



CRM Design Note: Auction Process

April 2024

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Introduction and context

This Design Note is provided for explanatory purposes only and does not confer any rights or permissions to the reader. The implementation and detailed design of the design concepts outlined in this document may vary based on specific constraints, or evolving design considerations. This document does not serve as a strict instruction manual.

This document does not constitute a legal or binding commitment by Elia Transmission Belgium to undertake any specific design or development activities. For the most accurate and up-to-date information, it is recommended that the reader always relies on the latest available information, such as the CRM Functioning Rules.

By reading and using this Design Note, you acknowledge and accept the terms of this disclaimer. This design note was last updated in April 2024 following Elia's submission of the Functioning Rules to the CREG on February 1st 2024.

The purpose of the present design note is to provide all stakeholders with a clear view on the design of the primary CRM Auctions for capacity (hereafter "Auctions").

In line with the Electricity Law as defined further, Art. 7undecies §6, three such Auctions for each Delivery Period are foreseen, i.e. one Auction four years ahead of the Delivery Period (Y-4 Auction), one Auction two years ahead of the Delivery Period (Y-2 Auction) and a final Auction one year ahead of the Delivery Period (Y-1 Auction). Auctions will take place yearly as from 2021 starting October 1 at the latest and will conclude with the publication of the Auction results on October 31.

Furthermore, this design note also elaborates on the treatment of so-called Opt-Out Volumes (i.e. capacity volumes that for one reason or another do not participate in the Auction) and discusses transparency on the Auction results (i.e. the validation of Auction results and the sharing of information on different Auction aspects in a transparent manner to allow the market to follow-up on the CRM).

Note that each Auction obviously relies crucially on a supply and Demand Curve. While the supply curve depends on the Prequalified CRM Candidates' Bids, the Demand Curve is set in an administrative way, according to the legal framework as determined by Royal Decree, its design is also elaborated upon in the present design note when relevant. Importantly though, the presented rules in this design note on the auction algorithm are generally applicable, irrespective of the shape of the Demand Curve.

Legal framework

The Law setting up a Capacity Remuneration Mechanism adopted on April 4th 2019¹ (hereafter "CRM Law"), modifying the Electricity law of 29 April 1999 on the organization of the electricity market (hereafter "Electricity law") defines in Art. 2 an Auction ("veiling/

¹ <http://www.ejustice.just.fgov.be/eli/wet/2019/04/22/2019012267/staatsblad>

mise aux enchères”) as (own translation) “the competitive process in which Capacity Holders are offering a price for making available capacity.”

The Electricity Law Art. 7undecies §6 defines that only Prequalified CRM Candidates can participate in the Auction. Besides, while production Capacity Holders situated in the Belgian control zone are obligated to prequalify, Art. 7undecies §6 determines that a Capacity Holder may decide not to offer its entire or part of its capacity into Auction – which is further referred to as the “Opt-Out Volume” – provided that prior notification of this decision is given to the grid operator.

The Electricity law further sets the governance framework of the auction algorithm design rules. Following Art. 7undecies §8 these rules are to be proposed by Elia and are included in the broader set of Market Rules to be approved by CREG. On a yearly basis, a consultation procedure of the market actors is foreseen, prior to presenting the Market Rules regarding the auction algorithm for proposal to the regulator.

Structure of the design note

In what follows firstly the auction format is presented, along with the price rule that will apply during the Auctions, determining the Capacity Remuneration Capacity Providers will receive when selected in the Auction. Secondly, the treatment of Opt-Out Volumes is described to give more insight as to how Capacities are classified as either contributing to security of supply, or not. Thirdly, the determination of the Auction demand curve is elaborated, together with how it is corrected right before the clearing of the Auction. Next, section five describes the bidding requirements that apply to all bids submitted in the Auction. Section 6 describes the Auction clearing methodology for both the Y-4 & Y-2 Auctions as well as the clearing methodology for the Y-1 Auction. Lastly, in section 7 an overview is given of the transparency rules with respect to the information sharing on different Auction aspects.

1 Capacity auctions

1.1 Auction format

The auction format sets the contours of the auction algorithm design and defines how the Auction process takes place. Given the Belgian context with the presence of a few large incumbents, the single-round sealed Bid auction format is currently implemented in the Belgian CRM. This format ensures a level-playing field among market participants and limits the potential for market power abuse. Under the single-round sealed bid format, market participants must submit their Bid(s) without knowing other participants' Bids, after which the market is cleared by the auctioneer in one single round (see illustration below). Additionally, complexity and flexibility in the auction clearing are best managed via such single-round sealed bid approach.

Single-round sealed bid

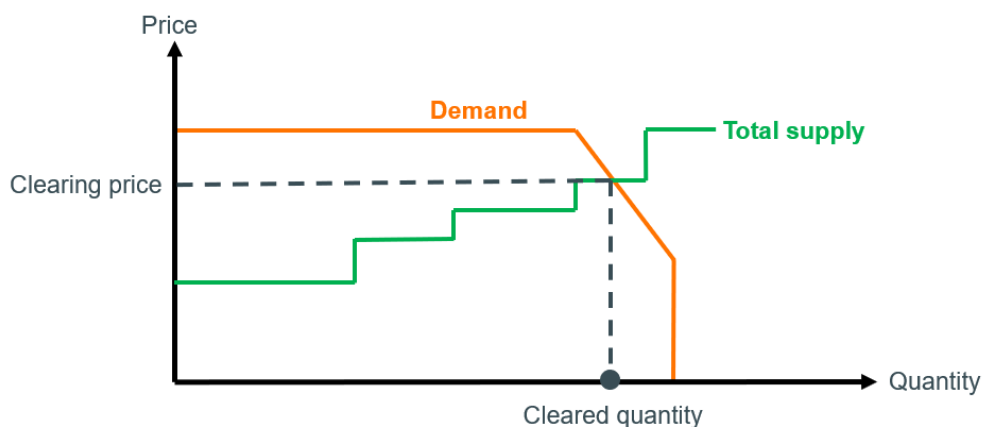


Figure 1: Single-round sealed bid auction

1.2 Auction pricing rule

In all Auctions, selected CMUs are remunerated based on a pay-as-bid principle. This means capacity providers will receive a remuneration equal to the Bid price for each of their selected Bids in the Auction. The CRM as being deployed in Belgium is conceived as a remuneration mechanism complementary to the energy market (incl. ancillary services) to ensure that Capacity Providers are capable to cover their costs including a reasonable and fair rate of return. Being complementary to the energy market implies that the initial sources of revenues should come from the energy market and that only the residual part, i.e. the so-called missing money, is ensured via the CRM. Therefore, it is not justifiable to earn inframarginal rents in the Belgian Capacity Mechanism. As the missing-money level is specific to each CMU and may therefore be different, it makes sense not to reward all Capacity Providers with the same Capacity Remuneration.

