Title: Contracts for Difference	Impact Assessment (IA)
IA No: DECC0144	**Date:** 18/06/2014
Lead department or agency: Department of Energy and Climate Change (DECC)	**Stage:** Final
	Source of intervention: Domestic
	Type of measure: Secondary legislation
Other departments or agencies: N/A	**Contact for enquiries:** Oliver.Rooke@decc.gsi.gov.uk; Robert.Epstein@decc.gsi.gov.uk;

Summary: Intervention and Options

RPC: N/A

Cost of Preferred (or more likely) Option				
Total Net Present Value	**Business Net Present Value**	**Net cost to business per year** (EANCB in 2009 prices)	**In scope of One-In, One-Out?**	**Measure qualifies as**
£10.2bn	-	-	No	N/A

What is the problem under consideration? Why is government intervention necessary?

Reducing emissions from the power sector will become increasingly important to help us meet wider decarbonisation goals. There are several reasons to believe that the current market arrangements will not deliver power sector decarbonisation at lowest cost to the electricity consumer. Contracts for Difference (CfDs) lead to a more efficient allocation of risk among investors, consumers and Government than under existing policies, thereby resulting in decarbonisation at lower cost to the electricity consumer.

What are the policy objectives and the intended effects?

The Government is committed to meeting the legally binding decarbonisation targets as set out in the Climate Change Act 2008, and economy-wide carbon budgets. In addition, on 23 November 2012, the Government agreed a Levy Control Framework (LCF) to 2020/21, which sets upper limits on spending for electricity policies.

The policy objective is to facilitate meeting our decarbonisation targets at least cost to the electricity consumer over the longer-term, while also facilitating the ability to stay within the spending limits imposed by the LCF.

What policy options have been considered, including any alternatives to regulation? Please justify preferred option (further details in Evidence Base)

The quantitative benefits of implementation of the CfD regime are modelled relative to a "basecase", under which existing policy instruments (the Renewables Obligation and carbon pricing) are used to achieve the same level of electricity sector decarbonisation. The key benefits of decarbonising using the CfD are reductions in financing costs for investors associated with reducting their exposure to wholesale market risk.

In addition, we summarise (in Annex A) the rationale, principles and evidence in support of policy decisions reached on key aspects of CfD allocation policy and contract terms.

Will the policy be reviewed? It will be reviewed. **If applicable, set review date:** 2018

Does implementation go beyond minimum EU requirements?			**N/A**		
Are any of these organisations in scope? If Micros not exempted set out reason in Evidence Base.	**Micro Yes**	**< 20 Yes**	**Small Yes**	**Medium Yes**	**Large Yes**
What is the CO2 equivalent change in greenhouse gas emissions? (Million tonnes CO2 equivalent)			**Traded:**	**Non-traded:**	

I have read the Impact Assessment and I am satisfied that, given the available evidence, it represents a reasonable view of the likely costs, benefits and impact of the leading options.

Signed by the responsible Minister: Michael Fallon Date: 18/06/2014

Summary: Analysis & Evidence

Description: Implementation of the generic CfD process

FULL ECONOMIC ASSESSMENT

Price Base Year 2012	PV Base Year 2012	Time Period Years 18	Net Benefit (Present Value (PV)) (£m)		
			Low:	High:	Best Estimate: 10,200

COSTS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	N/A	N/A	N/A	**N/A**
High	N/A		N/A	**N/A**
Best Estimate	N/A		N/A	**1,900**

Description and scale of key monetised costs by 'main affected groups'

Under EMR, carbon costs up to 2030 are higher than the 100g basecase, which achieves a similar decarbonisation profile using existing policy instruments (RO and carbon pricing). This reflects EMR's slightly slower decarbonisation profile; in NPV terms, carbon costs up to 2030 are **£1.3bn higher under EMR**. The institutional costs of EMR consist of both National Grid delivering their EMR functions and those associated with setting up the single counterparty body. In addition, there will be associated administrative costs to energy sector businesses (the costs of which cover the whole of the UK). In total, these costs (in discounted NPV terms, over the period 2012 -2030) are estimated to range between £400m to £600m (in 2012 prices) – a mid-point estimate of **£0.5bn up to 2030** is used[1]. Lastly, there will be a small admin cost to Government for processing the supply chain plans[2].

Other key non-monetised costs by 'main affected groups'

BENEFITS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	N/A	N/A	N/A	**N/A**
High	N/A		N/A	**N/A**
Best Estimate	N/A		N/A	**12,000**

Description and scale of key monetised benefits by 'main affected groups'

The total benefits of the EMR include savings in generation costs, capital costs, system costs, unserved energy and interconnector energy (total of £12bn in the 100gCO_2/kWh emissions intensity scenario).

The key benefits of decarbonising using EMR are achieved by reducing financing costs for investors and minimising generator rents under high wholesale prices. The greater price certainty from CfDs allows financing at a lower cost. The technology-specific hurdle rates used in this analysis are based on data and evidence drawn from various sources. For the central assumption about 2030 carbon emission intensity (100gCO2/kWh), these benefits are estimated to amount to £3.8bn up to 2030 in NPV terms (including administrative costs).

Other key non-monetised benefits by 'main affected groups'

Qualitative analysis of detailed CfD policy is set out at Annex A

Key assumptions/sensitivities/risks **Discount rate (%)** 3.5%

Some of the impacts described above may arise directly from primary legislation, due to the Secretary of State's powers to issue contracts directly outside of the generic process. We have not sought to attribute the benefits of the CfD regime between those being enabled directly by primary legislation versus secondary legislation. The aggregate savings from the reduced cost of capital under the CfD depends on the level of low-carbon investment. Modelling assessing the impact of reaching different carbon emission intensities for the power sector in 2030 (100gCO2/kWh as reported above, 50gCO2/kWh and 200gCO2/kWh) can be found in the EMR IA[3].

BUSINESS ASSESSMENT (Option 2)

[1] Please see the 'Electricity Market Reform – ensuring electricity security of supply and promoting investment in low-carbon generation [Delivery Plan update: March 2014]' Impact Assessment for more details: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/288463/final_delivery_plan_ia.pdf

[2] See Annex C.

[3] See footnote 1

Direct impact on business (Equivalent Annual) £m:			In scope of OIOO?	Measure qualifies as
Costs: -	**Benefits:** -	**Net:** -	No	N/A

Background and Context

1. This Impact Assessment (IA) accompanies the secondary legislation for the EMR programme. It considers the costs and benefits of long-term contracts to encourage investment in new, low-carbon, electricity generation ("Contracts for Difference" or "CfDs"). CfDs are one of the main elements of Government's Electricity Market Reform (EMR) programme.

2. The CfD scheme will work by stabilising revenues for generators at a fixed price level known as the Strike Price. Strike Prices are set by Government to attract a given level of investment in a particular technology. The CfD is an agreement to pay the difference between the "Strike Price" and the "reference price"– a measure of the average market price for electricity at a particular point[4]. Generators will receive revenue from selling their electricity into the market as usual. However, when the market reference price is below the strike price they will also receive a top-up payment from suppliers for the additional amount. Conversely if the reference price is above the strike price, the generator must pay back the difference.

3. For renewable generation, the CfD is intended to replace the Renewables Obligation (RO), the current mechanism for supporting large-scale renewable electricity. The RO functions effectively as a premium payment to generators, paid on renewable output, above the wholesale price:

    - Eligible renewable electricity generators report the amount of renewable electricity they generate on a monthly basis to the Office of the Gas and Electricity Markets (Ofgem).
    - Ofgem issues Renewables Obligation Certificates (ROCs) to electricity generators relating to the amount of eligible renewable electricity they generate.
    - Generators sell their ROCs to suppliers (or traders), which allows them to receive a premium in addition to the wholesale electricity price.

4. The Energy Act enables the Secretary of State to implement the CfD. The CfD will be a Private Law Contract between a generator and the CfD Counterparty, a Government-owned limited company.

5. Since the last Impact Assessment was published in October 2013, DECC is proposing moving straight to allocation rounds. This is because the pipeline of projects looks strong enough to permit competition from the start of the regime for some technologies. If there is more capacity trying to secure a CfD in a given delivery year than can be supported by the remaining budget for that year, then a constrained allocation process will be run through an auction. Further information is available in table 4 of Annex A below, with information on the auction design in Annex B.

Scope of IA

6. This IA focuses on the costs and benefits of CfDs, including the impact of policy decisions reached on the following:

    - "Generic" (i.e. applying to most renewable generation technologies) contract terms for the CfD;
    - The generic CfD allocation mechanism, including Supply Chain Plan provisions.

7. Both of the above would be given effect by the secondary legislation published alongside this impact assessment. Our policy on these areas is qualitatively appraised in Annex A.

8. This IA does not consider in detail the impacts of:

    - The process by which the CfD counterparty raises money from licensed electricity suppliers to settle difference payments under the CfD to generators (the "Supplier Obligation") – this is the subject of a separate IA accompanying the EMR secondary legislation;
    - The EMR Delivery Plan, including CfD strike prices (which were published in December 2013), and budget allocation;
    - Policy decisions on the technology mix or decarbonisation profile; or
    - CfD policy applying to technologies and/or projects not subject to the "generic" CfD allocation process (including nuclear and CCS), which is still under development (see footnote 24).

[4] The reference price is calculated under the CfD using a formula designed to produce a standardised reflection of the market price of electricity in £ per MWh for both baseload and intermittent generation. (See Annex A, Table 5 for more detail).

9. Much of the quantitative analysis presented is a summary of impacts of implementation of CfDs from the March 2014 EMR IA accompanying the consultation on the EMR Delivery Plan[5].

Policy Objective and Intended Effects

10. The Government is committed to meeting the legally binding decarbonisation targets as set out in the Climate Change Act 2008, and economy-wide carbon budgets. In addition, on 23 November 2012, the Government agreed a Levy Control Framework (LCF) to 2020/21, which sets upper limits on Government spending for electricity policies, reaching a total of £7.6bn (in real, 2011/2012 prices) annually by 2020/21[6].

11. The policy objective is to facilitate meeting our decarbonisation targets at least cost to the electricity consumer over the longer-term, while also staying within the spending limits imposed by the LCF.

Rationale for Intervention

12. In summary, the rationale for intervention is that:

- Reducing emissions from the power sector will become increasingly important to help us meet wider decarbonisation goals;
- There are several reasons to believe that the current market arrangements will not deliver power sector decarbonisation at lowest cost to the electricity consumer; and
- CfDs lead to a more efficient allocation of risk among investors, consumers and Government than under existing policies, thereby resulting in decarbonisation at lower cost to the electricity consumer.

13. These points are explained in more detail below.

Government's decarbonisation goals

14. Whilst the UK is on target to reduce its greenhouse gas emissions in 2020 by 34% on 1990 levels, in line with carbon budgets and the EU target, the longer-term goals are more challenging. From 2020, further deep cuts in emissions from the power sector are likely to be necessary to keep us on a cost-effective path to meeting our 2050 commitments. Reducing emissions from the power sector will become increasingly important to help us meet wider decarbonisation goals[7].

Issues with current market arrangements

15. The reasons why the current market arrangements will not deliver power sector decarbonisation at lowest cost to the electricity consumer are that:

- The current EU Emissions Trading Scheme (ETS) cap, and associated price, is insufficient and not certain enough to deliver investment at the pace and scale required that is needed for the UK to meet its 2050 targets;
- While the Carbon Price Floor (CPF) provides additional certainty over the minimum level of the carbon price, it alone will not encourage the total amount of low-carbon investment required to decarbonise the power sector; and
- Market failures associated with innovation mean the market would not deliver the required investment even if the carbon price were to reflect fully the environmental costs associated with CO_2 emissions.

These points are explained in more detail below.

