



LOW CARBON
CONTRACTS COMPANY

CfD Dashboards Guidance

Version 2 – January 2020



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Disclaimer

This guidance does not constitute legal or investment advice and should not be relied upon as such. Anyone using the guidance document should consult their professional advisors where they require advice, whether legal or otherwise. This guidance should be read in conjunction with the “Forecasts and Dashboards – Notice of Disclaimer” available on the Scheme Dashboards section of the website.

LCCC further reserves the right to amend this guidance and any associated guidance from time to time.

Dashboard descriptions

1. Actuals Dashboards

The historical Reconciled Daily Levy Rates (i.e. what CfD contracts have actually cost over a given day, divided by actual Eligible Demand) and the underlying Eligible Demand itself are published on the dashboards at daily granularity, from the beginning of the CfD scheme. For information on setting and reconciling the levy, see sections 5-9 below. Given that data can be updated on each settlement run performed by Elexon, we give the option to obtain the reconciled daily data by settlement run in our backing data, available at the CfD dashboard navigation level.

The Historical Dashboard also contains historical CfD generation, CfD payments, Market Reference Prices, Interim Levy Rate (ILR), avoided GHG emissions, avoided cost of GHG emissions and demand data. Data can generally be viewed at various granularities and may be able to be filtered by technology, allocation process and connection type.

The estimated GHG avoided from the CfD portfolio is calculated using the actual CfD generation and the BEIS annual generation-based long-run marginal emission factors. In this analysis, the emission reduction value for each contract is fixed across the term of the contract, at the BEIS annual value in the year that generation starts for each CfD. These emission factors have been used as counterfactuals for estimating the GHG emissions displaced by each CfD. The GHG avoided cost is calculated using the estimated GHG savings, the GB Carbon Price Support (CPS) and spot European Union Allowance (EUA) traded prices in respect of that period.

2. Levy Dashboards

The first set of dashboards in this section relates to the Interim Levy Rate and Total Reserve Amount, and the data used to derive these. The first dashboard shows key figures for the quarter selected, while the second shows the forecast capacity, generation, weighted average strike price and average market reference price for each technology in the operating CfD portfolio. The last dashboard shows forecast generation, forecast CfD payments and forecast Supplier payments, all of which can be shown at a daily granularity, plus a graph showing Market Reference Prices and how they vary over the quarter in question. Backing data can be obtained via our download function at the CfD dashboard navigation level.

The second set of dashboards relates to the further 15-month forecast of ILR and TRA, for the three quarters beyond the last quarter for which the Levy has been set. The dashboard shows the base, high and low assumptions for CfD generation, and the forecast payments, Levy rate and Reserve Amounts given the base, high and low assumptions.

The third set of dashboards provides “in-period tracking”, comparing the forecast against the realised values for the current Quarterly Obligation Period, and provides an estimate of the reconciliation payment to be made to electricity suppliers. See section 7 below for more detail.

For information on setting and forecasting the Levy and Reserve Amounts, see sections 5-9 below.

3. Forecast Dashboards

The first chart shows LCCC's long term forecast of CfD generation by financial year (April to March) including the bespoke contract for Hinkley Point C. It also contains forecast avoided GHG emissions. The forecast generation includes output for projects after the term of the CfD. All projects are assumed to run for a further ten years after the end of their CfD support period. Avoided GHG emissions are calculated based on BEIS generation-based long-run marginal electricity emission factors. A constant emission factor is used for each contract, fixed at the value extant in the year that generation starts for each contract.

The second chart shows the forecast generation weighted average strike prices for each allocation process, including Hinkley Point C. The weighted average strike prices of the overall CfD portfolio (as selected by the available filters) are also shown as well as a forecast of annual wholesale power prices.

In these dashboards, the information can be filtered by technology, the allocation process the generators were awarded contracts under, and connection type (transmission or distribution).

4. Portfolio Dashboards

This section shows the CfD cumulative Installed Capacity profile over time, plus the number of contracts starting to receive CfD payments in each period and their Installed Capacity. Both these dashboards can be shown at various granularities, and can be filtered by technology. The latter can also be filtered by allocation process. A final dashboard shows the number of contracts that are pre- and post-start date, as well as the number of terminated projects, all of which can be filtered by technology and allocation process. The data in the Portfolio Dashboards is sourced from the CfD Register, but visualised so that users can see and interrogate the information more easily.

Supplier Obligation Levy

5. Introduction

LCCC is responsible for ensuring that payments are made to and from Contracts for Difference (CfD) generators in accordance with their individual contracts.

