the prevailing range of confirmed bid/offer or spread activity at other times of day. This logic also applies to situations where a bid/offer spread at the close is uncorrelated with the rest of the day's market activity, and where ICIS can discover no fundamental reason for the change in market structure.

ICIS only uses spread information between permits where a strong price correlation has been demonstrated by past trading activity.

ICIS discovers the value of both time and permit spreads through the collection of spread trade and bid/offer information, as well as the relationship between permits issued by different entities when both outright contracts are trading.

Where ICIS uses spread information in its assessment process, it gives priority to information available for 16:00-17:30 London time. If this is not available, it will take evidence of market activity closest to this time. Where a contract typically does not trade as a spread to other permits and where there is no confirmed bid/ offer or transaction information at the time of the closing assessment, ICIS may use bid/offer or transaction information closest to this time.

Price assessments – Exclusion of data

In line with its Editorial Standards policy, ICIS reporters actively seek to identify anomalous market information and exclude it from the assessment process. For carbon market assessments, this is done by the daily information gathering and verification process carried out by reporters, whereby market transaction, bid and offer information is confirmed and verified by multiple sources. The context of ICIS reporters' knowledge of the fundamental supply/demand situation on a given market is also used to verify transaction data that appears to be anomalous but may be done at a price level explained by changes in this balance.

In assessing carbon markets, ICIS takes into consideration only arm's-length transactions between non-affiliated parties.

ICIS does not accept bids or offers that are not firm. Any bid or offer which is demonstrably not firm will be disregarded and further bids or offers from the same counterparty may also be disregarded. For example, if a company indicates to the market that it is bidding or offering at a certain price and volume but ICIS can confirm that it later refused to transact when that bid was hit or offer lifted, it will not use that company's bid/offer information.

ICIS also excludes from its assessment process transactions where ICIS reporters have reasonable grounds to doubt the transaction is representative of typical market behaviour: for example, where a deal is concluded disregarding the best bid or offer on the market; where there is evidence that a market participant has disclosed only part of its market activity to ICIS; or where a transaction lies outside the prevailing range of typical market activity as established through other market evidence.
ICIS actively seeks to verify the time at which reported transactions took place. If such verification cannot be obtained, ICIS may exclude the transaction information. ICIS records instances of anomalous data and reviews these instances on a regular basis with a view to determining if a pattern exists.

Where market reporters have concerns over the behaviour of a market participant, this will be escalated using the ICIS Escalation Process for Compliance and Regulatory Issues. This can be found in the company's Compliance Manual.

Price assessments – Width of bid/offer spreads

ICIS publishes a minimum bid/offer spread of €0.10/MWh and a maximum of €0.10/tCO2e. If the confirmed bid/offer spread is wider than this range, ICIS will narrow the spread using the alternative market evidence described above.

Price assessments – Types of market information used and collection process

ICIS gathers market information primarily via telephone, instant messenger and e-mail.

Market information includes bids, offers and deals done by sources or seen/heard by sources. ICIS reporters also investigate the reasons for market price movements. Information is typically gathered between 16:00 and 17:30 London time on the day the assessment is published. ICIS may disregard information received after 17:30 London time. On the working day immediately preceding 25 December and 1 January, ICIS assesses markets earlier and gathers information between 09:00 and 13:15 London time.

ICIS will never use information received after assessments have been published to retroactively correct an assessment.

Price assessments – Transaction data threshold

ICIS does not impose a minimum transaction data threshold on its assessment process. Alongside its role in assessing the more active and mature carbon markets, such as the EU ETS, ICIS plays a role in bringing price transparency to new markets where trading and market information can be sporadic. Such markets are not conducive to minimum data thresholds.

In the absence of both transaction and bid/offer information, ICIS procedures are described above in the "Exercise of Judgement" section.

Price assessments – Verification of sources

ICIS verifies that all sources are active participants of the European carbon market by checking they have a EU registry account to trade on the compliance market.

In addition, ICIS reporters use the indicators contained in the section entitled Validation Checks on Sources from the company's Data Standards Policy. This policy can be read in full in the ICIS Compliance Manual.

