SPECIFYING THE AUCTION SYSTEM TO GIVE GOVERNMENT FLEXIBILITY TO DEFINE PRICE-DURATION PREFERENCES

Section 1: Background

1. The System Operator has to begin to tender for the capacity auction system by end of November and to finalise the contract in January to allow for capacity auctions to be run in 2014. Any substantive changes to the auction system beyond that point risk creating delays to the delivery timeline.

2. However Government is still consulting on auction format and considering questions around the optimal agreement length (i.e. whether agreements should be up to 10 or 25 years) and whether offers should be assessed on the basis of agreement length as well as on price. However issues are unlikely to have been resolved before January.

3. The existing auction format (known as a "fixed prices" approach) is compatible with different decisions on agreement length/auction criteria. It is therefore desirable to specify the auction system requirements in a way that is robust to the eventual policy choice on agreement length and auction criteria.

Section 2: Principles for auction design

4. The auction format considered in this paper is one that builds on existing design principles:

    i. Auction format should continue to be a descending clock with pay-as-clear
    ii. Only new/refurbishing plant will be allowed to access longer term agreements
    iii. The Government announces the criteria by which the auction will be run prior to the auction – such that the auction itself is mechanistic and involves no ex-post discretion as to which offers to accept.
    iv. There should be a "fixed prices" auction format in which the Government commits to buying the least-cost products in the auction regardless of agreement length Under this auction format Government does not set minimum or maximum targets for how much of each length it seeks to buy - although importantly it *can* set handicaps on how it assesses the cost of short or long products (e.g. defining a £40 one year contract to be lower cost than a £39 twenty year contract).

5. The rationale for the fixed-prices approach over the alternatives – fixed quantity auction and product mix auctions – is based on advice by Peter Cramton and is set out in the Annex. It is also consistent with the design of capacity auctions elsewhere (PJM, ISO-New England, and Colombia).

6. The fixed prices approach is consistent with both the existing proposal (to assess on price alone) and on a multicriteria approach (where Government may be willing to pay more for a short term contract than a long term one). The following

sections of the paper consider how this auction format would work under different specifications for preferences on agreement length.

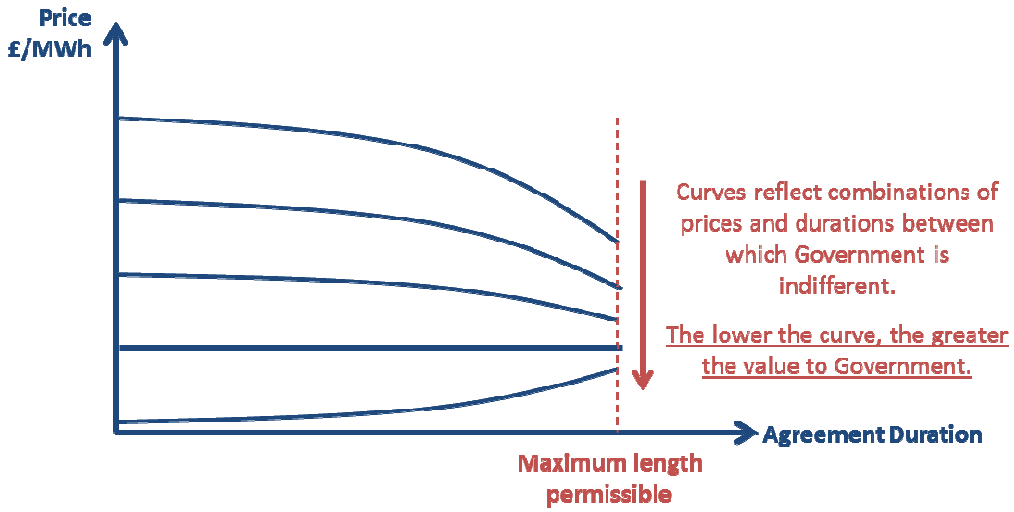
Section 3: Role of Government

7. Under a fixed-prices approach, Government sets out an overall Target volume to procure and a demand curve.

8. The demand curve, in representing the relationship between price and volume of capacity, makes the simplifying assumption that all capacity offers are expressed as single-year agreements. So, for instance, while the demand curve might say that the Government is willing to buy 50GW at £40/kW year, the actual volume procured at that price could be higher or lower according to the agreement length of offers at that price and how the Government views long term offers relative to single-year agreements.

9. Under a fixed-prices auction format Government can set out the price spreads that define the difference in price for a given agreement length that would render the Government indifferent between that agreement length and a single-year offer. This is illustrated in the chart below showing sets of prices and agreement lengths between which the Government could define itself as being indifferent (with welfare being improved by moving to a lower price duration curve).

