

Capacity Market Auction User Guide

Guidance Document for Capacity Market Participants



**Capacity Market Auction
User Guide**

March 2017

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1. Introduction and Purpose

Chapter 5 of the Capacity Market Rules 2014 (and subsequent amendments) explains the Capacity Market Auction. This document is intended to provide further guidance for those parties taking part in the 2017 Transitional Capacity Market Auction. The document includes general information on the auction, including what will happen during the auction and how the auction comes to an end.

The document references Bidders, these are the Authorised Individuals nominated by the Applicant Company's Main Administrator in advance of the auction.

National Grid in our role as Delivery Body is responsible for discharging the Auctioneer function specified in the CM rules and offering bidder support during the auction process. We have prepared this document on a non-legal basis, and it should not be taken as legal advice. In the event of any conflict or inconsistency between this document and the Regulations, the Rules or the Auction Guidelines those documents take precedence over this one.

Capitalised terms used in this guidance document shall have the same meanings given in the Capacity Market Rules.

If you have any questions on any of the information contained in this guide, please contact us at emr@nationalgrid.com or call us on 01926 655300.

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2. What is the Auction?

The Capacity Market Auction is the competitive process to award Capacity Market Agreements to try and meet the target capacity for the relevant Delivery Year. Capacity Market Units (CMUs) which have been Prequalified and if necessary have confirmed entry will enter in to the auction.

The 2017 Transitional Capacity Market Auction will start on the **22nd of March 2017 at 09:00** and will continue until it clears, this must be within **2 working days**.

The Auction is a descending clock, pay as clear auction. This means:

- The auction starts at a price cap set out in the Auction Guidelines
- The price is reduced in each round by a set decrement
- Bids must be placed in fixed windows
- You have to submit an Exit Bid to leave the auction
- The Exit Bid is the minimum price at which you would accept a Capacity Agreement
- The auction clears when the capacity that remains in the auction is less than the capacity sought.

All successful CMUs receive the same agreement price (the clearing price). The auction will start at a Price Cap of £75/kW/yr and will have a £5/kW/yr price decrement separating the round cap and round floor. **The first round duration will be 90 minutes and all subsequent rounds will be 30 minutes durations** with 30 minutes recess. The auction will continue as scheduled over the two days until a round is reached, where at the end of the round the supplied capacity is less than the capacity demanded - this round is identified as the **Clearing Round**. At the end of this round the Clearing Price will be calculated (this is explained further in section 5), anyone still in the auction below the Clearing Price will be eligible for an agreement.

The auction timetable is included in Appendix A. The auction parameters, including the Price Cap and target capacity, are determined by the Secretary of State and are published in the Auction Guidelines.

3. How much capacity is being procured?

The Capacity sought in the 2017 Transitional Capacity Auction was determined by the Secretary of State, informed by analysis undertaken by National Grid. The Secretary of State has specified the quantity of capacity required at certain prices during the auction. This information formed part of the Auction Parameters, published in the Auction Guidelines.

The table below details the auction parameters for the 2017 Transitional Capacity Auction:

Target capacity for 2017 Transitional Capacity Market Auction	300 MW
Demand curve coordinate –volume at price cap	100 MW
Demand curve coordinate –volume at £0/kW	500 MW
Price cap	£75/kW/year
Net CONE	£49/kW/year
Price Taker Threshold	N/A
15 Year Minimum £/kW Threshold	N/A
3 Year Minimum £/kW Threshold	N/A
Indexation base period	N/A
Percentage of auction clearing price payable to time banded capacity obligations	70.00 %

Figure 1: Auction Parameters for 2017 Transitional Capacity Market Auction

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The differing capacity figures sought at different prices is illustrated in the Demand Curve below. The Demand Curve captures the trade-off between cost of capacity and security of supply. The Demand Curve is sloped so that more capacity is procured as the price descends, reflecting the changing appetite for capacity at different prices. Figure 2 shows the demand curve for the 2017 Transitional Capacity Auction with the key coordinates supplied by the Secretary of State.