Price assessments – Definitions of periods

All periods quoted are based on Vintages as set out by the EU ETS.

Prompt

Spot: The EUA spot contract allows the near-immediate delivery of EUAs into holding accounts and can be traded OTC or via an exchange.

Curve

Years: EDCM quotes closing bid-offer ranges for yearly contracts, with relevant contracts from the current year to the third year ahead for the relevant phase of the EU emissions trading scheme with delivery in December of each year.

Other primary data tables in EDCM

Heren CO2

This number is a calculated price indication derived from primary and secondary data. To give the reader a general overview of the daily movement of the front year contract, ICIS averages its own OTC front year contract assessment, the Nord Pool front year contract settle and the ICE front year contract settle.

Spark and dark spreads

ICIS calculates its spark and dark spreads as the cost of power per MWh minus the cost of the fuel needed to generate that power. The cost of fuel is calculated using industry standard plant efficiencies to take account of energy not converted into electrical energy and therefore lost. A positive spread means that it is theoretically profitable to generate electricity for the period in question, while a negative spread means that generation would be a loss-making activity. However, it is important to note that the spreads do not take into account additional generating charges beyond fuel and carbon,

such as operational costs.

Spark spreads are calculated as the cost of power per MWh minus the cost of gas. ICIS uses the Day-ahead index for Day-ahead electricity and gas values in the UK and Germany, and the midpoint of baseload power price assessments for all other calculations from sister publication EDEM (please see EDEM methodology for an explanation of how those values are reached). Gas indices and price assessment values use data from sister publication ESGM, using the NBP for UK calculations and the TTF for German calculations, as the TTF hub is currently the most liquid gas market in the region, and is widely used as a reference for German gas prices (please see ESGM methodology for an explanation of how those values are reached).
ICIS uses the standard gas-fired plant efficiency factor of 49.13% for its spark spreads – an industry standard to allow for efficient spark spread trading – on the basis that 100,000 therms of gas could generate 60MW of power. The spark spread value is therefore the power price minus the gas price divided by 0.4913.
Spark spread = power price - (gas price/0.4913).

Dark spreads are calculated as the cost of power per MWh minus the cost of coal.
ICIS uses Baseload power price assessments for all contracts, and CIF ARA coal swaps price assessments from sister publication CSD (please see CSD methodology for an explanation of how those values are reached). The cost of coal in US dollars per tonne is converted to local currency using forward rates constructed by ICIS using currency data from Bloomberg. The cost per tonne figure is converted to MWh by dividing by 6.978, based on the energy content of coal CIF ARA coal swaps represent, which is 6,000kCal/kg NAR (net as received), and converted to MWh using conversion factors from the International Energy Agency. ICIS calculates its dark spreads using the industry standard of 35% plant efficiency.
Dark spread = power price – (((coal price converted to local currency)/6.978)/0.35).

The cost of emissions for **clean spark spreads** is calculated by multiplying the cost of carbon emissions allowances, converted to local currency where necessary, multiplied by the emissions intensity factor. ICIS uses the UK government natural gas conversion factor (dating from June 2013) of 0.18404 tonnes of carbon dioxide equivalent emitted per MWh on the basis of gross calorific value, in line with how gas is traded (http://www.transco.co.uk/services/cvalue/cvinfo.htm). The UK government figure has been chosen on the basis that the UK has the most liquid traded spark spread market. UK government carbon dioxide emissions conversion factors are issued by the Department for Environment, Food and Rural Affairs (DEFRA): http://www.ukconversionfactorscarbonsmart.co.uk/
The emissions intensity factor is calculated by dividing the carbon dioxide equivalent emitted per MWh by the standard plant efficiency. For a clean spark spread for a 49.13% efficient gas plant, the emissions intensity factor used is therefore (0.18404 divided by a plant efficiency of 0.4913). Clean spark spread = spark spread - (emissions price x (0.18404/0.4913)).

