CAPACITY MARKET AUCTION PARAMETERS

Section 1: Scope

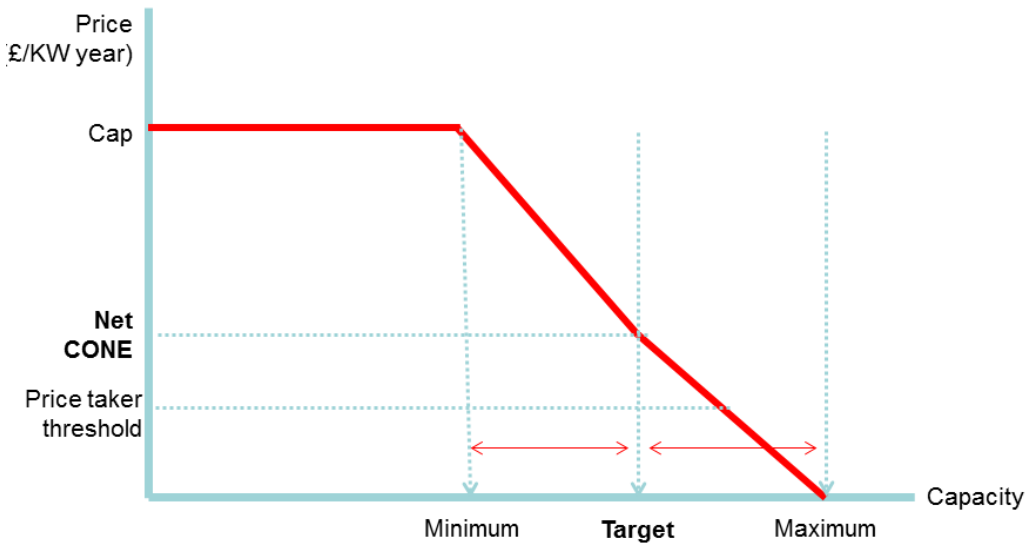
1. This paper sets out how the following parameters will be determined and then used in the Capacity Market Auction:

   i. Volume to Contract
   ii. Liquidity Requirements
   iii. Value of Lost Load
   iv. Gross Cost of New Entry
   v. Reliability Standard
   vi. Net Cost of New Entry
   vii. Auction Price Cap
   viii. Price Taker Threshold

Section 2: Use of Key Parameters in the Auction

2. The Blueprint sets out how the demand curve in the auction depends on a number of key parameters:
   i. Government picks a Target of how much capacity to contract in line with its Reliability Standard
   ii. This Target is bought if the price is equal to Net Cone – an administrative estimate of the reasonable payment level
   iii. More will be contracted at a lower price and less will be contracted at a higher price in line with the shape of the Demand Curve
   iv. Existing plant are not allowed to bid in above a threshold unless they register as a price-maker
   v. A capacity price cap is set in the auction at a multiple of Net CONE

Figure 1: Illustrative Demand Curve



3. This paper notes how the key parameters for the four-year ahead auction will be set and communicated with industry. These parameters generally apply to the year-ahead auction – with some exceptions that noted in Section 10.

4. Once the Capacity Market has been implemented the parameters will be updated on the following basis:
    i. The Reliability Standard, the Value of Lost Load and the penalty scaling factor, and the slope of the demand curve will be set on an enduring basis;
    ii. The target volume to contract in the auction and the Net CONE will be revised for each auction;
    iii. The auction price cap and the threshold for pricetakers will be set on an enduring basis in relation to Net CONE and so will be indirectly subject to change prior to each auction;
    iv. The value of capacity payments will be fully indexed to the CPI each year from the time of the auction. Full indexation according to the CPI ensures a level playing field between new and existing plant and is consistent with the approach for indexing CfD contracts.