Figure 1: Illustrative Price Duration Curves



10. Note that the discount on longer agreement durations could change (and even switch direction) at different prices – with, for instance the Government potentially preferring single year agreements at a high price and preferring longer-term agreements at a very low price. Note also that the Government would need to set this relationship for all potential price-duration sets (including all possible exit prices).

11. In the existing auction proposals Government is *implicitly* setting price spreads of zero – which means we effectively select on price alone (except in a tiebreaker).

However under the same auction format Government could alternatively choose to explicitly set preferences and to vary the maximum permissible length.

Section 4: Role of Auction Participants

12. Under the existing auction proposals, duration for new plant is selected at qualification so that the new plant is not able to select the duration conditional on the outturn capacity-price. This is in recognition that despite the simplifying decision to assess offers on price alone, the government might not really be indifferent between auction durations, and so letting a provider decide conditional on price may unduly favour new capacity.

13. However if Government were to explicitly define its price duration curves – such that it was truly indifferent between offers of different agreement durations in any round – then it would become possible to let the provider revise his preference for agreement length in each round of the auction.

14. Regardless of how the Government specifies preferences for agreement length, it would remain desirable for refurbishing plant, once it has exited, to be able to re-enter the auction as an existing plant on a one year agreement (given it may be willing to refurbish if the price is high enough but if not it could still be worthwhile for that plant to stay open on a single year basis).

Section 5: Role of Auctioneer

15. The process by which the auctioneer would conclude the auction may be subtly different as a result of the proposed changes to auction format:

16. The rules in the tie-break might no longer hold: in the existing arrangements if two offers are tied, the shorter agreement length will receive the contract, and if there is still a tie then the winner is chosen randomly. This is in recognition of the fact that while we have made the simplifying assumption to assess offers on price alone, we may actually prefer shorter agreements and picking such offers in a tie-break is appropriate as it adds negligible additional complexity. However if we allow for price duration curves then agreement length may no longer be a sensible tie-breaking criterion, since we have already explicitly expressed our preferences for agreement duration in the price spread and so we should theoretically be indifferent between the different offers.

17. The rules of settling the auction in the event of a non-continuous (i.e. “lumpy”) supply curve remain fit for purpose in a fixed-prices auction: The existing proposal is that the supply and demand curves provide a basis for estimating consumer and producer welfare – with the SO deciding to buying either too much or too little according to which outcome has the highest social welfare. In this methodology, we do not consider if buying more involves building a new plant, the price of which we will be paying for ten years; we only consider the cost and benefit of the plant in the first delivery year. Similarly if we assessed bids on agreement length as well as price, we could continue to formulate a single-shot

representation of demand and supply – with supply offers expressed in prices of the single-year agreements that they are considered equivalent in value to.

Section 6: Conclusion

18. There is likely to be significant complexity in Government specifying price-spreads for the auction, given uncertainty around future capacity values. This is a material consideration in considering whether to allow for agreement lengths of longer than 10 years and whether to explicitly specify price-duration curves.

19. However minimal change or added complexity is needed from a perspective of system procurement if we were to adopt this change. Procuring a fixed-prices auction format would allow the Government to specify preferences for agreement length and price – but it would *also* allow the Government to retain its existing proposal (by setting a zero price-spread and a maximum permissible agreement length of ten years).

20. Given the imperative to procure the auction system before the final policy decision is made, it is therefore desirable to specify the auction system as a fixed-prices auction format with optionality in the following areas:

    i. Maximum permissible agreement length;
    ii. The price-offer spreads for all possible sets of price and agreement duration;
    iii. Whether providers are allowed to modify their preference for agreement duration between auction rounds; and
    iv. Whether agreement length is used as a criterion in tie-breakers before random allocation.

Annex: Different Auction Formats

Peter Cramton – October 2013

21. The proposed capacity market accommodates the differing financial needs of different types of resources in an especially simple way. New plant can select a contract-duration of up to 10 years; refurbished plant can select a contract-duration of up to 3 years; and existing plant has a contract-duration of one year. These differences reflect the fact that new plant can benefit from locking-in a capacity price for a longer period to support the financing of substantial fixed costs that are not yet sunk. Existing capacity in contrast does not have substantial fixed costs. For existing plants, risks likely are reduced with a one-year contract. The major simplification is to have all resource types compete equally on price despite the different durations—the lowest-priced resources are selected irrespective of duration.

22. This simplification is made in existing capacity markets. For example, New England has one-year duration for existing capacity and up to 10 years for new plant. Colombia has one-year duration for existing capacity and up to 20 years for new plant. Allowing longer durations for new plant in Colombia was the result of its less developed capital markets. Duration for new plant is selected at qualification so that the new plant is not able to select the duration conditional on the capacity-price realization.