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[5] 'Electricity Market Reform – ensuring electricity security of supply and promoting investment in low-carbon generation [Delivery Plan update: March 2014]' Impact Assessment for more details: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/288463/final_delivery_plan_ia.pdf

[6] https://www.gov.uk/government/news/government-agreement-on-energy-policy-sends-clear-durable-signal-to-investors

[7] HM Government, December 2011, "The Carbon Plan: Delivering our low carbon future", paragraphs 2.144 and 2.145 (https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/47613/3702-the-carbon-plan-delivering-our-low-carbon-future.pdf).
In addition, new Government clauses have been added to the Energy Bill, which enable a 2030 decarbonisation target range for the power sector to be set in secondary legislation. The decision to set a target range will be taken once the Committee on Climate Change has provided advice on the 5th Carbon Budget, which will cover the corresponding period (2028 – 2032), and once the Government has set that budget, which is due to take place in 2016. The power will not be exercised until the Government has set the 5th Carbon Budget.

16. The EU ETS, a "cap and trade" system covering the EU electricity generation sector and energy intensive industries, has created a market in carbon so that emissions across the EU can be abated at least cost. Although the EU ETS has achieved certainty over EU net emissions, along with a strong signal regarding the future level of the declining cap, the level of this cap (and associated carbon price) is not consistent with the pace[8] and scale of decarbonisation that is needed for the UK to meet its 2050 targets. Thus the carbon price signal resulting from this cap has not been stable, certain or high enough to encourage sufficient investment in low-carbon electricity generation in the UK.

17. The Carbon Price Floor (CPF), which came into effect from 1 April 2013, is in part intended to provide greater support and certainty to the carbon price[9]. However, it alone will not encourage the total amount of low-carbon investment required to decarbonise the power sector. While a higher carbon price could lead to faster decarbonisation and drive a higher level of low-carbon investment, it may not be sufficient to compensate for market failures associated with innovation.

18. Fossil fuel generators have benefitted over many years from learning by doing and the exploitation of economies of scale. There is evidence that given the opportunity to deploy at scale, some low-carbon technologies could reduce in cost. However, at current relative generation costs these technologies would be unable to compete with mature technologies, even with the support of a carbon price. Therefore, and given the "spillover" effects associated with innovation, in the short term there is a case for offering additional support to low-carbon technologies to drive reductions in cost.

19. It should be noted that since the last Impact Assessment, DECC is proposing to move straight to allocation rounds. For established technologies, the move to competition reflects strong progress on cost reduction and the well-developed pipeline. For less established technologies, our aim is to ensure that that they have the opportunity to deploy at levels which enable continued cost reduction and which ultimately support cheaper, competitive deployment in the longer term.

The rationale for choosing the CfD

20. The Impact Assessment accompanying the July 2011 EMR White Paper[10] explained the case for CfDs against other potential options in more detail. In particular, it found that the CfD led to a more efficient allocation of risk among investors, consumers and Government, by allocating risk to those parties best able to manage or control it. In particular, the CfD:

    - insulates investors in low carbon generation from fossil fuel price risk, which they are unable to control, thereby leading to a reduction in the cost of capital to investors relative to alternative support mechanisms and, in turn, reductions in the costs to society and consumers of securing this investment; but
    - maintains exposure to a fluctuating wholesale price for those technologies that are able to respond to this signal in their operational decisions.

21. The paragraphs below explain in more detail:

    - The issues that low-carbon investors face in managing wholesale price risk; and
    - The difficulties of relying on market-based mechanisms to manage wholesale price risk.

22. Cost structures differ between low-carbon and conventional generation capacity investments. Low-carbon investments are typically characterised by high capital costs and low operational costs, while fossil-fuel generation tend to have relatively low capital costs and high operational costs. The current electricity market was developed in an environment where large-scale fossil fuel plant made up the

[8] The Impact Assessment on the level of the fourth carbon budget (page 12) explained how an "early action" pathway – where greater emissions reductions are made early on – is more likely to be cost effective than an emissions pathway that leaves greater levels of emissions reductions to later years (https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/48080/1685-ia-fourth-carbon-budget-level.pdf).

[9] The Carbon Price Floor (CPF) sets a rising trajectory for the carbon price paid by electricity generators, which raises the cost of electricity. The Carbon Price Support (CPS) rate – the tax on top of the EU ETS price to achieve the CPF – is set to rise to £18.08/tCO2 in 2015/16 and will subsequently be capped at £18/tCO2 from 2016/17 to 2019/20.

[10] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/48133/2180-emr-impact-assessment.pdf

bulk of the existing and prospective generation capacity, which presents a particular challenge for investment in low-carbon generation.

23. In the current market, the electricity price is set by the costs of the marginal generator, which is typically a flexible fossil fuel-fired plant. Fossil fuel generation therefore sets the price for all generation in the market, including low-marginal cost low-carbon generation such as nuclear and wind. This means that the electricity price, and hence wholesale electricity market revenue, is typically better correlated with the costs of a fossil fuel-fired plant than it is to the costs of low-carbon plant.

24. Non price-setting plant is therefore exposed to changes in the input costs, including both fuel and carbon, of price-setting plant. If these costs increase, revenues for non-price setting plant increase; if they decline, revenues for non-price setting plant also decline. Therefore whilst non price-setting plant can benefit from increases in the input costs of price-setting plant – costs which the price-setting plant can pass through – they are exposed to lower fuel or carbon prices in a way that price-setting plant are not (i.e. the input prices of non-price-setting plants do not fall in line with wholesale prices). This increases the risk of investment in low-carbon capacity relative to investment in conventional capacity.

25. It is possible that for some technologies, the market will find ways of managing some elements of the revenue uncertainty, such as through contracting between generators and suppliers or through vertical integration of generation and supply. However this may result in unnecessarily high costs for consumers given the costs suppliers incur in managing this uncertainty.

Description of Options

26. This IA accompanying a consultation considers quantitatively the following two high-level options:

    - Basecase - the counterfactual scenario where EMR does not take place; and
    - Implementation of the generic CfDs.

27. These options are described in more detail below.

28. We present a summary of quantitative evidence on the impacts of implementation of CfDs relative to the basecase, based on the March 2014 EMR IA accompanying the EMR Delivery Plan[11], which is consistent with the latest policy on the terms of the CfD.

29. The policy on key CfD terms and the CfD allocation process has developed since 2010 with significant input from stakeholders. The April 2014 CfD publications included a representation of the CfD terms and an explanation of key elements of the detailed allocation process and how it will be implemented. Annex A summarises:

    - the policy decisions made on the detailed aspects of generic CfD allocation and contract terms;
    - the rationale and supporting evidence base for these policy decisions; and
    - the extent to which policy decisions are reflected in the quantitative modelling.

Annex B offers a high-level outline of the auction design and an explanation of key elements of the detailed allocation process and how it will be implemented.

Basecase

30. In the absence of secondary legislation on EMR, we would not be able to implement the CfD regime. As such, we would need to rely on existing policies such as the Renewables Obligation (RO) and the EU-ETS and policies which the Government has committed itself to delivering, such as the Carbon Price Floor (CPF) policy announced in the Budget 2011. The basecase attempts to achieve the decarbonisation profile achieved under EMR using existing policy instruments, namely the RO and carbon pricing.

31. The assumptions underlying the basecase are explained in more detail in the March 2014 EMR IA[12], and are summarised in Table 1 below:

[11] See footnote 1
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/288463/final_delivery_plan_ia.pdf

Table 1 Summary of basecase assumptions

2030 emissions intensity gCO2/KWh	2049 emissions intensity gCO2/KWh	Carbon pricing	Renewables Obligation (RO)
92	23	Carbon prices increase to around £140/tonne in 2022, rising to around £175/tonne in 2030 and remains at that level until traded carbon prices rise above this level (in mid-2040's). This is broadly consistent with long-term decarbonisation ambitions.	RO support to meet 2020 renewable target and 2030 carbon emissions ambition. RO stays open to new renewable plants beyond 2017, closing in 2037.

Note: Analysis is also undertaken for two other emission intensity pathways – 50gCO2/kWh in 2030 (leading to 50gCO2/kWh in 2040 and 25gCO2/kWh in 2049) and 200gCO2/kWh in 2030 (leading to 50gCO2/kWh in 2040 and 25gCO2/kWh in 2049).

Implementation of generic CfDs

32. The details of our policy positions on generic CfD allocation and contract terms are described in more detail in and qualitatively appraised at Annex A. While the precise details of a number of the aspects of the policy could likely be flexed to some degree without affecting the quantitative results presented below, the aggregate impact of all these decisions is to make implementation of the generic CfDs feasible.

33. The one aspect of contract design that does materially affect the quantitative assessment of CfDs is contract length (see Annex B). The appraisal of this choice (from the perspective of a sample project) is covered in a separate note[13]. In this analysis, hurdle rates are fixed across the different options on CfD length considered, so there would be no difference between the options considered in the cost to society ("resource costs") of investing in low-carbon technology. However, there are differences between the options considered in the lifetime NPV of support payments, so there is a distributional impact.

34. Furthermore the total quantitative results presented below include the impacts of CfD deployment that may not be subject to the generic CfD process (e.g. early-stage CCS projects and early nuclear projects). This IA does not seek to distinguish between the impacts of generic CfDs versus bespoke/non-generic CfDs (nor does it distinguish between those effects being enabled directly by primary legislation versus those requiring secondary legislation). In addition, terms for non-generic CfDs are not considered in this IA.

35. As a result of lower exposure to fossil fuel price risk and the greater price certainty offered by CfDs, the cost of capital for investors in low-carbon generation is lower under a CfD for a number of technologies[14]. The technology-specific hurdle rates used in this analysis draw on data and evidence from various sources – Oxera[15] (2011), Arup[16] (2011), KPMG[17] (2013), and NERA (2013)[18].

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[12] Table 6 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/288463/final_delivery_plan_ia.pdf

[13] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/227491/CfD_contract_length_note.pdf

[14] See page 63 of the final Delivery Plan IA for hurdle rate assumptions: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/288463/final_delivery_plan_ia.pdf

[15] http://www.oxera.com/Oxera/media/Oxera/downloads/reports/Oxera-report-on-low-carbon-discount-rates.pdf?ext=.pdf

[16] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/42843/3237-cons-ro-banding-arup-report.pdf

[17] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/225619/July_2013_DECC_EMR_ETR_Report_for_Publication_-_FINAL.pdf

[18] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/267650/NERA_Report_Assessment_of_Change_in_Hurdle_Rates_-_FINAL.pdf

36. Initial analysis for the EMR White Paper suggested that CfDs could reduce hurdle rates across all low-carbon technologies by between 0.3 and 1.5 percentage points, depending on the technology and investor class. DECC commissioned NERA Economic Consulting to review the existing evidence on the costs of capital assumptions under EMR[19]. This involved NERA considering evidence from responses from the Draft Delivery Plan Consultation, Analyst Reports and Interviews with the finance industry. In addition, NERA quantified the factors that these sources of evidence identified as changing the cost of capital under CfDs relative to the Renewables Obligation. NERA assessed four factors that would change the cost of capital under CfDs relative to the Renewables Obligation: 'wholesale market risk', 'allocation risk', 'construction delay risk' and 'novelty premium'. The result of the analysis shows that some technologies are now expected to see marginal increases in their hurdle rate. For more information on these please see the fully NERA report[20] and Annex H of the EMR Delivery Plan[21]

Cost-Benefit Analysis

Quantitative impacts of generic CFD implementation

37. This section compares the basecase to a scenario which decarbonises through CfDs but does not include a Capacity Market.

38. Much of the quantitative analysis presented here is a summary of the impacts of implementation of CfDs from the March 2014 EMR IA accompanying the consultation on the EMR Delivery Plan[22]. Annex A of the March 2014 EMR IA explains the approach taken, including an overview of the model used and key input assumptions.

39. Relative to the basecase outlined above, the March 2014 EMR IA shows that the impact of CfDs alone in decarbonising the power sector to an average emissions level of 100gCO_2/kWh in 2030 would result in a positive NPV of around £10.2bn to 2030. Scenarios targeting an emissions intensity of 50gCO_2/kWh and 200gCO_2/kWh in 2030 show net benefits of CfDs of £15.3bn and £9.0bn respectively[23]. We assume that taking forward secondary legislation on EMR enables the majority[24] of the benefits of the CfD regime. Table 2 below shows the breakdown of monetised costs and benefits in the 100gCO_2/kWh scenario.