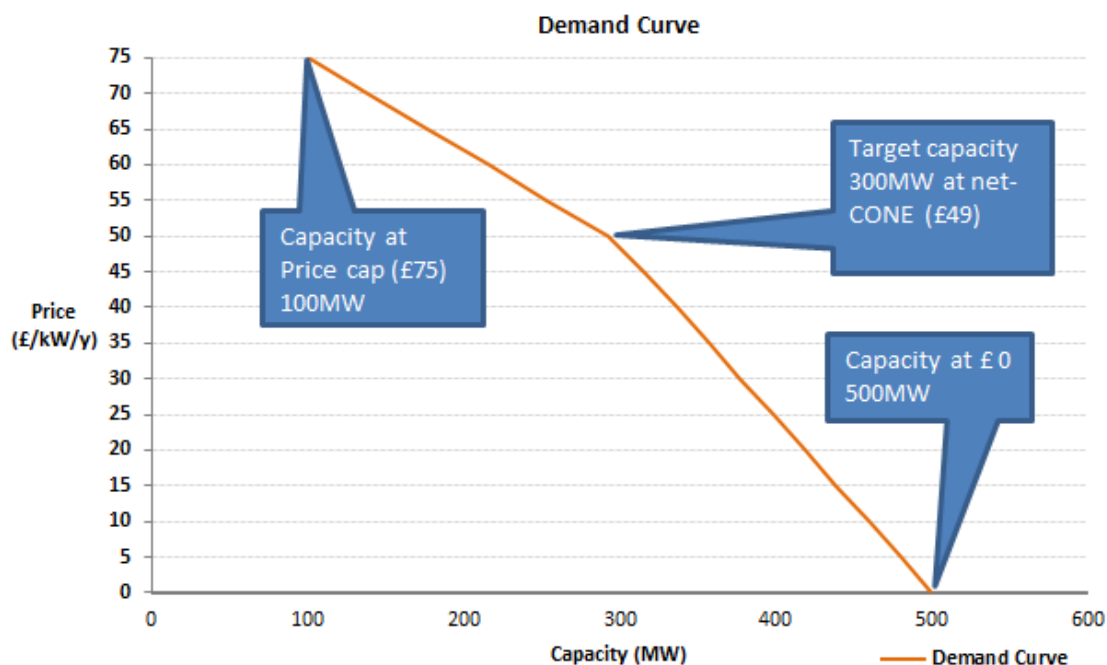


Figure 2: 2017 Transitional Auction Demand Curve

4. What happens during the auction?

The auction is held on a web platform and can only be accessed by the Bidders selected in advance by each Applicant. Please refer to Capacity Market Auction System [Bidder Guide](#) and in the online [tutorials](#) for more information on how to use the Auction System.

Start of the Auction

When the auction starts each Bidder will see their CMUs and the agreement lengths and capacities specified in advance of the auction. Bidders are also requested to print their Offline Verification Codes. These will be required if bidders need to contact the Auctioneer via telephone. The Auctioneer will not be able to provide any assistance without first verifying the Offline Verification Code.

During Bidding Rounds

During Bidding Rounds, participants will have the opportunity to:

- Submit Exit Bids that take effect in that Bidding Round
- Submit Exit Bids to take effect in a later round (a Proxy Bid)
- Amend or delete any Exit Bids

Bidder must place an Exit Bid to exit the Auction. If bidders do not place an Exit Bid, bidders will remain in the auction and will be awarded an agreement.

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Each of these actions are covered in more detail below.

The minimum price specified by the Applicant at which they would seek an agreement is known in the auction as an Exit Bid. Price Makers can submit Exit Bids at any price in the Auction.

Price Maker CMUs

A CMUs status as a Price Maker was confirmed in the Applicant's notification of Prequalification Results, their notification of a Reconsidered Decision following a Tier 1 Appeal, or via notification from the Delivery Body (if an Applicant subsequently provided a Price-Maker Memorandum and Certificate).

A Price Maker CMU is able to specify an Exit Bid at any price at or below the Price Cap in the auction, and bids that have not yet been realised can be revised within rounds.

If the Auction continues past the round for which the Exit Bid was made, the CMU will be out of the auction and if that round is not the Clearing Round then the CMU will not get a Capacity Agreement. If that round is the Clearing Round then the Exit Bid will be deemed a Relevant Exit Bid and will be considered in the clearing calculation.