CfD Payments to/from generators can be described as:

$$(\text{Strike Price} - \text{Market Reference Price}) \times \text{eligible generation}$$

where the Strike Price is part of the generator's contract, set administratively (in the case of Investment Contracts) or by auction, before the contract was signed, and the Market Reference Price is a price dependent on the traded value of electricity in the market. There are two types of Market Reference Price, depending whether the CfD generator is variable like wind and solar, or can run flat-out like biomass generators running on wood pellets.

CfD generation is forecast on an hourly basis alongside an hourly market price forecast. Each CfD has its Strike Price. The difference between this Strike Price and the Market Reference Price in each Settlement Unit (a period of time), multiplied by the forecast eligible generation in that Settlement Unit, generates a difference amount forecast for each CfD project. Generator difference payments are made daily, and are calculated by summing payment forecasts over all the Settlement Units in each day.

LCCC forecasts the total cost of these payments over a quarter (e.g. January – March). It recovers the cost from electricity suppliers (companies which bill individual consumers) according to their total eligible demand (in MWh). There is significant uncertainty around the costs, as described in sections 2 and 6 below, so LCCC performs many different simulations of the total cost (and eligible demand) and calculates the average.

This is used to set the **Interim Levy Rate** (ILR, in £/MWh). The 95th percentile of these simulations is used to calculate the **Total Reserve Amount** (TRA, in £) which is paid by suppliers according to their market share.

After the end of the quarter there is a reconciliation process where unused money from the ILR and TRA obtained from suppliers for the previous quarter is returned to them or, more accurately, is netted off their invoice for their contribution to the TRA for the next quarter. We also provide the industry with a **15-month forecast** of the Interim Levy Rate and Total Reserve Amount which gives our view on how we might set the ILR/TRA for a further three quarters after the quarter for which we are making the legal determination. We provide a base case, which we are required to provide by law, and a low and high case to illustrate the range of reasonable uncertainty over the figures.

6. ILR and TRA

Definition of Interim Levy Rate (ILR)

The Interim Levy Rate can be described as:

$$\text{Total (expected) quarterly CfD payments to generators} / \text{Total (expected) quarterly Eligible Demand}$$

The term “interim” reflects the fact it is based on a forecast, and it is a single figure for the whole quarter. However, when actual data is available, the effective levy rate for the purposes of the reconciliation will vary from day to day.

We calculate the Interim Levy Rate so that the amount collected from suppliers, based on forecast Eligible Demand in the Quarterly Obligation Period, covers the forecast accrued payments to be made to CfD generators for the Quarterly Obligation Period. The ILR is the average of our simulations.

Definition of Total Reserve Amount (TRA)

LCCC is required to hold the Total Reserve Amount so that there is a 19 in 20 (i.e. 95%) probability of LCCC being able to make all the payments required to CfD generators during the Quarterly Obligation Period using the money collected from the ILR and TRA for that quarter. The TRA is paid by suppliers according to market share. The TRA needs to reflect not only the uncertainty in the forecast (using our simulations), but also the timing of payments. This is significant because the ILR is set to be constant over the quarter, but the expected costs will generally not be constant over the quarter, e.g. due to seasonality.

Areas of uncertainty

The Total Reserve Amount reflects the uncertainties which could lead to payments being higher than forecast in the calculation of the Interim Levy Rate. Within the forecasting model, the main variables driving uncertainty in the determination of the Total Reserve Amount through our simulations are:

- Power price uncertainty leading to variation in both the Intermittent Market Reference Price (IMRP, used for variable generators like offshore wind) and Baseload Market Reference Price (BMRP, used for generators like biomass which are dispatchable and capable of running at high load factors).
- Intermittent generation uncertainty (wind and solar generation).
- Unplanned plant outages which we do not know about at the time of making our forecast.

These variables lead to uncertainty in the total amount of CfD payments that will be made.

In addition, LCCC models uncertainty due to other factors, including variations in Eligible Demand, that lead to uncertainty around the unit rate (in £/MWh) of that cost.

Managing cashflow timing using the TRA

In addition to taking into account cost and Eligible Demand uncertainties, the Total Reserve Amount also addresses the timing of payments.

The actual cashflow receipts and payments are generally not even over the quarter for several reasons. For example, wind speeds and therefore wind generation follows an annual pattern, with highest wind speeds in the winter and lowest in the summer. The seasonality in market prices can also impact the expected payments.

