Department for
Business, Energy
& Industrial Strategy

CONTRACTS FOR DIFFERENCE

Contracts for Difference: An explanation of the methodology used to set administrative CFD strike prices for the next CFD allocation round

November 2016

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Introduction

1.1. This paper explains the methodology for determining the Contract for Difference (CFD) Administrative Strike Prices (ASPs) for the next pot 2 (less established technologies) allocation round. The auction is held on a pay-as-clear basis, subject to no project receiving a higher strike price than its technology-specific ASP. The ASPs therefore act to cap the support rate available to each technology.

1.2. The ASPs presented here have been set in compliance with the methodology for setting ASPs endorsed by the European Commission in its state aid approval for the CFD scheme[1]. ASPs have been set with the aim of maximising the delivery of Government objectives for the electricity system – reducing the carbon intensity of the electricity sector, ensuring the electricity system is contributing appropriately to meeting the Government's renewable and low-carbon energy targets, and maintaining a secure electricity supply, all at an affordable cost to the consumer.

1.3. The draft ASPs for pot 2 technologies included in the Draft CFD Budget Notice[2] are presented in table 2 below. Final ASPs will be published in the budget notice which will be issued no fewer than ten working days before the commencement date of the next allocation round. However the Government is intent on giving developers and other interested parties as much visibility as it can offer on ASPs. Although these are draft ASPs, at this stage we do not anticipate any significant changes to the methodology by which they have been generated, and as a result do not expect significant changes for these ASPs applicable to the next allocation round.

We have not published an ASP for geothermal and are calling for more evidence on the generation costs for that technology as part of the Call for Evidence on Fuelled and Geothermal Technologies in the CFD[3] which is being published in parallel to the Draft CFD

[1] http://ec.europa.eu/competition/state_aid/cases/253263/253263_1583351_110_2.pdf
[2] https://www.gov.uk/government/publications/draft-budget-notice-for-the-second-cfd-allocation-round
[3] https://www.gov.uk/government/consultations/call-for-evidence-on-fuelled-and-geothermal-technologies-in-the-contracts-for-difference-scheme

Budget Notice. We intend to publish a draft ASP for geothermal as soon as possible following the outcome of the Call for Evidence and ahead of the next allocation round.

The role of Administrative Strike Prices (ASPs) in the next allocation round

1.4. The ASPs set out the maximum support, presented on a price per MWh basis, that the Government is willing to offer developers for each technology in a given delivery year, otherwise known as the reserve price. The auction clearing price is set by the bid made by the last project allocated a contract in the auction before the budget is used up.

1.5. The first CFD allocation round (held in 2014/15) offered support for some delivery years for which support under the Renewables Obligation (RO) remained available. Developers could therefore opt to apply for support either through the CFD or the RO. The Government therefore chose to set ASPs at broadly comparable levels to the RO until the closure of the RO. For subsequent years, ASPs were reduced in line with expected reductions in technology generation costs.[4]

1.6. The ASPs presented in table 2 have been modelled using BEIS's updated renewable generation cost assumptions[5]. The Government has identified a number of policy objectives that have framed our approach to setting ASPs. More detail on these three objectives is set out in table 1.

1.7. One of the key factors is that in the absence of an appropriate justification to do otherwise, we are consistent in our approach across technologies. At Budget 2016 we published the 2021/22 offshore ASP of £105/MWh and the ambition for offshore costs to reduce to £85/MWh by 2026. This was at the time the equivalent of targeting costs at the 20% of cheapest projects. However we have subsequently updated our fossil fuel assumptions which mean this offshore wind ASP would now deliver the cheapest 19% of projects. In order to be consistent, we have applied the same methodology of targeting the cheapest 19% of projects in setting ASPs for all other technologies in Pot 2 with the exception of geothermal, will be confirmed in due course.

1.8. A more detailed explanation of the methodology used in setting ASPs (including a worked example) can be found towards the end of this document.