[19] The full report is available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/267650/NERA_Report_Assessment_of_Change_in_Hurdle_Rates_-_FINAL.pdf

[20] ibid

[21] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/267960/Annex_H_-_Modelling_Assumptions.pdf

[22] 'Electricity Market Reform – ensuring electricity security of supply and promoting investment in low-carbon generation [Delivery Plan update: March 2014]' Impact Assessment for more details: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/288463/final_delivery_plan_ia.pdf

[23] All NPV estimates reported are inclusive of CfD administrative costs up to 2030.

[24] Note: there are some impacts that arise directly from primary legislation, due to the Secretary of State's powers to issue contracts directly outside of the generic process. We have not sought to attribute the benefits of the CfD regime between those arising directly from primary legislation and those being enabled by secondary legislation. In addition, the detailed "generic" arrangements for the CfD are specific to renewable technologies. We will continue to work closely with nuclear and Carbon Capture and Storage (CCS) generators on arrangements for CfD allocation for these technologies.

Table 2 Change in Net Welfare (NPV) – CfDs only, compared to basecase (emissions intensity in 2030 = 100gCO_2/kWh)[25]

		NPV, £m (real 2012)		
		2012 to 2030	2012 to 2040	2012 to 2049
Net Welfare	Value of carbon savings	-1,300	-2,700	-4,100
	Generation cost savings	2,000	4,600	6,900
	Capital cost savings	7,700	15,000	20,000
	System cost savings	420	730	1,000
	Unserved energy savings	410	1,200	1,100
	Cost of Interconnector energy saved	1,400	2,200	2,200
	Change in Net Welfare	**11,000**	**21,000**	**27,000**
	Change in Net Welfare*	**10,200**		

Source: DECC modelling

*Inclusive of administrative costs of approximately £0.5bn up to 2030. Administrative costs have not been estimated beyond 2030 (see section below on administrative costs for details).

40. The key benefit of CfDs is their ability to lower the capital costs associated with decarbonisation – up to 2030 such benefits are estimated to be around £7.7bn in the 100gCO_2/kWh scenario above (£8.1bn in the 200gCO_2/kWh scenario and £9.4bn in the 50gCO_2/kWh scenario). The estimated capital cost savings in turn reflect the combined impact of two factors:

- Financing cost impact: Benefits of decarbonising through CfDs rather than the RO and a higher carbon price, in terms of the impact on costs of finance.
- Technology mix impact: Relative benefits of CfDs being better able to target a cost-effective generation mix, in comparison to existing policy instruments.

Financing cost impact

41. The financing cost impacts are driven by the assumed reduction in the cost of capital for some technologies provided by the CfD relative to the RO. In order to isolate the savings due to reductions

[25] Figures do not sum due to rounding. Actual modelled change in net welfare is £10,650m, with approximately £500m subtracted for administrative costs. This takes the change in net welfare to around £10,150m which has been rounded to £10,200m. Administrative cost estimates are not estimated beyond 2030.

Carbon savings: The total carbon emissions for a year are multiplied by the appraisal value in that year to determine the total carbon costs for that year. An increase in carbon cost, other things remaining constant, leads to a decrease in net welfare.
Generation Costs: These are the sum of variable and fixed operating costs. The carbon component of the variable operating costs is removed – the EUA price is accounted for in the carbon costs, and the carbon price floor cost is a transfer between producers and the Exchequer so appears in the surplus calculations but not in the net welfare. An increase in generation costs leads to a decrease in net welfare.
Capital Costs: All new build is included (plants built by the model, and pipeline plants). Construction costs are annuitized over the economic lifetime of the plant, based on the hurdle rate. An increase in capital costs leads to a decrease in net welfare
System costs: These are the sum of the costs of building and operating the electricity system (TNUoS and BSUoS costs). These costs are calculated by National Grid models, based on DDM outputs. An increase in system costs leads to a reduction in net welfare.
Unserved energy: The estimation of Expected Unserved Energy takes plant outage probabilities, technology mix, demand and historical wind data and uses stochastic modelling to estimate a probability distribution of energy unserved. The mean unserved energy is valued at VOLL (defined by the user, assumed to be £17,000/MWh). An increase in unserved energy leads to a decrease in net welfare.
Interconnector energy: This measures the cost of electricity imported via the interconnectors net of the value of exports. If imports are greater or wholesale prices are higher than the cost of imported electricity is increased, scored as a reduction in net welfare.

in the costs of capital, we compare modelling runs for EMR with and without CfD hurdle rate reductions.

42. This reflects the efficiency of delivering low-carbon investment through CfDs, relative to an alternative mechanism that would deliver the same generation mix but without financing savings. The comparison is made using the EMR modelling without a capacity market.

43. The results suggest that, depending on the assumed level of decarbonisation in 2030, CfDs would generate an NPV of between £2.5bn and £6.0bn from lower costs of capital (up to 2030, including administrative costs), £9.8bn-£19bn up to 2040 and £15bn-£28bn up to 2049.

Table 3 Estimated financing cost reductions associated with the CfD (£bn, 2012 prices)

	2012 to 2030	2012 to 2040	2012 to 2049
100gCO2/kWh	3.8*	13	20
50gCO2/kWh	2.5*	9.8	15
200gCO2/kWh	6.0*	19	28

Source: Footnote 93 of the March 2014 EMR IA.

*Inclusive of administrative costs of approximately £0.5bn up to 2030.

Technology Mix Impact

44. There are differences between EMR and the basecase, which arise due to complexity in precisely matching the decarbonisation profile and generation mix under EMR and the counterfactual.

45. Different technologies have different operating and capital costs, therefore cost-benefit analysis results will be influenced by any differences in the technology mixes realised under EMR and the basecase scenario. Of particular importance is the role CCS plays in decarbonising. A further important factor is the difference in the new-build profile under EMR and the basecases. Comparing EMR and the basecase, there are also differences in the generation mix induced by the capacity market, with a greater proportion of OCGT plant and a lower proportion of CCGT plant built under EMR.

46. These impacts are considered in more detail in the March 2014 EMR IA[26].

Table 4 Disaggregated Change in Net Welfare (NPV) – CfD with Capacity Market (£bn, 2012 prices)

	emissions intensity in 2030 = 100gCO2/kWh	emissions intensity in 2030 = 50gCO2/kWh	emissions intensity in 2030 = 200gCO2/kWh
CfD	10,200	15,300	9,000
- **Financing Impact**	3,800	6,000	2,500
- **Technology Mix Impact**	6,400	9,300	6,500
Capacity Market	600	2,900	-400
Net Impacts	10,700	18,100	8,600

Source: DECC modelling - figures do not sum due to rounding.

47. The difference between the financing cost impact in Table 3, and the capital cost savings presented in Table 2 reflect the net impact of different technology mixes on total capital costs, independent of cost of capital savings. The remaining CBA categories also result from differences in technology mix between the CfD and basecase modelling scenarios.

Administrative Costs

48. The administrative cost estimate of approximately £0.5bn consists of:

- The institutional costs of National Grid delivering their CfD Delivery Body functions;

[26] Paragraphs 99 to 105: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/288463/final_delivery_plan_ia.pdf

- The costs associated with setting up the CfD Counterparty;
- Administrative costs to energy sector businesses.

49. The costs largely reflect:

- staff, IT, building costs and any external expertise which may be required for the institutional bodies[27]; and
- an estimate of the administrative costs of CfDs on energy sector businesses[28].

In the consultation published in November 2013 entitled Supply Chain Plan Consultation Addendum to Electricity Market Reform: Consultation on Proposals for Implementation, Government set out that, in order to be eligible to apply for a CfD, applicants of 300MW generating capacity or more will need to provide the Delivery Body with a letter from the Government certifying that they have an approved supply chain plan for their project which meets a defined standard. The administrative cost estimates above do not include estimates of costs to Government of reviewing supply chain plans or costs to businesses of preparing supply chain plans. The administrative costs to Government of reviewing supply chain plans are currently estimated to have a NPV cost to 2030 of around £0.3m (see Annex C). The detail of this policy was published in the Supply Chain Plan Draft Guidance document[29] on 29 April 2014.

Distributional impacts

50. The distributional impacts of the EMR package of measures, including price and bill impacts, are explained in more detail in March 2014 EMR IA[30]. As noted above (see "Scope of IA"), this IA does not consider in detail decisions on technology mix and rate of decarbonisation, which are the main drivers of the cost to consumer of low-carbon investment and in turn the distributional impacts of the EMR package.

Equality impact

51. It is not envisaged that the introduction of Contracts for Difference will impact on measures of equality as set out in the Statutory Equality Duties Guidance. Specifically, options would not have different impacts on people of different racial groups, disabled people, men and women, including transsexual men and women. There are also no foreseen adverse impacts of the options on human rights and on the justice system. We will keep a watching brief on this but we are confident that any issues have been addressed at the design stage without adverse impact on either human rights, or on the effectiveness of the mechanism.

Assumptions

52. Annex A of the March 2014 EMR IA explains the approach taken to the quantitative analysis, including an overview of the model used and key input assumptions.

[27] Cost estimates should be regarded as tentative, as the component costs have not yet been fully determined.
[28] The EMR White Paper IA presented estimates of the costs to energy sector businesses, both generators and suppliers. These include application for CfD allocation and the costs of settlement (see section 3.8). The same CfD energy sector business cost assumptions presented in the White Paper IA are used in this analysis.
[29] Supply Chain Plan Draft Guidance Document: https://www.gov.uk/government/publications/supply-chain-guidance.
[30] Sections 3

Annex A: Summary of policy decisions on generic CfD allocation and contract terms and supporting rationale

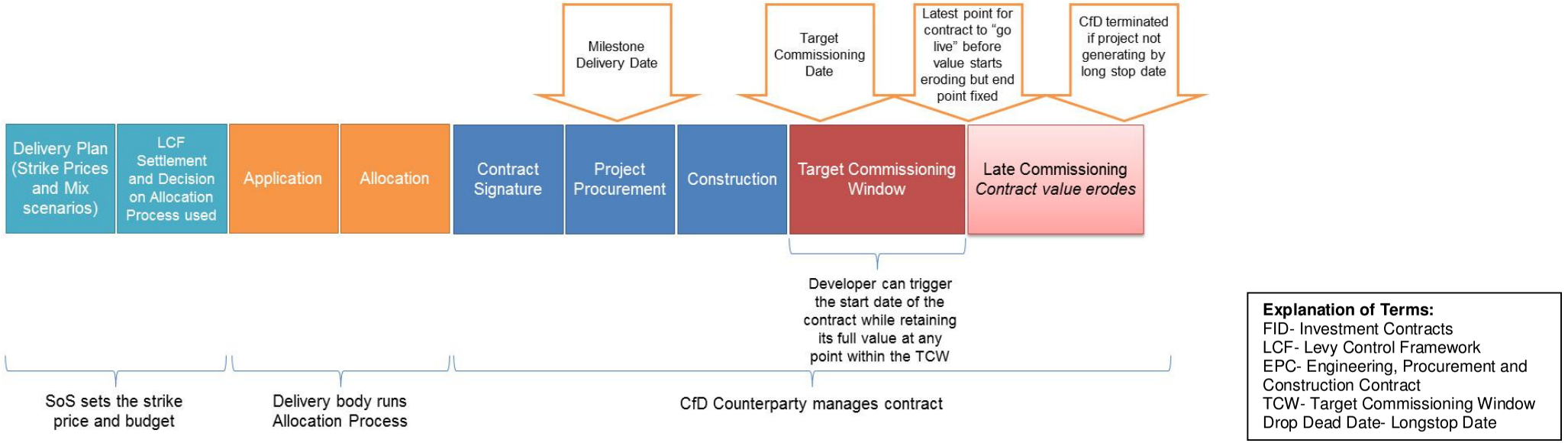
53. This Annex summarises:

- the policy decisions made on the detailed aspects of generic CfD allocation and contract terms[31];
- the rationale and supporting evidence base for these policy decisions; and
- the extent to which policy decisions are reflected in the quantitative modelling. This is reflected in the financing benefits we have modelled to be achieved under the CfD in the main body of this Impact Assessment.

CfD allocation

54. Figure 1 below summarises the generic allocation process. This IA does not consider policy decisions on budget management and Strike Price-setting.