7. In-Period Tracking

Determinations of the ILR and the TRA are made by LCCC three months in advance of the quarter to which they relate.

It is reasonable to expect that some factors and/or assumptions may change after the initial ILR and TRA determination. Also, the actual generation by CfD generators or demand by suppliers may differ from the projected generation or demand.

The purpose of the “in-period tracking” dashboard is to provide comparative information within the current Quarterly Obligation Period. In this process we compare the projected CfD difference payments to generators with actual difference payments. We also compare the projected ILR receipts from suppliers with actual ILR receipts. This dashboard also shows the impact of revised forecast assumptions after the determination of the initial ILR and TRA.

This dashboard is typically updated each week to show the cumulative comparative totals for the period, as actual figures are obtained based on invoices and/or credit notices issued to suppliers and generators. Invoices and credit notices are issued seven business days after the date of electricity supply or generation. Each time we update the tracker, we provide an updated view of the likely money to be returned to suppliers at the quarterly reconciliation.

8. 15-Month Forecasts

In addition to the quarter ahead ILR and TRA, we provide the industry with longer-term forecasts of the ILR and TRA. This means that, in addition to setting the ILR and TRA for the relevant quarter in accordance with the regulations, we also provide forecasts for three further quarters.

The 15-month forecast is produced using the same model and methodology used for setting the ILR and the TRA. In addition to the base case (required by legislation), we produce high and low case forecasts to give an indication of variability around the base case.

While the 15-month forecast is subject to the same uncertainties which surround setting the ILR and TRA, these are accentuated because of the longer time horizon.

The 15-month forecasts are updated each quarter on a rolling forward basis.

Uncertainties in the current forecast

The main sources of uncertainty in the 15-month forecast are generation start dates and market prices. In the base case we use our best view of assumptions, and use sensitivities (low and high) to illustrate the effect of variations of the base assumptions.

Generation Start Dates and Installed Capacity Estimates

- Our [CfD Register](#) sets out “generators’ expected Start Dates” as well as the Installed Capacity Estimates (ICEs) for all CfDs and Investment Contracts.
- The 15-month forecasts are informed by the start dates and ICEs set out in the CfD Register, but are augmented with more recent information (if such exists) provided by CfD generators, as well as our own assessments informed by market intelligence, such as planned outage information. If LCCC has received a notice of the Final Installed Capacity (FIC) from CfD generators, this will be used.

Market Prices

- UK electricity forward market prices can be volatile, with many factors that could cause sudden spikes or drops in prices at short notice. Due to this variability, the sensitivity cases included in this set of 15-month forecasts show the effect that deviations in market prices from the base case forecast would have on the ILR and TRA during the 15-month forecast period.

9. Main assumptions

Demand forecast

We produce forecasts of GB National Demand and of Gross Demand (the total metered consumption by end consumers) and use these as inputs when determining the ILR and TRA. These demand forecasts make use of historic data including weather and demand and are produced for up to two years ahead.

Eligible Demand

For the ILR forecast calculations, Total Eligible Demand (TED) is derived from the forecast of Gross Demand with deductions for Energy Intensive Industries (EII) exemptions. The calculations of the daily reconciled levy rates also include deductions for Green Exempt Electricity (GEE).

Commodities

Commodity prices are used in the modelling to simulate the marginal cost of power plants in Great Britain. The source of each commodity price we use can be found below. Gas is calculated at the GB National Balancing Point (NBP). Coal is calculated using an index called API2. Carbon is calculated using the UK carbon floor price plus the EU Emissions Trading Scheme (ETS) price.

Where non-sterling prices (US\$ and Euro) are published, exchange rates sourced from the Bank of England are used to convert into pounds sterling.

For some commodities, such as nuclear fuel cost, we use the Department of Business, Energy and Industrial Strategy (BEIS) Dynamic Dispatch Model assumptions (DDM assumptions).

Commodity	Price source	Currency conversion
Gas	Marex Spectron – NBP	None
Coal	Marex Spectron - API2	Converted from USD
Carbon	Marex Spectron – EU ETS	Converted from EUR
Biomass	DDM assumption	None
Oil	DDM assumption	Converted from USD

Power price calibration

After having modelled a future price using our dispatch model, we compare the forecast price with actual market prices.

We then adjust our average modelled prices (i.e. we maintain the modelled shape) so that the average price is consistent with the latest available market data on the date of the model run.

