Title: Electricity Market Reform – Offtaker of Last Resort

IA No: DECC0156

Lead department or agency: DECC

Impact Assessment (IA)

Date: 28/08/2014

Stage: Final

Source of intervention: Domestic

Type of measure: Secondary legislation

Contact for enquiries:
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Summary: Intervention and Options

RPC Opinion: Not applicable

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, Two-Out?**	**Measure qualifies as**
-£283m	£0 to 34m	£0 to 2.5m	No	Tax and spend

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

Independent renewable generators (IRGs) typically require long-term Power Purchase Agreements (PPAs) with an offtaker to secure a buyer for their power in order to secure finance. It has become increasingly difficult for IRGs to secure PPAs on bankable terms – there are few offtakers considered sufficiently credit-worthy to offer long-term PPAs and those that are have a finite capacity to offer them. The lack of competition risks the availability of efficiently priced long-term PPAs. The transition from the Renewables Obligation to Contracts for Difference (CfDs) should remove some of the constraints that have caused the deterioration in terms but evidence suggests that there is a risk that the availability of bankable long-term PPAs could still remain constrained going forward. If the issue were not addressed it could remain difficult for IRGs to raise finance to develop projects, increasing the risk of failing to achieve our renewables target while also limiting competition in both the electricity generation and PPA markets.

What are the policy objectives and the intended effects?

The policy objective is to provide a guaranteed route-to-market for IRGs. The intended effects are to provide more certainty to their investors and lenders over route-to-market and PPA risks, open up a wider range of contracting strategies, and increase the range of possible offtakers. This could increase competition and innovation in the PPA market and alleviate some of the constraints which could prevent independent renewable projects from coming forward in future.

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

This Impact Assessment (IA) considers the impacts of an **Offtaker of Last Resort (OLR).** This would guarantee eligible generators that, at any time during the operation of their CfD, they will be able to access a "Backstop PPA" at a specified discount to the market reference price in that CfD.

A range of OLR designs were considered in the consultation stage IA published in February 2014. The final policy design following the outcome of the consultation is characterised by (among other factors) a competitive allocation process for the Backstop PPA, a fixed Backstop PPA discount at £25/MWh and a quarterly levelisation process of any costs/rents incurred by backstop offtakers for managing a Backstop PPA.

Will the policy be reviewed? It will be reviewed.

If applicable, set review date: 2018/19 (see evidence base)

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:** -41 to 0	**Non-traded:** 0		

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: Matthew Hancock Date:17th Sept 2014

Summary: Analysis & Evidence

Description: Offtaker of Last Resort

FULL ECONOMIC ASSESSMENT

Price Base Year 2012	PV Base Year 2014	Time Period Years 22	Net Benefit (Present Value (PV)) (£m)		
			Low: -£2.558bn	**High:** £0	**Best Estimate:** -£283m

COSTS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	£0		£0	£0
High	£0		£369m	£4.709bn
Best Estimate	£0		£106m	£1.358bn

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

Reduced rents to incumbent offtakers/vertically integrated utilities (£0-1.152bn, midpoint £576m). Increased system imbalance costs (central cost scenario, £0-1.529bn, midpoint £765m, high cost scenario, £3.522bn). However, it is important to note that the incremental system imbalance costs associated with OLR arise only because renewable deployment in the counterfactual is below that in the EMR reference scenario. Overall system imbalance costs with the OLR are the same as in the EMR reference case. Expected business admin costs (largely preparing auction bids) (£0-34m, midpoint £17m). If OLR is never used then these costs would be zero.

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

Ofgem resource implications. Administrative costs to energy suppliers made mandatory offtakers (although these are likely to be small).

BENEFITS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	£0		£0	£0
High	£0		£169m	£2.151bn
Best Estimate	£0		£85m	£1.075bn

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

Improved PPA market competition increases rents to generators (i.e. an increase in consumer surplus through lower discounts) and consumers (i.e. an increase in consumer surplus through lower CfD strike prices under competitive strike price setting) (£0-1.152bn, midpoint £576m). Carbon savings from increased renewable generation between 0 and 41MtCO2e over the appraisal period (£0-998m, midpoint £499m). If OLR is never used, these benefits would still be applicable.

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

Improved generation market competition could lead to lower wholesale prices and CfD top-up payments and in the longer-term drive innovation, further reducing costs. While these have not been quantified, a break-even analysis suggests that **competition benefits equivalent to a 0.3% saving on average household electricity prices relative to the counterfactual would be sufficient to outweigh even the high cost scenario quantified**.

Increases the UK's ability to meet its 2020 renewables target in a cost-effective manner, reducing reputational risk and political risk (and associated cost of capital implications). In the short-term, improved security of supply and once the Capacity Market is introduced, avoided extra spend on capacity payments. Establishment of minimum revenues can also lower financing costs for new capital.

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

System imbalance costs and distributional impacts sensitive to outturn route-to-market costs and ability of suppliers to pass costs onto energy consumers. Success of the measure is also dependent on it being bankable. Moral hazard and adverse selection could also lead to undesirable impacts. A number of mitigating design features are intended to reduce the risk of OLR not being bankable and to reduce the materiality of any moral hazard incentives.

BUSINESS ASSESSMENT (Option 1)

Direct impact on business (Equivalent Annual) £m:			In scope of OITO?	Measure qualifies as
Costs: £0 to 92m	**Benefits:** £0-90m	**Net:** -£2.5m to 0	No	N/A

Evidence Base (for summary sheets)

Contents

Summary and preferred option

1. Evidence supports the conclusion that the terms offered by incumbent Power Purchase Agreement (PPA) providers have been deteriorating, particularly since 2010. In addition, while there are reasons why there may be an improvement in these terms from the transition from the Renewables Obligation (RO) to Contracts for Difference (CfDs), uncertainty over this transition and over future balancing costs could continue to act as a barrier to entry for new offtakers in the long-term PPA market, constrain the availability of long-term PPAs and limit the ability for projects to utilise shorter-term contracting strategies. These factors act as **barriers to entry for independent developers of power generation**.
2. In order to alleviate these constraints, the Government is introducing an Offtaker of Last Resort (OLR) which would guarantee eligible generators that, at any time during the operation of their CfD, they will be able to access a "Backstop PPA" at a specified discount to the market reference price. This would provide investors and lenders with more certainty over route-to-market and PPA risks. By capping the level of imbalance costs, lenders should be comfortable in sizing debt finance against revenues provided by the OLR rather than requiring a generator to sign a long-term PPA. The intended effect is that they will accept a wider range of shorter-term contracting strategies and offtakers, which will increase competition and innovation in the PPA market, alleviating some of the constraints which could prevent independent projects coming forward in future.
3. Following the outcomes of the Government's consultation on the OLR design in February 2014, the final design of the OLR involves a competitive allocation of generation seeking a Backstop PPA to a backstop offtaker, a fixed Backstop PPA discount of £25/MWh and a quarterly levelisation process of any costs or rents incurred by backstop offtakers for managing a Backstop PPA. These particular design elements would minimise a number of costs and risks associated with the policy.
4. The OLR is not expected to add significant costs to business and society in the central scenario as those energy companies who would be obligated to offer backstop provisions are already expected to have the resources required to manage PPAs in place. Moreover, under central expectations of future route-to-market costs, we would not expect generators to ever request a Backstop PPA as market PPAs should continue to offer more attractive terms (i.e. lower discounts) than the Backstop PPA. Under central assumptions for route-to-market costs, and based on analysis by DECC and Baringa, the OLR is estimated to deliver a quantified net cost of between **£0 and 565m in NPV terms**. However, the policy was stress tested under higher route-to-market costs to determine the scale and distribution of any costs under such market conditions.
5. However, **if the OLR's competitive benefits deliver cost savings equivalent to up to 0.3% of average domestic electricity prices over the period 2016-30, then the OLR is expected to provide a net benefit to society even in the high cost scenario**[1].
6. To put this cost saving into context, Ofgem's Impact Assessment on the 'Secure and Promote' Licence Condition to improve wholesale power market liquidity, estimates that a reduction in operational costs needed to deliver benefits equal to the on-going costs of the licence condition would be 0.5%. For profits, the respective reduction is 0.8%. The impact assessment states that the 'break-even changes required are therefore very small in relation to the overall size of operational costs and profits.'
7. The OLR is expected to realise benefits for consumers by increasing levels of competition in the PPA market and eliminating scarcity rents that would otherwise have been charged to generators. The policy has the potential to increase deployment levels of low-carbon technology and reduce the costs of generation relative to a 'do nothing' scenario, all else being equal. Overall, we therefore consider the costs of the OLR intervention to be small in comparison to the potential benefits of the policy.
8. Table 1 summarises the NPV estimates underpinning the figures in the policy summary.

[1] This type of break-even analysis is common where it is difficult to quantify the benefits of an intervention, and the approach is stated in the Ofgem guidance on Impact Assessments: Ofgem (2013), 'Impact Assessment Guidance', 1 October 2013, paragraph 3.30.

Table 1: Summary of NPV calculations (real 2012 prices)

	Central route-to-market cost scenario		Midpoint (best estimate)	High route-to-market cost scenario
	Counterfactual 1: Competitive World (The market for long-term PPAs is competitive and the BPPA is not exercised)	**Counterfactual 2: Uncompetitive World (The market for long-term PPAs is uncompetitive and the BPPA is exercised)**		**Counterfactual 2: Uncompetitive World (The market for long-term PPAs is uncompetitive and the BPPA is exercised)**
Quantified costs				
Loss of rents by incumbent offtakers through lower discounts	£0	£1.152bn	£576m	£1.152bn
Increased system imbalance costs	£0	£1.529bn	£765m	£3.522bn
Admin costs	£0	£34m	£17m	£34m
Total quantified costs (a)	**£0**	**£2.716bn**	**£1.358bn**	**£4.709bn**
Quantified benefits				
Transfer of rents to generators (through lower discounts) or consumers (through lower strike prices)	£0	£1.152bn	£576m	£1.152bn
Carbon savings	£0	£998m	£499m	£998m
Total quantified benefits (b)	**£0**	**£2.151bn**	**£1.075bn**	**£2.151bn**
Total quantified net benefits (b-a)	**£0**	**-£565m**	**-£283m**	**-£2.558bn**

Background

9. Following a call for evidence, which closed on 16 August 2012[2], and analysis undertaken by Baringa examining the current and future state of the PPA market[3], the Government tabled amendments to the Energy Bill[4] providing it with a "backstop power" to enable it to take additional action, if necessary, to reduce barriers to securing long-term contracts (PPAs) for independent electricity generation investment, in order to support delivery of Government's Electricity Market Reform (EMR) programme. On 11 February 2014, the Government published a consultation on a set of potential design options for an Offtaker of Last Resort (OLR) to achieve this.[5] The Government consulted on the detailed implementation options in June 2014. Following the outcomes of these consultations, this Impact Assessment (IA) sets out the costs and benefits of the Governments final OLR design.

10. This section provides background on:

    i. GB electricity trading arrangements;

    ii. the Renewables Obligation (RO);

    iii. Government's EMR programme; and

    iv. the role of Power Purchase Agreements (PPA).

GB electricity trading arrangements

11. The market is divided between network companies (transmission and distribution), generators and suppliers. National Grid is the System Operator responsible for the day to day real time operation of the network, ensuring that supply and demand is in balance at all times.

12. The wholesale market is divided into 30 minute periods for trading purposes; "normal" trading occurs until one hour prior to the start of each period - a point known as "gate closure". After gate closure, electricity generators and purchasers may not trade any further with each other, but may trade with National Grid.

13. Generally, market participants trade:

    i. Forward to mitigate "price risk", i.e. to give some certainty of the price for electricity sales/purchases; and

    ii. Spot and prompt to fine-tune positions (as factors such as weather, demand, and plant availability are better understood).

14. Participants are incentivised to contract fully against metered output through the use of imbalance charges, known as "cash-out" prices.

The Renewables Obligation

15. The Renewables Obligation (RO)[6] is currently the main financial mechanism by which the Government incentivises the deployment of large-scale renewable electricity generation. The RO places a mandatory requirement on licensed UK electricity suppliers to source a specified and annually increasing proportion of the electricity they supply to customers from eligible renewable sources or pay a penalty. The scheme is administered by Ofgem who issue Renewables Obligation Certificates (ROCs) to electricity generators in relation 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.

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[2] The Government response to this consultation, including responses received by stakeholders as part of the consultation are available online at: https://www.gov.uk/government/consultations/barriers-to-long-term-contracts-for-independent-renewable-generation-investment.

[3] Available online at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/212754/baringa_ppa_market_liquidity_call.pdf.

[4] On 19 July 2013.

[5] Available online at: https://www.gov.uk/government/consultations/supporting-independent-renewable-investment-offtaker-of-last-resort.

[6] Further information on the policy is available online at: https://www.gov.uk/government/policies/increasing-the-use-of-low-carbon-technologies/supporting-pages/the-renewables-obligation-ro.

16. Suppliers present ROCs to Ofgem to demonstrate their compliance with the Obligation. Where they do not present sufficient ROCs, suppliers have to pay a penalty known as the buy-out price. The money collected by Ofgem in the buy-out fund is recycled on a pro-rata basis to suppliers who presented ROCs. Suppliers that do not present ROCs pay into the buy-out fund at the buy-out price, but do not receive any portion of the recycled fund.

Government's EMR programme

17. On 12 July 2011, the Government published "Planning our electric future: a White Paper for secure, affordable and low-carbon electricity" (referred to in this document as the "EMR White Paper").[7] The EMR White Paper sets out key measures to attract low carbon investment, reduce the impact on consumer bills, and create a secure mix of electricity sources including gas, new nuclear, renewables, and carbon capture and storage.

18. Key elements of the reform package include:

    i. a Carbon Price Floor (which came into force in April 2013) to reduce investor uncertainty, putting a fair price on carbon and providing a stronger incentive to invest in low-carbon generation now;

    ii. the introduction of new long-term contracts (CfDs) to provide stable financial incentives to invest in all forms of low-carbon electricity generation;

    iii. an Emissions Performance Standard (EPS) set at 450g CO_2/kWh to reinforce the requirement that no new coal-fired power stations are built without Carbon Capture and Storage (CCS), but also to ensure necessary short-term investment in gas can take place; and

    iv. a Capacity Mechanism, including demand response as well as generation, which is needed to ensure future security of electricity supply.

19. A CfD is a long-term contract between an electricity generator and a contract counterparty. The contract enables the generator to stabilise its revenues at a pre-agreed level (the strike price) for the duration of the contract. Under the CfD, payments can flow from the contract counterparty to the generator, and vice versa. By providing stability of revenues, the CfD should increase the rate of investment and lower the cost of capital, thereby reducing costs to consumers.