Figure 1 Overview of generic allocation process



55. Table 4 summarises the rationale, basic principles and evidence for policy decisions made on generic CfD allocation. Note: The way the contract encourages timely delivery whilst making allowances for reasonable delays (through the use of Milestones, Target Commissioning Windows and Longstop Dates) is set out in more detail in Table 5 below.

[31] These reflect the latest positions, as set out in the August 2013 suite of CfD policy documents: https://www.gov.uk/government/publications/electricity-market-reform-contracts-for-difference.

Table 4 Summary of rationale for generic CfD allocation policy decisions

Area of policy	Description	Decision	Rationale
Price-setting	The process by which Strike Prices are set.	The Government has clearly stated its intention to move to a competitive price discovery process for all low-carbon technologies as soon as practicable[32]. Since the last Impact Assessment, Government is proposing to move straight to allocation rounds, with auctions setting the price where the demand for CfDs exceeds the budget allocated for each technology group. See Annex B for more information about the auction design.	Chapter 6[33] of the EMR December 2010 Consultation Document noted that the price discovery characteristics of an auction should enable financial support to be set at a level just high enough to lead to deployment but not high enough to lead to excessive profits, with bids driven down by competition. It should be noted that since the last Impact Assessment, DECC is proposing to move straight to allocation rounds. In an allocation round, an auction may be triggered if the demand for CfDs exceeds the budget allocated to each technology group in any given year of the delivery plan period. The auction will operate on a "pay-as-clear" basis and, if triggered, the Strike Price paid to projects will be the lower of the Administrative Strike Price for the technology or the clearing price established through the auction. If allocation is not constrained as described above, an auction is not triggered and all projects receive the Administrative Strike Price. For established technologies, the move to competition reflects strong progress on cost reduction and a well-developed pipeline. For less established technologies, our aim is to ensure that that they have the opportunity to deploy at levels which enable continued cost reduction and which ultimately support cheaper, competitive deployment in the longer term. Note: Some modelled simulations have been done to account for the potential for lower Strike Prices under future competitive price discovery processes and to inform Ministerial decisions. Hurdle rates assumed for the Delivery Plan modelling under CfDs account for the potential for increased risk of not securing support compared to the RO in addition to other effects of CfDs[34].
Application	The eligibility criteria that	The Developer will need to provide evidence that:	Following discussions with stakeholders the Government decided to provide pricing certainty to developers much earlier than under the RO and earlier than

[32] "EMR: Contract for Difference: Contract and Allocation Overview", August 2013, paragraph 1.16 (https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/233004/EMR__Contract_for_Difference__Contract_and_Allocation_Overview_Final_28_August.pdf).
[33] Paragraphs 4 to 16 (https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/42636/1041-electricity-market-reform-condoc.pdf).
[34] For more information see: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/267960/Annex_H_-_Modelling_Assumptions.pdf

Area of policy	Description	Decision	Rationale
	each technology will need to meet as a condition for entering the allocation process including the introduction of eligibility criteria linked to the development of a robust supply chain.	• The project is for a qualifying form of low carbon generation; • Planning Permission or Development Consent, plus Crown Estates Agreement for Lease where applicable, have been secured; • A Grid Connection Offer has been accepted; • Evidence that applicant is validly incorporated under the laws of the jurisdiction in which it is incorporated; and • For plants of 300MW generating capacity or more, evidence (in the form of a certificate from Government) that a company's plan meets the eligibility condition that the project has a valid supply chain plan. Supply chain plans will set out how the project will support the long term economic growth and viability of the low carbon electricity supply chain, how they will foster innovation and competition and support the development of skills. The Secretary of State may publish non-confidential parts of the plans.	under the Government's original proposals. It will provide developers with earlier certainty of CfD award by enabling them to apply for a CfD at an earlier stage in their project development. Allowing projects to secure CfDs before they have been built or before they have taken a financial investment decision increases the risk that CfDs will be awarded to speculative projects which go on not to be built. To mitigate this risk it is necessary to ensure that applicant projects have achieved meaningful eligibility criteria which demonstrate they have a strong chance of progressing to commissioning. The eligibility criteria will ensure that: • the application is for a project that contributes to the UK's 2020 target for low carbon electricity generation from renewable energy; • the project developer is a legal entity capable of contracting a legal contract; • that the application is for a viable project that is likely to proceed, through the granting of development/planning consent for the specific project; and • projects that are already in receipt of Government support from other schemes to promote renewable electricity generation are not given further support for the same electricity. Developers can choose to make more progress in developing their projects before submitting their application for a CfD, if that approach enables them to better manage their risks and uncertainties. By introducing the supply chain plans requirement, Government is highlighting the importance of supply chain development. Focusing on the way the projects are delivered can help develop the supply chain, reduce cost and support participation by smaller businesses, and promote innovation and skills. Publishing plans would allow information on approaches taken to be disseminated across the industry. This could bring all developers up to the standard of strongest performers in the sector in terms of supply chain support, supporting supply chain growth and competitiveness.

Area of policy	Description	Decision	Rationale
Allocation	The process by which the Delivery Body will allocate contracts and how that process will evolve over time.	• The Delivery Body will begin to allocate CfDs through Allocation Rounds. • If there is more capacity trying to secure a CfD in a given delivery year than can be supported by the remaining Budget for that year, then a constrained allocation process will be run allowing projects to be ranked by price with CfDs being secured by the least expensive projects[35].	It should be noted that since the last Impact Assessment, DECC is proposing to move straight to allocation rounds. In an allocation round, CfDs may be allocated via an auction if the demand for CfDs exceeds the budget allocated to each technology group in any given year of the delivery plan period (constrained allocation). If allocation is not constrained as described above, an auction is not triggered and all projects are allocated contracts at the Administrative Strike Price. Allocation Rounds will allow the EMR Delivery Body to monitor and control the number of projects coming in to the system. It will ensure that there is an orderly process of securing CfD contracts, and will allow effective rationing (if needed) when demand for CfDs exceeds the available budget[36]. For established technologies, the move to competitive allocation reflects strong progress on cost reduction and a well-developed pipeline. For less established technologies, our aim is to ensure that that they have the opportunity to deploy at levels which enable continued cost reduction and which ultimately support cheaper, competitive deployment in the longer term. Note: Some modelled simulations have been done to account for the potential for lower Strike Prices under future competitive price discovery processes and to inform Ministerial decisions. Hurdle rates assumed for the Delivery Plan modelling under CfDs account for the potential for increased risk of not securing support compared to the RO in addition to other effects of CfDs[37].

[35] "EMR: Contract for Difference: Contract and Allocation Overview", August 2013, paragraphs 3.14 to 3.16 (https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/233004/EMR__Contract_for_Difference__Contract_and_Allocation_Overview_Final_28_August.pdf).
[36] CfD Operational Framework, November 2012, paragraphs 76 and 78 (https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/66554/7077-electricity-market-reform-annex-a.pdf).
[37] For more information see: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/267960/Annex_H_-_Modelling_Assumptions.pdf

Area of policy	Description	Decision	Rationale
Appeals	Provisions that will allow developers to challenge the decisions made by the Delivery Body in respect of whether their project is eligible to enter in a CfD allocation process.	Developers who apply for a CfD will be provided with a right of appeal under secondary legislation (made pursuant to Section 10(6) of the Energy Bill) in respect of Delivery Body decisions on CfD eligibility. This appeals process will take the form of an initial right of appeal to the Delivery Body and a subsequent right of appeal to Ofgem.[38]	The rationale for providing an appeals procedure is to give a route for allocation disputes to be settled in a timely manner and in a way which minimises costs[39]. In addition, through providing a formal disputes process greater clarity can be provided on the on-going running of the allocation process in the event of the dispute, which should help to reduce generators' perception of risk. The appeals system is designed such that the risk of disruption to the allocation process through disputes is controlled.

[38] Paragraphs 12 to 21 of Electricity Market Reform: Contract for Difference – Allocation Methodology for Renewable Generation (5 August 2013) (https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/226976/Allocation_Methodology_-_MASTER_-_6_Aug_v_FINAL.pdf)
[39] Paragraph 8 of Electricity Market Reform: Contract for Difference – Allocation Methodology for Renewable Generation (5 August 2013) (https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/226976/Allocation_Methodology_-_MASTER_-_6_Aug_v_FINAL.pdf)

Area of policy	Description	Decision	Rationale
Phased commissioning	Provisions that will allow large offshore wind projects that deliver over a number of years to be accommodated.	• Each phase of a multi-year project to receive the strike price available for the delivery year of the first phase • Projects wishing to deliver in phases will be held to account against an appropriately tailored Substantial Financial Commitment Milestone, Target Commissioning Windows, and Longstop Dates (LSD). • The total capacity of the project must not exceed 1500MW. • 25% of the capacity must be constructed in the first phase of the project[40]. This requirement has been reduced since the last impact assessment as a result of engagement with stakeholders who have stressed that they often size the first phase of the project below 33% of the whole project as more construction time is taken up with works which support the whole project rather than installation of turbines for that phase. • The target commissioning date for the first phase must be no later than 31 March 2019; • The target commissioning date for the final phase must be the earlier of the two following points: ▪ no later than two years after the target commissioning date of the first phase; and ▪ no later than 31 March 2021.	The Renewables Obligation regime makes provision for offshore wind projects to structure their projects in a way that allows them to deploy over a number of years. In view of the fact that larger offshore wind projects are likely to be built in a series of stages and that Round 3 Offshore wind farms are more likely to be built in this way than Round 1 or Round 2 projects Government is prepared to facilitate phased commissioning within the CfD regime. It is intended that the CfD allocation process will ensure that phased projects can secure a CfD and have clarity about strike prices. At the same time the system will also seek to protect Government and consumers against risks of non-delivery, late delivery and gaming. The limitation on the size of phased projects reflects the fact that all projects to date are smaller than the limit imposed and is aimed at minimising the risk of separable projects seeking to brigade together to access higher strike prices than they would be able to achieve under normal circumstances. The provisions around dates by which the first and last phases of the project must commission are aimed at ensuring that projects don't seek to secure administrative strike prices when the majority of that project's capacity will be delivered in the period where competitive price setting is likely to apply. The provisions also ensure that phasing at this stage is only offered within a time horizon covered by the spending envelope agreed under the Levy Control Framework (i.e. up to March 2021). Note: In our quantitative modelling, we capture phased projects by assuming projects deploying in different years are the subject of separate investment decisions, but receive the same strike price as the initial phase.

Area of policy	Description	Decision	Rationale
Capacity adjustment	Amount by which a generator can reduce the project capacity (with and without penalty) between signing a CfD and commencement of payment.	• The majority of the specified amount of cost free flexibility may be exercised by the developer at the Substantive Financial Commitment Milestone. • Further flexibility is available by the Longstop Date. If the project delivers below a specified threshold [95% of the Initial Capacity Estimate specified at the Milestone Delivery Date, and 85% for offshore wind] then the CfD will be terminated.	Government recognises that for certain technologies it is not always possible for developers to be absolutely precise about the capacity of plant they will ultimately build at the point when they will apply for the CfD. For example Wind Developers typically seek planning permission and a grid connection for the maximum possible capacity at a site and then optimise their proposal as they select a turbine vendor and get a clearer understanding of the site. Government wishes to allow developers the ability to amend the capacity they are contracted to deliver under the CfD while ensuring the contract provides a reasonable and meaningful incentive on developers to commission the installed capacity as agreed at contract signature to the maximum extent possible. This is necessary to mitigate the risk that a developer might deliberately overstate its installed capacity in order to increase the likelihood that its competitors will not receive a CfD. The Government's intent is not, however, to introduce a cliff edge for developers, for example where only a marginal shortfall in achieving the expected installed capacity could lead to termination of the contract. The aim is that capacity adjustment provisions should: • Provide flexibility at the most appropriate point(s) in time; • Provide an appropriate amount of flexibility to take real account of the sort of changes which can occur (notwithstanding the fact that geological issues are covered separately as relevant construction events and force majeure protection is also offered – see Table 5 below); and • Not offer flexibility for incompetent project management. Note: Our quantitative modelling effectively assumes all projects are delivered to time and without adjustments to capacity – i.e. there are no Strike Price adjustments.