Section 3: Volume to Contract in Auction

5. The Demand Curve sets out how much capacity will be contracted given any potential capacity price in the auction. The key relationship is between Target and CONE – if the estimate of CONE reflects the market price for capacity then the System Operator will contract exactly the Target level of capacity (ignoring "lumpiness" in the volumes of capacity offered).

6. The slope of the demand curve determines how the volume contracted differs according to the price. The slope will be set so that the auction contracts a level of derated capacity up to 1.5GW more or less than Target.

7. This slope is justified on the basis of providing the equivalent de-rated capacity of two large CCGT's either side of capacity. This demand side variability will mean we mitigate the likelihood of a single plant being able to have a very large impact on the price.

8. To help mitigate the risk of gaming in the auction, Government will not reveal the true Target level of capacity but rather publish a range of capacity volumes within which the true Target value lies.

9. The range will be formulated by:

    i. Calculating the Target volume
    ii. Generating a random number of +/- 2GWs, calculated with a normal distribution around a mean of 0.
    iii. Putting a +/- 2GW range around the "true" Target level plus the random number adjustment.

10. This can be illustrated with the following numerical example:
    i. Government decides to set a Target of 40GWs

ii. A +1.5 adjustment is randomly generated[1]
iii. A range is then published around the Target + Adjustment – i.e. 39.5 to 43.5.

11. So the range published will *include* the true Target level but conceal what the exact number is. It is recognised that greater certainty about the volume to contract would reduce risk for investors. However investors will already face considerable uncertainty due to the face there is a demand curve, both demand and the level of low carbon capacity is not known, and new CM build may not commission on time. So the added uncertainty of having a range around Target should not significantly impact on the risk that generators face but is important in making it hard for portfolio players to know whether it would be profitable to withhold capacity in the auction.

12. After the auction is completed, the true level of Target in the auction will be revealed for participants to be able to appropriately scrutinise the outcome of the auction.

Question for Expert Group:

1. Is publishing a range for the volume to contract an appropriate measure to deliver value for money for consumers?

Section 4: Liquidity Requirements for the Auction

13. The four-year ahead auction may be postponed or cancelled if there is insufficient liquidity: In circumstances where less than 1.5GW below Target prequalifies for the auction or offers capacity in the first round (i.e. at the price cap), the auction will be declared illiquid. This is intended to prevent an illiquid auction leading to artificially high capacity prices.

14. The auction would then be held at a later date and steps would be taken to ensure that the next auction is more liquid, including:
    i. Immediately reopening the Prequalification process to enable new units to enter the auction;
    ii. Ensuring any remaining appeals from the previous Prequalification process are completed; and
    iii. Potentially reviewing the Net CONE parameter.

15. The second auction will be held within six months of the first auction having been declared illiquid. If the second attempted auction were again deemed illiquid then the process for contracting capacity for that delivery year will be cancelled.

[1] Note that he same asymmetric range will be put around the final Target level as the indicative Target level published for each particular auction.

16. The auctioneer will have a duty to inform the Secretary of State if there are any indications of impropriety among bidding and the Secretary of State will reserve the right to cancel or reschedule the auction at any point up to its conclusion.

Questions for Expert Group:

2. Is 1.5GW below Target the correct level to indicate sufficient liquidity for holding the auction?
3. What other indicators for illiquidity should be considered as potential grounds for rescheduling/cancelling an auction?
4. What should happen in the event an auction is cancelled twice?

Section 5: Value of Lost Load

17. London Economics is carrying out a survey of domestic and business customers' Value of Lost Load (VoLL) at different times of the day and year. This report is currently in the process of being finalised and will then be published alongside the EMR Delivery Plan. We will be using the results of the report to establish a single average VoLL to inform the Reliability Standard.

18. The final VoLL figure will be a weighted average of VoLLs for domestic customers and SMEs at times of winter peak demand. However it will exclude the value of lost load of large commercial and industrial customers because they are assumed either to be able to participate in the capacity market through demand side response, or else to be able to monitor their energy usage and change it in response to price signals.