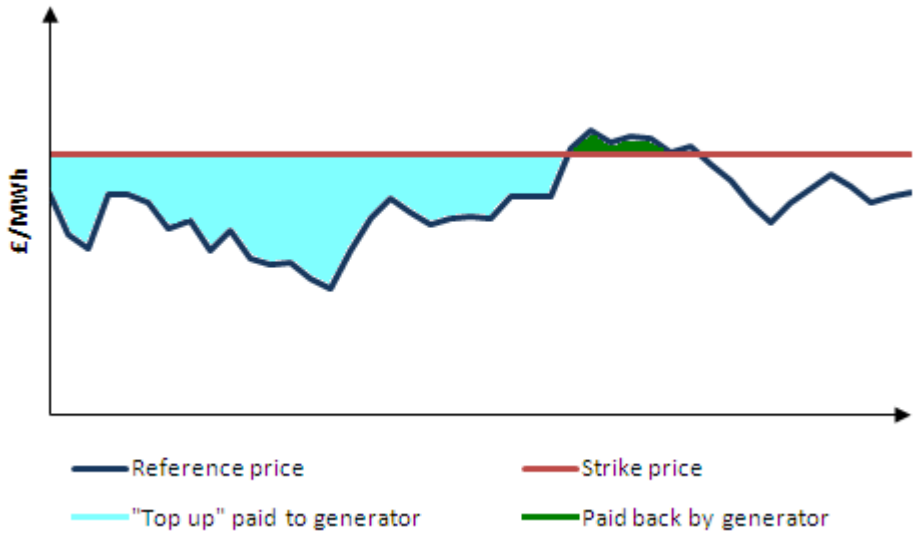
20. In terms of setting the "strike price", the Government intends to move to a competitive price discovery process for all low-carbon technologies as soon as practicable.[8] Competition will enable us to reduce the costs of decarbonisation, limit the bill impacts of achieving our low-carbon objectives and drive efficiencies across the sector. In the medium- to long-term we aim to introduce technology neutral low-carbon competition. The Government considers that “established” renewable technologies (including onshore wind and solar) should be subject to immediate competition through a competitive process of CfD allocation. Government considers that less established technologies (including offshore wind) should not have to compete in allocation rounds against lower cost, more established technologies. If all the projects seeking support within this group can be accommodated within the allocated budget, those projects would receive support at the administrative strike price. It is possible that constrained allocation may need to apply to this group in some years to ensure that we remain within the Levy Control Framework envelope.

21. A "two-way" CfD provides for payments to be made to a generator when the market price for its electricity (the reference price) is below the strike price set out in the contract. However, when the reference price is above the strike price, the generator pays back the difference (see Chart 1).

[7] Available online at: https://www.gov.uk/government/publications/planning-our-electric-future-a-white-paper-for-secure-affordable-and-low-carbon-energy.

[8] The final EMR delivery plan was published in December 2013 and is available online at: https://www.gov.uk/government/publications/electricity-market-reform-delivery-plan.

Chart 1: Operation of FiT CfD



22. In the EMR White Paper, the Government proposed[9] that "intermittent"[10] generators would receive a CfD referenced to a day-ahead market price, while "baseload"[11] generators would receive a CfD referenced to a year-ahead baseload price.

23. On 29 November 2012, the Secretary of State introduced the Energy Bill into parliament, which implements the main aspects of EMR. The Energy Bill received Royal Assent in December 2013. On 4 December 2013, the Government set out its decisions on strike prices for renewable projects for the period 2014/15 to 2018/19 and updated key CfD contract terms.[12]

The role of Power Purchase Agreements (PPAs)

24. For any power generation investment, investors will want to be certain that risks can be efficiently managed during the investment payback period. All generators need to manage a range of risks in order to operate effectively in the wholesale market. Those risks include:

    i. **Offtake risk –** the risk that power cannot be sold at an efficient price with a viable route-to-market;

    ii. **Balancing risk –** the risk of metered output not meeting the contracted position and being exposed to the "cash-out" price. This can be mitigated by effectively forecasting output and trading on the within-day market to avoid imbalance;

    iii. **Volume risk –** the risk that the total generation of the installed capacity falls short of what was expected (i.e. project load factor over a given period is lower than expected affecting the project's ability to cover its fixed costs);

    iv. **Price risk –** the risk that the underlying wholesale price changes and the power that is generated does not achieve the expected price; and

    v. **Basis risk –** the risk of deviation between the market price achieved by the generator and the market reference price in, for example, a CfD.

25. Market participants seek to manage these risks through their power trading strategies. Power can be traded directly in the wholesale market through bilateral contracts, brokered 'over-the-counter'

[9] A more detailed explanation of this is contained at Annex B to the EMR White Paper, available online at: http://www.decc.gov.uk/assets/decc/11/policy-legislation/EMR/2173-planning-electric-future-white-paper.pdf.

[10] Plant which has little or no control over when it generates or at what level of production (beyond a decision to be available or not) and for which fuel costs are not a consideration. This class therefore includes wind as well as other renewable technologies such as wave and solar.

[11] Plant which operates at a constant level of generation, either for economic reasons or because the plant has limited ability to vary output at short notice to respond to shifts in demand. In addition to nuclear generation, this class may also include some biomass plant and Carbon Capture and Storage (CCS) plant.

[12] Further information on the policy is available online at: https://www.gov.uk/government/policies/maintaining-uk-energy-security--2/supporting-pages/electricity-market-reform.

trades or on exchange platforms. In these cases, an efficient liquid market is essential so that independent operators have clear price signals and are able to effectively manage trading risks. Work by Ofgem and industry to improve liquidity will play an important part in increasing competition and trading options. On 20 November 2013, Ofgem published "Wholesale power market liquidity: statutory consultation on the 'Secure and Promote' licence condition".[13] This set out their final policy position proposing the introduction of a new special licence condition into the generation licences held by eight company groups aimed at improving access of small suppliers to the wholesale market and ensuring that the market provides the products and price signals that all firms need to compete effectively. On 23 January 2014, Ofgem set out their decision, following consideration of consultation responses, to direct changes to these generation licences and to implement, in full, their final policy position.[14]

26. However, some projects will not be directly helped by these measures. In particular independent generators currently rely on long-term offtake contracts, known as PPAs, for their route-to-market and risk management. PPA terms vary, but typically the offtaker agrees to buy power at a discount to the prevailing wholesale price. The discount reflects the risks that the offtaker will manage on behalf of the generator[15], but the overall discount may be affected by the level of competition amongst PPA providers (i.e. offtakers).

27. The most important reason why independent generation projects rely on PPAs is that these projects typically rely on non-recourse project finance[16] to part-fund the investment. Given the long length of financing, this typically requires the offtake and other risks to be entirely managed through a long-term PPA with a credit-worthy counterparty. Whilst other routes to market are theoretically available, in the majority of cases, financiers will require a long-term PPA to reduce risk. Reliance on PPAs may also reflect the scale of some generators' projects; including limited in-house trading capacity and the difficulties that individual wind projects face in managing their imbalance risks.

28. Whilst the structure of PPAs vary, they typically fall into three types, which deal with risk in the following ways:

    i. **Variable price PPA:** The PPA provider pays the generator the wholesale electricity price less a discount that reflects the value of the risks that have been transferred under the PPA. Under the RO, the generator is fully exposed to the price risk, while under the CfD the price risk is removed. This is expected to be the preferred type of PPA under the CfD, as generators will want to sell as close as possible to the CfD reference price.

    ii. **Variable price PPA with floor price:** As above, but the PPA provider guarantees a minimum price (either across all benefits – wholesale, ROCs and Levy Exemption Certificates (LECs) – or more commonly today only for wholesale power), which reduces the price risk to the generator. This increased certainty for the generator is typically reflected in a greater discount, reflecting the transfer of risk to the PPA provider. As the CfD will provide a top-up to the strike price, PPAs with a floor price are not expected to be required in future to such an extent.[17]

    iii. **Fixed price PPA:** The generator would receive a constant price for any power produced. Under the RO, this approach transfers the price risk from the generator to the offtaker. Fixed price PPAs offer stability but the degree of risk transferred is reflected in the price specified in the PPA, which would be significantly lower than the average market price. Government has been told that there is less appetite amongst utilities to offer long-term fixed price PPAs in large part because a change in accounting rules surrounding imputed debt since the financial crisis has resulted in the treatment of fixed and floor price PPAs as open obligations (essentially bringing them onto balance sheets) increasing pressure on their balance sheets. Generators are not

[13] Available online at: https://www.ofgem.gov.uk/publications-and-updates/wholesale-power-market-liquidity-statutory-consultation-secure-and-promote-licence-condition.

[14] The decision letter is available online at: https://www.ofgem.gov.uk/publications-and-updates/wholesale-power-market-liquidity-decision-letter.

[15] These costs might constitute a larger share of revenues from generation for projects with intermittent output (e.g. wind), which would require more active trading, and for smaller projects, which might be more expensive due to fixed costs (e.g. forecasting) being spread over lower generation output.

[16] Project finance relates to the long-term financing of projects based on analysis of the cash-flows of the specific project, rather than the strength of the balance sheet of the company sponsoring the project. In contrast to an ordinary borrowing situation, with project finance the financier usually has little or no recourse to the non-project assets of the borrower or the sponsors of the project. Historically, where PPA arrangements have been viable, project finance debt has financed between 60-90% of total construction costs and has been key to ensuring projects are economically viable for their shareholders.

[17] Although floors at £0/MWh may prevail.

expected to seek fixed price PPAs under the CfD, as breaking the link to the reference price would leave them with a variable revenue stream and potentially expose them to paying back more than they received from the PPA if the reference price went above the strike price.

29. Table 2 summarises the typical risk transfer under a PPA.

Table 2: Typical risk transfer under a PPA

Risk type	Risk transfer
Offtake risk	From generator to offtaker (offtakers in the long-term PPA market are typically vertically integrated utilities who can sell the power onto their customers).
Balancing risk	From generator to offtaker (offtakers typically have a diverse generation portfolio enabling them to better manage this risk).
Volume risk	Remains with the generator (under a PPA, the offtaker will typically only pay for the power generated).
Price risk	Depends on whether the PPA has a floor or a fixed price – PPAs with a price floor or fixed price will transfer at least some of this risk from the generator to the offtaker. The move from the RO to CfDs will significantly reduce this risk and the need for such floors in PPAs.
Basis risk	From generator to offtaker (if the PPA terms are linked to the market reference price then the offtaker bears any risk of it varying from the wholesale price, i.e. the price they could have paid from buying power in the wholesale market).

Problem under consideration

30. On 5 July 2012, the Government launched a call for evidence[18] aiming to improve our understanding of the issues facing independent developers. Based on the evidence provided by respondents from the Call for Evidence as well as targeted interviews, Baringa assessed the issues facing independent developers of intermittent power generation in securing commercially viable PPAs and how that might evolve in future with a move to CfDs.[19]

31. The main factors cited by respondents and supported by significant evidence for the recent deterioration in PPA market liquidity were:

    i. **Increased wholesale price risk –** In particular, a reduced appetite by offtakers to offer sufficient wholesale price protection (typically in the form of a price floor);

    ii. **Reduced appetite for long-term ROCs –** In particular, a reduced appetite to manage long-term ROC price and liquidity risk. Potentially also due to an increase in the ability of Vertically Integrated Utilities (VIUs) to meet their renewables obligation with their own assets;[20]

    iii. **Increased balance sheet/credit rating impact –** Consistent with greater scrutiny by credit-rating agencies following the financial crisis and greater involvement by VIUs in large-scale offshore wind projects requiring a significant amount of capital. Lending requirements currently restrict the ability of other non-VIU providers in the long-term PPA market; and

    iv. **Increased regulatory and policy risk –** For example, the uncertain impact of Ofgem's Electricity Balancing Significant Code Review (EBSCR) on future balancing costs.

32. The move from the RO to CfDs should act to reduce or remove at least the first two causal factors. In particular, CfDs provide a guaranteed top-up payment for every £/MWh produced against the market reference price. As such, a significant amount of price risk will be removed.[21] In addition, the closure of the RO removes the need to manage ROC price and liquidity risk for new projects. Both these factors should also mean that, all other things being equal, market PPA discounts should improve.

33. There will, however, remain significant risks to the improvement of PPA market terms and liquidity under CfDs. Namely:

    i. Uncertainty over future balancing costs – There is uncertainty over the impact on the future cost of balancing from the increased penetration of intermittent generation on the system. This uncertainty necessitates higher risk premia being applied to long-term PPA discounts.[22] Furthermore, managing this uncertainty requires more active trading and higher collateral requirements for hedging. This acts as a barrier to entry into the long-term PPA market by smaller offtakers. Possible changes to the balancing mechanism have also added to this uncertainty. Ofgem published their final EBSCR policy decision on 15 May 2014[23], which should reduce the level of regulatory uncertainty surrounding the costs of balancing.

    ii. Bank lending requirements – Bank lending requirements currently act as a significant barrier to entry in the long-term PPA market. Reflecting concerns over credibility, capitalisation, long-term experience and strategic positions in energy markets, lenders currently require a counterparty offering long-term PPAs to have a minimum credit rating of BBB- or above. As a consequence, large VIU offtakers are often preferred because they typically have large balance sheets, a

[18] Available online at: https://www.gov.uk/government/consultations/barriers-to-long-term-contracts-for-independent-renewable-generation-investment.

[19] Available online at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/212754/baringa_ppa_market_liquidity_call.pdf.

[20] Supported by evidence from Cornwall Energy and referenced in Baringa's report "Power Purchase Agreements for independent renewable generators – an assessment of existing and future market liquidity" available online at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/263919/Baringa_report_on_PPA_market_liquidity___July_2013.pdf.

[21] There will still remain some residual risk, for example, in relation to negative prices.

[22] The short-term PPA market involves smaller risk premia as a result of the shorter tenure of the contracts, however, lenders do not currently accept contracting strategies using this market.

[23] Available online at: https://www.ofgem.gov.uk/electricity/wholesale-market/market-efficiency-review-and-reform/electricity-balancing-significant-code-review.

relatively stable supply base, and are seen as being strategically invested in the GB energy market in a way that makes it very difficult for them to walk away from long-term contracts and liabilities. Lenders' requirements also prevent project developers from utilising the more liquid short-term PPA market as it does not guarantee offtake up front for the period beyond the initial PPA.

Rationale for intervention

34. Currently, around 21GW (or 65%) of pipeline large-scale renewable power projects are being developed by independents (i.e. non-vertically integrated utilities).[24] The majority of these projects will likely require a PPA in order to secure finance to proceed.

35. The factors cited above act as barriers to entry into the long-term PPA market, constraining the PPA market and, as a consequence, acting as barriers to entry for independent developers of renewable power generation.

36. We believe it is important to reduce these barriers for the following reasons:

    i. **Competition benefits:** A competitive market needs many sellers in order to deliver value-for-money for consumers. It also requires a credible threat of new entry (contestability) in order to maintain competitive incentives (to price competitively, improve service and innovate) among existing market players. As stated above, evidence suggests that there are currently constraints on new entry in the wholesale electricity market due to constraints in the PPA market. The long-term PPA market itself has seen some new entry over the last three years but large vertically integrated utilities remain the most material PPA providers with a high degree of pivotality.[25]

    ii. **Value for money:** Encouraging competition in the wholesale electricity market could deliver value-for-money to consumers in a number of ways including delivering lower strike prices (i.e. lower CfD top-up payments ultimately borne by energy consumers) through a competitive bidding process and reducing technology costs through greater innovation.

    iii. **Meeting our 2020 renewables target:** The UK is legally committed to meeting 15% of its energy demand from renewable sources by 2020. Independent renewable power projects could play an important role in enabling the UK to achieve this target.