The forward curve used to perform this calibration is based on data from Marex Spectron (and in some cases season-ahead trade data from the London Energy Brokers Association (LEBA)). For this purpose, month-ahead, quarter-ahead and season-ahead prices are used depending on which contracts have traded data available at the time of calculation.

Estimates of the Baseload Market Reference Price and Intermittent Market Reference Price

The BMRP, which is used to calculate payments for baseload CfD generators, is calculated using season-ahead forward baseload traded volume weighted daily average prices. These prices, based on data received from LEBA, are averaged over the six months prior to the start of the season. The formula for the CfD BMRP is set out in the CfD Standard Terms and Conditions, the various versions of which are published on the gov.uk website. The latest version is available [here](#).

The IMRP is defined for each hour based on the day-ahead prices from eligible power exchanges. Our power market model forecasts the IMRP used to calculate the ILR and TRA.

New generators

Where new generators are expected during the quarter, the ILR and TRA for the quarter have been set based on our best estimate of relevant start dates and capacity. We refer to the expected capacity as the Installed Capacity Estimate.

Start Dates and Installed Capacity

Our [CfD Register](#) sets out generators' expected start dates as well as the Installed Capacity Estimates (ICEs) or Final Installed Capacities (FICs) for all CfDs.

The forecasts are informed by the start dates and ICEs set out in the CfD Register, which are provided by the generators themselves, but we can use our own estimates if we believe they are more accurate than the information in the register.

Wind data

For modelling the uncertainty in wind generation, LCCC samples from historical wind speed data. This is sourced from the [NASA MERRA-2](#) data set provided by NASA.

As required by NASA, LCCC acknowledges that "the data used in this effort were acquired as part of the activities of NASA's Science Mission Directorate and are archived and distributed by the Goddard Earth Sciences (GES) Data and Information Services Center (DISC)".

Solar data

For modelling the uncertainty in solar generation, we use samples from historical load factors derived from historical weather data and metered generation from CfD plants.

Consumer Price Index (CPI)

Strike Prices are updated (indexed) each year, and an important component of that update is CPI. To calculate projected strike prices we use [historical CPI](#) from the Office of National Statistics (ONS) and [projected CPI](#) from the Office for Budget Responsibility (OBR).

UK power plant data

GB power plant data is sourced from BEIS, National Grid and Elexon Ltd. Start-up costs are sourced from the [National Renewable Energy Laboratory](#). This data is used for power plant stack modelling.

UK power plant availability

[The Maximum Export Limit \(MEL\)](#) published by National Grid is used for planned availability unless indicated otherwise.

Glossary

Please note that the below are intended as a guide to explain what these terms mean, they are not legal definitions and should not be treated as such.

- **BEIS** – Department for Business, Energy and Industrial Strategy.
- **Baseload Market Reference Price (BMRP)** – The value used as a reference point to calculate difference payments for applicable generators. The BMRP is calculated on a seasonal basis using a traded volume weighted average based on forward season data received from LEBA. The BMRP is published in April and October of each year.
- **CfD** – A Contract for Difference (CfD) is a long-term agreement between a low carbon electricity generator and LCCC. It is designed to provide the generator with a stable pre-agreed price (the “strike price”) for the lifetime of the contract. This is done by LCCC paying the difference, where the electricity price (the “market reference price”) is less than the strike price, and receiving the difference when the market reference price is higher than the strike price.
- **CfD Register** – A listing of all the CfDs that have been signed by LCCC, including ones that have been terminated. Data contained include the capacity (ICE or FIC) and initial and current strike price. The [CfD Register](#) is published by LCCC in accordance with the Contracts for Difference (Standard Terms) Regulations 2014 (as amended).
- **CfD Supplier Obligation Regulations** – The Contracts for Difference (Electricity Supplier Obligations) Regulations 2014 (as amended): [CfD Supplier Obligation Regulations](#).
- **Dynamic Dispatch Model (DDM)** – Long term wholesale electricity price forecasts are produced by the Dynamic Dispatch Model. The DDM was developed by BEIS to inform policy decisions by modelling investor behaviour in response to fuel and carbon prices, and the policy environment (the figures for Great Britain are modelled out to 2050).
- **Energy Intensive Industries (EII)** – Energy Intensive Industries are those industries that are determined by BEIS as intensive users of electricity. They are exempted from paying levies, such as for the CfD, up to 85% of the cost.
- **Eligible Demand** – Gross Demand less both Energy Intensive Industries demand and Green Excluded Electricity demand.
- **Final Installed Capacity (FIC)** – The level of capacity commissioned at the generators Start Date. The FIC is used to set the Maximum Contract Capacity (MCC) under the CfD.
- **GHG** – Greenhouse gas. Generally expressed as carbon dioxide equivalent (CO₂(e)).
- **Green Excluded Electricity (GEE)** – Eligible power generated abroad and supplied to GB can be used to reduce a suppliers’ liability for the CfD levy. Such supplies are named Green Excluded Electricity. This is a term defined in the [Electricity Supplier Obligations \(Amendment & Excluded Electricity\) Regulations 2015](#), as amended.
- **Gross Demand** – The volume of Active Import (i.e. electrical energy entering premises from the licensed distribution or transmission network), with no adjustment made for any Active Export (i.e. electrical energy generated on the premises and exported onto the licensed distribution or transmission network).
- **Intermittent Market Reference Price (IMRP)** – The Market Reference Price that is used as a reference point to calculate difference payments for applicable generators. It is calculated from the GB Day Ahead Hourly Price published by the Intermittent Day Ahead Indices.
- **Interim Levy Rate (ILR)** – Under the Supplier Obligation Levy, electricity suppliers make pre-payments consisting of a unit cost fixed Interim Levy Rate, charged at a daily £/MWh rate to fund the cost of CfD generation payments. The Interim Levy Rate is set by LCCC every quarter, one quarter in advance, based on an estimate of the payments that will need to be made in respect of CfD generation in that quarter. See "Interim Levy Rate" within the [CfD Supplier Obligation Regulations](#).
- **Installed Capacity** – Defined in the CfD as “The capacity of the Facility (expressed in MW) were it to be operated at optimal conditions on a continual basis at the maximum capacity possible without causing damage to it (net of any loads operating the facility and all losses that incurred from the units to the metering equipment)”. In operation, this is the ICE or FIC, as appropriate