19. The Capacity Market penalty regime will be based on a fraction of the full VoLL figure. The scaling factor will trade off the benefits of providing sharp performance incentives for capacity providers with the cost of added imbalance risk to generators.

Section 6: Gross Cost of New Entry

20. The Gross Cost of New Entry (CONE) represents the cheapest cost of a new entrant peaking plant. Gross CONE is the rental rate of the marginal peaking-plant; that is the yearly amount needed to pay for capacity such that the discounted value (NPV) of its operations is zero over its technical operating lifetime, assuming the plant does not receive any energy market revenue.

21. Currently that plant is a large scale Open Cycle Gas Turbine (OCGT) plant. The reason that OCGT is used to set CONE is because this is the marginal plant – the one that most needs a capacity payment (because it runs least) and should therefore be setting the price in the auction.

22. The assumptions on costs - including the annual and short run marginal costs of running the plant as well as the construction costs – are taken from analysis that

DECC commissioned from PB Power and which will be published alongside the EMR Delivery Plan in July. The assumptions on hurdle rates for OCGT are taken from analysis by Oxera.[2] We take the central estimates from these sources and are assuming a lifetime of 25 years for the plant and a hurdle rate of 7.5%.

Question for Expert Group:

5. Do you agree with the proposed assumptions for calculating Gross CONE?

Section 7: Reliability Standard

23. This reliability standard reflects the efficient tradeoff between the costs and benefits of additional capacity. The benefits of security of supply are reflected in the estimate of VoLL while the cost of additional reliability is captured through Gross CONE. The Reliability Standard is then calculated as Gross CONE divided by VoLL.

24. We think this equates to a derated capacity margin of about around 8% once we take into account National Grid's reserves although more work will be needed before the first auction to ensure that the efficient capacity margin is aimed for.

25. This reliability standard is more secure than that used in Ireland, it is very similar to the reliability standard used in France and it is less significantly less secure than most North American markets including PJM and ISO New England which have a standard of 1 day in 10 years which is equivalent to 0.1hrs per year.

Section 8: Net Cost of New Entry

26. Capacity Markets adjust the value of CONE used in auctions to take account of the value of energy market revenues that the marginal plant will earn.

27. There are a number of ways of doing this:

    i. Theoretical approach: Assume that in an efficient market, the *marginal* plant only runs at times of lost load – i.e. according to the number of hours in the reliability standard – and sell their energy at that time at the effective price cap in the market.
    ii. Modelling approach: Undertaking Dynamic Dispatch Modelling of plant revenues and add to analysis of supplementary revenues that plants earn for ancillary services (such as Black Start, STOR etc).

28. The modelling approach is made difficult by the considerable uncertainty around the value of energy market revenue and ancillary service payments in future – particularly for the marginal plant, which in theory should run extremely rarely.

[2] "Discount rates for low-carbon generation technologies", Oxera report prepared for the Committee on Climate Change, April 2011.

There is particular uncertainty around the value of ancillary service payments – which are significant and which may differ significantly in future with the introduction of the Capacity Market and changes to the plant mix. In theory however the value of ancillary services should approximately equal the foregone value of energy market revenue – except where plant provides additional services that are not valued in the energy market (for instance flexibility and location).

29. It is proposed that the Capacity Market employ the theoretical approach to calculating the energy market revenue for new plant. This is considerably simpler to calculate than the modelling approach, easier to quality assure, and is straightforward to adjust in line with the outcome of cash out reform (with Net CONE declining towards zero as cash out is reformed over time to rise to VoLL).

30. In absence of further cash out reform, it would be assumed that the marginal generator could earn £1000/MWh[3] for the number of hours a year in which there is lost load (i.e. the LOLE set in the Reliability Standard). This would be netted off the Gross CONE to give a net CONE reflecting the total missing money for the marginal new entrant.

31. The value of energy market revenue under this approach will increase if cash out were reformed to put in a particular value of lost load at times of stress.