1.3 Auction timing

In the Belgian CRM, multiple Auctions are organized for the same delivery period. For the first two delivery periods (2025-2026 and 2026-2027) only two auctions will be organized: a Y-4 Auction and a Y-1 Auction. For delivery periods after 2026-2027 (e.g. starting from 2027-2028), a Y-2 auction will be organized on top of the Y-4 and Y-1 auctions. Figure 2: Auction timing demonstrates the timing of the auctions:

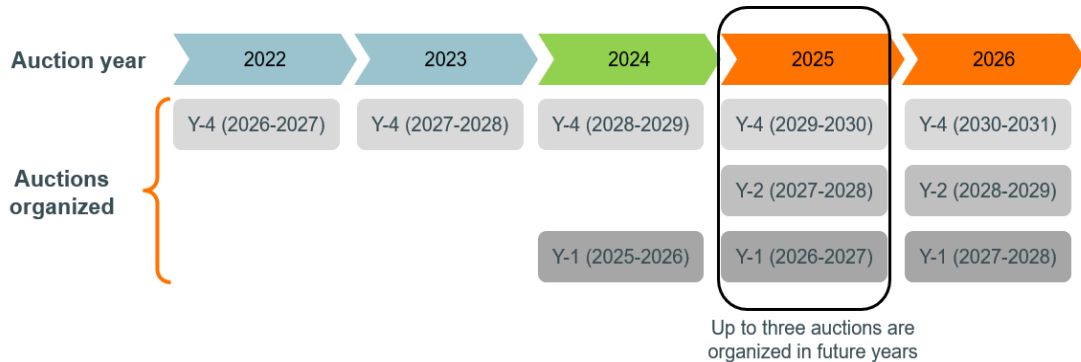


Figure 2: Auction timing overview

Organizing three different auctions for the same delivery period enables capacity providers to participate to the auction that best aligns with the investment horizon of their specific project.

2 Treatment of Opt-Out Volumes

This section aims to provide all stakeholders with a general overview on the treatment of Opt-Out Volumes, which touches not only on the auction algorithm but on other CRM aspects as well, such as the Prequalification Process during which the opt-out notification has to be submitted and the Secondary Market to which the Opt-Out Volume may or may not participate.

The opt-out notification allows Capacity Holders that are obligated to prequalify, or have been prequalified in the past, to refrain from offering capacity in an upcoming CRM Auction, while at the same time also informing the grid operator of the capacity that will not be offered in the upcoming CRM Auction.

Various reasons are possible for a CRM Candidate to (partially) opt-out of a CRM Auction, such as a notified temporary or definitive closure, extensive maintenance plans during the Delivery Period to which the Auction relates, an alternative view on the technical derating for its installation, the estimation that not participating in the CRM could prove more profitable, etc. It is important to note that, even though all market parties can freely indicate the reason related to the Opt-Out Volume, the final classification of the volume is described by the Functioning Rules. As such Capacity Providers are not able to indicate directly if the Opt-Out Volume of their capacity will be considered to contribute towards adequacy or not, hence classified as Opt-Out OUT (not considered contributing to adequacy) or Opt-Out IN (contributing to adequacy).

Depending on the reason for opt-out, an opt-out notification might have different implications, first of all related to the volume that can be bid into the Auction. Secondly, also towards Secondary Market participation there may be consequences of an opt-out notification, in terms of whether or not the Opt-Out Volume is still entitled to participate. In general, Secondary Market participation should be allowed to a maximum extent possible to ensure liquidity, while obviously avoiding double counting of capacity – meaning that capacity that is already counted upon to contribute to adequacy should not at the same time be allowed to participate in the Secondary Market as well. In practice this means that it is not possible to acquire obligations on the Secondary Market for Opt-out Volumes that are classified as “IN” for the relevant Delivery Period.

2.1 Treatment of Opt-Out Volume in the standard prequalification process

2.1.1 Treatment of Opt-out volumes in Y-4 and Y-2 auctions

Market parties submitting an Opt-out notification always do so relative to a specific delivery period. Each notification must contain both the Opt-Out Volume as well as the reason why the volume will not be offered in the upcoming auction for the delivery period. Different fractions of the Opt-Out Volume can be related to different Opt-Out reasons. These fractions will be classified differently depending on the reasons

attributed to them. In case the Opt-Out Volume is equal to the Nominal Reference Power of the CMU, the Opt-Out is considered as a “full Opt-Out”, in all other cases they are considered as “partial Opt-Out”. Full Opt-Outs will in some cases be classified differently compared to partial Opt-Outs.

Opt-out notifications submitted during the prequalification process for either a Y-4 or a Y-2 auction are considered as not contributing to adequacy, and therefore classified as “OUT” based on a limited set of reasons. Towards both the Y-4 and Y-2 auctions, in general, the following reasons linked to an Opt-Out Volume will lead to considering the volume as not contributing to adequacy:

1. Opt-Out Volumes supported by a definitive closure (or structural capacity reduction) notification in line with Art. 4bis of the Electricity Law is treated as firm both towards the Y-4, Y-2 and Y-1 Auction. In other words, this category of Opt-Out Volume is considered not contributing to adequacy in the relevant Delivery Period (OUT).
2. Opt-Out Volume linked to non-firm capacity as part of a connection with flexible access to the Elia grid.
3. Opt-Out Volumes linked to additional capacities for which Elia is not sufficiently certain the capacity will be developed (either in time or at all). The evaluation of this is based on, among other things, the obtained permits, information in the connection contract signed with the relevant grid operator, etc.
4. Opt-Out volumes linked to capacities that do not have an obligation to submit a Prequalification file as described in article 7undecies, §, 8 al. 2 of the Electricity Act.

The list above is not exhaustive but contains the most important reasons to classify a certain volume as not contributing, for the full list the CRM Functioning Rules must be consulted. Opt-Out Volumes submitted for all other reasons are by default considered as contributing to adequacy, e.g., Opt-Out “IN”.

2.1.2 Treatment of Opt-out volumes in Y-1 auctions

Opt-Out Volumes submitted towards a Y-1 Auction are classified in the same way as Opt-Out Volumes submitted towards a Y-4 or Y-2 Auction, with the exception of a few specific ones. The most important differences are volumes submitted with the following reasons associated to them:

1. The Opt-Out Volume is associated with a temporary decommissioning or temporary structural reduction of capacity notification in accordance with article 4bis of the Electricity Act during the Delivery Period to which the Opt-out Notification relate are classified as “OUT”. (Whereas volume related to this reason would be classified as “IN” during a Y-4 or Y-2 auction.)
2. The Capacity Provider indicates that the volume is not contributing to adequacy (“OUT”), in which case he also has to provide a motivational letter, as part of the Opt-Out notification, to support this indication.

Similar to notifications submitted leading up to a Y-4 or Y-2 auction, Opt-Out Volumes

submitted for all other reasons are by default considered as contributing to adequacy, e.g., Opt-Out “IN”.