Policy objective

37. The policy objective is to provide a guaranteed route-to-market for independent renewable generators. The intended effects are to provide more certainty to their investors and lenders over route-to-market and PPA risks, open up a wider range of contracting strategies, and increase the range of possible offtakers reducing a key barrier to entry for independent renewable project developers and enabling the achievement of the UK's 2020 renewables target in a cost-effective way.

[24] Centrica, E.On, EDF, RWE nPower, Scottish Power and SSE as well as foreign utilities, such as Dong, Statkraft, Statoil, Vattenfall, EDPR, Repsol and GDF Suez. Figures based on DECC's monthly planning database, available online at: https://restats.decc.gov.uk/app/reporting/decc/monthlyextract.

[25] The extent to which a company is indispensable to meet demand. Evidence based on Baringa's report "Power Purchase Agreements for independent renewable generators – an assessment of existing and future market liquidity" available online at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/263919/Baringa_report_on_PPA_market_liquidity___July_2013.pdf.

Options under consideration

An Offtaker of Last Resort (OLR)

38. The Offtaker of Last Resort will provide a minimum level of contracted revenue (when combined with CfD top-up payments) against which finance can be secured by giving generators access to a "Backstop PPA" at a fixed £/MWh discount to their CfD market reference price in order to guarantee a route-to-market.[26]

39. To help inform the policy development, an OLR Advisory Group (OLRAG) was formed consisting of generators, offtakers, accountants, financiers, solicitors and Ofgem. The group met several times, commenting on papers presented at each meeting and providing invaluable feedback.[27]

40. Detail on individual design aspects of the policy were consulted on in February and again in June 2014. The policy design outcomes of these consultations are set out in more detail in Annex A.[28] Table 3 summarises the characteristics of the Government's final policy design.

41. The Backstop PPA discount will be set at a level that is intended to strike the right balance between a discount that is large enough to minimise the risk that it ends up being smaller than discounts in the market, while still providing sufficient 'firm' revenue to allow projects to obtain a reasonable level of debt and equity returns. Annex B provides further detail on how we used analysis by Deloitte to inform an appropriate range of discounts on which to consult on. The Government will set this discount at a fixed level of £25/MWh, which we expect to be much larger than discounts offered in the market under current expectations of future route-to-market costs. Alternative options of £20/MWh and £30/MWh were also considered as part of the policy design consultation. This range was informed by analysis by Deloitte.[29] Following consultation, DECC undertook an internal update of this work, set out in Annex B, the results of which supported Deloitte's previous conclusions.

42. The Backstop PPA can be accessed by any eligible generator if its market PPA provider becomes insolvent, its existing market PPA expires, or if its existing market PPA is suspended as part of a mutual agreement with their offtaker and it is unable to secure another at better terms than the Backstop PPA. Eligibility will span the length of their CfD.

43. The Government will allocate the Backstop PPA through a competitive process under which potential backstop offtakers are invited to bid a £/MWh fee to purchase and manage the route-to-market costs associated with a generator's output under the terms of the Backstop PPA. The offtaker with the lowest bid would be required to offer to enter into the Backstop PPA with the generator. Once in the contract, the backstop offtaker would then manage the Backstop PPA and their bid multiplied by the total volume of generation covered by the Backstop PPA will represent the exercise costs which would be levelised across all licensed electricity suppliers on the basis of the volume of electricity supplied over the levelisation period (as in the case of the small-scale Feed-in-Tariff scheme). The size of the management fee bids (and therefore the total amount of levelisation payments) is expected to be smaller, the larger the Backstop PPA discount since a greater proportion of the route-to-market costs incurred by an offtaker would be covered by the discount. The amount bid by offtakers does not affect the level of the Backstop PPA discount for generators.

44. A quarterly levelisation process will be used, as in the small-scale Feed-in-Tariff scheme. A daily levelisation was also considered at consultation stage.

45. The Government is minded to report on and review the OLR scheme annually once it is accessible to generators. These reviews may consider a wide spectrum of OLR policy areas, including (among other things) whether the scheme should continue beyond the end of the first EMR Delivery Plan in 2018/19 and the potential for a revision of the Backstop PPA discount for new CfD signatories.

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[26] When reference prices are positive.

[27] Further information and relevant papers are available online at: https://www.gov.uk/government/policy-advisory-groups/electricity-market-reform-off-taker-of-last-resort-advisory-group.

[28] Further detail on how the design options below were narrowed down is available in the consultation documents available online at: https://www.gov.uk/government/consultations/implementing-the-offtaker-of-last-resort and https://www.gov.uk/government/consultations/supporting-independent-renewable-investment-offtaker-of-last-resort.

[29] And set out in Annex B of the consultation stage Impact Assessment, available online at: https://www.gov.uk/government/consultations/supporting-independent-renewable-investment-offtaker-of-last-resort.

Table 3: Final OLR design

Eligibility	• All renewable CfD and investment contract (IC)[30] holders. • All sizes.
Offtaker identity	• Mandated suppliers (determined by a minimum threshold of electricity supplied) to submit bids to manage each Backstop PPA. • All other licensed suppliers are able to voluntarily submit bids.
Access	• Generators will be able to apply for Backstop PPAs from October 2015. • Beyond this, generators are able to enter the OLR from the start of their CfD payments. • Generators' eligibility for the OLR is lost if their Backstop PPA is terminated by the offtaker for 'material breach' or if they terminate a Backstop PPA early without required notice.
Allocation	• Competitive allocation where potential offtakers bid a management fee (reflecting route-to-market costs they expect to incur beyond the level of the fixed discount). Obligation on Ofgem to allocate within a 26 working day time period. • Contract allocated to the lowest bidder. Mandatory offtakers are required to submit bids. • If generator has a capacity ≥100MW, output is split across identical Backstop PPAs of equal capacity.
Pricing and terms	• Fixed £/MWh discount, flat for CfD term, indexed to CPI. Set at £25/MWh for all technologies. • Contracts allocated for a 1 year period for all generators, with a break clause at 6 months for intermittent generators. • As close to open market PPA terms as possible.
Levelisation	• The sum of the management fees bid by offtakers will be levelised across all licensed suppliers. • Quarterly levelisation process similar to small-scale FITs, subject to a BPPA being in effect.
Scheme review	• OLR reported on in the Annual Update to the Delivery plan, parameters reviewed annually, and scheme requirement reviewed at the next Delivery plan.

Alternatives to regulation

46. Government intervention does not rule out the possibility of pursuing non-regulatory approaches (e.g. voluntary approaches). DECC has been taking forward a "Market Readiness Project" to smooth transition to CfDs. For this, DECC has been facilitating industry-led working groups reporting to a steering group which are considering how PPAs will need to change to complement the CfD and are developing a set of best practice guidelines for PPA providers and generators.[31]

Other alternatives ruled out

47. Annex 1 of the Impact Assessment on the Primary Powers[32] set out potential intervention options that could be taken forward (one of which was the OLR). These included a Supplier Obligation to offer terms. This was not taken forward over concerns that it would not be bankable and would not address the drivers of the current poor liquidity in the PPA market.

48. Another alternative to the implementation of OLR that has been proposed by some market participants was a Green Power Auction Market (GPAM). This would create a type of fixed feed-in-tariff by treating the price achieved in a six-monthly auction as the reference price for the purposes of the CfD so that generators achieve the same price regardless of the impact on system balancing costs. This has the merit of providing price certainty for the generator. However, we do not believe that GPAM is an appropriate solution to route-to-market issues for independent generators. It

[30] Under the FIDeR process, certain projects that need to make final investment decisions before the CfD is in place are able to apply for Investment Contracts (ICs) – a form of early CfD. ICs are being designed to be as consistent with the enduring CfD as possible, with identical strike prices and key commercial terms under both schemes.

[31] More information on this work is available online at: https://www.gov.uk/government/policy-advisory-groups/electricity-market-reform-emr-cfd-market-readiness-working-groups.

[32] Available online at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/197626/barriers_independent_generators_ia.pdf.

guarantees generators that they would always receive the strike price for their power, regardless of the choices they make around design and operation of their plant. Therefore, incentives to manage imbalance risks would be removed from generators. This could lead to significantly higher costs to consumers, as the cost of balancing the electricity system would be higher. It would also not provide assurance to lenders that it would be 'bankable', without additional measures, such as the OLR. GPAM would have prescribed one particular route-to-market, and would have removed generators from the mainstream energy market removing incentives to innovate. As a result, this option was not taken forward.

Cost-Benefit Analysis

Summary

49. Table 4 summarises the benefits and costs identified in the rest of this IA (related to central route-to-market cost assumptions). The range reflects the impact of OLR against two counterfactuals set out below (representing two market extremes reflecting the uncertainty at the outset as to the development of the PPA market and in order to bound the impacts).

50. The quantitative and qualitative analysis in this section has been supported by analysis by Baringa and discussions with stakeholders via the OLR advisory group.[33] The figures in the table below are also set out in the relevant subsections in this chapter and are based on internal DECC analysis and analysis by Baringa.

Table 4: Summary impacts (central route-to-market cost assumptions, range based on two counterfactuals)

Description	**NPV (real 2012 prices)**
Benefits	**Total quantified benefit: £0-2.151bn (midpoint £1.075bn)**
Improved PPA market competition	Transfer of rents from incumbent offtakers to generators, electricity consumers and new offtakers of between **£0-1.152bn (midpoint £576m)**. Small liquidity benefit and potential for lower overall discounts due to lower tail risk for offtakers (unquantified).
Improved generation market competition	Could lower project costs and drive innovation delivering further benefits to society (unquantified, however a breakeven analysis suggests that **competition benefits equivalent to 0.1% of average domestic electricity prices over the period 2016-30 would be sufficient to deliver a positive NPV** in both counterfactuals under central route-to-market cost assumptions).
Increases UK's ability to meet renewable target in cost-effective manner	Could increase wind generation in 2020 by between 0-13TWh. Reduced risk of sanctions and reduced reputational/political risk limits impact on cost of capital (unquantified).
Other benefits	Including improved near-term capacity margins, lower capacity market payments, lower cost of capital, secondary benefits of additional renewable build (unquantified). Carbon savings between 0-41MtCO_2e. Equivalent to between **£0-998m (midpoint £499m)**.
Costs	**Total quantified cost: £0-2.716bn (midpoint £1.358bn)**
Transfer of rents away from existing offtakers	Rents transferred away from incumbent offtakers due to increased competition in the PPA market (see "Benefits"). Between **£0-1.152bn (midpoint £576m)**.
Costs to Ofgem/Government of administering the scheme	Resource implications from implementing (one-off) and monitoring likely to be recovered through licence fees. Additional resource implications related to allocation, cost-assessment and levelisation likely to be small (unquantified).
Administrative costs to energy suppliers	Cost to suppliers of provision of Backstop PPA likely to be small. Cost of adapting to settlement system likely to be minimal (unquantified). Costs of preparing bids for auctions in competitive allocation between **£0-34m (midpoint £17m).**
Credit rating/balance sheet impacts	Could reduce rents/financing costs for suppliers but impact likely to be small (unquantified).
Increased system imbalance costs	Due to increased intermittent generation on the system as a result of OLR increasing overall system balancing costs. Between **£0-1.529bn (midpoint £765m)**.
Other costs	Secondary costs of additional renewable build (unquantified).
Net quantified benefit	**-£565m to £0 (midpoint -£283m)**[34]

51. Overall, the OLR is estimated to deliver a net cost of between **£0 to 565m in NPV terms under central route-to-market cost assumptions (and between £0 and 2.558bn in the high route-to-market cost scenario**). However, the nature of the costs makes them easier to quantify and benefits from competition are typically difficult to quantify. A simple breakeven analysis suggests

[33] All relevant documents are available online at: https://www.gov.uk/government/policy-advisory-groups/electricity-market-reform-off-taker-of-last-resort-advisory-group.

[34] Upper bound costs deducted from upper bound benefits as the upper bounds are both consistent with a consistent counterfactual (Counterfactual 2). See Table 1.

that **increased competition benefits due to OLR in NPV terms will need to be equivalent of up to 0.1% of domestic retail electricity prices in the central route-to-market cost scenario over the period 2016-30 and up to 0.3% of domestic retail prices in the high cost scenario**.

52. The following sections provide greater detail on the likely benefits and costs of the proposed OLR against the counterfactual as set out in the next section.

53. Although all renewable generators will be eligible to access a Backstop PPA, the analysis which follows focuses mainly on offshore and onshore wind. While other technologies will be eligible, they are not expected to require the backstop to the same extent and, as they are expected to represent a smaller share of the future generation mix, any additional costs are expected to be small.[35]

The counterfactual – 'Do Nothing'

54. As previously stated, the move to CfDs should act to remove or reduce some of the factors causing the current deterioration in the PPA market. However, residual factors will remain which could continue to act as a limiting factor to market PPA availability on bankable terms. The development of the PPA market under CfDs without further intervention, therefore, remains uncertain.

55. Reflecting this uncertainty, the analysis of the impact of any intervention will be assessed against two counterfactuals which are designed to establish lower and upper bounds to the true impacts of the policy as, in reality, the PPA market is likely to behave in a manner between these two extremes:

- **Counterfactual 1 –** Sufficient improvement in the PPA market to enable achievement of the EMR reference case[36] without further intervention. For the purpose of the analysis, Baringa have identified this as a world where there is sufficient competition in the PPA market to provide long-term PPAs at the discounts assumed in the CfD strike price.[37]
- **Counterfactual 2 –** Constraints in the PPA market remain such that we cannot achieve the EMR reference case without further intervention. For the purpose of their analysis, Baringa characterise this scenario as "monopolistic" whereby one PPA provider sets a profit maximising discount above the competitive level, extracting rents and constraining the market.

56. For ease of comparison, the OLR is assumed to be successful in delivering the EMR reference case in both counterfactuals. In other words, it is not expected to deliver additional build in Counterfactual 1 (although there will likely still be a range of costs and benefits to its implementation in this counterfactual).

57. The analysis below uses "Central" route-to-market cost assumptions derived from work performed by Baringa for Ofgem as part of its EBSCR and set out in Annex C. The impact of the OLR (in particular, on cost to consumers) will be stress tested against a range of route-to-market cost scenarios in the sections "Sensitivity analysis around future route-to-market costs" and "Distributional impacts". Risks and potential mitigation to the success of the OLR are assessed in the section "Risks and unintended consequences".

Benefits

Improved PPA market competition

58. Lenders' credit requirements on PPA offtakers should no longer be a binding entry barrier into the PPA market because the mechanism insulates debt lenders from offtaker insolvency. Shorter-term PPAs (and providers of shorter-term PPAs who do not operate in the long-term PPA market) should become part of the menu of contracting options available to independent generators to secure a route-to-market as lenders will be insulated against the risk of the generator failing to find a bankable PPA when their first PPA expires.