To calculate clean dark spreads, ICIS uses the Intergovernmental Panel on Climate Change (IPPC) emissions conversion factor (dating from 2006) of 0.34056 tonnes of carbon dioxide equivalent emitted per MWh of power generated from coal on the basis of net calorific value, in line with how coal is traded. The IPCC emissions conversion factor has been chosen as an international figure to reflect the coal market, and the resulting emissions factor is in widespread use within the power industry. The IPCC taskforce on national greenhouse gas inventories on energy emissions dating from 2006 can be found here: http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol2.html

The emissions intensity factor is calculated by dividing the carbon dioxide equivalent emitted per MWh by the standard plant efficiency. For a clean dark spread for a 35% efficient coal-fired plant, the emissions intensity factor used is therefore (0.34056 divided by a plant efficiency of 0.35). Clean dark spread = dark spread - (emissions price x (0.34056/0.35)).

Secondary data in EDCM

Exchange	Contract	Period	Price represented
ICE	EUA	Year; Year +1; Year + 2; Year + 3	Settlement
ICE	CER	Year; Year + 1	Settlement
Nordpool	EUA	Year; Year + 1; Year + 2; Year + 3	Settlement
Nordpool	CER	Year; Year + 1	Settlement

For more information see:

ICE: https://www.theice.com/emissions.jhtml

Nordpool:
http://www.nasdaqomx.com/transactions/markets/commodities/markets/marketprices

Other principles and guidelines

Changes to methodology

All markets evolve, and ICIS has a duty to ensure its methodologies for market-reporting evolve in step with markets. ICIS therefore regularly conducts internal reviews of the appropriateness of its methodologies. Draft changes are then made public and comment requested from industry participants, with a minimum one-month notice period, except where, exceptionally, a force majeure event (natural disaster, war, bankruptcy of a trading exchange etc) makes necessary a shorter notice period.

ICIS is committed to reviewing all comments on proposed methodology changes, but in some cases may find it necessary to alter its methodologies against the wishes of some market participants.

In addition, ICIS has a formal methodology consultation process. The company commits to holding this consultation every two years for EDCM.

Please also refer to the Methodology Consultation Process section of the company's Compliance Manual. This contains detailed flow charts documenting the internal and external review and consultation process.

Consistency

ICIS achieves consistency between its assessors in exercising their judgement by requiring all assessors to understand and follow this detailed methodology as well as the company's Editorial Standards document. In addition, ICIS employees are required to complete standard training before undertaking the work of a market reporter. Every reporter's work is peer reviewed daily and spot checked by senior management. Adherence to these processes is documented at every stage.

Data standards

ICIS has a public Data Standards Policy which covers the type and quality of information it asks market participants to report. The following principles relate to ICIS carbon market assessments and comment:

- Where possible, please allow access to active market traders and allow them to comment on active news stories.
- Where possible, please provide market data from both front and back-office functions.
- Where possible, please provide complete data and not a subsection.
- Flag inter-affiliate transactions.
- Flag sleeve trade.
- Flag spread trades.
- When a source or contact leaves the organisation please contact ICIS to the replacement (ICIS requests that both the source and the organisation contact them).
- Where information is not validated by the source (i.e. rumour) please indicate as such.

Delivery locations

Allowances and Kyoto Units are held, traded and surrendered for compliance purposes via the European Union Registry, which is an online database hosted and managed by the European Commission.

The EU ETS Union Registry operates similarly to an online bank account. The registry system is a web-based application that records:

- CO2 allowances and units allocated to and held in operator, person, trading and government accounts
- the movement of allowances and units between accounts (including allocations, transfers, surrender and cancellations)
- annual verified emissions of installations and aircraft operators
- annual compliance status of installations and aircraft operators

An account holder can hold, transfer, cancel or acquire EU Allowances and eligible Kyoto units.
The European Union Transaction Log (EUTL) checks, records, and authorises all transactions that take place between accounts in the European Union registry. The EUTL can be viewed online and provides detailed information on the compliance of EU ETS operators, Union Registry account holders and transactions between accounts.

Computerised registries are key components of the EU ETS and wider international emissions trading under the UN Framework Convention on Climate Change's (UNFCCC) Kyoto Protocol.