2.2 Treatment of Opt-Out Volume in the Prequalification fast track

All capacity that goes through the fast track Prequalification Process, instead of the full Prequalification Process is by default considered as Opt-Out Volume. In this case the Opt-out is always considered as a “full Opt-out”, as the Opt-Out Volume will be equal to the NRP of the Capacity participating to the fast track Prequalification Process.

Opt-Out Volume resulting from fast track prequalification, can still be classified into the opt-out categories as discussed above. The same rules apply for Opt-Out Volume resulting from fast track prequalification with respect to the volume requirement.

3 Auction demand curve

This section aims to provide all stakeholders with a general overview on the way the auction demand curve is determined, which touches not only on the legal framework, but on other CRM aspects as well, such as the Prequalification Process during which the opt-out notification has to be submitted.

Determining the demand curve for an upcoming auction is a vital element in the CRM. The demand curve for any auction is determined in two different stages. In the first stage the demand curve is set based on the methodology described in the Royal Decree on “Methodology and Parameters”.² During the initial determination of the demand curve by the Minister, a number of assumptions are taken. In the second stage, after the Prequalification Phase, these assumptions need to be validated, and if they were inaccurate, corrected. On top of correcting the assumptions of the initial demand curve, a number of additional corrections are introduced to ensure all volumes able to contribute (or not) to adequacy are considered correctly. These corrections are described in the CRM Functioning Rules. This design note only aims to describe the most important volume corrections of the demand curve. The list of corrections described here below is not exhaustive, for a full view on all potential upward or downward corrections, the functioning rules should be consulted.

3.1 Setting the demand curve

Chapter 4 Articles 8-11 of the Royal Decree on Methodology describe way the demand curve is initially calculated for an upcoming auction. The demand curve for each Auction is determined by means of two price parameters and two volume parameters. These parameters are used to determine 3 points (A, B & C) that will determine the demand curve. This is shown graphically below:

² [LOI - WET \(fgov.be\)](https://www.fgov.be/loi-wet)

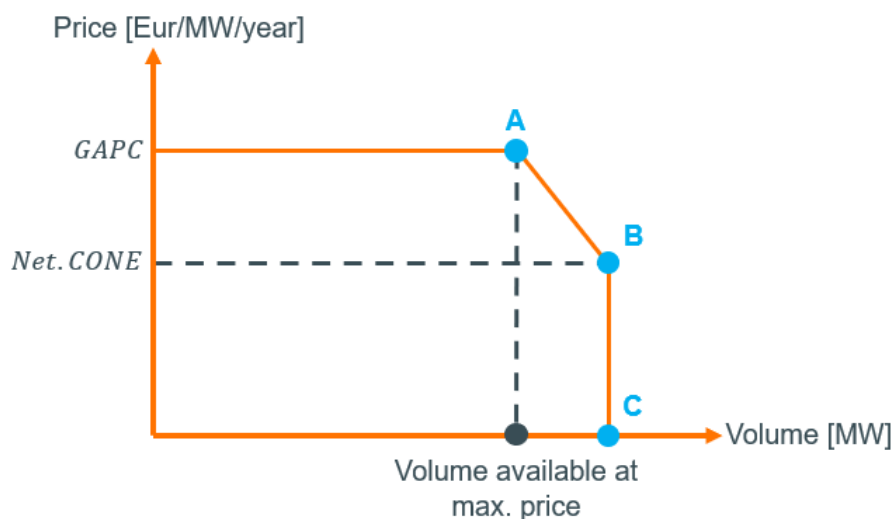


Figure 3: Auction demand curve shape, graphical illustration

Article 9 § 1 of the Royal Decree on Methodology determines the way the coordinates of these points are determined:

Point A:

- Volume: The maximum volume that is available to be contracted at the Global Auction Price Cap (GAPC). Note: In case of a Y-1 auction, this volume is equal to the volume of points B and C, e.g. the volume required to ensure security of supply as determined by article 7undecies, § 7 of the Electricity Law of 1999
- Price: The Global Auction Price Cap, calculated as the net cost of a new entrant in the market (Net. Cone) and a correction factor "X".

Point B:

- Volume: The volume required to ensure security of supply as determined by article 7undecies, § 7 of the Electricity Law of 1999.
- Price: The net cost of a new entrant in the market.

Point C:

- Volume: The volume required to ensure security of supply as determined by article 7undecies, § 7 of the Electricity Law of 1999.
- Price: A price of zero

3.1.1 Price parameters of the demand curve

This design note will not go into further detail with regards to how the Global Auction Price Cap and net cost of a new entrant are determined. Elia refers market parties to both the legal framework and the calibration reports published by Elia for more information regarding this calculation.

3.1.2 Volume parameters of the demand curve

Given that the determination of the volume parameters is relevant to understand the corrections that are applied before the auction clearing, this part of the design note will give a high-level overview on how the volume parameter of points B and C are determined. To calculate the volume, Article 11 of the Royal Decree on Methodology describes five steps, these steps are summarized here below:

1. The average load during simulated scarcity moments (simulation based on the reference scenario)
 2. A volume required to fulfill the (upward) balancing needs of the grid is added to the volume from step 1
 3. The average volume of Energy Not Served (ENS) during the simulated scarcity moments is subtracted from the volume from step 1
- The volume obtained after steps 1-3 is the “Target Volume”
4. The Non-eligible capacity and the capacity contracted in previous auctions are subtracted from the target volume
 5. In case of a Y-4 or a Y-2 auction, a volume is reserved for later auctions. This reservation also applies to reserving the Maximum Entry Capacity of cross-border capacities for the Y-1 auction.

The figure below summarizes these steps graphically in case of a Y-4 or Y-2 auction:

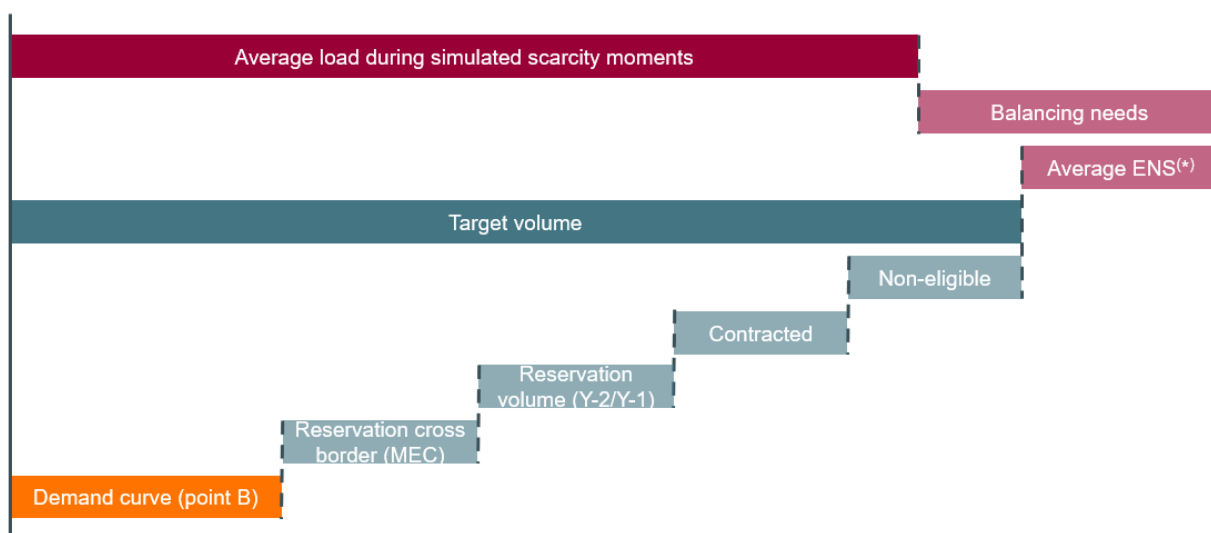


Figure 4: Determination of the volume for point B of the demand curve (illustrative example for a Y-4/Y-2 auction)

The volume obtained after these five steps is the volume of point B of the demand curve. The final values for the target volume and the volumes subtracted from it, are published as part of a Ministerial Decree published on 31/03 of the year in which the auction takes place.

3.2 Correcting the demand curve

After the Prequalification phase, and before the auction is cleared, several volume corrections are applied to the demand curve. These corrections can either cause the demand curve to be shifted to the right (increasing the volume up for auction) or downward (decreasing the volume up for auction).

3.2.1 Upward corrections of the demand curve

This section summarizes the two most important upward corrections of the demand curve. Capacity providers are referred to the CRM Functioning Rules for the exhaustive list of upward corrections of the demand curve.

3.2.1.1 Correction for contracted Capacities whose derating factor has deteriorated

For capacities of Energy Constrained CMUs that are engaged in a Transaction with a Transaction Period that (partially) overlaps with the Delivery Period to which the Auction relates and for which the Derating Factor has deteriorated (Derating Factor as indicated by the CRM Candidate during the Prequalification Process, lower than Derating Factor (CMU,t)), the adjusted contribution of the previously contracted capacities for the delivery period is calculated as follows:

$$\frac{\text{average Total Contracted Capacity over the Delivery Period to which the Auction relates}}{\text{Derating Factor}(CMU, t)} \cdot [\text{Derating Factor}(CMU, t) - \text{Derating Factor}(CMU, PQ)]$$

Where:

- *Derating Factor (CMU, t)* is equal to the weighted average Derating Factor of all transactions in Annex A of the relevant CMU's Capacity Contract that constitute the Total Contracted Capacity over the Delivery Period to which the Auction relates.
- *Derating Factor (CMU, PQ)* is equal to the Derating Factor as indicated by the Capacity Provider for the CMU during the Prequalification Process.

In essence, this correction tries to take into account that the contribution of the previously contracted capacity of CMU to security of supply of the Delivery Period to which the Auction relates, is lower than anticipated because the value of the derating factor has deteriorated. Because the originally contracted capacity is able to contribute less than anticipated, the demand curve is shifted upwards.

3.2.1.2 Correction for participation of non-eligible capacities

As explained above, during the process of setting the demand curve, Capacity that is expected to be non-eligible is already subtracted from the demand curve. Non-eligible capacities have no obligation to Prequalify as their contribution is already considered. In case however, one of these Capacities decides to participate to the Standard Prequalification Process (with the intention of submitting a bid into the Auction), it is not

possible to automatically consider that the capacity will contribute to Security of Supply (SoS) as its contribution might be determined based on the outcome of the Auction. Therefore, the demand curve is corrected upwards, taking into account that in case the capacity is not selected in the Auction, it will not contribute to SoS, and other capacity needs to be contracted instead.

3.2.2 Downward corrections of the demand curve

This section summarizes the three most important downward corrections of the demand curve. Capacity providers are referred to the CRM Functioning Rules for the exhaustive list of downward corrections of the demand curve.

3.2.2.1 Correction for Opt-Out IN Volumes

After the Bid Gate Closure Time, the Opt-Out notifications submitted to Elia are final. As explained in detail above, this also means the final classification of the Opt-Out volumes into either Opt-Out “IN” or Opt-Out “OUT” can take place. As a classification of volume in to the Opt-Out “IN” category means that the capacity is considered to be contributing to security of supply during the Delivery Period to which the Auction relates, these Opt-Out “IN” volumes are subtracted from the demand curve. Volumes that are already contributing to SoS do not need to be contracted anymore, explaining the rationale behind their subtraction from the demand curve.

3.2.2.2 Correction for contracted Capacities whose derating factor has improved

Similar to the upward correction described above, for capacities of Energy Constrained CMUs that are engaged in a Transaction with a Transaction Period that (partially) overlaps with the Delivery Period to which the Auction relates and for which the Derating Factor has improved (Derating Factor as indicated by the CRM Candidate during the Prequalification Process, higher than Derating Factor (CMU,t)), the adjusted contribution of the previously contracted capacities for the delivery period is calculated as follows:

$$\frac{\text{average Total Contracted Capacity over the Delivery Period to which the Auction relates}}{\text{Derating Factor}(CMU, t)} \cdot [\text{Derating Factor}(CMU, PQ) - \text{Derating Factor}(CMU, t)]$$

Where:

- *Derating Factor (CMU, t)* is equal to the weighted average Derating Factor of all transactions in Annex A of the relevant CMU’s Capacity Contract that constitute the Total Contracted Capacity over the Delivery Period to which the Auction relates.
- *Derating Factor (CMU, PQ)* is equal to the Derating Factor as indicated by the Capacity Provider for the CMU during the Prequalification Process.

In essence, this correction tries to take into account that the contribution of the

previously contracted capacity of CMU to security of supply of the Delivery Period to which the Auction relates, is higher than anticipated because the value of the derating factor has improved. Because the originally contracted capacity is able to contribute more than anticipated, the demand curve is shifted downwards.

3.2.2.3 Correction for the non-selection of foreign capacity in Pre-Auctions

This correction is only relevant for Auctions and for borders for which a Pre-Auction is organized, which is currently only for Y-1 Auctions. In each Pre-Auction the volume to be procured is equal to the Maximum Entry Capacity (MEC) for each border. In case the selected Volume in a certain Pre-Auction is lower than the MEC, the difference between the MEC and the Pre-Auction selected volume for each border are subtracted from the demand curve. In this case the non-contracted part of the MEC for each border is counted on implicitly towards adequacy. For more information regarding this topic, please refer to the design note on Indirect foreign participation to the CRM.