[4] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/268221/181213_2013_EMR_Delivery_Plan_FINAL.pdf

[5] https://www.gov.uk/government/publications/beis-electricity-generation-costs-november-2016

Table 1: Objectives for setting draft administrative strike prices (ASPs)

	Objective	Implications for setting ASPs
1	**Based on robust cost information.**	
	ASPs should draw on the latest generation cost data, while also considering market conditions, policy considerations and other technology-specific factors in order to minimise the risk of overcompensation and ensure value-for-money for consumers.	Use latest evidence on renewable generation costs[6] to produce a supply curve for each technology in each year.
2	**Set to encourage a high level of participation in the allocation round.**	
	ASPs should be set at a level that encourages a significant proportion of the supply curve to participate while preserving budget for future allocation rounds.	Target 19% of the supply curve when setting prices.
3	**Set using a consistent approach across technologies.**	
	In the absence of sufficient justification for differential treatment, the methodology for ASPs should take a consistent approach across all technologies.	In the absence of appropriate justification for differential treatment between technologies, target the same proportion of the supply curve (19%) for each technology.

Setting ASPs

1.9. In light of the objectives identified above, in setting ASPs, the Government has considered a range of factors, including:

[6] https://www.gov.uk/government/publications/beis-electricity-generation-costs-november-2016

- Technology specific factors such as capital and operating costs, financing costs as well as any build constraints.
- Market conditions such as wholesale electricity prices and the discount which Generators face when signing a Power Purchase Agreement (PPA).
- Policy considerations such as the need to drive technology cost reductions and therefore maximise the generation within the LCF budget envelope - increasing value for money for consumers; in the absence of appropriate justification to be non-discriminatory between technologies and thus targeting the same proportion of the supply curve. ASPs have also been set to encourage a significant proportion of potential projects to come forward and compete in the allocation round – we have set this level at 19% of the supply curve.

1.10. These factors mean that an ASP for a particular technology is different to the 'levelised cost' – the average cost over the lifetime of the plant per MWh generated. Relative to this levelised cost, an equivalent strike price could be higher or lower for a number of different reasons, all of which are taken into account in the setting of these ASPs:

- *Costs not included in BEIS's standard levelised costs*: CFD top-up payments will be paid on the basis of generation after taking account of the Generator's share of transmission losses, known as the Transmission Loss Multiplier so the ASPs need to be increased to account for this.
- *PPAs:* The revenue received by the Generator is a combination of the wholesale price and the CFD top-up, which is the difference between the strike price and the reference price. Where the Generator is assumed to not be able to achieve the reference price because it sells its power through a PPA at a discount to the market price (or faces equivalent transaction costs within a vertically-integrated utility), the ASP must be increased to compensate for this. PPA discounts therefore reflect route to market costs including the costs of trading and imbalance costs.
- *Contract length:* The levelised cost is defined over the operating life of a project. If the CFD contract length is shorter than the operating life and wholesale prices and capacity market revenue post-contract are lower than the levelised cost then, all other things being equal, the ASP must be increased above the levelised cost to compensate for this.

Supply Curve Analysis

1.11. The methodology for setting ASPs draws on the latest generation cost data[7] to produce a supply curve for each technology in each delivery year. The supply curve represents the volume of capacity in MW that could be built at different ASPs. This is represented graphically as an upward-sloping curve, with more projects expected to be financially viable as the ASP is increased.

1.12. The ASP that is expected to incentivise a certain capacity of deployment is determined through a discounted cash-flow calculation for the marginal project – or the most expensive project within the deployment range. The ASP is determined as the price that renders the net present value of the project's cash-flows equal to zero, taking account of the revenues in the wholesale market after the end of the CFD. The project cash-flows are discounted at the central hurdle rates published in BEIS's latest Generation Costs report.[8] Wholesale price assumptions include updated fossil fuel price assumptions[9].

1.13. To ensure a consistent and fair approach, in the absence of sufficient justification for differential treatment, the same proportion of the supply curve has been targeted for all technologies captured in pot 2.