If a Bidder does not enter an Exit Bid, they will receive a Capacity Agreement at the Clearing Price, subject to tie break rules.

End of Bidding Round

At the end of each round, the Bidding window will close at which time bids will no longer be able to be amended or placed. During the recess, if the auction continues, then the Auctioneer will post the results of the round that has just closed and announce the next bidding round.

Start of a new Bidding Round

The excess capacity at the start of the Bidding Round will be announced during the recess before the start of the next Bidding Round. The Auctioneer will announce the capacity required in line with the published Demand Curve. The next round will then be opened for Bidders in line with the auction schedule (see Appendix A).

In accordance with the Rules the excess capacity is rounded to the nearest 100 MW in the Transitional Auction— so if the excess capacity is 150.000MW the bidders will see an excess capacity of 200.000MW stated, and if the excess is 149.999MW the bidders would see an excess of 100.000MW stated.

Intra-round reporting

As per Rule 5.5.18; prior to the start of each round the high level round results will be made publically available. This will include the Bidding Round Price Spread, Potential Clearing Capacity at the price floor for that round, Excess Capacity rounded to 100MW for Transitional Auction.

End of the Auction

Once the Clearing Round has been identified there will be no further rounds and the auction will remain in recess. Within 24 hours Bidders will be notified of the provisional results for their CMUs via the auction system (discharging Delivery Body obligations under Rule 5.10.1). This will specify the

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Clearing Price, which of a Bidder's CMUs have been awarded an agreement and what the capacity and duration of the agreement is. For the avoidance of doubt you will only see provisional results for your own CMUs.

5. How and when does the auction finish?

The Auction will finish when there is more capacity demanded than supplied at the end of a bidding round, this round is known as the **Clearing Round**.

Auction Clearing

If a completed round is identified as the Clearing Round, then the all CMUs that have not been subject to an Exit Bid above the Clearing Round price floor will be eligible for an agreement. In addition to these units the auction system will also identify which CMUs (if any) that submitted an Exit Bid in the Clearing Round are also eligible for an agreement and in doing so will also determine what the Clearing Price of the auction is.

An Exit Bid that is made in the Clearing Round is known as a **Relevant Exit Bid**, in the 2017 Transitional Capacity Auction Relevant Exit Bids are ranked first by price (lowest to highest), then by capacity offered (highest to lowest), then by duration of agreement (lowest to highest) and finally by lottery via a random number (lowest to highest). Figure 4 demonstrates the Exit Bid ranking - In the event of a tie break the system will use this hierarchy to decide who is eligible for an agreement.

Rank	CMU	Exit Bid	Capacity	Duration	Lottery
1	CMU 1	£6	100	3	5
2	CMU 2	£7	105	3	4
3	CMU 3	£7	100	1	3
4	CMU 4	£7	100	3	1
5	CMU 5	£7	100	3	2

Figure 4: Exit Bid Ranking

When the auction clears, there are two possible scenarios. The auction system will first check if there has been an **Exact Match** between the capacity supplied and the capacity demanded at a particular price within the round. If there has not been an Exact Match, it will assess if over procuring or under procuring capacity would be most economically beneficial for the consumer. This is calculated using the **Net Welfare Algorithm** (NWA).

Once the Clearing Round has been identified the system will determine if the auction has cleared via an Exact Match, or if it needs to apply the Net Welfare Algorithm. To establish how the auction has cleared, the system will first calculate the capacity that is remaining at the end of the Clearing Round - which is the total capacity of all CMUs that have not exited the auction at this point.

Exact Match

After the system has calculated the capacity remaining at the end of the Clearing Round, it will then work backwards up the supply curve to add back the Relevant Exit Bids in order from the highest ranked to the lowest ranked in order to determine if it can establish a point on the supply curve that exactly meets a point on the Demand Curve.