Can investors bank on scarcity rents?

There are three reasons why investors might struggle to invest on the basis of scarcity rents in the energy market:

1. Risk of overprocurement: If industry believes that Government will be risk-averse in setting the volume to contract, then it may believe that Government will "overshoot" the reliability standard and so they will not get to earn the level of scarcity rents assumed in the calculation of Net CONE. However in this case less capacity than Target will be contracted through the auction, helping to bring the Loss of Load Expectation closer in line with the Reliability Standard.
2. Events are infrequent: The Reliability Standard is an average target for lost load – and it may be the case that in most years there will be no lost load or scarcity rents. In theory generators should be able to sell options around the energy price to suppliers – giving generators a stable/regular payment.
3. The BM is Pay As Bid: There is no centralised energy market (i.e. pool) in GB and the balancing mechanism is paid on a Pay-As-Bid basis. This means that for generators to earn the price cap they have to either bid that price into the BM at gate closure (up to 90 minutes out) or to go long into the BM (assuming a more marginal cash out price).

[3] The view of £1000/MWh as an effective price cap is based on the fact that cash out prices have never risen above £964/MWh – which was the highest System Buy Price in May 2008 during a Demand Control Instruction event (blackout).

As a result of these obstacles it may in practice take time for reforms to cash out to feed through to higher incentives for investment. Thus it may be appropriate to put in a transitional formulation – for instance assuming that it takes [five] years for higher cash out prices to fully feed in to higher forward prices for energy.

Question for Expert Group:

6. Do you agree with the proposed methodology for taking account of energy market revenue in the calculation of Net CONE?

Section 9: Auction Price Cap

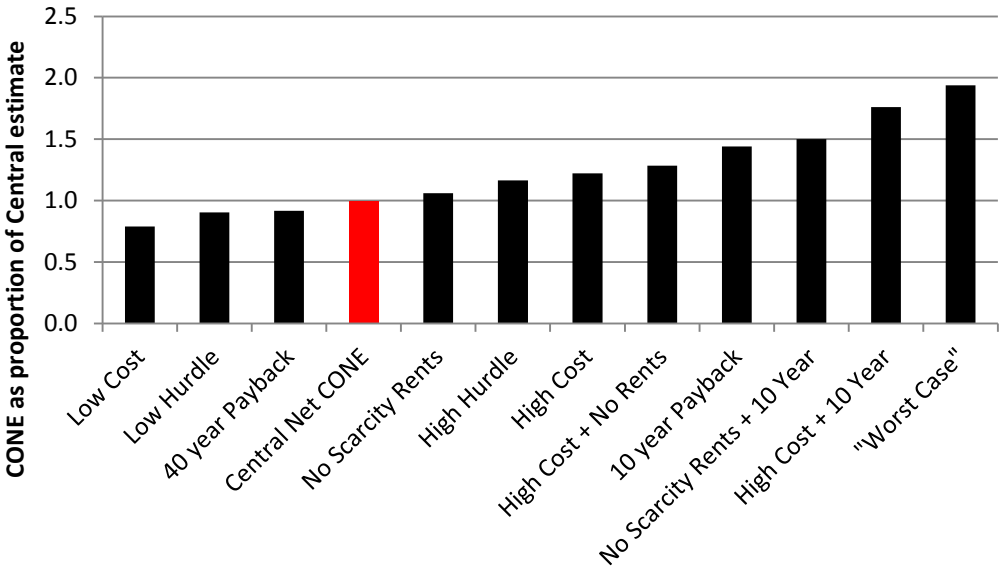
32. In theory it would be appropriate to impose a price cap of Net CONE in the auction in order to prevent gaming – as the market should not need to clear above that level and so a higher clearing price would suggests a lack of competition in the process.

33. However in practice there is uncertainty around the estimate of Net CONE, and a high price may simply suggest that DECC had underestimated this parameter. Setting a price cap too low may therefore foreclose buying the efficient level of capacity.