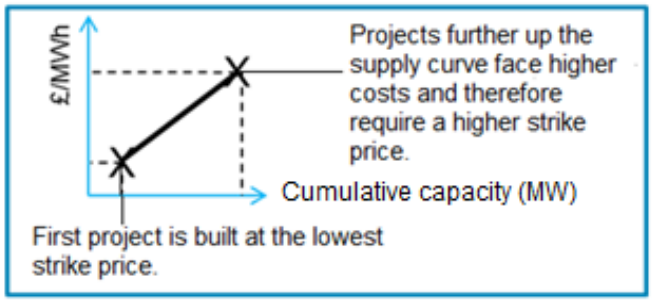
Step-by-step guide of how strike prices have been set

1.14. The following summarises the general approach used to set ASPs for the next CFD allocation round.

- A supply curve is generated for each technology using BEIS' updated view of electricity generation costs[10] and latest wholesale electricity price assumptions[11]. The strike price at each point on the supply curve represents the level of total revenue under the CFD required for the relevant project at each point to achieve a rate of return equal to BEIS central hurdle rate assumption.

Figure 1: Illustrative technology supply curve

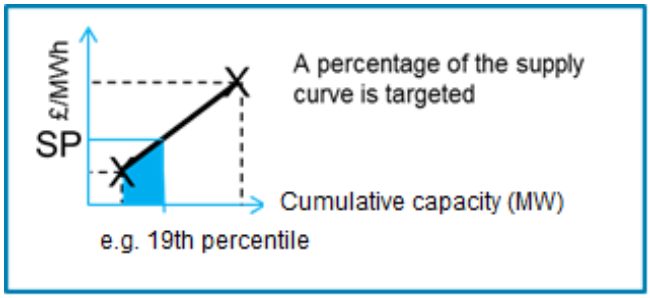
[7] https://www.gov.uk/government/publications/beis-electricity-generation-costs-november-2016
[8] https://www.gov.uk/government/publications/beis-electricity-generation-costs-november-2016
[9] https://www.gov.uk/government/publications/fossil-fuel-price-assumptions-2016
[10] https://www.gov.uk/government/publications/beis-electricity-generation-costs-november-2016
[11] Consistent with BEIS's latest fossil fuel price assumptions



- Construction, pre-development and infrastructure costs increase linearly from the bottom to the top of the supply curve. This is consistent with the sensitivities presented for capital costs in BEIS' latest Generation Costs report[12]. The low point on the supply curve assumes that low capital costs, low predevelopment costs and low infrastructure costs apply to this particular project.
- Operating costs and all other cost assumptions (for example load factors, hurdle rates and fuel costs where applicable) are assumed to constant across the length of the supply curve.[13]

[12] https://www.gov.uk/government/publications/beis-electricity-generation-costs-november-2016
[13] The variation in overall levelised costs across these supply curves, due to the variation in capital costs assumed, is intended to proxy the variation in overall levelised costs across the potential new projects, which itself will reflect variations across all cost components.

Figure 2: Setting the Administrative Strike Price (ASP)



- A point on the supply curve is then chosen to encourage participation in the auction, ensure competition, and fulfil policy objectives. This has been taken as 19% of the supply curve for the next allocation round.
- The Government has chosen to model ASPs for each technology at a level sufficient enough to incentivise 19% of the supply curve to participate in the next allocation round. Draft ASPs for the next allocation round are shown below in table 2.

Table 2: Proposed Administrative Strike Prices for delivery years 2021/22 and 2022/23

Proposed Administrative Strike Price (£2012; £/MWh)	**Delivery Year**	
	2021/22	**2022/23**
Offshore wind	105	100
ACT (standard or advanced; with or without CHP	125	115
AD (with or without CHP; >5MW)	140	135
Dedicated biomass (with CHP)	115	115
Wave	310	300
Tidal stream	300	295

Worked example: setting the offshore wind ASP for 2021/22

1.15. The following worked example shows how draft ASPs for the next CFD allocation round have been set, using the example of an offshore wind plant commissioning in 2021/22.

1.16. We have modelled the draft ASPs outlined in table 2 on the basis of BEIS'F latest electricity generation costs[14] estimates. These estimates shows that the levelised costs of generating electricity from an offshore wind plant commissioning in 2021/22 ranges between £89/MWh in the low scenario and £113/MWh in the high scenario[15].