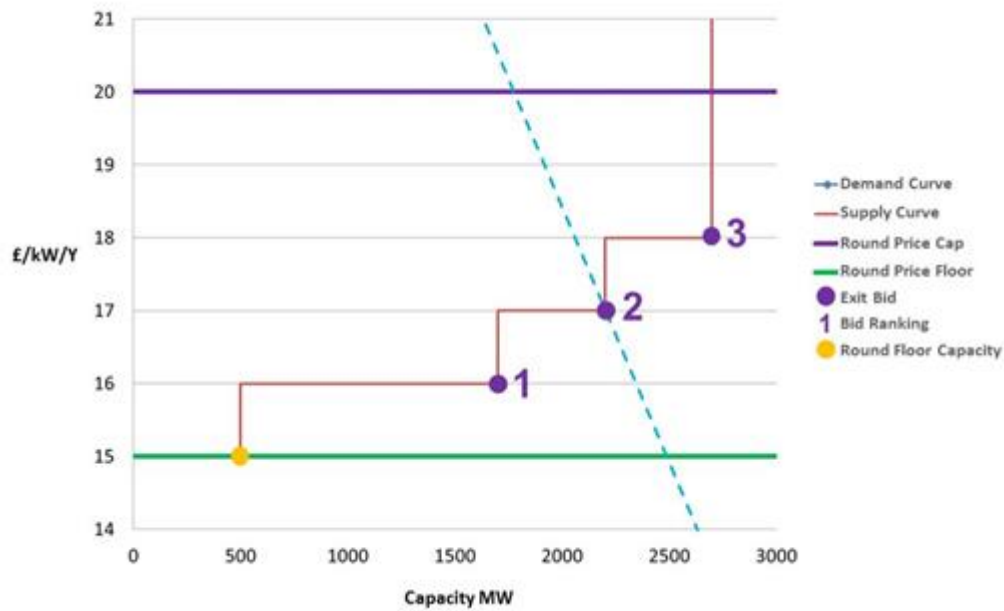


Figure 5: Exact Match

Figure 5 above provides an example of a Clearing Round where there is an exact match. The starting point for the calculation is represented by the orange dot on the supply curve at the Clearing Round price floor (which is equal to the total capacity of all continuing CMUs at the price floor).

The highest ranked bid is added back first, which takes us to point 1 on the supply curve, this is not a point on the Demand Curve so we have not established an exact match. Relevant Exit Bids continue to be added back until either an Exact Match has been identified, or until we have reached a point where the supply curve has crossed the Demand Curve and no exact match has been found. In the example above the second Relevant Exit Bid that is added back (point 2) takes us to a point on the supply curve that is also a point on the Demand Curve and therefore an exact match has been established.

In an exact match clearing scenario the Relevant Exit Bid that caused the exact match would set the Clearing Price and capacity - this means that all CMUs that were still in the auction at the end of the Clearing Round, plus all CMUs with Relevant Exit Bids ranked higher than the CMU that caused the exact match, along with the CMU that caused the exact match, would all be eligible for a capacity agreement. CMUs that have a lower Exit Ranking than the CMU that caused clearing (e.g. the CMU that exited at point 3) plus all of the CMUs that had exited in a previous round would not be eligible for a Capacity Agreement.

Net Welfare Algorithm

In reality it is unlikely that the auction will clear via an exact match, as the supply curve and the Demand Curve would need to match to the exact kW. Therefore, the Clearing Price and capacity is likely to be determined by the Net Welfare Algorithm.

The purpose of the Net Welfare Algorithm is to establish where the auction should clear when there is not an exact match. This is done by comparing the nearest points of supply on either side of the Demand Curve to determine which point is most beneficial to the consumer.

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The Net Welfare Algorithm is defined in the Rules as follows:

For the purposes of Rule 5.9.4(c) the Auctioneer must calculate the integral

$$\int_{Ql}^{Qh} P(Q)dQ$$

and subtract the product of

$$(PhQh - QlPl)$$

In order to calculate net welfare we first need to determine the values of the inputs into the clearing algorithm, these are:

Net Welfare Algorithm Inputs	Explanation
Pl	Pl is the price of the lowest ranked Relevant Exit Bid that is below the demand curve. If there is no Relevant Exit Bid below the demand curve then Pl is the price at the Clearing Round Floor.
Ql	Ql is the capacity of all continuing bids, plus the capacity of all Relevant Exit Bids in the ranking order, up to and including the lowest ranked Relevant Exit Bid that is below the demand curve. If there is no Relevant Exit Bid below the demand curve, then Ql is the capacity supplied at the Clearing Round Floor.
Ph	Ph is the price of the highest ranked Relevant Exit Bid that is above the demand curve. If there is no Relevant Exit Bid above the demand curve then Ph is the price at the Clearing Round Cap.
Qh	Qh is the capacity of all continuing bids, plus the capacity of all Relevant Exit Bids in the ranking order, up to and including the highest ranked Relevant Exit Bid that is above the demand curve. If there is no Relevant Exit Bid above the demand curve then Qh is the capacity supplied at the Clearing Round Cap.
P(Q)	Represents the Demand Curve as specified by the Secretary of State (price as a function of quantity)

Figure 6. Net Welfare Algorithm inputs

To find these inputs we use the same starting point as when calculating an exact match, on this occasion we are looking to identify the closest Relevant Exit Bids on the supply curve that fall either side of the Demand Curve. In Figure 7 below the Relevant Exit Bids ranked 1 & 2 would be used to identify these input values, with the lowest ranked bid below the Demand Curve (Bid 1) setting Ql/Pl and the highest ranked bid above the Demand Curve (Bid 2) setting Qh/Ph.

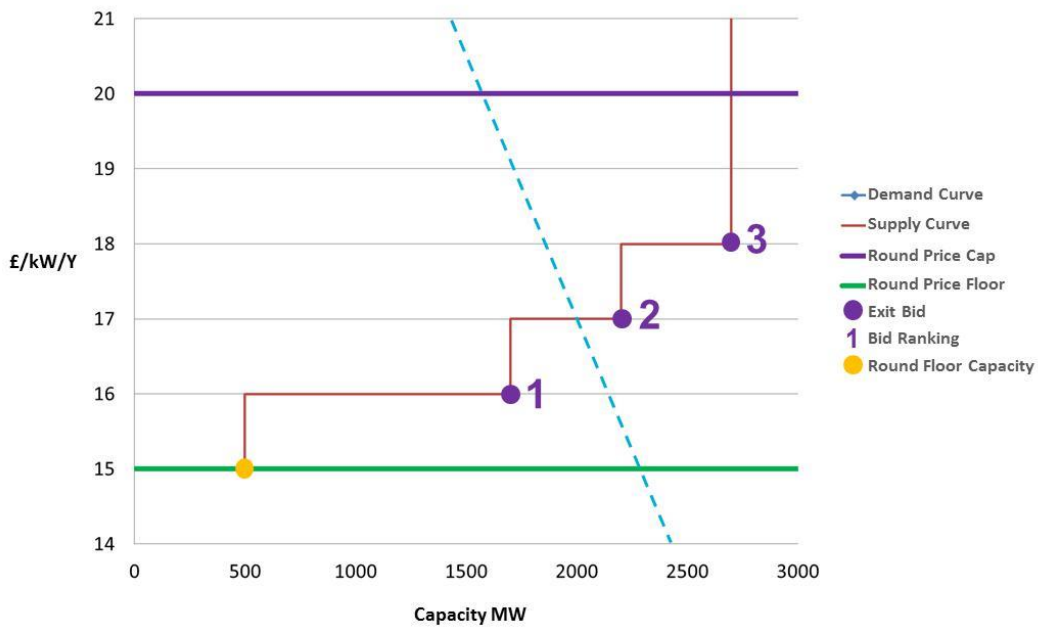


Figure 7: Net Welfare Algorithm

Please note that in some scenarios there may not be a Relevant Exit Bid below and/or above the Demand Curve. If there are no Relevant Exit Bids below the Demand Curve, then Q_l/P_l will be taken from the point where the supply curve crosses the bidding round floor price, equally if there are no bids above the Demand Curve, then Q_h/P_h will be the point where the supply curve crosses the bidding round cap price.

Once the inputs into the Net Welfare Algorithm have been established we can then calculate at which point the auction should clear at. The first step is to calculate the integral of the Demand Curve between Q_l and Q_h (this is the area under the Demand Curve between the two points specified), this calculation represents the extra benefit for the consumer in clearing the auction at the higher quantity (Q_h) rather than the at the lower quantity (Q_l). The red shaded area in Figure 8 shows the result of the integral calculation between bid 1 & 2 graphically.