23. Here I briefly address some alternatives in which durations are bid and explicitly considered by the auction mechanism. There are three common approaches: fixed quantities, fixed prices, and variable quantities and prices.

24. **Fixed quantities**. The auctioneer announces specific quantity shares of each duration. For example, the shares might be 70% 1-year, 10% 3-year, 10% 10-year, and 10% 25-year. Bidders express preferences for their substitution across durations. The auction determines competitive prices for each duration that are consistent with the expressed preferences.

25. **Fixed prices**. The auctioneer announces specific price spreads for each duration, indicating load's indifference among resources of different durations. For example, the spreads relative to a 1-year duration might be £0.10 for a 3-year, £0.30 for a 10-year, and £0.60 for a 25-year duration. This means that load is indifferent between a 1-year and 10-year duration when the 10-year price is £0.30 higher than the 1-year price, and prefers the 10-year duration when the price is less than £0.30 higher than the 1-year price. This design can be implemented as a descending clock auction where the price difference between products is given by the indifference spread. Bidders indicate the preferred duration during the auction and are paid the duration-specific clearing price (adjusting for the specified price spread).

26. **Variable prices and quantities**. More generally, the auctioneer can let bidders bid a price for each duration. The auctioneer then selects at most one of the bids for each resource so that supply and demand match and establishes clearing prices for each duration such that each winning resource prefers its selected

duration. This is a version of the product-mix auction proposed by Paul Klemperer.[1]

27. The fixed quantities approach is appropriate in circumstances where the demand-side has strong preferences for a particular portfolio of durations. The fixed prices approach is best when the demand-side has clear price preferences among durations, but does not care too much about the quantities of particular durations. Finally, the product-mix auction (variable prices and quantities) is best when the demand-side has more complex preferences among portfolios of durations that satisfy demand.

28. One way to think of the current proposal is that it is a fixed price approach where (1) all permissible durations are viewed as equivalent (an indifference price spread of zero), and (2) each type of resource has a different set of permissible durations (existing is 1-year only, refurbished is up to 3 years, new is up to 10 years). The main advantage of this approach is simplicity. The regulator does not have to express complex preferences across durations. Moreover, the restrictions on permissible durations assure that most of the capacity will be purchased with a 1-year duration. Thus, the demand-side will not be excessively locked in.

29. Any of the three approaches described above could be implemented, provided the regulator is prepared to make price tradeoffs between different durations.

How are bids for different contract lengths best evaluated?

30. Were there a robust market for capacity futures then this market information could be used to establish the price-duration tradeoff. However, such information is unlikely to be available until the market is mature. Absent this information, price preferences for particular durations are apt to be viewed as arbitrary.

31. It is not even clear that shorter durations should be preferred to avoid consumer lock-in. Lock-in is desirable when one is locking in a low price. Further, some share of longer duration capacity reduces consumer risk.

32. This is the motivation for not favoring one duration over another in the current proposal. Absent good information about the price-duration tradeoff it seems best to treat all durations equally.

33. One possibility would be to extend the current proposal to allow new capacity bids for durations greater than 10 years. For example, one could allow new plants to submit bids for both 10-year and 20-year durations. The regulator would still need to specify the tradeoff between the two durations. This could be a fixed price-spread (e.g., buy 10-year unless 20-year is at least £0.50 lower) or a variable spread that depends on the quantity of 20-year accepted.

34. For reasons of transparency, I recommend publishing the tradeoff among durations in advance of the auction.

[1] The Product-Mix Auction: A New Design for Differentiated Goods," Journal of the European Economic Association, 2010

Conclusion

35. The proposed capacity market recognizes the different financing needs of different resource types. New plant and to a lesser extent refurbished plant can opt for longer-term contract lengths. To evaluate projects of different durations it is assumed that only price matters to demand: there is no additional cost or benefit from accepting a project with a longer duration. This is a useful simplifying assumption, as it avoids having to make what would be difficult and arbitrary tradeoffs among projects with different contract lengths. I strongly favor the current proposal for this reason.

36. If it proves necessary to allow multi-criteria bidding, I recommend that this be limited to new plants. There is no good reason why an existing plant would desire a longer contract length.

37. For new plants seeking a longer contract length, the simplest approach is a fixed price rule in which durations above 10 years can be specified but require a positive discount from the 10-year price. The required discount would be specified in advance of the auction for durations from 11 to 20 years. Then the same descending clock auction can be used as is proposed.

38. Another simple approach to address the concern that the contract length is too short is to raise the maximum contract length to 15 or 20 years.

39. The product-mix auction in which the bidders bid both price and duration pairs also could be used. However, then the regulator would need to establish explicit tradeoffs between price and duration. This would appear to be a difficult and arbitrary determination. I do not recommend this approach.