[40] Please note this has been revised since the previous Impact Assessment following feedback from stakeholders that the threshold for capacity should be lower as construction time is taken up with works which support the whole project rather than installation of turbines for that phase.

Generic Contract Terms

56. Table 5 below summarises the rationale and evidence base for policy decisions made on generic contract terms.

Table 5 Summary of rationale for generic contract term policy decisions

CfD Term	Description	Decision	Rationale
Contract term	Duration of the contract from point project is commissioned (i.e. starts generating).	Contract duration standardised, but flexibility to adapt to technology requirements: • Renewables projects (under the "generic" allocation mechanism) – 15 years of payments. • Biomass conversion – all contracts cease to pay in 2027 (regardless of start date). • Flexibility for the Secretary of State to adjust contract term for projects where technology justifies a different duration (e.g. nuclear, CCS, tidal range and potentially large hydro projects).	Government's initial preference for a 15 year contract was set out in the CfD Draft Operational Framework[41] (Section D(iii)), published in March 2012. Government has subsequently confirmed this preference. This position is based on a trade-off between value for money for consumers and bankability for investors. Investors discount future costs and returns at a higher rate than Government's social discount rate. Other things being equal, this points towards shorter CfDs as the costs to consumers of future payments associated with longer CfDs are higher than the benefit to developers. On the other hand, Government is mindful of the need for projects to be able to raise debt finance for investment. A 15-year CfD length appears to represent an effective balance. In August 2013, Government published quantitative analysis supporting this decision[42]. The approach taken for biomass conversion projects is consistent with the approach under the Renewables Obligation and reflects the transitional nature of the technology. Note: Our quantitative modelling assumes 15 year contracts for all renewable technologies (apart from biomass conversions).

[41] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/48373/5358-annex-b-feedin-tariff-with-contracts-for-differe.pdf
[42] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/227491/CfD_contract_length_note.pdf

CfD Term	Description	Decision	Rationale
Inflation indexation	How strike prices are adjusted for inflation.	Index-linked payments. Strike price fully indexed 100% to Consumer Price Index (CPI) throughout entire term.	The EMR White Paper indicated that Government was minded to adjust the CfD Strike Price for inflation. Section D(iv) of the CfD Draft Operational Framework[43] set out Government's view that indexing a proportion of the Strike Price would represent an efficient allocation of risk: in the absence of indexation, the CfD Strike Price would reflect a risk premium associated with uncertainty over future inflation, which would increase costs to consumers. The Draft Operational Framework also set out Government's preference to link the Strike Price to a general index (for reasons of simplicity, applicability over a range of technologies and familiarity with investors). The (final) CfD Operational Framework, published in November 2012 (paragraphs 187 to 194)[44], confirmed our preference for linking the Strike Price to CPI and indicated we were considering the relative merits of full and partial indexation. In the EMR Spending Review Announcement of June 2013 we confirmed that the CfD strike price would be fully indexed in line with CPI throughout the entire term of the CfD[45]. Whilst some investors indicated a preference for RPI, we consider that there is a clear case for CPI to be used for indexation: it is the preferred government measure of general inflation; is governed by international legislation; and therefore is arguably more robust and durable than alternative indexation measures. We believe that full indexation should also accommodate the requirements of the wide range of different investors we expect to come forward under the CfD. We believe that this should also be attractive to investors who have not traditionally participated in the financing of low carbon generation in the UK. Note: Our quantitative modelling is in real terms. Strike Prices in our modelling are held constant in real terms. As such, our modelling assumes full indexation of the Strike Price to CPI.

[43] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/48373/5358-annex-b-feedin-tariff-with-contracts-for-differe.pdf
[44] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/66554/7077-electricity-market-reform-annex-a.pdf

CfD Term	Description	Decision	Rationale
Reference price	The difference payments are based on the difference between the reference price (a measure of the electricity market price) and the strike price.	Payments based on a reliable measure of the market price: • For intermittent generation (e.g. wind), the reference price will be the GB day-ahead hourly price published under the European market coupling arrangements. The contract sets out the backup arrangements for where this price is not directly available. • For baseload technologies (e.g. nuclear), the reference price will initially be a season-ahead price, calculated by taking a volume-weighted price of trades conducted every trading day in the season ahead of delivery. These daily prices are then averaged to give a single price for the season. • When market conditions allow, a year-ahead reference price will be introduced for new contracts, with those generators that have alread signed contracts on the basis of a season-ahead price having the option to switch.	The EMR White Paper set out our view that intermittent generators and baseload generators should face different reference prices[46]. • Averaging the reference price provides strong incentives for generators to carry out maintenance at the right time and ensure plant is generating when prices are higher. This is a signal that baseload generators can respond to, but the maintenance schedule for intermittent plant (such as wind) is already largely driven by other factors such as wind patterns. Therefore, the efficiency benefits of averaging are significant for baseload plant but not for intermittent. • Averaging also creates additional risks for intermittent plant. High winds can drive electricity prices down and reduce wind generators' revenues. The scale of this effect depends on the amount of wind generation on the system, which in turn is driven largely by renewables targets. Generators cannot predict how much wind generation will be on the system in the future and therefore would find it hard to predict how the price they receive from the market relates to the average price; averaging therefore introduces risk for intermittent plant that is difficult for them to manage. • As such, for intermittent generation[47], the reference price should be drawn from the day-ahead market. While a real-time price would completely remove the risk described above, it would also mean generators would have no incentive to actively manage any of their output into the market. Rather, they would sell power very close to delivery which would increase system balancing challenges for the System Operator. • For baseload generation[48], the reference price should be drawn from the forward (year-ahead) market. Year-ahead prices effectively represent an average of market prices across the year of delivery, and so should provide incentives for baseload generators to schedule maintenance at the right times. Section D(i) of the CfD Draft Operational Framework[49] set out our view that the "GB Hub" price, because of regulatory and market developments, would likely

[45] https://www.gov.uk/government/publications/electricity-market-reform-delivering-uk-investment
[46] Annex B, paragraphs B.8 to B.11: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/48130/2173-planning-electric-future-white-paper.pdf.
[47] Annex B, paragraphs B.22 to B.27: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/48130/2173-planning-electric-future-white-paper.pdf.
[48] Annex B, paragraphs B.34 to B.35: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/48130/2173-planning-electric-future-white-paper.pdf.
[49] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/48373/5358-annex-b-feedin-tariff-with-contracts-for-differe.pdf

CfD Term	Description	Decision	Rationale
			provide the most credible, robust and enduring day-ahead index for intermittent generators. In addition, it removes "basis risk" for generators as (provided that generators trade their output on one of the participating exchanges) they will receive the single clearing price for each half hour. Following concerns expressed by industry about low liquidity, increased basis risk, collateral and larger clip sizes associated with year-ahead trading, and that this could increase costs to consumers, we have decided that the reference price for baseload generation will initially be calculated from a season-ahead index.[50] However, it remains our intention to introduce a year-ahead reference price for baseload generators once market conditions allow. Note: In our quantitative modelling, difference payments for intermittent CfD generators (wind, solar, marine) are settled with reference to a "spot" price (our modelling does not distinguish between the intraday price and the day-ahead price). Baseload CfD generators (nuclear, CCS, biomass and waste technologies) are settled with reference to the annual baseload price (i.e. time-weighted annual average spot price).

[50] "Electricity Market Reform – Contract for Difference: Contract and Allocation Overview", August 2013, paragraphs 4.24 to 4.28: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/233004/EMR__Contract_for_Difference__Contract_and_Allocation_Overview_Final_28_August.pdf.

CfD Term	Description	Decision	Rationale
Refinancing	Whether to include any arrangements to recover higher returns from project refinancing.	No refinancing clause is included in the generic CfD contract. Bilaterally negotiated CfDs for large projects may have different approaches, including possible refinancing clauses.	When carrying out their investment appraisal, investors may factor in an expected level of gain from refinancing (albeit with some uncertainty around this central expectation). Imposing a refinancing gain-share clause would reduce investors' ability to capture upside potential from refinancing, without offering symmetric protection from downside risk. This might increase investors' perceptions of the riskiness of investment, increasing the cost of capital. Feedback from investors and developers was that the imposition of refinancing gain-share clauses could have created an upfront barrier to certain forms of investment, and may have introduced additional risk that is currently not present in the RO regime. However, it may be appropriate to include refinancing provisions where CfDs are directly negotiated. This is because the process of directly negotiating a CfD is likely to include the detailed scrutiny of financial models, which allows bespoke refinancing terms to be developed (where appropriate). The impact of this policy decision on the cost of capital has not been separately modeled. However, the approach to refinancing is not different from what currently exists under the RO. As such, it is assumed to be consistent with an overall reduction in risk from the CfD relative to the RO (see Annex B).

CfD Term	Description	Decision	Rationale
Change in law	Protections given to generators against certain changes in law.	Generators will be protected against material and unforeseeable changes in law that uniquely target specific technologies, individual projects or CfD holders as a group. Protection also covers general changes in law that have discriminatory effects without objective justification. Protection extends to such changes in law that limit a generator's ability to either generate and deliver its full capacity, or which have impacts on generators' operational or capital costs. Depending on the nature of the Change in Law in question compensation will be delivered via strike price adjustments or staged, daily or lump sum payments.	In the CfD Draft Operational Framework published in May 2012 [section D(vi)], Government set out its intention that, in the case of a qualifying change in law, the CfD should be adjusted so as to preserve the overall balance of risk and reward in the contract. Following this date Government has further refined the nature of the changes in law which qualify for compensation, and the form that compensation should take. Details were most recently set out in December 2013. Change in law provisions which share risk between Government and investors are often used in major capital projects. The Government's view is that including such arrangements in the CfD is likely to represent better overall value for money for the consumer, as the alternative approach would see investors seeking higher strike prices to compensate for a range of potential future risks which are in fact unlikely to materialise. The provisions are two-way, so that any changes which are to the benefit of a generator should lead to compensation being provided to the CfD Counterparty body. These provisions are primarily designed to address the risk that the price stability afforded by the CfD is unduly impacted by unforeseeable changes in law, regulation or industry documentation. The CfD will therefore protect generators against specific and discriminatory changes in law and for changes in law that have an unjustifiable discriminatory effect. It will not protect against other general changes in law which are considered to be usual business risks that developers already take in the existing market without compensation. There is an obligation on generators to mitigate the impact of any change in law. However, where a qualifying change in law has a material impact on a project, compensation will be payable. Compensation can take a number of different forms depending on the impact on operational costs, capital costs and revenues. Compensation mechanics have been tailored in this way to reflect the impact of the change during the course of the CfD term. This should ensure that generators are not overly compensated for risks.

CfD Term	Description	Decision	Rationale
Change in Applicable Law	Provisions to amend the CfD in cases where changes in law frustrate the Contract or render it inoperable	The Change in Applicable Law provisions create a process whereby in circumstances where a change in law would frustrate the contract terms an amendment can be instituted to relieve the effects of such change in law/	After the December Consultation on the Contract for Difference terms concerns were expressed by Generators that a Change in Law which rendered the CfD frustrated or inoperable would not necessarily qualify as a 'Change in Law' under the CiL terms. Further the CiL provisions only provide scope for compensation to be paid in circumstances where a Qualifying Change in Law has occurred. They do not allow the Contract to be amended to take account of changes in the regulatory landscape which materially affect the Contract's operation. introduction of the Change in Applicable Law procedure the Counterparty Body can institute the contract amendment process if any change in law would cause the Contract for Difference to cease to be in force or render any provision of the Contract for Difference illegal, invalid, uneneforceable or inoperable. Generators may also trigger the Change in Applicable Law Review process where at least 30% of all CfD Generators submit requests to effect such a Review in any ten day period. If a Change in Applicable Law Review is triggered the CfD can be amended to mitigate the effects of the relevant Change in Applicable Law. Such amendment is subject to the agreement of CfD Generators. Any Dispute in respect of a Change in Applicable Law can be subject to a bespoke Expert Determination process which will determine how the CfD needs to be amended in order to allow the contract to continue to operate in light of the relevant changes. It was felt that it was in the interest of both Parties to ensure that Contracts for Difference could be enabled to continue in such circumstances rather than potentially being frustrated indefinitely. The alternative option of providing Change in Law protection was not felt to offer value-for-money from a consumer's perspective considering both the capacity and budget assigned to the Project would be lost. All reviews will seek to maintain the risk balance that the original CfD represented and shall be effected in a manner that does not materially benefit either party disproportionately.