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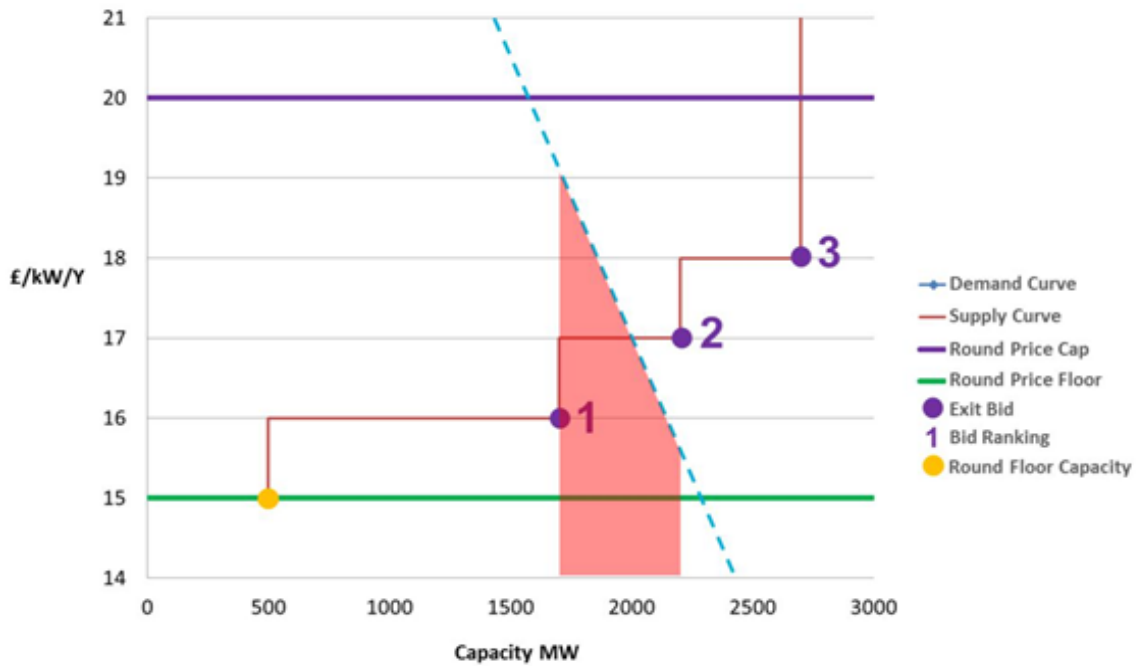


Figure 8: Net Welfare Algorithm

Once we have established the extra benefit of the higher capacity to the consumer, we must then calculate the additional cost of procuring the higher level of capacity, in order to see if the benefit outweighs the cost. To do this we simply calculate the total cost of procuring the higher amount of capacity ($PhQh$) and subtract the total cost of procuring the lower amount of capacity ($QlPl$). The result of this calculation gives us the extra cost associated with procuring Qh rather than Ql - this is represented graphically by the blue shaded area in Figure 9.