4 Bidding Requirements

4.1 Who can bid in the Auction?

In order for a Belgian Capacity Provider to submit a Bid for a CMU in the Auction, certain conditions must be fulfilled:

1. The CMU must be Prequalified following the Standard Prequalification process (described in more detail in the Prequalification design note)
2. A financial security must be submitted up to the required level
3. The (Remaining) Eligible Volume of the CMU must be equal to, or greater than 1MW

In addition to the three conditions stated above, Capacity Providers wishing to submit a bid for a foreign CMU (e.g. Capacity that is not connected to the Belgian grid), must also be selected in the Pre-Auction for the relevant border. Pre-Auctions are only organized for Y-1 Auctions.

4.2 Bid compliance conditions

Key Design element: Bid compliance conditions

Each Bid into the Auction shall comply with the following requirements:

- Each Bid shall correspond to a single CMU
- Each Bid shall include one single volume (expressed in MW with a precision of 0,01MW), one single price (cf. the Bid Price, expressed in €/MW/year with a precision of 0,01€/MW/year) and the preferred Capacity Contract Duration (expressed in number of years with a precision of 1 year) component
- The volume of each Bid related to a CMU, as well as the maximum selectable volume by the auction algorithm of a combination of Bids related to a CMU (taking into account all bids related to a CMU including linked Bids and mutually exclusive Bids), shall not be higher than the (Remaining) Eligible Volume of the corresponding CMU as determined during the Prequalification Process
- The volume of each Bid shall not be lower than the Minimum Threshold as defined in the Royal Decree meant in Art. 7undecies §4 of the Electricity Law, which is currently set at 1MW.
- The Bid Price of each Bid shall not be higher than the Global Auction Price Cap defined in accordance with the rules set out in the Royal Decree meant in Art. 7undecies §2 of the Electricity Law.
- The Bid Price of each Bid applying for a 1-year Capacity Contract shall not be higher than the Intermediate Price Cap defined in accordance with the rules set out in the Royal Decree meant in Art 7undecies §2 of the Electricity Law. Capacity Providers can submit

an IPC derogation request with the regulator, if such a request is granted, this condition does not apply anymore.

- Each Bid shall be indivisible, meaning that it can only be accepted in its entirety or not at all
- Each Bid submitted for a foreign CMU is expected to have an identical Bid Price and Bid Volume compared to the Bid selected in the Pre-Auction for the same CMU.

The obligation for a Bid to correspond to a single CMU (hence not allowing portfolio bidding in the Auction across several CMUs) is in the first place a market power mitigation measure, to avoid as much as possible the potential for market players to exploit a pivotal position. However, CMU-based bidding may also lead to a more cost-efficient market clearing, as it provides the auctioneer with a more granular set of Bids to find the most cost-efficient solution. Note also that this rule does not obstruct the introduction of one Bid for a portfolio of aggregated (<25MW) capacities, as long as these aggregated capacities are accumulated into one CMU.

However, an exception applies for Bids corresponding to CMUs that are covered by a signed technical agreement, for which linked Bids are allowed (cf. infra).³ Still, one Bid per CMU has to be introduced, but the various Bids corresponding to CMUs covered by the same signed technical agreement may (and should be to comply with all bidding requirements) be linked.

The fact that only indivisible Bids are allowed does not obstruct Prequalified CRM Candidates in terms of expressing their specific preferences or constraints related to one or more CMUs when mutually exclusive sets of Bids are allowed (cf. infra).

4.3 Capacity volume of Bids to respect opt-out rules

Key design element:

For each domestic CMU, the volume of at least one Bid or the maximum selectable volume by the auction algorithm of a combination of Bids related to this CMU (taking into account all bids related to a CMU including linked Bids and mutually exclusive Bids) shall be equal to the (Remaining) Eligible Volume for the corresponding CMU as determined during the Prequalification Process. For each non-domestic CMU, the volume of the submitted Bid expect to equal to the volume of the Bid selected in the Pre-Auction for the same CMU. In case the (Remaining) Eligible Volume determined during the Prequalification process were to exceed this Bid volume, it is not expected that this

³ A signed technical agreement is a prerequisite to prequalify to ensure compliancy with the grid connection process foreseen in the Federal Grid Code. Today this compliancy corresponds to the delivery of a detail study (later on in the document referred to as "EDS")

additional volume is bid into the Auction.

This rule aims at the prevention of strategic behavior of bidders in the form of physical withholding to exploit a pivotal position. By withholding capacity, pivotal bidders could push up the market clearing price that would then benefit all other capacity within their portfolio. Physical withholding is in the first place neutralized through the opt-out rules, as capacities are obligated to give prior notification about this decision (via the notification of the Opt-Out volume) to the grid operator so that the auction volume can be reduced accordingly if needed and as such eliminating the potential to exploit a pivotal position (cf. infra).

If bidders would not offer the entire (Remaining) Eligible Volume of a CMU in the Auction though, this would in fact be an opt-out only during the Auction, for which the auction volume cannot be reduced anymore. This is not allowed, since – in line with the Electricity Law Art.7undecies §6 – a Capacity Holder has to decide on a (partly or full) opt-out before the Auction takes place.

4.4 Linked Bids

Key design element:

Bids that correspond to CMUs that are covered by the same signed technical agreement, or that concern linked capacities as indicated during the Prequalification process, may be linked, meaning that those bids can only be accepted together or not at all. The Bid Price, as well as the preferred Capacity Contract duration, shall be equal across linked Bids related to the same signed technical agreement.

During the Prequalification Process, CMUs related to additional capacity require a signed technical agreement to ensure compliancy with the grid connection process foreseen in the Federal Grid Code. Such technical agreement may cover multiple CMUs.

To be able to evaluate grid feasibility constraints, as elaborated below, bidding has to respect signed technical agreement. Therefore, linking of Bids is for bids corresponding to CMUs covered by a signed technical agreement, such that bidding respects the signed technical agreements.

Linked Bids should be interpreted as a combined Bid across multiple CMUs, which can only be accepted in its entirety or not at all, characterized by a single and equal Bid Price and a single and equal preferred Capacity Contract duration.

4.5 Mutual exclusivity of Bids

Key design element:

Prequalified CRM Candidates may submit one or more sets of mutually exclusive Bids.⁴ From each set of mutually exclusive Bids, maximally one Bid shall be selected by the auction algorithm.

Bids within a set of mutually exclusive Bids may include linked, which are within a set of mutually exclusive Bids interpreted as a single Bid. Different Bids within a set of mutually exclusive Bids may correspond to different CMUs, also for Bids not corresponding to CMUs covered by a signed technical agreement.

Mutually exclusive Bids allow Prequalified CRM Candidates to express their specific preferences in terms of flexibility and/or constraints while maximizing the chance of being selected in the Auction, and despite the requirement that all Bids are indivisible Bids.