CfD Term	Description	Decision	Rationale
Generation Tax	Protections given to generators against the introduction of new or revised taxes on electricity generators	The generation tax provisions seek to compensate CfD generators for changes to generation taxes that they are prevented from passing through to the market by virtue of their status as CfD generators	Concern has consistently been expressed by generators that the general imposition of a new tax on electricity generation would not be covered by the Change in Law provisions and would substantially undermine the risk balance of the CfD as CfD generators, unlike other market participants, would be prevented from passing through any such changes to the market. This meant that Strike Prices, and this consumers, would need to absorb a significant price risk that might never materialise. With this in mind the generation tax conditions will compensate generators for the lesser amount of the liability which they incur by virtue of the introduction of such a tax and the amount by which non-CfD generators have been able to pass the impacts of such tax through to the market, as determined by an Expert. Tax risks, as compared say to Change in Law, are relatively likely and we were keen to avoid a scenario in which the Generator was forced to price the full spectrum of potential changes in generation tax into their Strike Price for the reasons mentioned above. This approach ensures that ordinary changes in generation tax which are not passed through by non-CfD generators will not be compensated for. This was felt to be a reliable proxy for determining the manner in which the Generator would have dealt with such a change were it not subject to a CfD. Similarly, we were concerned that in cases where, for whatever reason, a CfD Generator was better able to absorb the impacts of any such generation tax than the average market generator that we had recourse to ensure that only their actual costs were reimbursed.
Curtailment	Protections given to Generators in the case of forced curtailment	The curtailment provisions seek to compensate generators in circumstances where, by virtue of a change in law, the generator is prevented from exporting electricity which they would otherwise have been in a position to export	In circumstances where Generator is prevented from operating at the capacity at which it would otherwise have been able to operate and is also prevented from making a bid on under the Balancing Mechanism in respect of that restriction they may submit a report to the CPB detailing such events. If the CPB agrees that the events detailed meet the definitions of Qualifying Curtailment or Qualifying Partial Curtailment the Generator will be entitled to a compensation amount equivalent to the revenues foregone as a direct result of the adjusted output period.

CfD Term	Description	Decision	Rationale
Qualifying Shutdown Event	Protections given to the Generator in the case of a targeted shutdown of their Facility	The QSE provisions provide compensation to the generator in circumstances where their Facility is summarily shut down	In circumstance where through a Change in Law or the exercise of government or Competent Authority powers a Facility is shut down for reasons other than: (i) health, safety, security, environmental considerations (or any other Relevant Matters) (ii) arising from the generators negligence or fault (by reference to breach of a Reasonable and Prudent operator standard); or (iii) by virtue of a State Aid decision, The generator will be entitled to a compensation amount that will seek to put it in a 'No Better, No Worse' position financially to a scenario in which the Contract for Difference had been allowed to continue. Such an event falls outside the Change in Law definitions but operates, in principle, upon the same bases. It was decided to deal with this particular scenario in isolation, however, to allow greater specificity to be achieved in the drafting so that DECC was in a position to delineate very clearly that it is only in circumstances of summary political shutdown that we envisage compensating a Generator. Again, this avoided the need for Generators (and thus consumers) to incorporate this very unlikely risk into the Strike Price for their Project.

CfD Term	Description	Decision	Rationale
Other Strike Price adjustments	Protections given to generators against other changes in costs.	Protection against certain changes in network charges, relating to the costs of the balancing system (BSUoS) and transmission losses (TLM). Compensation in the scenario where government has directly intervened in the market and as a result of that intervention the relevant CfD generator is curtailed involuntarily.	BSUoS (charges to cover network balancing) and TLM (an adjustment to cover transmission losses) both recover costs from generators that are normally passed through to the wholesale market price to a high degree. By removing exposure to the average wholesale price, the CfD would (in the absence of any Strike Price adjustments) expose generators to the risk of increases in these charges. As generators have limited ability to hedge changes in these charges, they may therefore require compensation for this additional risk, increasing costs to consumers. In addition, these charges also do not play a significant role in setting incentives to invest or operate efficiently. For these reasons, we consider there is a value-for-money case for providing a degree of cost pass-through for BSUoS and TLM. However, we do not consider there is a value for money case for providing cost pass-through for transmission network access (TNUoS) charges for generic CfDs. These charges have very large locational elements which play a significant role in setting incentives for efficient location of generation investment. We believe holders of CfDs of up to 15 years in length have some ability to manage the risk of changes to TNUoS through their initial choice of location. In addition, changes in TNUoS do not flow through fully to the wholesale price – i.e. the CfD is not introducing a risk to generators that is materially different to the risk they currently face under the RO. Greater penetration of low-carbon generation could increase the frequency of system operator actions to balance the electricity system or resolve transmission constraints. At present, generators affected by these system operator actions receive market-based compensation for the impact on their operations. Whilst we do not consider it likely, it is possible that the current system of market-based compensation could be replaced by one that does not provide generators with economic levels of compensation. The proposed compensation mechanism should ensure that investors do not increase hurdle rates in order to reflect a risk that is unlikely to crystallise. The impact of these policy decisions on the cost of capital has not been separately modeled. However, it is assumed to be consistent with an overall reduction in risk from the CfD relative to the RO (see Annex B).

CfD Term	Description	Decision	Rationale
Milestones	Parameters to ensure project delivery.	Each project will be subject to a milestone where they have to provide 'Evidence of Substantive Financial Commitment'. This Milestone is an obligation on the developer to demonstrate that they have made an investment in the project that suggests that there is a sufficient financial commitment to completion.	The objective of the Substantive Financial Commitment milestone is to provide the CfD counterparty with a means to assess whether a developer is committed to developing its project and to provide Government with assurance that the available budget will not be absorbed by highly speculative projects that fail to progress to commissioning. The milestone will also provide an early signal to Government on the timely delivery of a project and gives confidence that the UK is making sufficient progress towards its decarbonisation and renewables objectives. Once the Developer has made a substantive financial commitment to the project (broadly analogous to a financial investment decision), they are fully incentivised to construct the project as soon as possible and there is no need for the Counterparty to attempt to micromanage the development of that project.

CfD Term	Description	Decision	Rationale
Conditions precedent (including target commissioning windows and longstop dates)	Further parameters to ensure project delivery.	• Generator flexibility to deliver within a 'target commissioning window' • Payments for generation output commence once specified standards are met relating to connection, metering, capacity installed, and contract payment/collateral requirements. • Satisfaction of conditions precedent outside of the target commissioning window leads to a reduction in the contract's payment term. Failure to satisfy by the long stop date could lead to termination.	Government acknowledges that the technical challenges associated with building projects of the eligible technologies can mean it is often not possible for projects to be able to be absolutely confident that they will deliver on a specified delivery date. As a result, projects will be allowed a specified penalty-free window in which they can deliver the capacity needed to trigger payments under the contract. The length of the target commissioning windows will be technology specific. As long as a project fully commissions within this window it will be able to receive payments under the CfD (according to its output) for the full duration of the contract term. Where a project fails to either start generating or starts generating but fails to meet the Further Conditions Precedent before the end of the Target Commissioning Window, the payment term will start from the last day of that window. This means that the duration of the generator's CfD will reduce by an amount commensurate with the length of the delay up until the Longstop Date. This is a proportionate response to late delivery of low carbon electricity under the contract and provides a financial incentive on the developer to commission the remaining capacity as soon as possible. Failure to commission at least 95% (85% for offshore wind) of the Installed Capacity Estimate[51] specified at the Milestone Delivery Date by the Longstop Date gives the Counterparty the right to terminate the project's CfD. This is for two reasons. Firstly, it prevents capacity being sterilised by projects which secure CfDs but then go on to never be built. Secondly, it provides an incentive for developers to make more accurate assessments of the capacity of project they intend to build than might be the case if they were offered unlimited flexibility to deliver less than originally contracted. This reduces the risk that other viable projects will be crowded out by speculative projects, or unscrupulous developers; reduces the risk of under-allocation of LCF resources; and allows the government to have more certainty about its progress towards meeting its biding decarbonisation and renewables targets.

[51] Note the project is able to adjust the Installed Capacity Estimate to a certain extent prior to the Longstop Date.

CfD Term	Description	Decision	Rationale
Force Majeure and Relevant Construction Events	Criteria for when flexibility will be allowed on a generator's contractual obligations due to circumstances which arise during construction which are beyond the Generator's control.	Protection against events outside of the control of the generator • Force Majeure ensures that a generator will not be held liable for breach of the CfD due to unforeseen circumstances beyond a generator's control (which will include a 'reasonable and prudent operator test'). • Additional flexibility where connection delays are caused by network operator. • Relevant Construction Events provide leeway in the case off geological or other construction issues of which the Generator could not reasonably have been expected to be aware at the Agreement Date	Generators have limited ability to protect themselves against the risk of liability/breach under the CfD where their failure/delay is caused by circumstances beyond their control. As such, providing Force Majeure and Relevant Construction Event protection means that generators/investors should require a lower cost of capital to invest, reducing costs to consumers. The risk transfers to the societal level, where it can arguably be more efficiently handled. When aggregating across all projects (and other public policies/spending), the impacts of some randomly occurring factors may cancel out, such that the overall cost to consumers of providing Force Majeure and Relevant Construction Event protection from a societal perspective is lower than the aggregate cost of exposing individual generators to risks beyond their control[52]. Providing Force Majeure and Relevant Construction Event protection should therefore provide better value for money in respect of the funding of CfDs, and encourage uptake of CfDs. Such protections, or equivalents are also common in commercial contracts within the energy sector, and therefore are something developers would expect to see in the contracts into which they enter. For similar reasons, we have allowed for equivalent Force Majeure protection to be given to the CfD Counterparty under the draft CfD terms.

[52] If instances of Force Majeure relief had no randomly occurring elements, but instead were systematically correlated with the overall performance of the economy, this would make it more difficult for the impact of providing relief to be diluted across the economy. Our assumption is that instances of Force Majeure relief will not be systematically correlated with the overall performance of the economy. By way of illustrative example, we would expect force majeure protection might apply to events such as terrorist attack, war and civil disobedience (provided in the circumstances that the relevant event fulfilled all the requirements of the definition of Force Majeure within the CfD).

CfD Term	Description	Decision	Rationale
Dispute resolution	Mechanism for resolving contractual disputes.	Clear process to resolve disputes in a timely manner, including with binding arbitration. • Generator and CfD Counterparty will seek to agree informal resolution of disputes, but with access to external, legally binding determination of disputes (through arbitration or expert determination). • Government has no contractual right to impose settlements.	It is a commercially accepted principle that commercial contracts require clarity on how disputes should be resolved. In order to preserve generator/investor certainty in respect of the CfD and the private law nature of the CfD, it is also important in the context of the CfD that this resolution process should involve independent determination of disputes without any government involvement. The use of a two stage process of (1) discussions between the parties, followed by (in the absence of resolution of the dispute by the parties), (2) binding LCIA[53] arbitration or binding expert determination is a familiar contractual approach to resolving disputes. It is an approach which should allow for disputes to be resolved in a timely manner, and which provides a reliable and independent forum for disputes to be resolved within.

