



# European Clean Energy Markets Methodology

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## Introduction to European Clean Energy Markets (ECEM)

European Clean Energy Markets (ECEM) contains independent price assessments and indices for European renewable energy certificate markets, as well as in-depth analysis on price drivers, authoritative commentary on each month's trading activity and news.

ECEM is published on or after the 22<sup>nd</sup> of every month 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 and tender price negotiations, prices of related commodities, and relevant transmission 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 methodology

All ICIS renewable and electricity certificate prices contained in ECEM are intended to provide a reliable and accurate measure of physical market value on the over-the-counter traded markets.

### Assessment

For markets at all stages of development, ICIS deems its assessment methodology to be appropriate.

Assessments in ECEM 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 physical trading positions.

Some companies choose to use the midpoint between this bid and offer as the best indicator of market value.

ICIS assessments reflect the value of the market at the last point of liquidity for that market. The last point of liquidity is defined as the latest time of day when a wide range of market participants based in that market's local time zone are still actively trading and available to be contacted for information.

ICIS uses transaction data as well as bid and offer data in its assessment process. Transaction information is used to verify bid or offer information when available.

Where a transaction can be confirmed at exactly the time of the published market close, it will not necessarily supersede a firm bid-offer spread. This is because on the more active energy markets, ICIS considers the depth and continuity of bid/offer information to be the most reliable measure of market value. On the less active contracts, there will not typically be a transaction exactly at the ICIS published assessment time. See the section entitled "Exercise of judgement" below.

## Primary price references

ICIS assesses renewable energy prices and certificates in Europe thus:

Region	Assessment name	Frequency	Method	Units
UK	ROC (bid-offer spread)	Monthly	Assessment	£/ROC
UK	UK renewable power receiving 0.25 ROC	Monthly	Calculation	£/MWh
UK	UK renewable power receiving 0.5 ROC	Monthly	Calculation	£/MWh
UK	UK renewable power receiving 0.9 ROC	Monthly	Calculation	£/MWh
UK	UK renewable power receiving 1.0 ROC	Monthly	Calculation	£/MWh
UK	UK renewable power receiving 1.5 ROC	Monthly	Calculation	£/MWh
UK	UK renewable power receiving 2.0 ROC	Monthly	Calculation	£/MWh
UK	UK renewable power receiving 5.0 ROC	Monthly	Calculation	£/MWh
UK	Buy-out price	Monthly	Calculation	£/ROC
Sweden /Norway	Nordic Renewable Energy Certificates	Monthly	Assessment	SKr

## Recent changes to this methodology

Date	Assessments	Change
22 November 2011	All	Document
04 September 2012	All	Minor changes throughout
24 August 2015	All	Methodology change replacing the renewable obligation certificates (ROCs) calculation method, including the Redistributed Buyout Fund, with an assessment of the over-the-counter market. Calculation of levy exemption certificates (LECs) ceased to reflect UK government policy changes ending the scheme. Nordic certificates published as bid-offer spread. Greater detail on price assessment methodology added.
22 September 2015	All	Removes the UK clean electricity price assessments based on receiving 3.0 renewable obligation certificates (ROCs), and replaces these with 0.9 ROCs. Nordic certificates published as bid-offer spread only in line with other price assessments, removes reference to midpoint. Removes the Redistributed Buyout Fund price references, as this is no longer quoted separately.

ICIS continually develops, reviews and revises its methodologies in consultation with industry participants. Product specifications and trading terms and conditions used aim to reflect typical working practices prevalent in the industry.

## Price assessments

### General definitions

All price assessments published in ECEM represent ICIS' close-of-day bid-offer ranges.

Assessments are based on bids and offers widely available to the market closest to the typically observed last point of liquidity. "Bid" is deemed to be the highest price bid by buyers at this time.

"Offer" is deemed to be the lowest price offered by sellers at this time.

ICIS assesses renewable electricity certificates at 16:30 London time for each market on publication day. It does not consider bids and offers and transactions made available to the market after these times, except as indicators of market trend over the ICIS close.

### 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 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 only a bid or offer is available, or where the bid/offer spread is wider than the ICIS published maximum (see section below: "Width of bid/offer spreads"), confirmed spread information may take priority over bid/offer information in forming the assessment. The value of component periods within a given contract will typically be used where confirmed market information is available for these component periods and not the contract itself. Similarly, where confirmed market information is available for a contract for a longer delivery period, this will typically be used to assess component contracts.

Where transaction information is available, 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 latest point of liquidity 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 may also disregard transaction information where the deal is for a contract with a delivery period overlapping another more liquid contract, and where market information for the more liquid of the two indicates a different price level or price trend. This is because on actively traded markets, participants do not typically leave arbitrage between a contract and its constituent parts.

In the absence of any of the above market information, ICIS may use other types of market data, including but not limited to tender results, contract conditions and related derivative contracts. This type of data will typically only be used in markets in the early stages of development.

## Data used key

For each assessment published in ECEM, ICIS gives a concise description of which type of market data was used to form the assessment. This is done using a standardised key code. A single letter published alongside the assessment denotes the type of information used as the primary basis for the assessment. Any other type of information ICIS may have gathered for that assessment can be considered as supporting and of secondary importance in the formation of the assessment.