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[35] The biggest route-to-market exposure for biomass plant is liquidity risk for which measures are already being put in place both within the CfD itself but also through Ofgem's liquidity reforms (see 'Background'). In addition, although solar may also face increasingly uncertain future imbalance costs, these will be less significant than for wind because solar forecast error is lower and, as it will play a smaller role in the future generation mix, it is less likely to be correlated with system imbalance as wind. Route-to-market costs for other technologies are less well understood but, as these technologies will likely be a small part of the future generation mix, any potential costs associated with their accessing a Backstop PPA are likely to be small.

[36] Deployment consistent with the EMR delivery plan. Further detail available online at: https://www.gov.uk/government/publications/electricity-market-reform-delivery-plan.

[37] 10% for onshore wind, 5% for offshore wind. Final delivery plan assumptions available online at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/267960/Annex_H_-_Modelling_Assumptions.pdf.

59. This improvement in competition should deliver greater choice and lower costs to generators. All other things being equal, increasing the proportion of shorter-term contracting strategies undertaken should reduce average market PPA discounts as shorter-term PPAs necessarily include lower risk premia associated with future imbalance costs and (if relevant) wholesale price risk (although this effect may be quite small). In addition, long-term PPA discounts could further be reduced as a result of the removal of tail risk to offtakers – the OLR could facilitate instances where offtakers buy themselves out of their market PPA (in instances of high route-to-market costs – generators will be more willing to accept such terms due to their ability to access other market PPAs or the Backstop PPA). As such, the OLR therefore caps route-to-market cost risk for long-term PPA providers.

60. While the OLR could encourage more potential offtakers to enter the PPA market, increasing competitive pressure and efficient pricing in the market, it could also lead to more intermittent renewable deployment than is economically efficient because higher than expected system imbalance costs would be spread across all suppliers through levelisation (considered in "Risks and unintended consequences"). However Baringa have assessed that the extent to which this tail risk is removed for offtakers is unlikely to be material[38].

61. Under Counterfactual 2, increased competition in the PPA market should reduce rents to incumbent PPA providers. Under administrative strike price setting for CfDs, these rents should transfer to generators through lower market PPA discounts. However, if we move to competitive strike price setting, these rents could also fall to electricity consumers (through lower strike prices and CfD top-up payments which ultimately fall on electricity bills).

62. Baringa estimate the total value of these rents in Counterfactual 2 to be around **£1.152bn in NPV terms**.[39] This is equivalent to up to roughly £1 per year off average household electricity bills over the period 2016-30.

63. An increased number of non-vertically integrated players in the wholesale market could also act to improve market liquidity which could exert greater pressure on wholesale prices. This reflects a transfer from generators to consumers, although this effect is likely to be small as it could only act to increase day-ahead and within-day liquidity, whereas wholesale energy costs which drive bills are influenced more significantly by longer-dated contracts as a result of supplier hedging strategies.

Improved generation market competition

64. It is inherently difficult to quantify the benefits of greater competition in the power generation sector. We therefore consider these benefits qualitatively. Relative to Counterfactual 1, we would not anticipate any significant new entry into the electricity generation sector. However, relative to Counterfactual 2, we could see a number of new entrants into the sector. An increased number of players in the market could, in the long-run, drive competition (to secure finance, or a CfD, for example) lowering the overall costs of future projects which could in turn lower costs to consumers through lower CfD top-up payments under competitive strike price setting. This competition could also drive innovation – new entrants may have new ideas or business models which may be at the forefront of technological change – delivering further benefits to society.

65. As an example, the Public Utility Regulatory Policies Act of 1978 (PURPA) in the US reduced barriers to entry into the wholesale electricity market for independent power producers.[40] While its primary objectives were to increase self-sufficiency in electricity production and create incentives to develop domestic renewable energy, it had the effect of enabling independent power producers to become a major source of technological change in the sector – By 1992, independent power producers built 60% of new capacity in the US.[41] Furthermore, prior to PURPA, less than 3%[42] of US electricity generation was by independent power producers, by 2011, it had risen to 14%.[43]

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[38] This, and the appropriateness of the Backstop PPA discount more generally, will be reviewed annually.

[39] NPV over the period 2014-2035 in real 2012 prices. Table 2 from Baringa's report "Cost Benefit Analysis in support of DECC's Impact Assessment of the Offtaker of Last Resort", available online at: https://www.gov.uk/government/consultations/supporting-independent-renewable-investment-offtaker-of-last-resort.

[40] The first main provision of PURPA forced electric utilities to buy electricity generated by small power producers (or 'Qualifying facilities') at 'avoided cost' rates – the rate that approximates what it would cost the utility to generate the same amount of electricity. The second major provision forced utilities to also supply backup power to small power producers. As a result, PURPA ensured that power producers could buy electricity from utilities when they needed it and that they could also sell the electricity they generated back to utilities at a fair price.

[41] US Energy Information Agency (EIA)

[42] 'PURPA: the intersection of competition and regulatory policy', Hon. Richard D Cudahy (1995)

[43] US Energy Information Agency (EIA)

66. While the benefits of greater generation and PPA market competition have not been quantified, it is estimated that any **benefits equivalent to up to around 0.1% of domestic electricity prices in the central cost scenario over the period 2016-30 (up to around 0.3% in the high cost scenario considered in later sections) would be sufficient to deliver a positive NPV**.[44]

Increases the UK's ability to meet its 2020 renewables target (in a cost-effective manner)

67. As previously discussed, in the absence of further government intervention, the PPA market could remain sufficiently constrained as to prevent a number of pipeline independent renewable projects from going ahead at the announced strike prices, increasing the risk of failing to meet our 2020 renewables target. Baringa estimate that the shortfall could equate to up to around 13TWh of onshore and offshore wind generation in 2020 in Counterfactual 2 (recall there is assumed to be no shortfall and no benefit here from Counterfactual 1).

68. Furthermore, reducing the risk of failing to meet the UK's renewables target will reduce any associated issue of reputational and political risk which could increase cost of capital and electricity sector costs in the longer-term.

Other benefits

69. The OLR delivers greater renewables deployment under Counterfactual 2 delivering associated benefits. In particular, we are able to estimate the expected carbon savings which could be achieved (under Counterfactual 2 only) from displacing higher carbon marginal generation with this additional low carbon (and lower marginal cost) generation. This is done by multiplying the annual increase in renewable generation[45] relative to Counterfactual 2 as estimated by Baringa by a marginal generation emission factor.[46] This results in a cumulative saving of 41MtCO_2e over the period 2014-34, equivalent to a monetary saving of **£998m** in NPV terms.[47]

70. Relatedly, under Counterfactual 2, the OLR could therefore act to avoid incurring additional costs through the Capacity Market to fill the capacity gap and increase security of supply in the near-term before the Capacity Market is introduced. Furthermore, minimum guaranteed revenues implied by the OLR could act to lower the cost of capital for future projects.

Costs

Costs to Ofgem/Government of administering the scheme

71. There will be Ofgem resource implications of implementing and monitoring the OLR. These costs have not been quantified at this stage as we expect this role will be rarely used.

72. In the event that the OLR is triggered, the Backstop PPA would be allocated through a sealed-bid auction where bids reflected the net cost offtakers expected to incur as a result of managing the Backstop PPA after taking into account the Backstop PPA discount. However, Ofgem could choose to change the design in future if the prevailing market circumstances call for it. Ofgem would also need to monitor the allocation process to ensure participants are operating competitively. The likelihood is that these functions could fall to existing resource (although with associated opportunity costs). However, Ofgem would not have to undertake a separate cost-assessment, the cost to be levelised being determined by the management fee bid by the 'successful' backstop offtaker.

Administrative costs to energy suppliers

73. Administrative costs relating to the provision of a Backstop PPA that fall to obligated suppliers (mandatory offtakers) are likely to be small as all but one of those which will be made mandatory offtakers already participate in the PPA market and already have the facilities and personnel in place to act as Backstop PPA providers. The administrative cost implications on all other suppliers are

[44] DECC analysis. Estimates based on constant annual benefits required to deliver an NPV benefit equal and opposite to the net benefit NPV presented in Table 3. (The "high" scenario is based on a consistent methodology assuming higher system imbalance consistent with the "high" route-to-market cost scenario set out in the section "Sensitivity analysis around future route-to-market costs".

[45] Charts 3c and 5c from Baringa's report "Cost Benefit Analysis in support of DECC's Impact Assessment of the Offtaker of Last Resort", available online at: https://www.gov.uk/government/consultations/supporting-independent-renewable-investment-offtaker-of-last-resort.

[46] As set out in the Green Book supplementary guidance for valuing greenhouse gas emissions for appraisal, available online at: https://www.gov.uk/government/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal.

[47] Using central traded carbon values in the above appraisal guidance.

likely to be comparatively smaller in absolute terms as they would only choose to be backstop offtakers if they determined that it would be economic for them to do so.

74. In the event that a Backstop PPA is requested, a competitive allocation will lead to additional costs on offtakers in terms of preparing bids. If we expect that for every tranche of generation requesting a Backstop PPA, participating offtakers require one or two additional members of full time staff, costing around £50,000 each (i.e. between £50,000 and £100,000 per bidder), and that there are between 6 and 25 participants in the auction[48], then this equates to between £300,000 to £2.5m. This equates to an NPV of between **£0 and £34m** over the period 2014 to 2035, the range reflecting whether auctions occurred in each year of the appraisal period.[49]

75. The quarterly settlement would add minimal costs as the systems are already in place under the small-scale FIT scheme. This settlement period could imply significant carry costs to offtakers awaiting payment in the event that the OLR was used extensively but this is considered unlikely.

Increased system imbalance costs

76. It is important to remember that imbalance costs would prevail with or without the OLR. We assume for simplicity that the only driver of differences between total system imbalance costs (relating to wind generation) between the counterfactuals and a world with the OLR is the level of deployment. As characterised, we assume that the EMR reference case is achieved in all scenarios with the OLR and in Counterfactual 1 without the OLR. Only Counterfactual 2 without the OLR delivers a lower level of deployment consistent with a monopolistic supply of long-term PPAs. This lower level of deployment would be consistent with lower total system imbalance costs.

77. Baringa estimate the total increase in system imbalance costs (related to wind) from OLR as a result of an increase in deployment in Counterfactual 2 under central route-to-market cost assumptions to be around **£1.529bn** in NPV terms.[50] To the extent that these imbalance costs are passed onto consumers[51], this would be equivalent to up to around £1 per year on average on household electricity bills over the period 2016-2030.

78. It is important, however, to note that these costs are not additional to those resulting from the EMR Reference scenario (as Counterfactual 2 underachieves against this deployment profile). As such, **these costs are not additional to those costs already set out in the Contracts for Difference Impact Assessment**.[52] These costs are not incurred in Counterfactual 1.

Sensitivity analysis around future route-to-market costs

79. While it is not considered likely that route-to-market costs (mainly imbalance costs) will exceed the range of discounts being considered for the Backstop PPA, there is a risk that, if these costs were higher than expected, the OLR could be triggered passing costs onto consumers through the levelisation of management fees. This section looks at the impact of alternative (higher) route-to-market costs on system balancing costs resulting from any increased wind deployment as a direct result of the OLR, and the subsequent section ("Distributional Impacts") considers the direction and scale of distributional impacts of the OLR under the range of counterfactuals and sensitivities presented here.

80. Chart 2 represents the range of route-to-market (primarily imbalance) cost assumptions (for independent wind generators) used for this sensitivity analysis alongside the central assumption and the Backstop PPA discount (these cost assumptions are also set out in Annex C). The "high" case is intended to reflect the downside scenario that an offtaker or equity provider might use to price

[48] The lower bound reflects the six largest energy suppliers likely to fall above the threshold for being mandatory offtakers and the upper bound reflects all suppliers. Source: Ofgem's 2013 report to the European commission (available online at: https://www.ofgem.gov.uk/ofgem-publications/82755/2013greatbritainandnorthernirelandnationalreportstotheeuropeancommission.pdf) states that, in 2012, there were 6 large electricity suppliers, 1 small supplier serving domestic and non-domestic customers, 11 small suppliers serving only domestic customers and 6 small suppliers serving non-domestic customers only. In addition, there was 1 new entrant in 2013.

[49] We would not expect these costs to increase one-for-one with the number of auctions per year as these are largely reflective of annual fixed costs (i.e. there are likely to be economies of scale relating to the number of auctions per year).

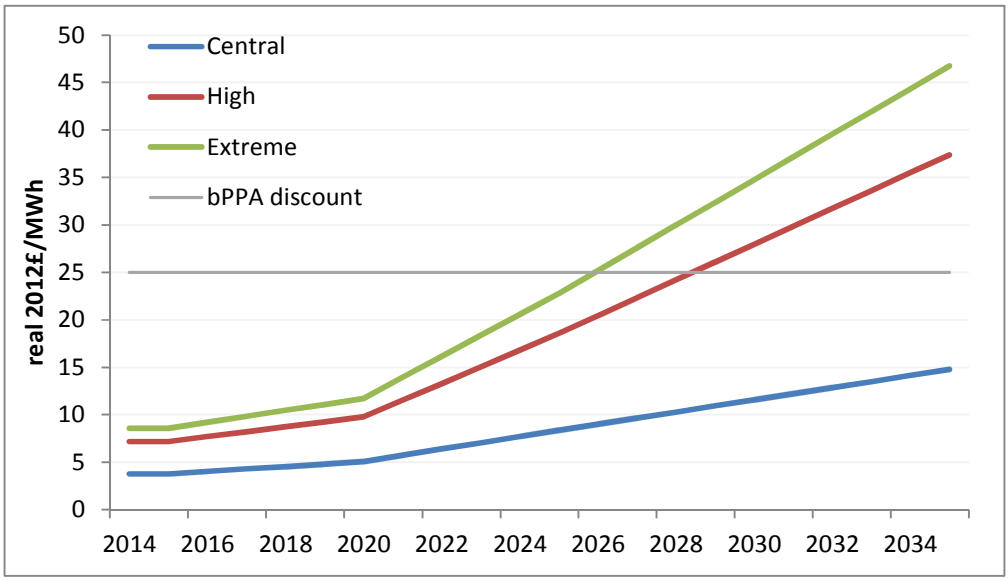
[50] Table 3a (difference between "with OLR" and "No OLR" in "uncompetitive world") from Baringa's report "Cost Benefit Analysis in support of DECC's Impact Assessment of the Offtaker of Last Resort", available online at: https://www.gov.uk/government/consultations/supporting-independent-renewable-investment-offtaker-of-last-resort.

[51] There is further consideration of this in the "Distributional Impacts" section.

[52] Available online at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/268202/Delivery_Plan_IA.pdf.

long-term imbalance risk into its PPA discount or cost of capital.[53] The "extreme" scenario is intended to be an imbalance scenario not envisaged by offtakers or generators, even for setting a risk premium.[54] We consider this a highly unlikely scenario (used simply for the purpose of stress testing) as it assumes no investment response to these high cash-out price signals in order to reduce exposure to imbalance charges.

Chart 2: "Central", "High" and "Extreme" route-to-market cost scenarios for independent wind generators



Source: Baringa

81. Table 5 presents Baringa's estimates of total system imbalance costs (relating to wind) under these imbalance cost scenarios and deployment profiles. As would be expected, as OLR delivers no additional wind build against Counterfactual 1, it also does not impact on system route-to-market/imbalance costs. Against Counterfactual 2, the increase in system route-to-market costs as a result of the OLR is driven by the increase in wind build the mechanism brings forward.