[53] London Court of International Arbitration

CfD Term	Description	Decision	Rationale
Termination	Circumstances when contract can be terminated.	In pursuance of a proportionate approach to contract enforcement termination will attach to: • Those breaches of contract by generators that affect the fundamental objectives of the CfD – such as, non-payment, fraud and non-delivery of capacity (subject to Force Majeure or delay to grid connection). • Cure periods for certain events encourage generators to move back into compliance with the contract Where events of default cannot be remedied and the termination right is triggered, the Government is proposing that the CfD counterparty should have the right to recover a lump sum termination payment by way of compensation for the early expiration of the contract. The Government is minded that this payment, which would be one way, would be calculated mechanically as the present value of the projected difference payments to be made by the generator over the remaining term of the contract.	The Government's ultimate objective is that low-carbon generation should be built and should operate for the full term of the contract. As such the termination provisions are intended to provide an appropriate and proportionate approach to contract enforcement in order to ensure projects are efficient and deliver value for money. The breaches that could give rise to the CfD Counterparty exercising its right to terminate the contract are focussed on those events which are fundamental to the objectives and operation of the contract, such as the legitimate functioning of generator and flow of payments. It is not appropriate for a generator to continue to benefit from the CfD if it is in default and unable to perform these fundamental obligations. However the Government appreciates that some of these breaches may be remediable. Therefore, it intends to offer realistic and practical cure periods for those remediable events in order to offer generators the opportunity to move back into a position of compliance. This limits the risk faced by generators. The termination payment from generators to the CfD counterparty will be based on a calculation of the net present value of expected difference payments from the generator to the CfD counterparty over the remaining life of the contract. Should this calculation return a total net payment from the CfD Counterparty to the generator no termination payment is payable to the generator by the CfD Counterparty[54]. The Government has considered whether termination rights should also be available to the generator as a result of CfD counterparty default. Its view is that such rights would be not be appropriate as the legislative underpinning of the scheme, together with the restrictive purpose of the CfD counterparty (that is, to enter into CfD contracts with low-carbon generators) should provide sufficient comfort to investors that the CfD counterparty will perform its obligations under the contract. The CfD counterparty will also be required by law to raise revenue from suppliers in order to make payments to CfD generators. This will, in turn, be supported by the secondary legislation on the detail of the supplier obligation, which will also be enforced as a relevant requirement. Unlike generators, the CfD counterparty will therefore have express legislative support in meeting its CfD obligations and will have no further commercial incentive that might lead to non-performance under the contract.

CfD Term	Description	Decision	Rationale
Difference payments	The basis on which payments are made.	Government has decided that the CfD for intermittent and baseload generation should be paid based on output with payments capped at an amount equal to the strike price[55].	Payments under the CfD can either be based on output (e.g. MWh), a measure of availability, or a mixture of both. Annex B of the EMR White Paper[56] described one possible CfD structure for "flexible" generation that involved paying on availability. Supporting low-carbon generation based solely on output can lead to dispatch distortions or negative pricing as this plant will generate even when the electricity price it receives is lower than its running costs, so that it can access support. However, the Government believes that support on metered output is more appropriate for intermittent and baseload generators for the following reasons[57]: • it is simpler as there is a clear and direct link between the low-carbon output and the low-carbon support; • there is no risk of paying when the plant is not available and not generating; and • analysis by consultants LCP[58] demonstrated that the distortions to the merit order are likely to be limited. In addition, paying intermittent plant on firm volume / availability means that they would have to pay back the difference between the reference price and the strike price when the former is higher. However, as intermittent plant cannot control their output, they would not know whether they would be generating (and thus earning the market price) in such a scenario. As a result, this would represent a significant and unknown risk for intermittent plant.

[54] Please note that this is only in the case of post-Start Date termination
[55] Paragraph 173, CfD Operational Framework, November 2013 (https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/66554/7077-electricity-market-reform-annex-a.pdf).
[56] Paragraphs B.36 to B.43 (https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/48130/2173-planning-electric-future-white-paper.pdf).
[57] Section D(ii), CfD Draft Operational Framework (https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/48373/5358-annex-b-feedin-tariff-with-contracts-for-differe.pdf).
[58] "LCP's assessment of the dispatch distortions under the Feed-in Tariff with Contract for Differences policy", May 2012 (https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/48443/5693-lcp-assessment-of-the-dispatch-distortions-under-t.pdf). Note this conclusion is heavily dependent on assumptions around fuel prices and the carbon price, even if the CfD does alter the position of the CfD plant in the merit order, it can be argued that this meets Government objectives as it maximises the output from low-carbon plant that is being supported through the CfD.

CfD Term	Description	Decision	Rationale
			However, the LCP analysis showed that there is significant potential for negative prices caused by paying on metered output. Government considered two options for addressing the consequent risks of increased costs of system operation and spiralling difference payments: 1. Paying CfD plant on output unless the reference price drops below zero, in which case payments would be on availability. 2. Paying CfD plant on output with payments capped at an amount equal to the strike price. The System Operator's view is that Option 1 price may produce a distortionary 'cliff-edge' effect, complicating and increasing the costs of system operation (including reserve costs). This would increase overall costs on consumers as reserve costs are ultimately passed through to energy bills. While Option 2 avoids this cliff-edge effect on system operation, it has the potential to increase revenue risk to investors. Revenue would not be guaranteed when prices are negative, and it is difficult for investors to assess accurately the magnitude of this risk. However, on the basis of the System Operator's modelling at the time of the November 2012 Operational Framework, which indicated that periods of negative prices are expected to be infrequent and are unlikely to occur until far into the future (less than 2% of the hours in 2030). Government considered the effect of this risk on strike prices is to be relatively marginal. As such, Option 2 was preferred[59]. Note: Our quantitative modelling assumes that CfDs are settled on the basis of output, adjusted for transmission losses, with payments capped at the Strike Price.

[59] CfD Operational Framework, paragraphs 161 to 173.

CfD Term	Description	Decision	Rationale
Metering arrangements	How low-carbon electricity generation is recorded for the purposes of billing.	Arrangements to support a wide-range of project types, using existing processes where possible: • Making use of existing settlement arrangements, where possible[60]. • Loss adjusted net metered energy[61]. • Arrangements will be developed for transmission, distribution and private wire generation[62]. Where necessary, further calculations will be applicable to derive the generator's difference payment for each Settlement Period. To derive this value the loss-adjusted net metered output would be multiplied by: • Renewable Qualifying Multiplier or "RQM" (in the case of fuels with variable renewable energy content) and • Qualifying Power Output or 'QPO' (in the case of qualifying CHP generating stations).	The key underlying principle for metering arrangements is that payments under the CfD will be made on the basis of net 'green' electricity that is generated and is available for sale. This approach, relative to alternative options, better maintains the link between the support provided and the electricity produced, and reflects the Government's objective to decarbonise the power sector[63]. Adjusting metered output for losses on the transmission (and/or distribution systems, where relevant) is consistent with existing settlement arrangements. We believe it is the appropriate basis against which to settle difference payments, as we believe that generation closer to demand (i.e. after transmission losses have been applied) should be worth more than generation at the notional balancing point. The processes for private wire generation will be designed to support fairness across the scheme, consistency, simplicity and competition. Note: Our quantitative modelling assumes that CfDs are settled on the basis of output adjusted for transmission losses. Where relevant, we make assumptions on the proportion of input fuel with renewable content in line with the latest available data.

[60] A BSC registered and compliant metering system is required by all CfD-eligible generators connected to the public electricity system. Generators (or the BSC Parties acting on their behalf (i.e. suppliers operating on behalf of embedded generators) should satisfactorily set up their metering and/or IT systems consistent with Section K and L of the BSC code to accurately measure their metered flows and to ensure their CfD assets are included in the BM Unit(s) associated with their CfD contract (which must not include other non-CfD assets).

[61] The CfD Operational Framework published in November 2012 proposed that difference payments would be calculated over a given settlement period, based on a generator's loss net adjusted metered energy for each settlement period, at the BSC boundary point (or other point agreed by the BSCCo via a metering dispensation). This was confirmed in the August 2013 publication.

[62] Although the same metered output model will apply to both BSC traded and private wire generators, under the CfD private wire generators will be required to follow the RO approach by providing both input and output data to the CfD Settlement Agent for each Settlement Period. The Agent will then net off the gross metered input from the gross metered output to arrive at a net metered output figure.

CfD Term	Description	Decision	Rationale
Contract Regulations	Regulations that govern the mechanics of the generic CfD contract post-allocation.	Regulation closely controls the following: • The content of any generic CfD issued now or in the future. • The ability for generators to pursue limited pre-signature modifications to a generic CfD. • The mechanic through which a contract is offered and entered in to. The publication of information relating to CfDs.	The generic CfD is the result of two years of successive drafting and engagement. As a result of that process, a number of key areas within the contract, in particular many of those described above, have been identified as essential either from a functional perspective or in order to ensure that the CfD remains investable. As a result, we have set out in regulation that certain provision must be contained within any CfD terms issued by the Secretary of State, ensuring that the CfD continues to conform as closely as is feasible to the assessment within this document. The Energy Act 2013 contains provision for Generators to pursue 'necessary' modifications to the terms and conditions issued by the Secretary of State where they have a 'minor effect'. In keeping with the above rationale relating to required areas of provision within any CfD, we have chosen to limit the scope of such modifications, preventing additional risk or reduced liability and thereby ensuring that any CfD, even where modified before signature, retains a comparable economic profile to an unmodified generic CfD. We have chosen to closely control the time available to the CfD Counterparty in order to issue an offer to contract following successful allocation, and the time available to a Generator to respond to that offer. This increases Generator certainty in the way in which the CfD Counterparty will act, and ensures that offers do not hold open resources indefinitely. Finally, we are ensuring that as much non-sensitive information is included in the public domain concerning the use of the CfD regime, generic and otherwise.

[63] CfD Operational Framework (November 2012), paragraph 154 (https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/66554/7077-electricity-market-reform-annex-a.pdf).

Annex B: Summary of policy decisions on CfD auction and supporting rationale

Table 5 6 below summarises the rationale and evidence base for policy decisions made on auction design.

Area	Description and Decision	Rationale
Type of Auction	Sealed bid versus Descending Clock Auction The CfD Auction will be a sealed-bid auction.	The Government has undertaken extensive stakeholder engagement to develop the design of the CfD auction under competitive allocation, including through collaborative development in autumn 2013, and CfD expert group sessions. We have also used responses to publications in August 2013, and the October 2013 EMR consultation, as well as the January 2014 consultation on competitive allocation to further shape the design. We set out a further update to stakeholders through an open letter published on 12 February, and the CfD Allocation Framework setting out our design was published on 8 April 2014[64]. The Allocation Framework overview document[65] explains the changes we have made since our last publication on competitive allocation. There may be small further refinements to the rules in advance of the first auction, which will be communicated in the auction explanatory document, and the next version of the Allocation Framework. The CfD Auction will be a sealed-bid auction. We consider that it would be an efficient process, delivering value for money in the CfD context. A sealed-bid auction is likely to best guard against the risk of collusion, whereas transparency in a multi-round auction (i.e descending clock) may come with an increased risk of collusion and/or predatory behaviour, reducing VfM[66]. While reducing the transparency in a multi-round auction can reduce these concerns, they also reduce the benefits (described below) of such a process. A multi-round auction process provides bidders with more information on the true value of the object being auctioned and allows them to bid more aggressively without fear of the "winner's curse" (winning at a price that is too low) because they know they can withdraw their bid once they see a significant number of other bidders withdraw from the auction. This reduction of uncertainty can improve VfM (and participation in auctions, increasing the likelihood of meeting renewables targets), but is only relevant where "common value" uncertainty is material.

[64] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/301968/Contract_for_Difference_Draft_Allocation_Framework.pdf
[65] Published on 23 June and available on the gov.uk website
[66] For example, if strong bidders can see or infer entrants' bids between rounds, they can ensure they always beat them. In the CfD context, bidders may be able to infer individual bidder behaviour (all eligible bidders will need to have planning permission and agreed Transmission Entry Capacity, which makes the potential capacity of plant in the pipeline public knowledge).