The definition of the key is as follows:

B – Bid/offer

T – Transaction

S – Spread

F – Fundamentals

I – Interpolation/extrapolation

## 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 energy 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 the physical market.

In assessing renewable electricity certificate 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.

## Indicative assessments

ICIS seeks confirmation of bids and offers from at least three independent and non-affiliated market participants in order to assess a price as non-indicative. If spread value has been confirmed at the latest point of liquidity and the price of the related outright contract value has been confirmed, ICIS will not mark an assessment as indicative.

ICIS will not publish a bid/offer spread wider than £1.00/ROC. If the confirmed bid/offer spread is wider than this range, ICIS will narrow the spread using the alternative market evidence described above and mark the assessment as indicative.

If a stand-alone transaction is confirmed and conforms to the ICIS methodology, but no bid-offer information is available, ICIS will either confirm the transaction level conforms to spread information available at the latest point of liquidity on that market, or otherwise mark that assessment as indicative.

## Width of bid/offer spreads

ICIS publishes a minimum bid/offer spread of £0.05/ROC, or SKr0.05/elcertificate, and a maximum of £1.00/ROC or SKr10.00/elcertificate.

## Types of market information used and collection process

ICIS gathers market information primarily via telephone, instant messenger and e-mail. Lists of transactions are primarily collected electronically and ICIS employs a data management team to collect and de-duplicate this data. ICIS has designed bespoke programmes to standardise the various data feeds received, for the purposes of reporter verification and publication.

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 and cross-check information received against market fundamentals data, primarily gathered from transmission system operators.

Information is typically gathered between 10:00 and 17:30 London time on the day the assessment is published. ICIS may disregard information received after 17:30 London time.

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

## 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 markets, 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.

ICIS does impose a minimum data threshold on its indices, however (see section below: “DEFINITION OF HEREN INDICES”).

## Verification of sources

ICIS verifies that all sources are active participants in the European markets by checking they have a shipper and/or supplier licence or are registered to trade at a relevant venue.

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

### Renewable Obligation Certificate (ROC)

Renewable Obligation Certificates are issued to renewable generators enrolled in the Renewable Obligation subsidy scheme in England, Wales and Scotland by British regulator Ofgem. The number of ROCs issued to each plant per MWh vary according to criteria including technology, size and location. The ROCs can then be sold directly or indirectly to suppliers who will redeem them against their Renewables Obligation.

The ROC price assessment represents ICIS' close-of-day bid-offer ranges for a single ROC certificate issued in a certain compliance period traded on the over-the-counter (OTC) market.

Assessments are based on bids and offers available in the market and reported to ICIS.

Prices for the compliance period (CP) profile quoted are for ROCs valid for that compliance period, delivered during the specified delivery period.

ROCs are valid for the compliance period they were issued in, but can be carried over into the next compliance period.

Please see Ofgem's website, as the scheme administrator, for more information.

<https://www.ofgem.gov.uk/environmental-programmes/renewables-obligation-ro>

The spot prices refer to ROC prices for certificates that can be used in the current compliance period, to be delivered as per contract terms.

Compliance periods (CPs) run for 12 months beginning on 1 April. The first – CP1 – began on 1 April 2002.

The CP+1 contract refers to the upcoming compliance period, with CP+2 the following period, and so forth. So for a price quoted in July 2015, the CP+1 contract would refer to the compliance period from 1 April 2016 to 31 March 2017.



## ICIS UK Renewable Power Price Assessments

ICIS assesses the forward wholesale price of electricity generated from renewable sources to be delivered over monthly, quarterly, seasonal and annual delivery periods.

The UK OTC wholesale power price is assessed each UK working day by ICIS. Assessments are published in European Daily Electricity Markets (EDEM) and not in ECEM. They are one component in the renewable power price assessment process. For the purpose of ECEM assessments, ICIS uses the EDEM wholesale power price at the close of the day, on the working day prior to publication.

For the full methodology of ICIS UK power assessments, please go to the ICIS website at <https://www.icis.com/compliance/reports/european-daily-electricity-markets/>

The April annual assessment period begins in line with the start of the second quarter.

Each assessment represents the price of renewable electricity to be delivered on each day of the relevant period.

ROCs are banded by renewable technology, so that a different amount is awarded per MWh generated, dependant on the technology type.

The future market price for power generated from renewable sources in the UK is the sum of two primary factors:

- The midpoint of the wholesale power price, as assessed by ICIS in EDEM
- The midpoint of the ROC value, as assessed by ICIS

The UK renewable electricity price is calculated by adding the midpoint of the UK wholesale power price to the midpoint of the ROC OTC assessment allowing for the number of ROCs issued per technology.

ICIS' forward clean power price assessments will be modified in line with the results of any Renewable Obligation Certificate (ROC) banding reviews carried out by the UK's Department of Energy and Climate Change (DECC).

Grandfathering under the renewables obligation (RO) is accounted for in ICIS' forward clean power price assessments.