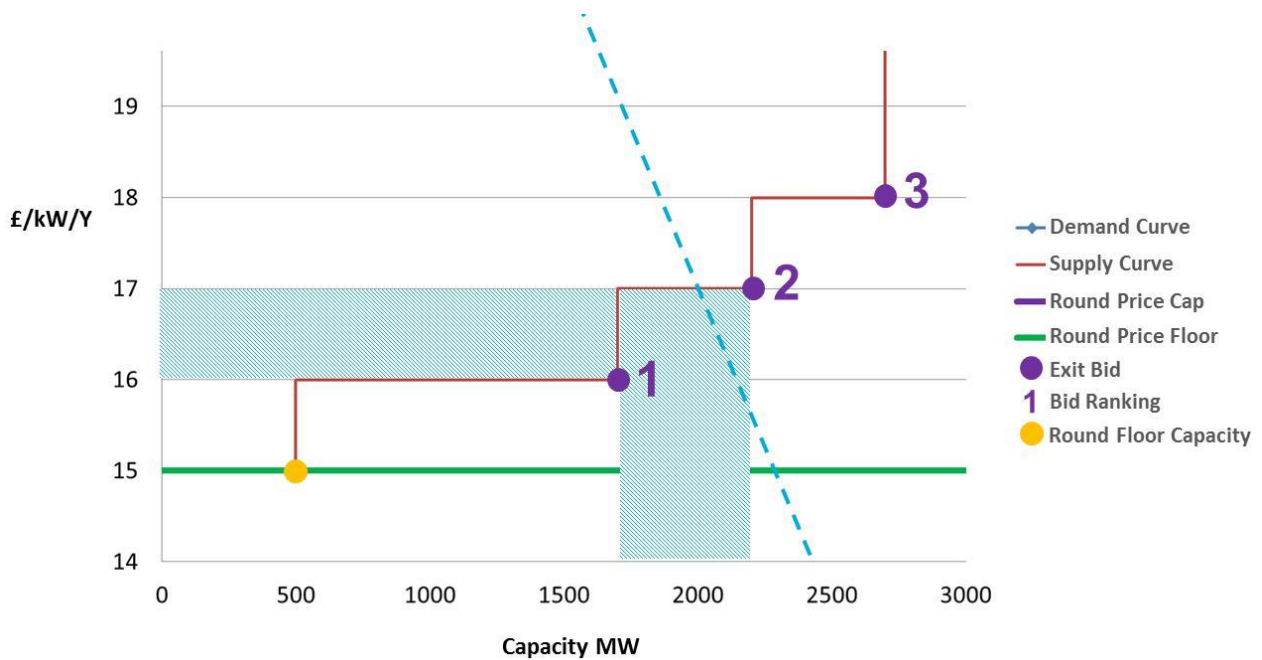


Figure 9: Net Welfare Algorithm

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Finally, to determine the outcome of the Net Welfare Algorithm the product of $(PhQh - QlPl)$ must be subtracted from the integral calculation. If the result of the Net Welfare Algorithm is positive, this means the benefit of procuring Qh outweighs the additional cost and the auction clears at a capacity of Qh and a price of Ph . Otherwise, if the result is not positive, then the benefit does not outweigh the cost and the auction would clear at a capacity of Ql and a price of Pl .

In this scenario all CMUs still in the auction at the end of the Clearing Round, along with all CMUs in the exit ranking up to including the CMU that sets clearing would be eligible for an agreement.

As previously mentioned, in some scenarios there may not be a Relevant Exit Bid below and/or above the Demand Curve. In such a scenario if the Net Welfare Algorithm results in selecting Ql/Pl at the Clearing Round floor, then all CMUs that remain in the auction at the end of the clearing round would be eligible for an agreement. Similarly, if the Net Welfare Algorithm results in selecting Qh/Ph , and this is at the Clearing Round cap then all CMUs who were still in the auction at the start of clearing round would be eligible for an agreement.

6. What happens next?

When the Clearing Round has been identified there will be no further rounds and the auction will go into recess. Timeline and process is described below for the release of result:

If the auction clears on before 12:30 of an auction day, the provisional results would be published at 19:00 that night as follows:

- DB publishes on website the Clearing Round price range within the cleared round recess.
- DB sends the individual Provisional Results to bidders via the auction system at 19:00 and also publishes the Clearing Price on the EMR Portal.
- DB will upload the full Provisional Results report to the EMR Portal at 19:00 the same evening.

If the auction clears after 12:30 on an auction day, the provisional results would be published at 07:30 the next morning:

- DB publishes on website the Clearing Round price range within the cleared round recess.
- DB sends the individual Provisional Results to bidders via the auction system at 19:00 and also publishes the Clearing Price on the EMR Portal.
- DB will upload the full provisional report to DB website at 07:30 next morning.

The Delivery Body within 24 hours of the Capacity Auction clearing notify Bidders whether, based on the Provisional Results, they have been provisionally awarded a Capacity Agreement with respect to a Bidding CMU. Such notification is provisional only and does not constitute notification of a Capacity Agreement. The Secretary of State and Authority will also be notified as soon as reasonably practicable.

Within 2 working days of the Capacity Auction closing, the Auction Monitor must report to the Secretary of State on whether the procedures in the CM Rules and Auction Guidelines have been properly followed.

After the auction clears, the Secretary of State will have 7 working days to consider the auction and has the power to annul the auction if they believe there was an irregularity in the auction that affected the clearing price or the successful CMUs. The process for this is set out in Regulation 27.