Area	Description and Decision	Rationale
		Common value uncertainty describes situations where an object being auctioned is worth the same to all bidders, but bidders have different private information about its true value (e.g. wholesale electricity prices in Capacity Market auctions). Our assessment is that common value uncertainty in the CfD context should be limited. • CfDs are specifically designed to remove long-term electricity price risk; bidders mostly do not need to worry about their forecasts being out of line with others when making a Strike Price bid. • For many bidders, load factors will be a significant factor in determining the project cost and bid. Load factors will vary across projects. • For some technologies (e.g. biomass) there may still be common values issues with respect to long-term fuel costs, particularly where these are not subject to indexation in the contract and there is limited forward liquidity. Access to market forecasts may mitigate this, although there will still be some divergence of views. However, this risk will not be systematic across all bidders - not all projects will have the same fuel source. • Bidders may have common value uncertainty regarding the performance of the technology being used, particularly where it is less proven (e.g. potentially in the case in offshore wind). However, at least for some technologies there are a variety of turbine designs and manufacturers, so it is not clear that this risk will be systematic across bidders. We consider the reasons on pure efficiency grounds to use a descending clock auction are not strong. We also believe that a sealed-bid approach inherently reduces the potential for signalling behaviour within an allocation round, limiting the potential for tacit collusion and predatory behaviour.

Area	Description and Decision	Rationale
General Auction Clearing Principles	Pay as Clear versus Pay as Bid The CfD Auction will be a sealed-bid, pay-as-clear auction. Clearing Prices will be differentiated across Delivery Years	Our preference is that the constrained allocation process will operate on a "pay-as-clear" basis for each technology group. In considering the options, we have used evidence from academic literature[67], expert advice, international experience, and extensive engagement with stakeholders. Such evidence collected over time supported the adoption of a pay-as-clear model which pays all providers in a given delivery year a single price, the clearing price. The clearing price is set at the level of the marginal bid which is affordable and is capped at the Administrative Strike Price of the technology. Pay-as-bid auctions pay successful bidders different prices based on their specific price bid. For this reason, they are sometimes promoted as a way to reduce the cost to suppliers and charge lower prices to consumers. It also seems intuitive to believe that when participants are paid on the basis of their bids, payments are proportional and equivalent to the minimum needed. However, theory and practice suggest that, where parties are able to exercise market power, strategic bidding can lead to inefficiency in capacity investment and ultimately a higher average price.[68] Under pay-as-bid auctions, bidders can submit bids above their costs – as was found to be the case in the market for secondary reserve power in Germany in 2009 and 2010, where drastic price increases can be traced back to an abuse of the pay-as-bid auction by the two largest firms, and the failure of the auction design to protect against collusion between suppliers.[69] A pay-as-clear auction is more cost effective than pay-as-bid for a number of reasons: • It provides generators with stronger incentives to bid their true economic cost of providing electricity[70].In a setting where there is no uncertainty about the clearing price, a pay-as-bid auction creates incentives for participants to guess the marginal bid and bid at this level to try and attain a higher price. This can put upward pressure on prices. Smaller market players will lose out, since larger incumbents have better market information and will more effectively exploit the design of a pay as bid auction. This will reduce competition and further drive up prices. • Paying the market the clearing price creates the right long-term signals for the market to innovate and develop cheaper technologies: Over time, this puts downward pressure on the price and therefore achieves the lowest long-term sustainable price. With pay as bid, there is no incentive to innovate since if a provider produces capacity more cheaply, it may only be paid the cost of producing this capacity. A pay-as-clear auction also offers lower barriers to entry, encouraging new entrants and independent generators, and improves investor buy-in. Increased participation and confidence in the auction is likely to increase efficiency.

[67] See for example:

- Federico, Giulio, and David Rahman. "Bidding in an electricity pay-as-bid auction." *Journal of Regulatory Economics* 24.2 (2003): 175-211. Available at: http://www.nuff.ox.ac.uk/economics/papers/2001/w5/federico-rahmansept2001.pdf

Area	Description and Decision	Rationale
Flexibilities	Whether to offer flexibilities The Auction will enable bidders to express flexibilities through the entry of multiple bids.	We are planning to offer flexibilities through allowing projects to submit multiple bids. This allows them to offer flexibility over capacity, delivery year and to a limited extent price. Bids will be assessed in order of strike price bid (lowest first). When a project is accepted, other 'flexible bids' will be removed from the bid stack. Several stakeholders have expressed a desire for the provision of flexibility in the auction design. We are keen to offer flexibilities if possible. We have also received advice from an auction design expert that also it is important to enhance the flexibility of bidding. Enhanced flexibility will make the outcome less vulnerable to distortions arising from particular budget choices and lumpiness.
Reserve Prices	The administrative strike price will act as a reserve price for each technology in the auction.	The reserve price acts as a price cap in the auction and seeks to trade-off between two factors: • Auction participation: setting a cap too low can deter participation and hence competition in the auction. • Value for money and the exercise of market power: setting a cap too high increases ability of bidders to exercise market power. The administrative strike prices provide an upper bound on prices that protects buyers and limits opportunities for collusion. Having administrative strike price caps allows a more flexible move from paying different prices to each technology, to paying the same price for all, as the prices of expensive technologies comes down, and also prevents serious auction malfunctions.

- Heim, Sven and Götz, Georg, "Do Pay-as-Bid Auctions Favor Collusion? Evidence from Germany's Market for Reserve Power" (2013). ZEW - Centre for European Economic Research Discussion Paper No. 35. Available at SSRN: http://ssrn.com/abstract=2278873 or http://dx.doi.org/10.2139/ssrn.2278873.
- Maurer & Barroso. Electricity Auctions: An overview of efficient practices. A World Bank study.
- Milgrom, Paul and Robert J. Weber (1982), "A Theory of Auctions and Competitive Bidding," *Econometrica*, 50, 1089-1122.
- Alfred E. Kahn, Peter Cramton, Robert H. Porter, and Richard D. Tabors, *Uniform pricing or pay-as-bid pricing: A dilemma for California and Beyond*, Electricity Journal, 70-79, July 2001.

[68] See for example: Tierney et al. (2008), *Pay-as-Bid vs Uniform Pricing*, Public Utilities Fortnightly Magazine.
[69] Heim, Sven and Gotz (2013)
[70] Alfred E. Kahn, Peter Cramton, Robert H. Porter, and Richard D. Tabors (2001).

Annex C: General Regulations

Supply chain plans

57. The detail of this policy was published in the Supply Chain Plan Draft Guidance document[71] on 29 April 2014. Developers of projects with a generating capacity of 300MW or more will be required to submit a Supply Chain Plan explaining what actions they have taken or will be taking in order to:

    - support the development of competition in supply chains (the 'competition' criterion);
    - support innovation in supply chains (the 'innovation' criterion); and
    - support the development of skills in supply chains (the 'skills criterion')

58. By introducing the Supply Chain Plan requirement, the Government is highlighting the importance of supply chain development. Focusing on the way the projects are delivered can help develop the industrial base, reduce cost and encourage participation by smaller businesses, and promote innovation and skills. Publishing plans could help bring all developers up to the standard of strongest performers in the sector. Taken together, the supply chain plans requirement has the potential to increase competition and lower development costs.

59. In the report 'Offshore wind cost reduction: pathways study', published by The Crown Estate, it is estimated that greater competition in each of the main supply markets (turbines, foundations, installation, etc) can lead to significant cost reductions for offshore wind[72]. Specifically the report claims that:

    - Increased competition could reduce turbine prices by up to 15% for projects taking final investment decisions in 2020, lowering the levelised cost of electricity (LCoE) for the whole wind farm by up to 5%.
    - Increased competition may reduce support structure prices by 7% by 2020, reducing LCoE for the whole wind farm by around 1%.
    - Increased competition will reduce installation prices by 5% by 2020, reducing LCoE for the whole wind farm by around 0.5%.

    Overall, increased competition is expected by the Crown Estate to reduce LCoE for offshore wind by 6% by 2020 (including the impacts described above, plus impacts of competition on operations and maintenance costs and array capital costs).

60. Furthermore, greater competition in the supply chain leads to lower risk over construction costs as better management and understanding of risks are established across the industry to maintain competitiveness. This, in turn, may lead to cost of capital savings due to higher gearing ratios, lower risk premia charged by debt providers, a reduction in the developer's return uplift, and greater liquidity in the capital markets. The Crown Estate estimates that holding all other factors constant, a one percentage point reduction in the cost of capital reduces the baseline LCoE for offshore wind by about 6% or £8/MWh.

61. There are likely to be administrative costs to Government to review these plans; these are currently estimated to have a NPV cost to 2030 of around £0.3m[73]. The administrative costs to industry are unknown but we would expect these costs to be at least as much as the cost to Government of assessing the plans, and could be higher.

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[71] Supply Chain Plan Draft Guidance Document: https://www.gov.uk/government/publications/supply-chain-guidance

[72] http://www.thecrownestate.co.uk/media/305094/Offshore%20wind%20cost%20reduction%20pathways%20study.pdf
Note, the Carbon Trust also state in their report entitled 'Offshore Wind Power: Big Challenge, Big Opportunity', that significant cost reductions in offshore wind installations are achievable through the introduction of greater competition in the supply chain, although they do not quantify. Further information can be found here: http://www.carbontrust.com/media/42162/ctc743-offshore-wind-power.pdf

[73] This is the discounted cost of 9 Grade 7sG7s deployed for 3 months during the first allocation round, followed by 6 Grade 7sG7s deployed for 2 months during subsequent allocation rounds through to the end of the delivery plan period, based on the pay scales published in DECCs most recent "Equal Pay Review".

62. We have sought more evidence on the costs of these measures on business. A number of developers stated that this process would not result in additional costs as the information required is already collected. A few responders were concerned that the policy may result in a potential administrative burden if the process / criteria are too ambiguous. This cost may be higher for smaller companies. No quantitative evidence was provided and in order to lower the burden on suppliers we have worked to ensure that the guidance for submitting a supply chain plan is clear and helpful. We have also undertaken other measures such as running Supply Chain Plan workshops that allowed interested parties to learn about the Supply Chain Plan requirement (and publishing the answers to some of the questions raised online).

Provision of data to National Grid

63. To improve the analysis and advice National Grid provides to Government it is important that the EMR delivery body (National Grid) has the best data available. This would include build, capital and operational costs of a plant which is receiving support through a CfD. Without this data there is a risk that the information and analysis National Grid carries out will be less accurate and of less value than would otherwise be the case.

64. In the EMR implementation consultation[74] , October 2013, we consulted on how the EMR delivery body would obtain data from CFD generators. In response to this consultation several stakeholders gave support for the delivery body being able to collect this information to enable the best analysis. Some raised concerns in respect of NG handling commercially sensitive information, the additional administrative burden specifically to small business, requiring specificity in requests and that 'calls for evidence' should continue.

65. Three options were considered by which the EMR delivery body could obtain this information.

i) Solely via the Counterparty Body

The Counterparty Body can collect and hand over commercially sensitive information to National Grid if National Grid needs that information to perform a function given to them under the Energy Act 2013 or the CfD. However from the illustrative list of evidence provided by National Grid it is considered likely that not all this information could be collected via the Counterparty Body because of limitations on the Body's powers.

This potentially means that the Counterparty Body would not be able to collect some of the data National Grid may require (based on their previous call for evidence).

ii) Direct from CfD Generators

This would involve National Grid requesting information direct from CFD generators in all cases.

As the Counterparty Body will already be collecting some of this information this route would be likely to be seen as an increased administrative burden with the data being collected twice.

iii) Initially from the Counterparty Body and then direct from CFD generators if required

This route would involve National Grid seeking information via the Counterparty Body in the first instance as generators already have a contractual requirement to provide cost information to the Counterparty Body, and only to seek further information direct from generators if it is not possible to access it via the Body.

This is our preferred option and we are setting out in the EMR (General) Regulations 2014 that National Grid has a duty to firstly collect data available via the Counterparty Body and also be given the powers to collect information directly from CFD generators if required. This enables National Grid to obtain all the data it requires with the least administrative burden on CfD generators.

Handling of commercially sensitive information and conflicts of interest

74 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/255254/emr_consultation_implementation_proposals.pdf. Pages 257- 259

66. We have confirmed that the Counterparty Body is able to transfer commercially sensitive information to National Grid for use in their analysis. National Grid are not entitled to release such information without appropriate consent.

67. Prior to EMR Secondary legislation coming into effect, The Government has a currently has legally binding Confidentiality Agreement in place with National Grid. At conferral of functions, modifications to NGET's Transmission Licence will ensure that commercially sensitive information is handled and protected appropriately.