Table 5: Total system route-to-market costs relating to wind (real 2012 NPV)

	Route-to-market cost scenario	Counterfactual 1	Counterfactual 2
No OLR (a)	Central	£3.034bn	£1.505bn
	High	£6.981bn	£3.459bn
	Extreme	£8.616bn	£4.268bn
With OLR (b)	Central	£3.034bn	£3.034bn
	High	£6.981bn	£6.981bn
	Extreme	£8.616bn	£8.616bn
Impact of OLR (b – a)	Central	-	£1.529bn
	High	-	£3.522bn
	Extreme	-	£4.347bn

Distributional impacts

82. The OLR essentially involves consumers underwriting the risk that route-to-market costs (i.e. imbalance costs) rise to such an extent that market PPA discounts exceed the Backstop PPA discount. This can be partly mitigated by setting a large enough Backstop PPA discount (although small enough to still be effective in achieving the desired policy objectives).

[53] It is derived from work performed by Baringa for Ofgem (available online at: https://www.ofgem.gov.uk/ofgem-publications/82296/baringa-ebscr-quantitative-analysis.pdf), and is based on the forecast costs under "Package 5 – No CM". This is consistent with the "worst case" used by Deloitte for determining the Backstop PPA discount range, where it represented the 95th percentile scenario against which PPA providers would set a risk premium. This scenario was selected for the relative extremity of the assumptions rather than policy consistency. In both our counterfactuals, we assume the introduction of a capacity market. It should be noted that the model used to determine these imbalance cost assumptions was designed to make comparisons between potential policy options, not to provide forecasts of absolute imbalance costs and therefore do not represent Ofgem's or Government's view of imbalance outcomes.

[54] In the same way that the Ofgem modelling was used to define the mean and the 95th percentile of possible outcomes, the 99th percentile is estimated, and is taken to represent this "extreme" case.

Estimating the total amount of levelisation payments

83. There are a variety of scenarios under which a generator might request a Backstop PPA. For example:

    i. Their existing PPA is terminated due to their defaulting on their old PPA's obligations;

    ii. Their existing PPA provider has defaulted;

    iii. Their existing PPA expires;

    iv. Mutually agreed termination of the PPA by offtaker and generator.

84. The first two examples are likely to be isolated instances - they are unlikely to mean a significant volume of generating capacity following suit. As such, they are unlikely to be significantly costly in isolation - although we have not been able to quantify the total amount of levelisation payments (positive or negative) in such examples, it is likely to be small.

85. In the third and fourth examples, generators are unlikely to request a Backstop PPA unless market PPA discounts (i.e. route-to-market costs) are greater than the Backstop PPA discount. (There may be a risk that other aspects of the Backstop PPA may make it more attractive than market PPAs despite offering a greater discount than the market – this is discussed in 'Risks and Unintended Consequences'). In the event that route-to-market costs exceed the Backstop PPA discounts, we would expect an increasing volume of generation triggering the Backstop PPA. We consider this unlikely under the proposed Backstop PPA discount and central imbalance cost assumptions although it is important to consider what the impact of OLR would be under more extreme scenarios.

86. It is assumed for the purposes of this analysis that, in scenarios where route-to-market costs exceed the level of the fixed discount in the Backstop PPA, all eligible generators will exercise their right to a Backstop PPA irrespective of the route-to-market strategy assumed. In this way we are implicitly assuming that, for those generators that opt for long-term PPAs, their PPA provider is allowed to "buy them out" of any residual obligations (i.e. the PPA provider would pay the generator the difference between what they would have received under the original PPA and what the generator is able to secure in the OLR under the Backstop PPA). It is important to note that this is a worst case assumption[55], as it is not entirely clear that generators would necessarily agree to such arrangements (either up front or at the time that high imbalance costs materialise). The effect of any departure from this assumption would be to reduce the size of the levelisation fund as PPA providers that are locked into long-term PPAs would incur route-to-market costs below the level of the backstop discount that they would be unable to socialise more widely.

87. Table 6 presents the estimated total amount of levelisation payments under each of the route-to-market scenarios considered in the previous section. Note the levelisation total has been estimated as a function of the prevailing route-to-market cost and the Backstop PPA discount (representing total management fees). Note that route-to-market costs are not expected to exceed the level of the Backstop PPA discount before 2035 under central route-to-market cost assumptions.

Table 6: Estimated total levelisation payments (exercise cost) relating to wind (real 2012 NPV)[56]

Route-to-market cost scenario		
Central	**High**	**Extreme**
-	£323m	£1.000bn

Figures rounded to 2 significant figures

88. The total levelisation payments do not represent an additional cost of the OLR. It is a small proportion of total system route-to-market costs (from Table 5, previously) – meaning that wind generators and PPA providers will still absorb the vast majority of an unexpected rise in route-to-market costs.[57] As such, the total amount of levelisation payments represents a transfer of rents from electricity consumers to generators (and would fall within the Levy Control Framework).

[55] However, it is important to consider this upside risk around the estimates together with the fact that the figures only apply to wind generators. That being said, for other types of generator to trigger the backstop, market conditions would have to be even more extreme than those being tested here. Risk-weighting those additional costs would yield very low expected values.

[56] Source: Baringa, Table 3b, 'Cost Benefit Analysis in support of DECC's Impact Assessment of the Offtaker of Last Resort', available online at: https://www.gov.uk/government/consultations/supporting-independent-renewable-investment-offtaker-of-last-resort.

[57] Although, where those PPA providers are also energy suppliers, they may still pass these costs onto consumers (which they would have done under the counterfactual).

Estimating the impact of OLR on cost to electricity consumers

89. The total amount of levelisation payments does not represent the true cost to consumers of the OLR relative to either counterfactual – for this to hold, we would have to assume that, without the OLR, all offtakers that were also retail energy suppliers would be unable to pass on any costs incurred from higher than expected route-to-market costs to their energy customers. This is unlikely. Depending on the extent of retail competition, and insofar as other suppliers find themselves in a similar situation, a portion of these costs would likely be passed onto retail customers through higher retail electricity prices in the counterfactuals.

90. This implies that the impact of the OLR on electricity bills is dependent on the rate of pass-through of system imbalance costs. In order to bound these impacts, we consider three possibilities of pass-through:

    i. **No pass-through before or after OLR (0,0):** In a world without OLR, no route-to-market costs are passed through to retail electricity prices (and therefore bills).[58] In a world with OLR, only those route-to-market costs covered by the Backstop PPA (i.e. the total levelisation payments presented in Table 6) are passed through to retail electricity prices.[59] As such, the total system route-to-market costs that fall to customers as a result of OLR equal the total levelisation payments presented in Table 6.[60]

    ii. **Full pass-through before and after OLR (1,1):** In a world with and without OLR, all route-to-market costs are passed through to retail electricity prices (and therefore bills). As such, the total system route-to-market costs that fall to consumers as a result of OLR equal the full increase in system route-to-market costs from OLR presented in Table 5 (b – a).

    iii. No pass-through before OLR, full pass-through after (0,1): In a world without OLR, no route-to-market costs are passed through to retail electricity prices (and therefore bills). In a world with OLR, all system route-to-market costs are passed through to retail electricity prices.[61] As such, the total system route-to-market costs that fall to electricity customers in a world with OLR as presented in Table 5 row b.[62] This scenario is highly unlikely. In reality, some proportion of system imbalance costs will inevitably be absorbed by generators and offtakers. However this scenario is used to set an upper limit on total costs to consumers resulting from the OLR.

91. We do not consider a scenario where there is full pass-through prior to OLR and no pass-through after (1,0). This is highly unlikely, in particular, since the OLR should increase the pool of offtakers, not decrease it. This scenario would be consistent with OLR driving a lower cost to consumers than a world without the policy.

92. Table 7 presents the resulting average household electricity bill impacts implied by these scenarios. The range captures the impact of the range of pass-through scenarios and the impact of the two counterfactuals. A more disaggregated breakdown is presented in Annex D. As can be seen, the impacts in the central scenario are relatively small, representing less than 1% of total household electricity bills in all scenarios over the period 2016-30. The impacts on business electricity bills are expected to be of similar magnitude in percentage terms.

[58] For example, because not all large energy suppliers participate in the PPA market. Those who incur these route-to-market costs will be forced to absorb those costs in order to compete at the same price as those who do not face these costs.

[59] Because these levelised costs fall on all energy suppliers equally.

[60] And are independent of whether we are in counterfactual 1 or 2.

[61] For example, OLR might encourage increased participation in the PPA market which might mean all electricity suppliers share route-to-market costs more equally.

[62] And are independent of whether we are in Counterfactual 1 or 2.

Table 7: Average impact of OLR on annual household electricity bills (Averaged over the period 2016-30, real 2012 £)

Route-to-market cost scenario	Average annual bill impact (2016-2030)	
	Counterfactual 1	Counterfactual 2
Central	£0 to 2 (0 to 0.3%)	£0 to 2 (0 to 0.3%)
High	£0 to 5 (0 to 0.7%)	£0.1 to 5 (0.0 to 0.7%)
Extreme	£0 to 6 (0 to 0.9%)	£1 to 6 (0.1 to 0.9%)

Range represents the range of impacts from the three pass-through scenarios. Figures rounded to the nearest 1 significant figure.

93. The figures in the table above do not include the impact of OLR admin costs or the impact on household electricity bills from any extraction of rents as a result of OLR and a competitive CfD allocation as these costs and benefits are expected to be small and work in opposing directions. We have also been unable to quantify the benefits from increased competition as a result of the OLR, but a simple breakeven analysis suggests that, **if domestic retail electricity prices were up to around 0.4% less with OLR compared to the counterfactuals in the central route-to-market cost scenario over the period 2016-30, it would mean that the OLR would deliver an overall cost saving to consumers** (up to around 0.8% in the high cost scenario and 1% in the extreme cost scenario). Note this is different to the level of saving required for the OLR to breakeven in NPV terms (which is lower).[63]

Risks and unintended consequences

94. The success of the OLR in achieving its intended objective rests on driving a more efficient PPA market (or, at least, to not distort the PPA market towards worsening terms against the counterfactual). There are a number of potential risks in achieving this. This section sets out the key risks, their materiality and how they can be mitigated. A summary is presented in Table 8.[64]

[63] These figures are slightly larger than those set out in the breakeven analysis for the NPV. This is because, even if the OLR breaks even in terms of net costs to society, the nature of the OLR in that it transfers certain costs from generators/offtakers to suppliers/consumers could mean it still delivers a net reduction in consumer surplus. As such, a greater benefit (but still relatively small) from competition would be required to break even in cost-to-consumer terms.

[64] Some of these risks were initially considered by Baringa in the initial Backstop PPA proposal available online at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/253179/Backstop_PPA_Proposal__report_by_Baringa_LLP___Report_published_July_2013_.pdf.

Table 8: Key risks and mitigation measures

Description of risk	Mitigation measures	Materiality
Lack of bankability	Multiple mandatory offtakers with acceptable credit, proof of bankability for voluntary offtakers, Backstop PPA discount not too high	Not significantly material given mitigation measures
Incentivising excessive risk taking by equity	Backstop PPA discount sufficiently high	Not significantly material given mitigation measures and the fact that debt is unlikely to give equity free-reign through the terms of the loan agreement
Creating a floor towards which market offerings converge	Backstop PPA discount sufficiently high	Not significantly material given profit maximising and competitive incentives by offtakers.
Distorting incentives on suppliers to offer PPAs	Levelisation of any rents to Backstop offtakers, competitive allocation	Not significantly material given profit maximising and competitive incentives by offtakers.
Reducing suppliers' capacity to enter into PPAs	Maximum tenure for backstop PPA, maximum tranche of generating capacity per Backstop PPA, competitive allocation	Not significantly material given mitigation measures
Distorting incentives on generators to contract in the PPA market	Minimum tenure for Backstop PPA, removal of eligibility for generators who terminate the Backstop PPA earlier, sufficiently high Backstop PPA discount	Not significantly material given profit maximising incentives on generators and mitigation measures.
Distorting incentives for poorly performing generators	Removal or suspension of eligibility if there is a material breach	Not significantly material given mitigation measures
Bids in the competitive allocation process not being cost reflective	Multiple mandatory offtakers, levelisation of costs/rents.	Not considered material given mitigation measures and evidence of bidding behaviour in the NFPA
Reduced incentives to manage imbalance	Backstop PPA discount sufficiently high, annual review of scheme given prevailing market conditions, removal of eligibility due to material risk	Not significantly material given mitigation measures and current expectations of future route-to-market costs. Residual risk for grandfathered projects in the event that route-to-market costs exceed the level of the Backstop PPA discount although this will only apply for the length of their CfD.

Lack of bankability

95. This is not considered a material risk because specific elements of the OLR design are intended to ensure bankability.

96. The creation of mandatory offtakers should provide assurance to lenders that there will always be a backstop offtaker for a project. It will also be important for bankability to ensure that suppliers can only opt into the scheme if they would be acceptable to lenders and have the technical capabilities. To ensure this, proof of voluntary offtaker bankability would be required ensuring they were credible offtakers.

97. Lenders will also need to be confident that the OLR will deliver a Backstop PPA via a swift, practicable and certain process, while also minimising costs for consumers. As described in "Costs" the competitive allocation process will likely be the least-cost backstop allocation option of those considered. This process can be monitored and reviewed if market circumstances necessitate it.

Incentivising excessive risk-taking by equity

98. By protecting lenders from the risk of contracting with less credit-worthy counterparties or through the short-term PPA market, the OLR is intended to allow equity greater flexibility in terms of the level of exposure that it takes to long-term route-to-market risk. Excessive risk-taking, however, would increase the likelihood of triggering the backstop and increase costs to consumers through the levelisation.

99. Evidence[65] suggests that lenders are unlikely to give equity a completely free hand on contracting strategy through the covenants package in the loan documentation. In addition a larger Backstop PPA discount (i.e. one which leaves a lower cash buffer to pay debt) should reinforce incentives on equity to avoid excessive risk-taking.

Creating a floor towards which market offerings converge

100. The intention of the Backstop PPA is to be a last resort for generators. As such, it is designed in such a way that the Backstop PPA discount should be larger than for PPAs of equivalent tenor offered in the open market. Given the low level of liquidity in the PPA market currently and the fact that a larger discount would be more attractive to offtakers, there is a risk that market PPA offerings converge towards the Backstop PPA discount.

101. This risk is not assessed to be significantly material. Consider opposite extreme states of competition in the long-term PPA market. If the market is competitive, there will always be an incentive for competing offtakers to undercut (offer a smaller discount than) their competitors in order to secure a project, driving discounts to cost-reflective levels. In a world with the OLR, this should still be the case. In a world with a single monopolist provider, the monopolist will set their market discount offerings in order to maximise profits (i.e. any discount larger than the monopolist discount does not maximise profits and therefor is less preferable for the offtaker). In a world with OLR, if the Backstop PPA discount is greater than the profit maximising discount, it will not be preferred by the monopolist.[66]

Distorting incentives on suppliers to offer PPAs

102. Similarly, the risk of an individual supplier choosing to withdraw their market PPA offerings in favour of the Backstop PPA is considered to be low. The levelisation of any rents should act to make the Backstop PPA less attractive for an individual offtaker than offering a market PPA at a discount marginally lower than the backstop discount. Then, for the reasons described above, the risk of the Backstop PPA discount effectively creating a floor price is also not considered to be material.