34. It is therefore desirable to set the price cap at a multiple of Net CONE – with the size of the multiple recognising the degree of uncertainty around the estimate. The factors that influence Net CONE are:
    i. Hurdle rates
    ii. The payback period
    iii. The capital cost estimates
    iv. The degree of energy market revenue assumed

35. The graph below illustrates the impact of the assumptions on hurdle rates, payback period and the sensitivities around capital cost estimates for a given level.

Figure 2: Sensitivities around CONE with £1000/MWh price in stress even



36. This suggests that a cap of between 1.5 and 2 X CONE seems appropriate under a range of scenarios.

Question for Expert Group:

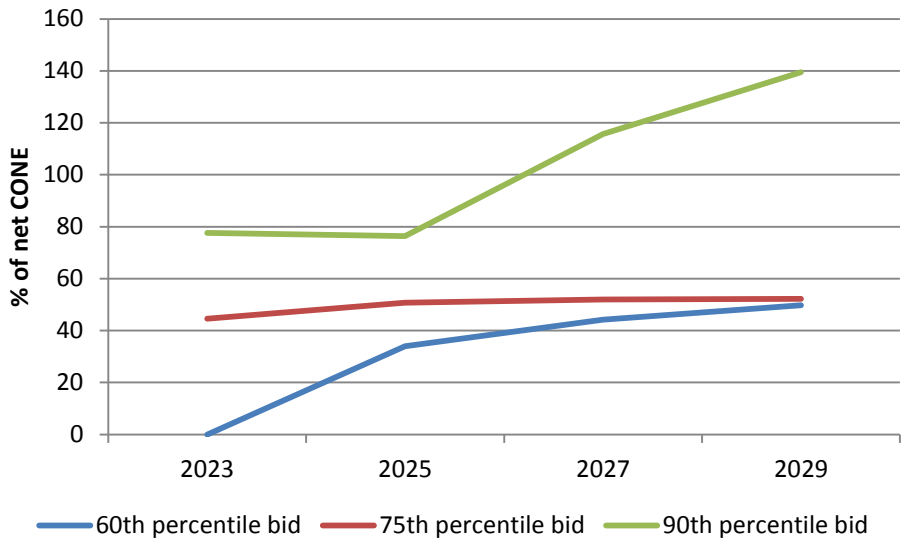
7. What level of price cap do you think strikes the best balance between recognising uncertainty in estimates of Net CONE and controlling costs for consumers?

Section 10: Price Taker Threshold

37. The price taker threshold for existing plant needs to balance the administrative burden of requiring existing plant to submit a business case in order to bid above the threshold, with the risk of gaming if existing plant are able to price high without good justification.

38. Figure 3 shows the 60th, 75th and 90th percentile of net going forward costs as a percentage of Net CONE for existing plant. This shows that 25% of plant are expected to need to bid around 50% of net CONE in order to cover their going forward costs.

Figure 3: Net going forward costs for existing plant



Source: DECC DDM modelling

39. On the basis of this modelling we consider that it is appropriate to set the price taker threshold at 50% of net CONE – i.e. to expect that 25% of existing plant would need to bid higher than the threshold and so would be required to submit a business case to OFGEM to justify their bid.

Section 11: Year-Ahead Auctions

40. The Year-Ahead auctions operate in the same way as the Four-Year Ahead auctions in terms of the price cap, pricetaker threshold, and use of CONE. However given the shorter lead time and the lower level of capacity to be contracted, the Year-Ahead auction will be different to the Four Year Ahead auction in the following ways:
    i. There will be no option for long term contracts at the Year Ahead stage;
    ii. The slope of the demand curve will be +/- 10% around the Target, rather than +/- 1.5GWs;
    iii. There will be no minimum liquidity requirements and no potential for rescheduling the auction if cancelled; and
    iv. Target will be expressed as a single figure rather than as a range.