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The final Auction Results will be published by the Delivery Body 8 working days after the auction concludes – the Auction Results Day. The results will include the Auction Clearing Price, the total amount of capacity procured and the successful CMUs. For the successful CMUs the results will also include the de-rated capacity of the CMU and the length of the obligation.

Capacity Agreement Notices will be issued no later than 20 working days after the Auction Results Day. The Capacity Agreement Notice is set out in schedule 1 of the CM Rules. A separate notice will be issued for each successful CMU.

7. Important Information

Offline Verification Codes

The offline verification codes will be used to verify a Bidder's identity for auction related queries from D-9. These codes will also be necessary for use of the backup bidding procedure during both the mock and the actual auction. It is strongly advised that all Bidders print these verification codes off from the system at the earliest opportunity as without them you will not be able to make any backup bids via the telephone. Each code can only be used once and are used sequentially. How to find the access codes can be found in the bidder support guide.

Help During the Auction

If you need help during the auction either submit a message on the auction platform, or call 01926 656574. This number should only be used in the event of a systems failure and to use this line you will need your offline verification codes in order to confirm your identity.

For all queries not specific to the auction process, e.g. general Rule queries call the CM helpline 01926 655300.

If you exit the auction by accident there is nothing the Auctioneer can do – be extra careful submitting Exit Bids.

If you have confirmed entry into the auction but do not log in to the auction system you will get an agreement at the Clearing Price.

8. Frequently Asked Questions

Can I submit my Exit Bids at the start of the auction?

Yes, providing the Bidding Round is open you can submit an Exit Bid at any time. An Exit Bid that will become active in a later Bidding Round is called a Proxy Bid.

Within my Bidders can I see who has submitted Exit Bids and/or Duration Bid Amendments?

Bidders can see this information within the auction system. They would find this information in the downloads section called My Exit Bids and Duration Bid Amendments.

Can a Price Maker still get an agreement below the Price Taker Threshold? Can a Price Maker submit an Exit price below the Price Taker Threshold?

A Price Maker is able to submit an Exit Bid at any price between the Price Cap and £0 as such they are entitled to an agreement at a clearing price below the Price Taker Threshold, providing they did not submit an Exit Bid that took effect in an earlier Bidding Round. If a Price Maker exits the auction above the Price Taker Threshold then they will not be entitled to an agreement if the auction clears below the threshold.

Can a Price Taker get an agreement above the Price Taker Threshold?

A Price taker will get an agreement above the Price Taker Threshold if the auction clears above the Price Taker Threshold. Exit Bids for Price Taker CMUs must be at or below the Price Taker Threshold.

If I have a Refurbishing capacity of 180MW and Pre-Refurbishing capacity of 150MW what is the capacity seen by the auction system, is it 330MW?

When the Refurbishing CMU is in the auction the system will see a capacity of 180MW, then when/if you submit a Duration Bid Amendment and switch to the Pre-Refurbishing State, which then takes effect, the system will see 150MW. The Auction system will never combine the capacity of the two different states.

If I don't get an agreement in the provisional results is it likely that this will change when the results are final?

The provisional results become final following checks from the Auction Monitor and Secretary of State, there will not be a change to the demand.

9. Appendix A – Auction Timetable

	Price range (£/kW/y)	Round Start	Round End	Recess
Day 1 (22nd Mar)				
R1	75 - 70	09:00	10:30	30mins
R2	70 - 65	11:00	11:30	30mins
R3	65 - 60	12:00	12:30	30mins
R4	60 - 55	13:00	13:30	30mins
R5	55 - 50	14:00	14:30	30mins
R6	50 - 45	15:00	15:30	30mins
R7	45 - 40	16:00	16:30	30mins
Day 2 (23rd Mar)				
R8	40 - 35	09:00	09:30	30mins
R9	35 - 30	10:00	10:30	30mins
R10	30 - 25	11:00	11:30	30mins
R11	25 - 20	12:00	12:30	30mins
R12	20 - 15	13:00	13:30	30mins
R13	15 - 10	14:00	14:30	30mins
R14	10 - 5	15:00	15:30	30mins
R15	5 - 0	16:00	16:30	30mins