An overview of some potential use cases of mutually exclusive Bids:

1. Assume a market player with plans to construct a new power plant, considering a CCGT configuration consisting of CMU1=GT, CMU2=GT and CMU3=ST or an OCGT configuration consisting of CMU1=GT. Assume that the Prequalified CRM Candidate holds a signed technical agreement for both configurations. Of course, both configurations cannot be constructed at the same time. The Prequalified CRM Candidate can submit a mutually exclusive set of Bids including on the one hand the linked Bids for the CCGT configuration (three Bids in total, one Bid for each of the CMUs involved in the CCGT configuration) and on the other hand the one Bid for the OCGT configuration corresponding to CMU1. As such, either the linked Bids (CCGT configuration) or the single Bid (OCGT configuration) can be selected by the auction algorithm.
2. Assume an aggregator composing a pool of demand response capacities. After an initial fixed investment cost (e.g. to develop a monitoring and steering platform), economies of scale may lead to a lower per unit price as more capacity is added to the pool. This Prequalified CRM Candidate may have different options ranging from bidding in a smaller pool at a higher Bid Price or a bigger pool at a lower Bid Price. Of course, both options cannot be selected at the same time. This Prequalified CRM Candidate can therefore submit a set of mutually exclusive Bids related to the same CMU characterized by different capacity volumes and different Bid Prices.
3. Assume a market player with plans to construct a new OCGT unit, at two possible locations. As long as this Prequalified CRM Candidate complies with all individual

⁴ Notwithstanding restrictions on the number of sets of mutually exclusive Bids and/or restrictions on the number of Bids within such a set following algorithm complexity considerations.

grid connection requirements for both locations and has successfully prequalified both CMUs, he can submit a set of mutually exclusive Bids with two Bids, relating to the CMUs at two different locations, from which only one will be selected by the auction algorithm.

4.6 Cross auction dependencies

As explained in section 1.3, in the future, Elia will organize up to three Auctions for three different Delivery Periods during the same Auction year. In case multiple Auctions are organized in the same year, Elia will clear these Auctions in the chronological order of the Delivery Periods for which they are organized, e.g., starting with the Auction that is closest to delivery and ending with the Auction furthest away from delivery.

It is possible that market parties that want to bid for a multi-year contract with their new build CMU, would participate to more than one auction in the same year with the same CMU. When this is the case, and the duration of the capacity contract is such that the Transaction period of the bids submitted in different Auctions are overlapping, these bids, submitted in two or more different auctions, are considered to be mutually exclusive.

For example, in case a capacity provider bids for a 15-year contract with the same CMU in both the Y-2 and Y-4 Auctions, these bids will be considered mutually exclusive as the transaction periods of both bids are overlapping in this case. In practice it means that if the CMU is selected in the first cleared Auction (the Y-2 Auction), the bid for a 15-year contract for the same CMU in the Y-4 Auction cannot be selected anymore. In this case, as the selection of the bid in the Y-2 auction, impacts the contracted capacity during the delivery period of the Y-4 auction, the demand curve of the latter auction is also adapted accordingly.

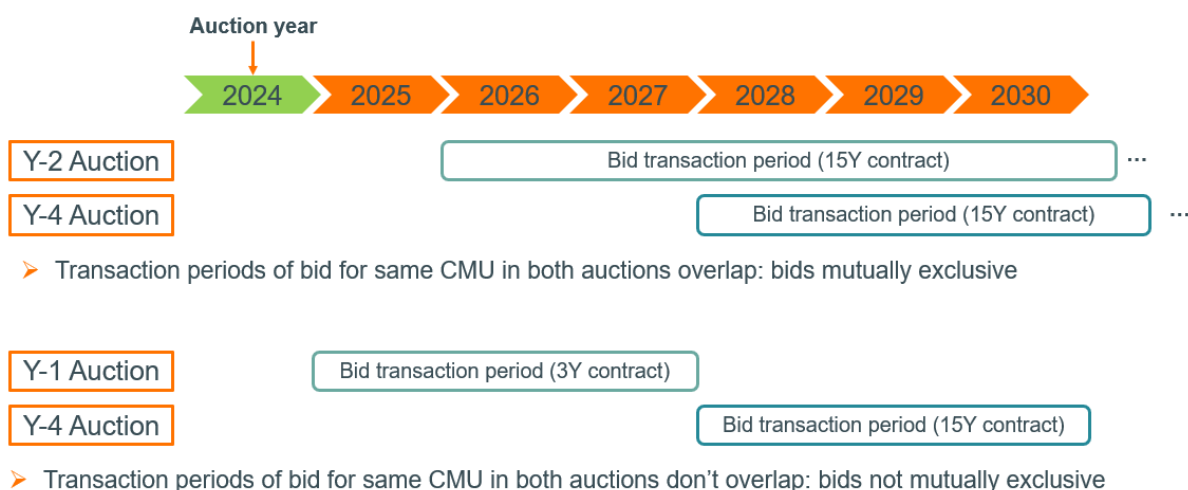


Figure 5: Cross-auction bid dependency: example

5 Auction clearing

5.1 Optimization phase

5.1.1 Y-4 and Y-2 auctions: Welfare maximization

For the sake of clarity, in this section on the objective function, grid feasibility constraints are considered not active and therefore not influencing the auction algorithm. The objective remains the same with or without grid constraints though, as grid constraints only restrict the set of plausible auction outcomes, i.e. by rejecting certain combinations of Bids which are together not grid feasible.

The objective function of the clearing algorithm used in both the Y-4 and Y-2 Auctions shall maximize social welfare, which is equivalent to pursuing the most cost-efficient combination of Bids, taking into account the administratively determined Demand Curve (cf. infra). This objective shall be applicable regardless of the implemented pricing rule, i.e. in both a pay-as-cleared and pay-as-bid mechanism. In the context of a CRM, social welfare (also illustrated in Figure 6: Market clearing under pay-as-cleared (left) and pay-as-bid (right) with perfect information on the left below) is to be interpreted as the sum of

1. Surplus for society from satisfying capacity demand at a price below the willingness-to-pay for capacity, as defined by the Demand Curve (also referred to as “Consumer Surplus”)
2. Surplus for Capacity Providers from the selection of their Bids at a price above the Bid Price (also referred to as “Producer Surplus”)

From Figure 6: Market clearing under pay-as-cleared (left) and pay-as-bid (right) with perfect information (on the left), it can be derived that the social welfare maximizing solution is found by accepting all orange-colored Bids. Indeed, selecting an additional grey Bid would decrease social welfare, as the willingness-to-pay for this additional capacity (defined by the area under the Demand Curve) is clearly lower than the cost of accepting this Bid (defined by the grey block that defines the Bid).