## Buy-out price

The buy-out price is the price electricity suppliers pay to Ofgem for any ROCs they do not present towards their compliance obligation.

ICIS publishes the buy-out price as a reference to enable traders to compare the current traded price with the buyout price, typically the minimum amount for which a ROC could be redeemed.

The buy-out price is index-linked to the retail prices index (RPI) measure of inflation. It is adjusted to reflect the RPI rate published monthly by the Office for National Statistics.

Please see <http://www.ons.gov.uk/>

ICIS publishes the buy-out price for the ongoing compliance period and the most recently completed compliance period, taking the figure from Ofgem's data available at <https://www.ofgem.gov.uk/environmental-programmes/renewables-obligation-ro/information-suppliers>

Ofgem officially announces the buy-out price for the coming compliance period (CP) in early February, approximately two months before the CP begins.

Once Ofgem has announced the official figure, this is reflected in the ICIS published buy-out price for the compliance period.

ICIS also publishes the buy-out price for compliance periods that follow. The forward buy-out price projections are calculated by multiplying the buyout price value for the current compliance period with the official inflation figures. ICIS updates monthly inflation figures as they are published by the Office for National Statistics (ONS). These are used to calculate the upcoming compliance period (CP +1).

Where the official inflation rate has not yet been published, forecasts published twice annually by the Office for Budgetary Responsibility (OBR) are used. <http://budgetresponsibility.org.uk/category/topics/economic-forecasts/>

## Nordic Renewable Energy Certificates

The Norwegian-Swedish electricity certificate (or Elcertificate) market covers green electricity certificates produced in Norway and Sweden.

Green power producers are issued certificates corresponding to the production from installations approved by NVE and the Swedish Energy Agency.



Eligible new power plants receive one green certificate per megawatt-hour (MWh) of electricity generated, regardless of the technology. Electricity consumers are required to buy these on the market to comply with a mandatory quota.

Please see NVE's website for more information, as one of the scheme's administrators, along with the Swedish Energy Agency (Energimyndigheten) in Sweden.

<http://www.nve.no/en/Electricity-market/Electricity-certificates/>

ICIS assesses the spot price for a single Nordic renewable energy certificate traded on the OTC market, as well as forward prices for the next three compliance periods. The spot price is used to assess all contracts which form part of the ongoing compliance period.

The compliance periods run annually until 31 March each year.

Information contributing to the assessment is gathered in line with the ICIS standards and methodology.

## Secondary data in ECEM

### UK Inflation

The retail prices index (RPI) measure of inflation is published monthly by the Office for National Statistics. Please see <http://www.ons.gov.uk/ons/publications/index.html> for more details.

## 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 ECEM. The date of the last consultation launched and the expiry date by which the company commits to conducting the next consultation can be seen at the top of the methodology document.

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.

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 energy market assessments and commentaries:

- 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 contacts them).
- Where information is not validated by the source (i.e. rumour) please indicate as such.

## Delivery locations

Locations for ICIS ECEM assessments are chosen to reflect areas of traded liquidity.

## Key submitter dependency

Because of the sometimes thinly-traded nature of certain renewable electricity markets and the existence of markets where there are a limited pool of active counterparties, ICIS does not employ minimum rules on the number of submitters. This is particularly true of the newest European traded markets, where ICIS plays a key role in bringing price transparency and efficient trading to markets in the early stages of development.

For all markets ICIS only considers bid/offer data to be confirmed when it has been verified by three independent, non-affiliated sources. If this was not the case then ICIS will mark an assessment indicative. See section above, “Price Assessments – Indicative Assessments”.

## 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/icis-feedback-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 energy markets and contracts, ICIS does not have a minimum data threshold for its assessment methodologies in these markets. ICIS’ renewable electricity 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.

ICIS does implement a minimum data threshold for its indices, however. ICIS will not typically publish an index until it has at least six months’ worth of data showing that at least 10 deals have been completed for each index period.

When an index series is launched, ICIS publishes a minimum number of transactions an index must meet in order for a weighted average to be calculated. If the number of deals falls below this threshold, ICIS reverts to a default methodology using its assessments or previous index values. These defaults are specified above in the section entitled “Indices – definitions”. ICIS does not consider such methodology switches desirable in terms of consistency and transparency and endeavours not to launch an index where it believes there is a likelihood that the minimum data threshold will not be met.

## Selection of participants

ICIS’ policy on general market data is that it welcomes all information regardless of source or constitution as long as it is provided in good faith as true.

However, only active market participants verified as such by existing active industry participants and verified as a viable business by ICIS investigations will be allowed to contribute price data to ICIS for the purpose of assessing tradable market value under this methodology.

## Units

ICIS assesses renewable electricity markets in the units which attract the majority of trade. For UK renewable energy trading areas quoted by ICIS, trading activity takes place in £/ROC, while Nordic electricity certificates trade in Swedish krona (SKr).

Units of energy are used for trading purposes in all active European markets, rather than units of volume.

In the early days of market development, however, there may be multiple units trading. ICIS will typically assess using the most regularly traded unit and publish parallel assessments in other active units.

## ICIS contact details

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