103. There does, however, remain a residual risk that the OLR mechanism itself might overcompensate an offtaker for acting as a Backstop PPA provider relative to the actual cost of doing so (leading to rents and increased cost to consumers through the levelisation process).

104. Under competitive allocation, a backstop offtaker may be able to secure large rents if competition for the contract is low (e.g. due to structural barriers preventing wider PPA market participants from also offering Backstop PPAs).[67] As such, Ofgem would have to closely monitor supplier behaviour and intervene if necessary. The introduction of six mandatory offtakers, allowing voluntary offtakers and a maximum capacity level per Backstop PPA at 100MW should also aid competition in this allocation process. Moreover, the levelisation of any rents or costs incurred by the backstop offtaker should also act to incentivise cost-reflective bidding.

[65] From Baringa's discussions with industry, as set out in the section of "The Backstop PPA Proposal" considering this risk, available online at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/253179/Backstop_PPA_Proposal__report_by_Baringa_LLP___Report_published_July_2013_.pdf.

[66] A more detailed rationale is provided in Baringa's paper 1A to the OLR Advisory Group, available online at: https://www.gov.uk/government/policy-advisory-groups/electricity-market-reform-off-taker-of-last-resort-advisory-group.

[67] E.g. If there is a requirement to hold a supply licence, which many aggregators may not have. Further consideration of this is presented in Baringa paper 1B to the OLR Advisory Group, available online at: https://www.gov.uk/government/policy-advisory-groups/electricity-market-reform-off-taker-of-last-resort-advisory-group.

Reducing suppliers' capacity to enter into PPAs

105. As opposed to the risk that offtaker incentives to offer PPAs in the open market might be adversely affected, there is also a risk that their capacity to offer open market PPAs is adversely affected by an obligation to provide a Backstop PPA.

106. Under competitive allocation, this risk is unlikely to be material as any bidder, including those who are required to bid, will be able to submit bids reflective of the costs of providing the Backstop PPA.

Distorting incentives on generators to contract in the PPA market

107. We would not expect any generator to seek a Backstop PPA if better alternatives existed – to do so would not be commercially rational or indicate a fundamental difference in the risk-reward ratio of a Backstop PPA when compared to an equivalent PPA in the open market

108. However, it is possible that generators might want access to a Backstop PPA for a short period despite better terms being available in the open market; for example, when negotiating a new open-market PPA or if the open market does not move towards absolute discounts (and thereby making the more stable revenues of the Backstop PPA more attractive to lenders).

109. In addition, there is a risk that the Backstop PPA, by essentially setting a floor for project revenues, could provide too strong a price signal for intermittent generation resulting in a greater than optimal (in terms of system imbalance) level of intermittent generation on the system.

110. The latter two examples can be mitigated by setting the Backstop PPA discount sufficiently high relative to market PPAs (and reviewing it systematically for new entrants if market conditions change).

111. In the first example, allowing access to a Backstop PPA could allow generators to negotiate more forcefully in the knowledge that they had a backup contract if necessary that could be used to fill any gap. This does not reflect the objective of the OLR: a Backstop PPA should exist to provide support if open market PPAs are not available on better terms, but not to strengthen the negotiating hand of generators or reduce their desire to enter open-market PPAs in a timely manner.

112. Furthermore, there is a cost associated with generators frequently entering Backstop PPAs for a very short period of time both in terms of administrative costs of allocation to Ofgem and offtakers, and reduced incentives on offtakers to forecast and actively trade the power generated (which would ultimately lead to higher costs to consumers).

113. These risks can be mitigated by setting the minimum tenure of the Backstop PPA to 6 months and by having a generator that terminates a Backstop PPA earlier than this or without giving due notice, lose their eligibility for future Backstop PPAs.

Distorting incentives for poorly performing generators

114. There is potential moral hazard in allowing a generator who has had their original market PPA terminated as a consequence of the generator themselves defaulting on its obligations. Allowing such generators to access a Backstop PPA could reduce the incentives on generators from meeting obligations on their original PPAs (which could, in turn, lead to increased market PPA discounts and a greater chance of triggering the backstop). Furthermore, there is a risk that such generators could continue to fail to meet their obligations under their Backstop PPA given their history of poor performance. While the size of the Backstop PPA discount relative to market PPAs should act as a disincentive for generators to default on their market PPAs, the OLR's existence altogether could have the opposite effect.

115. In order to mitigate this risk, the OLR would need to be designed such that any generator that has had their Backstop PPA terminated for material breach will have their eligibility for further Backstop PPAs revoked or suspended.

Bids in the competitive allocation process not being cost-reflective

116. We previously considered the risk of a lack of competition in the process leading to high mark-ups in the prices bid and associated mitigating actions. Here we consider the likelihood of mandatory offtakers submitting inflated bids in order to avoid having to enter into a Backstop PPA (which could result in the Backstop PPA provider not being the offtaker who can manage the contract at the lowest cost, resulting in additional costs to consumers). The levelisation of any costs to the backstop offtaker should act to dampen such incentives, first by reducing the cost incurred by

the 'successful' backstop offtaker, second because, if such action resulted in a backstop offtaker who would incur greater costs for managing the contract, the levelisation of these costs would result in a greater cost to the offtaker who submitted an inflated bid.

117. A related risk is that, if a generator is of relatively small capacity, mandatory offtakers may not bother to submit cost-reflective bids in the knowledge that any levelisation costs and profits would be minimal. We do not judge this as a significant risk as voluntary offtakers would be more likely to bid for these smaller contracts to avoid a transfer of value to its competitors under levelisation. The Non-Fossil Purchasing Agency (NFPA) has shown that even the smallest capacity generators are subject to competitive bidding and it is reasonable to expect that Backstop PPAs under the OLR will follow a similar pattern.

Dulling incentives to manage imbalance if route to market costs exceed the Backstop PPA discount

118. Under current expectations of future route-to-market costs, the OLR is designed to minimise adverse incentives to manage imbalance. There remains a risk, however, that when route-to-market costs exceed the level of the Backstop PPA discount, generators and offtakers will no longer face the same incentives to manage imbalance (as route-to-market costs in excess of the Backstop PPA discount will be transferred to electricity suppliers/consumers) further exacerbating the problem.

119. In the case of offtakers, this risk is expected to be minimal as they will always seek to beat the cost set out by their bid in the competitive allocation in the prospect of potential rents.[68] In the case of generators, this risk is partly mitigated by undertaking an annual review of the scheme and adjusting particular terms (including the Backstop PPA discount) for new CfD signatories based on the prevailing market conditions. There does, however, remain a residual risk if some generators are on grandfathered terms (for the remaining duration of their CfD) whereby the Backstop PPA discount is lower than prevailing route-to-market costs. The regularity of the annual review should seek to minimise the volumes of generation for which this applies and the risk of losing eligibility to the OLR for material breach should seek to mitigate the most extreme instances of this.

Specific impact tests

Competition assessment

120. The OLR is not expected to directly or indirectly limit participation in the energy market. Its intended effect is to enable greater participation in the long-term PPA market and/or to unlock the short-term PPA market (and therefore exposing the long-term PPA market to greater competition). In turn, this should facilitate pipeline projects by independent renewable generators to successfully find a route-to-market and secure lending. Reducing barriers to entry for new players in the wholesale electricity market could deliver longer-term competition benefits.

Small Firms Impact Test

121. The OLR is intended to have a positive effect on small firms in the power generation sector and PPA market by reducing barriers to entry in both markets to smaller suppliers.

122. The threshold for determining mandatory offtakers will be set at a level considered high enough such that small suppliers are not covered, and are unlikely to be captured without a significant increase in their market share.

123. We do not consider it appropriate to exempt small suppliers from the levelisation. Its expected value is considered to be low (accounting for its size and likelihood of the OLR being used). In addition, we also wish to avoid additional distortions to the retail energy market – this is consistent with the levelisation mechanism for small-scale FITs and the intended levelisation mechanism for CfDs.

Other impact tests

124. The OLR is not expected to have significant direct differential impacts on the basis of protected equality characteristics. There are also no foreseen adverse impacts on human rights, health and wellbeing, or the justice system.

[68] See also earlier section assessing the risk of bids not being set competitively in the allocation auction.

Post-implementation review

125. The OLR mechanism is intended to be a temporary measure, remaining in place only until the market for bankable PPAs is sufficiently robust and lenders, generators and offtakers have become comfortable with the CfD regime. The intention is to leave the OLR unchanged until the end of the scheme. However, any adjustments that the Secretary of State sees as necessary following its review would only apply to new CfD signatories, with existing generators' rights of access and Backstop PPA terms being grandfathered from when they signed their CfD.

126. We are minded to undertake annual reporting of the scheme covering a number of market parameters and an evaluation of the performance of the OLR and wider PPA market conditions to ascertain whether there have been any significant shifts in the market that require the OLR to be removed. These annual reviews would consider (among other things) whether the scheme should remain open to new generators after the end of the first EMR delivery plan. If at this point there is evidence for a continuing need for the scheme then it could be kept in place, with the potential for a number of design or parameter changes.

127. Further detail on the intended implementation timetable and review is available in the related consultation documents.[69]

[69] Available online at: https://www.gov.uk/government/consultations/supporting-independent-renewable-investment-offtaker-of-last-resort and https://www.gov.uk/government/consultations/implementing-the-offtaker-of-last-resort

128.

Annex A: Design of the Offtaker of Last Resort

This Annex sets out the individual design elements of the OLR in more detail. Further detail is provided in the Government response to the June consultation. [70] The individual design elements were also presented to the OLR Advisory Group for consideration. The accompanying papers are available online.[71]

Eligibility

Technologies

We intend to allow all renewable CfD generators access to the OLR irrespective of technology. Although the primary concern for lenders with shorter-term contracting strategies appears to be the risk of rising imbalance costs, lenders have indicated that, at least at the outset of the CfD, they will require other technologies to attain long-term PPAs in order to provide debt finance. This covers intermittent generators for whom imbalance is not anticipated to become a significant risk (such as solar), and baseload generators where concerns are focussed more around the liquidity of the CfD reference price and generator availability.

Generator size

We do not intend to limit the size of generators that are eligible for the OLR. Any issues that might arise from a large project seeking to access the OLR (e.g. lumpy payments and lack of bids in a competitive allocation) we seek to mitigate through other elements in the design of the policy (e.g. mandatory offtakers/bidders, competitive allocation and splitting the output of generators above 100MW across multiple offtakers).

Support Mechanism

Under the FIDeR process, certain projects that need to make final investment decisions before the CfD is in place are able to apply for Investment Contracts (ICs) – a form of early CfD. ICs are being designed to be as consistent with the enduring CfD as possible, with identical strike prices and key commercial terms under both schemes.

IC projects will be eligible for the OLR to help preserve this consistency.

Offtaker Identity

The need for mandatory offtakers

For the OLR to achieve its objective of guaranteeing generators a route-to-market, there will need to be a counterparty or offtaker to the Backstop PPA. Whilst we would always expect suppliers to bid for Backstop PPAs, it is hard to anticipate all possible market conditions that could arise over the lifetime of a CfD which could lead to offtakers being unwilling to bid in a competitive tender.

Generators and lenders would have more confidence in the scheme if at least some offtakers were mandated to bid for Backstop PPAs. This requirement would also help ensure a minimum level of competition within the allocation process. Therefore some licenced suppliers will be mandated to bid to manage Backstops PPAs.

Nature of mandatory offtakers

Mandatory backstop offtakers must be a suitable PPA counterparty to any generator that enters the scheme, including potentially in times of market stress (e.g. high imbalance costs), without undue impact on the company's ability to continue as a going concern. It is likely that only larger supply companies with a strong customer base are likely to be able to meet these requirements.

[70] Available online at: https://www.gov.uk/government/consultations/implementing-the-offtaker-of-last-resort https://www.gov.uk/government/consultations/supporting-independent-renewable-investment-offtaker-of-last-resort and https://www.gov.uk/government/consultations/implementing-the-offtaker-of-last-resort

[71] Available online at: https://www.gov.uk/government/policy-advisory-groups/electricity-market-reform-off-taker-of-last-resort-advisory-group.

Setting the threshold for mandatory offtakers

We believe that a threshold for mandatory offtakers based on the volume of electricity supplied is the best proxy for requirements to contract for power in the market and propose that suppliers obligated to be mandatory offtakers would those that supply more than a six per cent share of electricity in Great Britain.

Ensuring credit-worthiness

For the OLR to achieve its objectives, generators and lenders will need to be comfortable about the credit-worthiness of the offtakers.

To ensure credit-worthiness, all offtakers will have to commit at the point they submit a bid for a Backstop PPA that, if awarded the Backstop PPA contract, they can provide evidence that they meet the credit requirements. These will be either a company credit rating of BBB-, or a collateral provision consisting of a Parent Company Guarantee of BBB- or a letter of credit at A- to cover the period of potential loss for the generator.

Access

We anticipate the main reasons why a generator would request a Backstop PPA would be if their previous PPA has expired or been terminated due to offtaker default and they are unable to find a new route-to-market on better terms than the Backstop PPA. These are the principal circumstances that the OLR has been designed to provide protection for, and we would not seek to limit access in these situations.

We also propose to allow all generators access to the OLR, but to revoke or suspend eligibility for further Backstop PPAs from generators that have a Backstop PPA terminated by an offtaker as a result of material breach.

In addition, intermittent generators that seek a Backstop PPA are committed to remaining within the agreement for a minimum period of six months (with a minimum six week notice period for leaving). Baseload generators are required to remain in a BPPA contract for a year because offtakers sell baseload power on a season ahead basis. Therefore, if the generator were to leave the contract early the offtaker may have sold their output and would have to spend time and resources to unwind their trading position'. If a generator terminated a Backstop PPA earlier than the minimum contract term or without giving due notice, they would lose their eligibility for future Backstop PPAs. All contracts can be terminated by mutual agreement at any time during the contract.

The OLR will be in place in time for the first CfD allocation in October 2014. BPPA contracts will become available to generators from October 2015 to allow time for Ofgem and offtakers to put relevant systems in place. Beyond this, all renewable CfD holders would be able to access Backstop PPAs at any point during their CfD from the point of CfD signature.

Allocation

Generators will most likely require a Backstop PPA if their existing PPA expires or their offtaker defaults. Therefore generators (and their lenders) require confidence that they will be able to secure a Backstop PPA with an appropriate offtaker in such circumstances within a reasonable amount of time and via a clear, objective process.