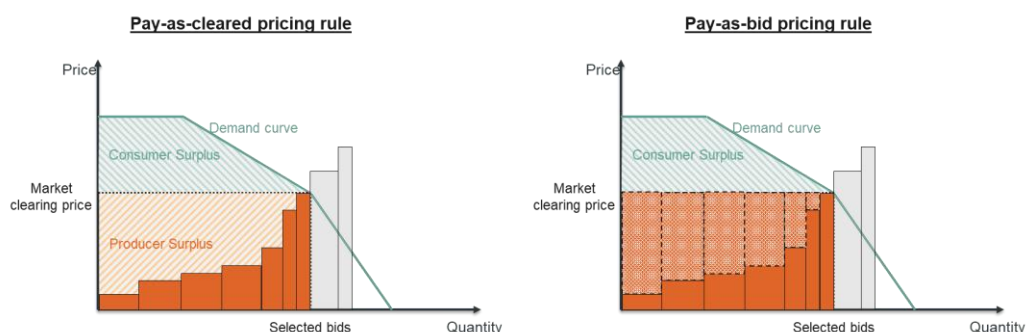


Figure 6: Market clearing under pay-as-cleared (left) and pay-as-bid (right) with perfect information

As there is in fact no rationale for inframarginal rents (i.e. Producer Surplus) to Capacity Providers in a CRM Auction context, which can be regarded as windfall profits. The application of an Intermediate Price Cap serves in particular to avoid as much as possible these windfall profits. However, in a market clearing, and especially when projects with various levels of missing-money compete, some inframarginal rent towards Capacity Providers cannot be avoided. Also, a pay-as-bid pricing rule cannot eliminate these inframarginal rents, although under pay-as-bid there is in fact no explicit producer surplus (see **Error! Reference source not found.** on the right). Since bidders are known to have an incentive to Bid in at the expected market clearing price under pay-as-bid, some producer surplus is likely implicitly incorporated in the Bids. For illustrative purposes only, a theoretical illustration of market clearing under a pay-as-bid pricing rule when the market has perfect information, is shown in Figure 6: Market clearing under pay-as-cleared (left) and pay-as-bid (right) with perfect information on the right. From this illustration it can be derived that under pay-as-bid, bidders with perfect information would update the Bid Prices of their Bid to exactly the would-be market clearing price under pay-as-cleared. In the end therefore, the market outcome would be the same.

Note that because of the presence of indivisible Bids, it may happen that the social welfare maximizing solution does not exactly correspond with a point on the Demand Curve (contrary to the illustration in Figure 6: Market clearing under pay-as-cleared (left) and pay-as-bid (right) with perfect information). In determining the social welfare maximizing solution therefore, the auction algorithm will always make a trade-off between willingness-to-pay for additional capacity and the cost for additional capacity. Furthermore, in doing so, the entire set of Bids is considered. These principles are illustrated in Figure 7: Dealing with indivisible Bids below (note that also the would-be market clearing price under a pay-as-cleared pricing rule is indicated in the figure):

- In example 1, Bid E is accepted, because the willingness-to-pay for the extra capacity of Bid E is higher than the cost for extra capacity (yellow triangle > red triangle).
- In example 2, Bid E is not accepted, because the willingness-to-pay for the extra capacity of Bid E is lower than the cost for extra capacity (yellow triangle < red triangle).
- Finally, example 3 shows how another Bid – Bid F in the example – that is actually situated higher up in the merit order (higher Bid Price) but is a better fit regarding the Demand Curve, could be accepted at the expense of a Bid a lower price Bid – Bid E in the example.

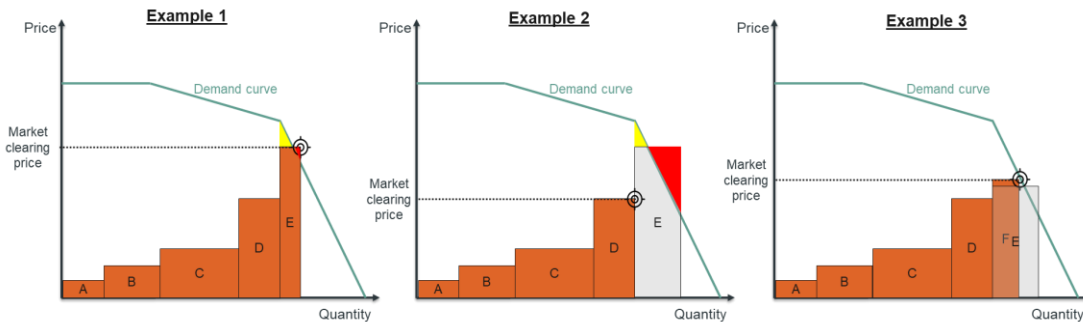


Figure 7: Dealing with indivisible Bids

To illustrate more clearly that the social welfare maximization objective does indeed minimize the cost of the CRM Auction, consider the following alternative formulation of the objective function. The social welfare maximization objective can alternatively be formulated as “minimizing the total cost of the CRM Auction”. The total cost of the CRM Auction is to be interpreted as the cost of the Bids that are selected (indicated by the orange-colored Bids in Figure 8: Alternative formulation of the auction clearing objective in terms of total cost below) and the cost of unserved capacity demand (indicated by the green-colored area in **Error! Reference source not found.** below). Selecting the orange-colored Bids minimizes the total cost. Indeed, accepting an additional grey-colored Bid would increase the total cost, as the cost of accepting this Bid is higher than the cost of unserved demand related to the capacity volume of the Bid.

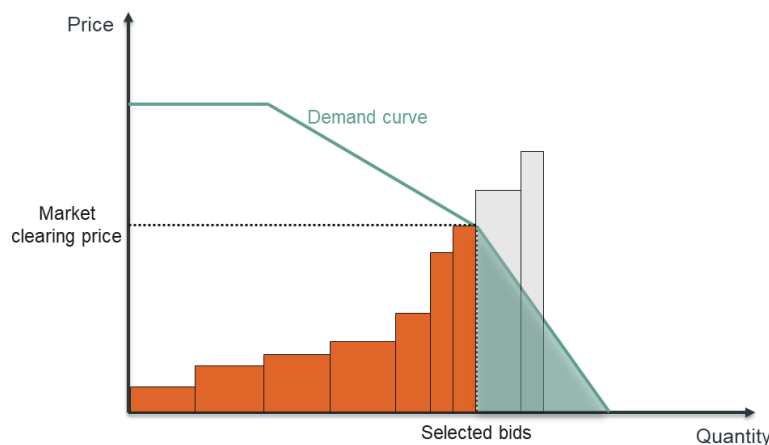


Figure 8: Alternative formulation of the auction clearing objective in terms of total cost

Also note that towards finding the highest social welfare combination of Bids, the Capacity Contract Duration for which Bids apply, is not considered. Indeed, the Bids are only judged based on their Bid Price, which has a 1-year granularity (i.e. Bid Price expressed in €/MW/year). The impact of taking into account the Capacity Contract

Duration on the cost-efficiency of the CRM Auction outcome is not straightforward and depends on a number of assumptions. For instance, there is no formal data on the future cost of capacity compared to the cost of current contracts, so any welfare-optimizing choice would be based on assumptions regarding the anticipated trend of the cost of capacity. Furthermore, it would not be fair towards Prequalified CRM Candidates to judge on Bids based on the Capacity Contract Duration, which serves in the first place to create a level-playing field among CMUs requiring more/less investments.