1.17. ASPs have been modelled on the basis of wholesale price projections which include updated fossil fuel price assumptions, and our modelling assumes that in addition to wholesale market revenue and CFD top-up payments received over the lifetime of the Generator's CFD contract the Generator is also eligible for capacity market payments and wholesale revenue payments for the remainder of the project's operating lifetime after the CFD contract has ended[16].

1.18. Table 3 below shows how BEIS has converted its estimates of levelised costs into a draft ASP for an offshore wind plant commissioning in 2021/22.

1.19. ASPs have been set to incentivise 19% of the offshore wind supply curve.

[14] https://www.gov.uk/government/publications/beis-electricity-generation-costs-november-2016
[15] £2012 prices; calculated for an offshore wind plant commissioning in 2021/22.
[16] BEIS's latest levelised costs report assumes that offshore wind projects operate for a lifetime of 22 years.

Table 3: Step-through calculation of the 2021/22 offshore wind ASP

Levelised lifetime costs (£2012/MWh; discounted at 8.9%)	**Costs (levelised over lifetime generation; £2012/MWh; 8.9%DR)**
Pre-development	£3
Operating costs	£23
Capital costs	£64
Variable costs	£3
Total lifetime levelised costs (A)	£93
Levelised lifetime revenues (£2012/MWh; discounted at 8.9%)	**Revenues (levelised over lifetime generation; £2012/MWh)**
Wholesale revenue	£41
Capacity market revenue (after the end of the CFD contract)	<£1
Total non-CFD revenue (B)	£41
Additional levelised revenue required over lifetime to meet costs (C= A - B)	£52
Total revenue required over lifetime (D = A = B + C)	£93
Administrative Strike Price (adjusting D for 15-year contract length and rounded to the nearest £5/MWh)	**£105**

1.20. On the open market, the wholesale revenue that the Generator could expect to receive is less than their costs, meaning that in the absence of Government support it is unlikely that offshore wind developers would choose to invest in new generating facilities as the high costs they face mean that it is not possible to make a return on their investment.

1.21. In the example above, an offshore wind Generator on the 19% percentile of the supply curve faces lifetime levelised costs of £93/MWh. Lifetime levelised costs are

comprised of pre-development costs (£3/MWh), operating costs (£23/MWh), construction costs (£64/MWh) and variable costs (£3/MWh).

1.22. The ASP offered to Generators does not need to cover all their costs. This is because over the Generator's lifetime, it will receive both wholesale electricity revenue and capacity market payments. These revenue streams help to cover some of the Generator's costs. In the example above, this revenue is worth £41/MWh over the plant's lifetime.

1.23. Given the additional revenue Generators receive over their operational lifetime, the ASP therefore only needs to be set a level sufficient to cover a proportion of the project's lifetime generation costs of £93/MWh.

1.24. In this example, the ASP therefore needs to be set at a level sufficient to cover £52 of a Generator's costs for every MWh of electricity generated over the Generator's operating lifetime, given the Generator receives £41/MWh in revenue through wholesale revenue and capacity market payments.

1.25. The duration of a CFD contract is less than the assumed operating lifetime for an offshore wind plant. The CFD contract lasts for 15 years, whereas an offshore wind plant is assumed to operate for 22 years. This means that support payments required to support lifetime generation are paid over a smaller amount of generation and therefore the ASP has been adjusted proportionately upwards to account for this, to £105/MWh[17].

1.26. The example outlined above is equally applicable to other technologies. For those technologies which can deploy as CHP projects, our modelling takes into account that Generators may receive heat revenues and RHI payments consistent with currently published tariff levels18 in addition to CFD payments, wholesale electricity revenue and capacity market payments. Note these are modelling assumptions only, and does not mean that such revenues and payments are received by any particular project. It should not be taken as an indicator of UK Government policy. This assumption has been incorporated to ensure that the true costs of producing electricity by these technologies which may elect to deploy with CHP takes account of a possible revenue stream and RHI payments which could otherwise lead to overcompensation if otherwise ignored.

[17] Rounded to the nearest £5/MWh
[18] https://www.ofgem.gov.uk/environmental-programmes/non-domestic-renewable-heat-incentive-rhi/contacts-guidance-and-resources/tariffs-and-payments-non-domestic-rhi

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