- **Installed Capacity Estimate (ICE)** – The level of capacity set from the MDD for the project. Generators must commission a set percentage of this capacity level, the Required Installed Capacity (RIC), to achieve certain contract milestones and avoid contract termination.
- **Investment Contract** – Investment Contracts are an earlier version of CfDs entered into by the Secretary of State in mid-2014 pending the full establishment of the CfD scheme and of LCCC. The Secretary of State has transferred these contracts to LCCC. The contracts are also known as the Financial Investment Decision enabling Renewables (or FiDeR).
- **LCCC** – The Low Carbon Contracts Company Ltd, the CfD Counterparty.
- **Market Reference Price (MRP)** – The market reference price is a proxy for the average market price relating to the electricity sold by the generator.
- **Milestone Delivery Date (MDD)** – A milestone in the CfD that requires generators to demonstrate their commitment to delivering the project within 12 months of signing. This can be achieved either by demonstrating significant spend or by evidencing project commitments.
- **National Demand** – GB National Demand is defined by the Grid Code: The amount of electricity supplied from the Grid Supply Points plus that supplied by Embedded Large Power Stations, plus GB Transmission System Losses, minus the Demand taken by Station Transformers and Pumped Storage Units. National Demand does not include any exports from the GB Transmission System across the Interconnectors.
- **Quarterly Obligation Period (QOP)** – Quarterly period in which an Interim Levy Rate is applied. See "Quarterly Obligation Period" within the [CfD Supplier Obligation Regulations](#).
- **Reconciled Daily Levy Rate** – The result of the reconciliations of the daily CfD payments divided by the daily Eligible Demand.
- **Settlement Run Type** – Elexon publishes II, SF, R1, R2, R3, RF settlement runs and can publish a DF settlement run. For more information on Elexon's settlement process, see their [Beginner's Guide to Settlement Performance for Suppliers](#).
- **Settlement Unit** – Each hour period (Intermittent Technologies) or each half hour period (Baseload Technologies) in a day.
- **Strike Price** – The clearing value for a project determined through the CfD auction process. The strike price sets the point against which CfD difference payments are made.
- **Total Reserve Amount (TRA)** – The amount LCCC determines is needed for there to be a 19 in 20 probability of it being able to make all the CfD generation payments required during that quarter, having regard to:
 - a) the amount of Interim Levy Rate payments which it expects to collect from suppliers during the quarter;
 - b) the likelihood of any supplier failing to make payments during the quarter; and
 - c) the estimated income to be received by the company from CfD generators in the quarter, the estimated amount of electricity to be supplied by suppliers in the quarter and the estimated amount the company will need in the quarter to pay CfD generators.