The Government proposes a competitive allocation process, completed within 26 working days, under which backstop offtakers are incentivised to bid a £/MWh fee to purchase and manage the route-to-market costs associated with a generator's output under the terms of the Backstop PPA. Offtakers would judge for themselves the likely costs and benefits of entering into a particular Backstop PPA with a generator and reflect this in their management fee. Bids are thus representative of the specific site characteristics and reflect the offtaker's ability to manage the output, resulting in an appropriate match between generator and offtaker. The size of these bids is expected to be negatively correlated with the size of the Backstop PPA discount (see 'Pricing') as a larger discount implies larger gross revenues to the offtaker which can be used to cover a greater proportion of route to market costs.

We have set out in Regulations the timings for the OLR allocation process. This is in order to give lenders and generators assurance of the maximum length of time for a BPPA to be allocated, barring a force majeure event that could affect Ofgem's capacity to perform functions to the mandated timings.

The allocation mechanism at the outset would be via a sealed bid, with Ofgem able to switch to a more comprehensive auction if the volume of Backstop PPAs meant that doing so would lower costs to consumers.

Cost Assessment and Levelisation

Under competitive allocation, offtakers make their own assessment of the costs and benefits and reflect this in the amount they bid in the competitive allocation process.

All licensed suppliers, not just those mandatorily or voluntarily offering Backstop PPAs, are obligated to participate in the levelisation process. The costs (or benefits) incurred by offtakers will be split between suppliers on the basis of the volume of electricity supplied over the levelisation period, as in the case with the ssFiT.

At the end of the levelisation period, Ofgem will determine the volume of electricity generated by each generator under a Backstop PPA. This data would be matched with the cost-assessment to give the total levelisation sum needed to be borne by all licensed suppliers.

Each supplier's share of the levelisation payments will then be established based on the volume of electricity that they have supplied over the period. Payments due will be netted off against any payments already made to generators through providing Backstop PPAs as is the case under ssFiTs.

Payment timetable

We propose a quarterly settlement similar to the ssFiT and with which suppliers are already comfortable. The frequency of settlements will be subject to the annual review, which will consider the current and projected volume of generation within Backstop PPAs. The intention is to increase the frequency of levelisation payments in the event that the OLR is widely used. To ensure the cost effectiveness of the OLR, levelisation will only take place if a Backstop PPA is in effect, with no levelisation when costs are zero.

We do not propose to require suppliers to post collateral for their levelisation payments under the OLR.

Mutualisation

We propose that mutualisation provisions are included to guard against a shortfall in the levelisation payments to the offtaker. Should a shortfall arise (through supplier insolvency), suppliers would have 10 working days to make mutualisation payments once they are issued with a mutualisation notice.

Pricing

The discount on the Backstop PPA will be set on a fixed £/MWh basis and indexed to CPI (consistent with CfD strike prices). This will mitigate the wholesale price risk which would prevail under CfDs with a percentage discount (which could adversely affect the bankability of the mechanism) and allow stable unit revenues under the Backstop PPA.

DECC commissioned Deloitte to undertake project finance analysis on a range of different discount options to determine the most appropriate level which met a number of criteria. These criteria, along with a summary of the modelling approach and results, are set out in Annex B of the consultation stage Impact Assessment.[72] Following the outcomes of the February 2014 consultation, DECC undertook internal analysis to update Deloitte's work which drew similar conclusions. This analysis is set out in Annex B. Based on this work and the outcomes of the consultation, we will introduce the OLR with a Backstop PPA discount of £25/MWh.

We will offer a single discount for all technologies. The discount proposed was sized against the technologies widely expected to face the highest route-to-market costs. It should be sufficient for other technologies such as baseload, since there is arguably greater potential for equity upside with these technologies. It is also important that the OLR remains a backstop for all technologies; a consistent discount across technologies helps to ensure this whilst minimising the administration burden of the OLR.

[72] Available online at: https://www.gov.uk/government/consultations/supporting-independent-renewable-investment-offtaker-of-last-resort.

Contract terms

The terms in the Backstop PPA are intended to mirror as closely as possible those in a typical bankable commercial PPA as using familiar structures will help lenders understand the risks they are exposed to. However, there are some areas where the Backstop PPA will need to differ from a commercial contract (as well as some areas where the contract is shaped through negotiation between the parties and where we will need to make decisions on the final text). Specifically:

- The index price for the Backstop PPA shall be the relevant CfD Market Reference Price for that particular project. Although we expect that this will become common in CfD compatible PPAs, it has yet to be tested in the market.
- Intermittent generators will have the ability to specify a price at which they would not wish to have their power sold. The generator will then be notified to self-curtail or would face the cash-out price. This will reduce the risks associated with extreme negative price events. The negative price trigger will be expressed in £5 increments.
- Offtakers will be able to claim penalties, capping the exposure for each event. The cap is calculated as a function of the project's capacity; the average MRP in the 12 months prior to the calculation date; and an assumed 24 hours for trading losses. An aggregate cap will also be applied over the term of the contract, calculated as a function of the generator's capacity and a multiplier, with the offtaker being able to terminate the contract if there are more than 2 instances where the actual costs per event is greater than the cap per event.

Scheme review

Once BPPAs have become available to generators, Government will review the OLR to evaluate the performance of the scheme and assess wider PPA market conditions. Government will conduct this review on an annual basis and the outcomes will be published.

These reviews may consider a wide spectrum of policy areas including, but not limited to: making adjustments to BPPAs available to new CfD signatories and considering whether the scheme should continue for generators who sign their CfD beyond March 2019.

The terms of the BPPA for an eligible generator will be grandfathered from the point at which they sign their CfD. As such, changes to the terms of BPPAs resulting from these reviews will only apply to new CfD entrants. However, the SoS retains the power to adjust the terms of legacy BPPAs in a very limited set of circumstances, where:

i. The amendments are necessary in order to take account of a new market structure, trading arrangement or industry code; and
ii. The effect of all amendments taken together is to maintain so far as possible the balance of risk and reward between the parties to the BPPA.

A public consultation will precede any changes to the OLR that may be suggested by the review.

Annex B: Setting the Backstop PPA discount level

Summary:

- The Offtaker of Last Resort was consulted on in February 2014. The proposal is for generators to have access to a Backstop PPA at a fixed discount to their CfD market reference price in order to guarantee a route-to-market.
- The aim is to set the discount for the Backstop PPA at a level that would, when taking account of the cost of debt, give the generator similar equity return regardless of whether it chooses a longer (e.g. 15yr PPA) or a shorter (e.g. 5yr PPA) term contracting strategy through the wholesale PPA market (assuming efficient pricing of PPAs in both cases).
- Initial model runs for the consultation were undertaken by Deloitte. Following continued discussion with stakeholders DECC has undertaken this internal analysis to test for consistency with EMR Delivery Plan assumptions.[73]

Key Findings:

- Equity returns decrease as the OLR discount increases. This is to be expected as the level of gearing available to the project has decreased. This is expected to occur across the supply curve of potential projects.
- For all projects there is a trade-off between the combination of lower gearing levels and higher PPA revenues under the OLR and the combination of higher gearing levels and lower PPA revenues under the baseline. As projects become more marginal and absolute levels of return fall, the combination of lower gearing and higher PPA revenues when taking account of the cost of debt, leads to greater returns overall and therefore returns under all OLR scenarios rise relative to the baseline.

- On balance across the area of the supply curve modelled an OLR of £25/MWh has the smallest effect on equity returns when compared to the baseline scenario.[74]

Background to Issue and Caveats:

The aim of this modelling is to answer the question:

> **What level of OLR discount gives a similar equity return when comparing two scenarios: one where project finance is raised on a long-term PPA; the second where project finance is raised on a combination of a short-term PPA and OLR revenues?**

The proposed Offtaker of Last Resort (OLR) is intended to offer a backstop PPA, which is intended to improve conditions in the PPA market. However this could lead to a change in the types of PPAs that a generator seeks.

Under the proposed OLR, a generator could see a short-term PPA (e.g. 5 years at a lower discount to those under a long term PPA) with debt sized against both this and the OLR. Under all scenarios the cost of PPAs is expected to rise over time as the cost of balancing increases.

The purpose of this modelling is to examine what level of OLR discount would give a similar equity return between the long-term PPA scenario and a shorter-term scenario backed by the OLR. This is done by considering how debt may be structured (and geared) in an 'OLR-world' with shorter-term PPAs:

- A smaller OLR discount is likely to be associated with higher potential levels of gearing. This in turn should result in higher equity returns.

[73] https://www.gov.uk/government/publications/electricity-market-reform-delivery-plan

[74] We have analysed projects in the bottom half (lowest cost) of the supply curve which for the purposes of our modelling are seen as the most likely projects to be deployed under CfDs. In reality the actual projects deployed under CfDs will be determined by the outcome of the CfD allocation process.

- In order to maintain neutrality, the policy aim is for the level of OLR discount at which equity returns are the same in an 'OLR world' as those in a 'no-OLR world'.

Initial model runs have been undertaken by Deloitte. Following continued discussion with stakeholders DECC has undertaken this internal analysis to test for consistency with EMR Delivery Plan assumptions. Therefore, with the exception of the assumed PPA discounts which are consistent with the previous OLR analysis undertaken by Deloitte[75], the new work was conducted to ensure consistency with Final EMR Delivery Plan 2013 assumptions.

We have undertaken further modelling to illustrate equity returns under different PPA assumptions. We have modelled several illustrative onshore wind projects that are likely to be deployed under CfDs (i.e. those in the bottom half of the potential supply curve used in DECC modelling) to show a range of project returns for each OLR scenario versus a 'baseline' long-term PPA scenario.

Modelling Approach:

In order to test the question posed, we have used analysed project returns for 3 different onshore wind projects that could deploy in [2015/16] under CfDs. For each scenario the following steps were taken:

Step 1) Model the 'Debt Providers' perspective

Using assumptions on how a lender would model potential returns, we find a maximum potential level of gearing for the project, i.e. given constraints a debt provider is likely to use what would the maximum amount of debt funding be, within these constraints. Two different sets of assumptions were made from a debt provider's point of view: a central case (where the lender takes a central view on potential returns) and a downside case (where the lender takes a pessimistic view on potential returns).

Key assumptions for the central case were:
1. Contracted Revenues from the CfD for the full 15 year period
2. Contracted revenues from the wholesale market for the length of the PPA and then the OLR up to a maximum of 15 years
3. A minimum debt service cover ratio (DSCR) of 1.25 is maintained
4. P50 output = the mean expected output
5. Debt term of 12 years maximum (including construction)

Key assumptions for the downside case were:
1. Contracted Revenues from the CfD for the full 15 year period
2. Contracted revenues from the wholesale market for the length of the PPA and then the OLR up to a maximum of 15 years
3. A minimum debt service cover ratio (DSCR) of 1.1 is maintained
4. P90 output = 85% of P50 output
5. Debt term of 12 years maximum (including construction)

Step 2) Model the 'Equity Providers' perspective

Then using assumptions about what an equity provider's central case might look like, and the gearing level found in Step 1, we examine what equity returns may look like for each project.

Key assumptions for this case were:
1. Contracted Revenues from the CfD for the full 15 year period
2. Contracted revenues from the wholesale market for the length of the PPA
3. P50 output

These steps were completed for the following scenarios:

1. Baseline Scenario: a "no OLR" scenario, where PPAs are available for a longer (15 year initial) period, but at higher discounts

[75] https://www.gov.uk/government/consultations/supporting-independent-renewable-investment-offtaker-of-last-resort

2. 3 “OLR scenarios”, where PPAs are available for a shorter (5 year) period, but at lower discounts and debt providers size debt on the OLR after the initial 5-year PPA period. Three OLR levels were examined:
    a. Run 1 – OLR £20/MWh
    b. Run 2 – OLR £25/MWh
    c. Run 3 – OLR £30/MWh

Equity returns were compared across all scenarios. A breakdown of the scenarios is shown in Table B1 below.

These results were tested across three illustrative projects that may deploy under the CfD (i.e. to capture a range across the supply curve[76]).

Table B1: Summary of key differences between scenarios

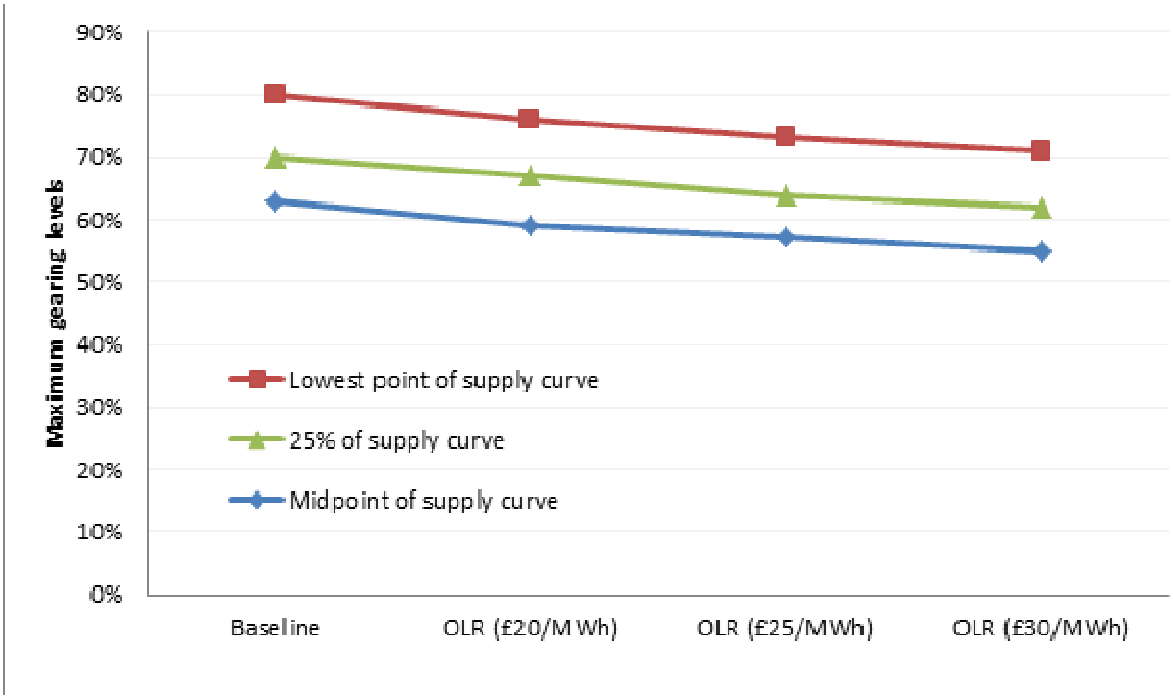
Scenario	Baseline	Run 1 – OLR £20/MWh	Run 2 – OLR £25/MWh	Run 3 – OLR £30/MWh
PPA in debt case	15 years initial PPA	5 year PPA and then OLR	5 year PPA and then OLR	5 year PPA and then OLR
PPA in equity case	15 years initial PPA and then 1 year rolling	5 year PPA and then 1 year rolling	5 year PPA and then 1 year rolling	5 year PPA and then 1 year rolling
OLR	No OLR	£20/MWh	£25/MWh	£25/MWh
Output:	Equity IRR	Equity IRR	Equity IRR	Equity IRR

Results:

Step 1) The ‘Debt Providers’ perspective

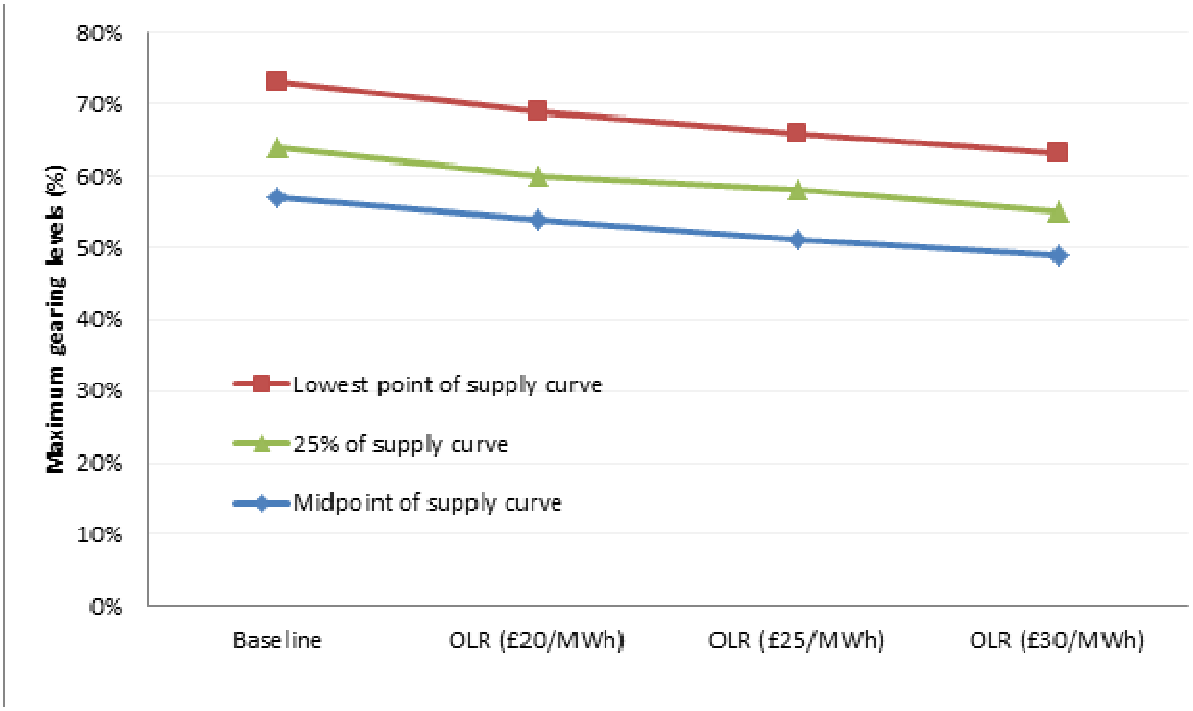
As expected, the level of gearing possible reduces with a larger OLR discount (shown below in Charts B1 and B2). This is because the revenues used to size the debt on are smaller. As expected, this occurs when looking across projects at different points on the supply curve, and in both the central and downside cases.

Chart B1: Central case – Gearing levels



[76] We have analysed projects at the midpoint of the supply curve, at 25% of the supply curve and at the lowest point of the supply curve.

Chart B2: Downside case – Gearing levels



Step 2) The 'Equity Providers' perspective

Charts B3 and B4 show the equity returns for all the modelled projects using an index to show the difference in these returns from the baseline (baseline set to 100). These charts show:

- Equity returns decrease as the OLR discount increases. This is to be expected as the level of gearing available to the project has decreased. This is expected to occur across the supply curve of potential projects.
- For all projects there is a trade-off between the combination of lower gearing levels and higher PPA revenues under the OLR and the combination of higher gearing levels and lower PPA revenues under the baseline. As projects become more marginal and absolute levels of return fall, the combination of lower gearing and higher PPA revenues when taking account of the cost of debt leads to greater returns overall and therefore returns under all OLR scenarios rise relative to the baseline.

- The reason for this is that PPA discounts are fixed in the modelling, such that the absolute difference in revenues between the long-term PPA (higher discount) and short-term PPA (lower discount) scenarios remains constant as other factors change which affect the overall level of returns. The result is that when returns are squeezed (e.g. through higher technology costs) gearing and therefore returns under both scenarios fall, but the short-term PPA scenario retains the same higher PPA revenues in absolute terms compared to the long-term PPA scenario. Because of this constant difference in PPA revenues in absolute terms, the short-term/OLR scenario becomes relatively more attractive as returns reduce.

- On balance across the area of the supply curve modelled an OLR of £25/MWh has the smallest effect on equity returns when compared to the baseline scenario.

Chart B3: Central case – Equity returns relative to the baseline

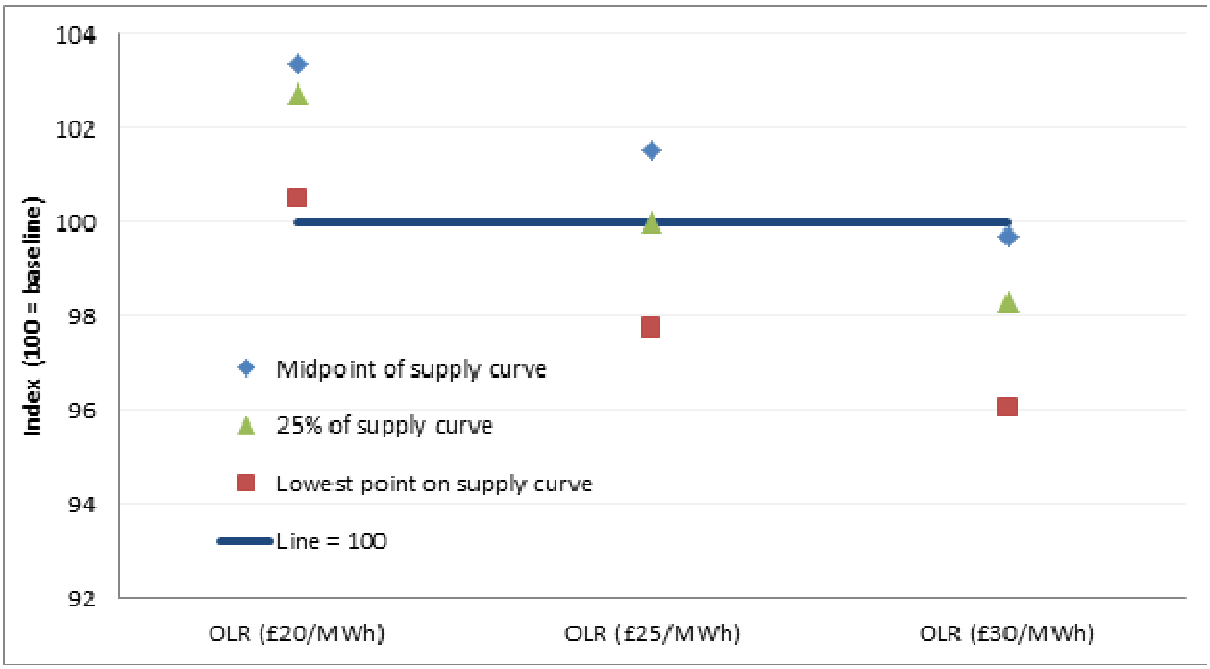
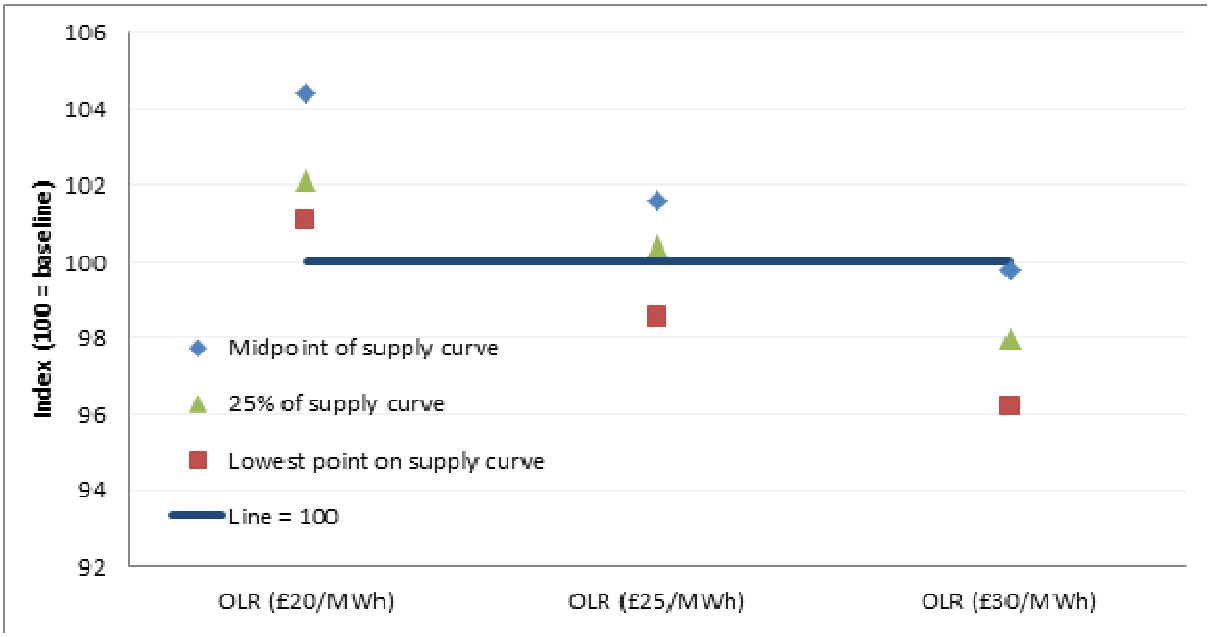


Chart B4: Downside case – Equity returns relative to the baseline



Annex C: Route to market cost assumptions

Table C1 presents the range of route-to-market cost scenarios for independent wind generators used by DECC and Baringa for the purpose of this cost-benefit analysis.

Table C1: Route-to-market cost assumptions

Real 2012 £/MWh	Central	High	Extreme
2015	3.8	7.2	8.6
2020	5.1	9.8	11.7
2025	8.4	18.6	22.8
2030	11.6	28.0	34.8
2035	14.8	37.4	46.7

These costs scenarios are derived from work performed by Baringa for Ofgem's EBSCR.[77]

The "central" case based on Ofgem's "minded to" position, assuming a Capacity Mechanism is in place, and that imbalance cost accrues only from the Gate Closure stage.

The "high" case is intended to reflect the downside scenario that an offtaker or equity provider might use to price long-term imbalance risk into its PPA discount or cost of capital. It is based on the forecast costs under "Package 5 – No CM". This is consistent with the "worst case" used by Deloitte for determining the Backstop PPA discount range, where it represented the 95th percentile scenario against which PPA providers would set a risk premium. This scenario was selected for the relative extremity of the assumptions rather than policy consistency. In both our counterfactuals, we assume the introduction of a capacity market. It should be noted that the model used to determine these imbalance cost assumptions was designed to make comparisons between potential policy options, not to provide forecasts of absolute imbalance costs and therefore do not represent Ofgem's or Government's view of imbalance outcome

The "extreme" scenario is intended to be an imbalance scenario not envisaged by offtakers or generators, even for setting a risk premium. In the same way that the Ofgem modelling was used to define the mean and the 95th percentile of possible outcomes, the 99th percentile is estimated, and is taken to represent this "extreme" case. We consider this a highly unlikely scenario (used simply for the purpose of stress testing) as it assumes no investment response to these high cash-out price signals in order to reduce exposure to imbalance charges.

[77] Available online at: https://www.ofgem.gov.uk/ofgem-publications/82296/baringa-ebscr-quantitative-analysis.pdf.

Annex D: Electricity bill impacts

Table D1 presents the estimated impacts of OLR on household electricity bills across the two counterfactuals, the range of pass-through assumptions, route-to-market cost scenarios and Backstop PPA discounts currently under consideration. All impacts equate to no more than 1% of average household electricity bills over the period. The impacts on business electricity bills are expected to be of a similar scale in percentage terms.

Table D1: Average impact of OLR on annual household electricity bills (real 2012£)

Route-to-market cost scenario	Backstop PPA discount	Average annual bill impact (2016-2030)					
		Counterfactual 1			Counterfactual 2		
		(0,0)	(0,1)	(1,1)	(0,0)	(0,1)	(1,1)
Central	25	-	£2	-	-	£2	£1
High	25	£0.1	£5	-	£0.1	£5	£2
Extreme	25	£1	£6	-	£1	£6	£3

Glossary

Agreement Date	**The date on which the generator signs their Backstop PPA**
Allocation Date	**The date on which Ofgem sends the generator a Backstop PPA to sign**
Backstop PPA	**PPA contract offered under the OLR (BPPA)**
CfD	**Contract for Difference**
CfD Agreement	**The initial section of a CfD which details the project-specific information relating to that particular contract, such as the eligible generator's name and the location of the facility**
CfD counterparty	**The counterparty for CfDs, which will be the Low Carbon Contracts Company Limited**
Commencement Date	**means the later of the generator's Preferred Commencement Date (as specified in Schedule One of their project information) and the date falling five (5) days after the Agreement Date.**
Contract for Difference	**The combination of the Standard Terms and a CfD Agreement, which when signed by the CfD counterparty and an eligible generator comprise a legally binding contract**
DSCR	**Debt Service Cover Ratio**
EBSCR	**Electricity Balancing Significant Code Review**
Eligible Generator	**Any electricity generator eligible for the OLR**
EMR	**Electricity Market Reform**
FIDeR	**Final Investment Decision Enabling for Renewables**
Generator	**Any legal entity which might apply for a CfD**
GPAM	**Green Power Auction Market**
GW	**Giga Watt**
IC	**Investment Contract**
IRGs	**Independent Renewable Generators**
IRR	**Internal Rate of Return**
LCCC	**Low Carbon Contract Company Limited**
LEC	**Levy Exemption Certificate**
LOC	**Letter of Credit**
MRP	**Market Reference Price**
MW	**Mega Watt**
Offtaker	**Licensed supplier party to a PPA or Backstop PPA (BPPA) with a generator**
Ofgem	**Office of Gas and Electricity markets, the Authority**
OLR	**Offtaker of Last Resort**
OLR Notice	**The notice sent to all licensed suppliers, informing that one or more BPPAs are to be subject to an OLR auction**
OLR Year	**A period of 12 months commencing on 1 April and ending on the next 31 March**
NPV	**Net Present Value**
PNG	**Private Network Generator**
PPA	**Power Purchase Agreement**
REGO	**Renewable Energy Guarantees of Origin**
RO	**Renewables Obligation**
ROC	**Renewables Obligation Certificate**
SCADA	**Supervisory Control and Data Acquisition**
ssFiT	**Small Scale Feed in Tariff**
SOC	**A signed 'Statement of Confirmation' (SoC) from a director of the electricity generator confirming that the PI is complete, true and**

	accurate, and a declaration that the provision of the statement commits the generator to entering into the OLR
System Operator	The operator of the national electricity transmission system in Great Britain, which will act as the Delivery Body for the CfD regime
T&Cs	Terms and Conditions
VIU	Vertically Integrated Utility
£/MWh	Pound per Megawatt hour