From June 2012, registry systems were brought together to a single registry system, operated and managed by the European Commission. Each Member State now has its own national administrator and national registry

section within the single Union Registry.

Key submitter dependency

Because of the sometimes thinly-traded nature of certain permits being traded and the existence of a limited pool of active counterparties, ICIS does not employ minimum rules on the number of submitters.

For all markets ICIS only considers bid/offer data to be confirmed when it has been verified by three independent, non-affiliated sources.

Market communication

ICIS communicates with a broad range of market participants – traders, brokers, back-office employees, supply managers, operations personnel and company executives – to obtain market information. ICIS communicates with participants by telephone, email, instant messenger and face to face. All instant messenger, email communication and notes of any face-to-face communication are archived and details of telephone communication are logged and data-based. ICIS does not accept instant messenger communication from unknown parties, and reporters are required to verify a market participant's identity prior to using instant message communication.
ICIS does not regard in any way as binding, attempts by market participant companies to restrict ICIS communication with their employees. ICIS has a duty to its subscribers to obtain the maximum possible amount of market information. ICIS treats all communication from market participants as confidential.

ICIS reporters are bound by a Code of Conduct to report to their superiors any coercive or threatening communication from market participants, or any offers of inducements of any kind intended to influence an assessment.

Where improper communication appears to have taken place, ICIS will communicate in the first instance with senior management at the company or companies involved, and if necessary with relevant market authorities. ICIS expects the highest standards of propriety from all market participants, and regards all communications from market participants as representative of the views of an individual's employer. ICIS is committed to the highest levels of customer service, and has a formal feedback and complaints policy, which can be viewed here http://www.icis.com/about/icisfeedback-policy/.

Market data verification

ICIS will always make best endeavours to confirm bids, offers and transactions with the relevant party/parties. ICIS attempts to cross-check all market data received from a buy or sell-side participant with a participant's trading counterparty. Where both counterparties to a transaction cannot or will not confirm the data, ICIS seeks corroboration from other market sources.

Where transaction or bid/offer information has been received from a trader rather than from a company's back office, ICIS always seeks confirmation from other sources.
Where ICIS has grounds to doubt an item of market data, it may request further evidence that a transaction has taken place, including documentary evidence.

ICIS treats transaction data received from active brokerages as confirmed and treats bid/offer information as firm. This information will be considered in conjunction with other sources during the assessment and index process as described above.
In markets with low liquidity and a low number of counterparties, ICIS may choose to use unconfirmed data, but only in so far as it is aligned with other market information and comes from a source deemed reliable by ICIS based on previous interactions.

Minimum data threshold

Because of the sometimes thinly-traded nature of certain carbon markets and contracts, ICIS does not have a minimum data threshold for its assessment methodologies in these markets. ICIS' carbon methodology is designed to function accurately under all market conditions and to make use of parallel data where no direct transaction or bid/offer data is available. See the section entitled "Price Assessments – Exercise of Judgement" above.

Quality specifications

The EU ETS market makes use of two types of carbon credits – EU allowances (EUAs) and UN offsets (CERs and ERUs).

EUAs are directly and (mostly) predictably issued by the EU, in line with the agreed cap and installations individual allocations.

Offsets' issuance depends on UN approval of clean development mechanism (CDM) or joint implementation (JI) projects. However, the EU has put offset quality restrictions and use limits in place for EU ETS compliance. EU companies can offset their emissions

using CER credits generated by projects in the developing world under the UN's CDM.

As of 1 January 2013, only CERs from projects registered in the world's Lowest Developing Countries (LDCs) are eligible in the EU's ETS. The ban does not apply to CERs from projects registered before 31 December 2012.

Similarly, for every ERU issued, the Joint Implementation (JI) project host country has to retire one Assigned Amount Unit (AAU) to avoid double counting. But AAUs for the second Kyoto commitment period (2013-2020) are only due for issuance after its ratification in 2015. This means ERUs cannot be issued to projects cutting emissions post-2012 at present.

Units

ICIS assesses the carbon market in one standard unit, euros per tonne of CO2 equivalent (€/tCO2e).

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