5.1.2 Y-1 auction: Cost minimization with minimal volume to be procured

Again, in this section on the objective function, grid feasibility constraints are considered not active and therefore not influencing the auction algorithm. The objective remains the same with or without grid constraints though, as grid constraints only restrict the set of plausible auction outcomes, i.e. by rejecting certain combinations of Bids which are together not grid feasible.

As the Y-1 Auction is the last auction before the Delivery Period, and therefore the last possibility to ensure adequacy during this Delivery Period, the clearing objective differs from other auctions in order to reflect the special nature of this auction.

The objective function of the clearing algorithm used in the Y-1 auction shall minimize the total cost of the Auction. In the context of a CRM, the total cost of the Auction (also illustrated in Figure 9: Y-1 clearing example **Error! Reference source not found.** below) is to be interpreted as :

- The product of the Bid Price and the Bid Volume summed over all bids retained in the final combination of bids selected in the Auction.

At the same time a constraint is added to ensure that the cleared volume is at least greater than or equal to the volume of point B of the demand curve (the volume required to ensure security of supply). This prevents the algorithm from not selecting any bid, as this would be by far the cheapest option and at the same time ensures that the capacity necessary to ensure SoS is contracted in the Auction. Note that because bids in the Auction are indivisible it is likely that the selected capacity in the Auction slightly exceeds the volume to be procured in the Auction. This is graphically shown in Figure 9: Y-1 clearing example below, the total cost of the Auction is equal to the green area. Given that bids are indivisible, in order to contract at least the volume required to safeguard SoS, selecting the last bid in the example leads to the selected capacity slightly exceeding the volume to be procured (volume of point B of the demand curve).

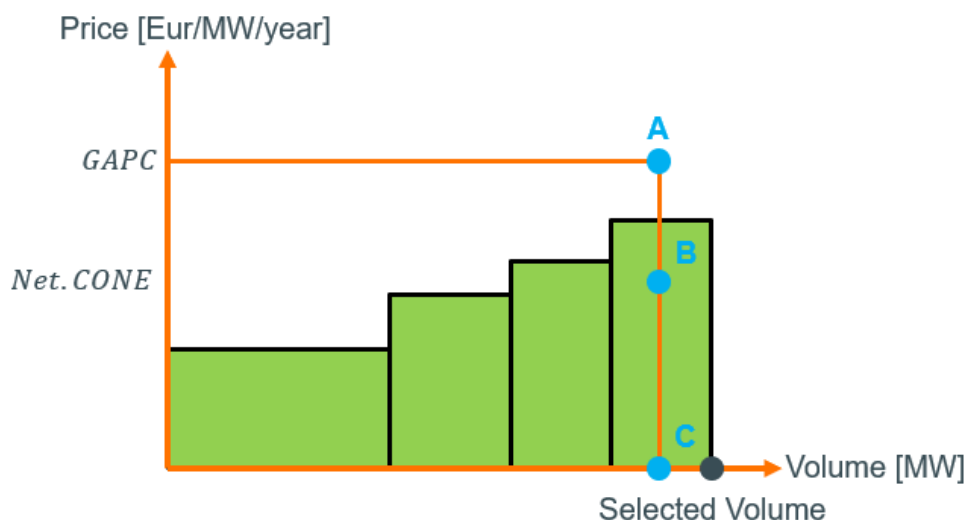


Figure 9: Y-1 clearing example

In the event that it is not possible to select a combination of bids that covers the volume to be procured, the objective function of the clearing algorithm will instead maximize the total selected volume in the auction, where the total selected volume is to be interpreted as the sum of the Bid Volumes of each bid retained in the final combination of bids selected in the Auction. This ensures that in this case, the selected volume is as close as possible to the level required to ensure SoS. If multiple combinations of bids lead to the same total selected volume, the algorithm will select the combination of bids with the lowest total cost. This case is demonstrated graphically in Figure 10: Y-1 algorithm: volume maximization example, it shows two feasible solutions for which neither solution covers the volume to be procured. Even though it is clear that the total cost (green area) of the right solution is significantly lower than the total cost of the left solution, the Auction algorithm will maximize the selected volume and therefore select the left solution over the right one.

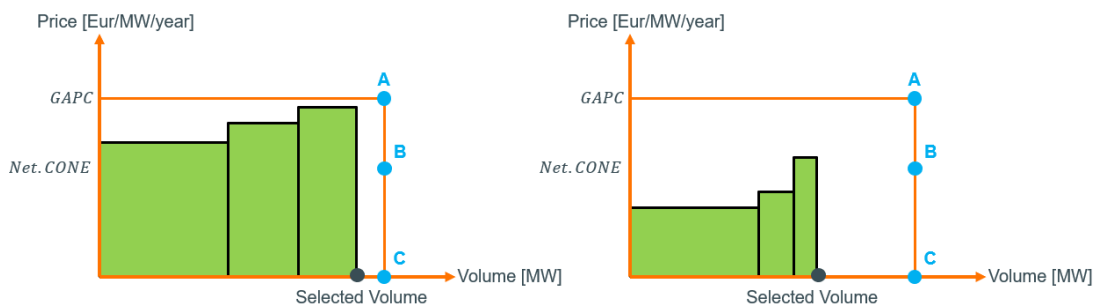


Figure 10: Y-1 algorithm: volume maximization example

5.1.2.1 Cross-border participation

This design note does not cover the pre-Auction process; however, the following

section describes the way bids from foreign capacities are treated in the Auction process. As already explained in section 4.1, Bids for foreign capacities can only be submitted after the CMU has been selected in the Pre-Auction for the relevant border. In addition, the foreign CMU is also expected to submit a Bid identical (in terms of price and volume parameters) to the Bid that was selected in the Pre-Auction.

Any bids related to foreign CMUs submitted in the Auction are treated identically to Bids submitted by domestic capacities. As a result, both foreign and domestic capacity compete for the same volume ensuring that only the most competitive units are selected. Consequently, it is possible that domestic capacity outcompetes foreign capacity and that a part of the MEC for a certain border is filled by Belgian capacities instead. However, whenever this is the case it is only because this solution leads to a lower cost of the CRM, as the objective is still to minimize the cost.

5.2 Tie-breaking phase

In case of multiple grid feasible CRM Auction outcomes (i.e. an Auction outcome is to be interpreted as a combination of Bids) which are equivalent in terms of the objective function (maximizing social welfare or minimizing cost), tie-breaking rules have to be applied to decide which combination of Bids is ultimately selected. It is proposed to apply the following tie-breaking rules:

1. Select the combination of Bids leading to the lowest carbon emissions
2. Select the combination of Bids characterized by the shortest Capacity Contract Durations (in number of Delivery Periods).
3. Select the combination of Bids based on the “First come, first served” principle

To apply the first tie-breaking rule that aims to select the combination of Bids with the lowest carbon emissions, an overall carbon emission factor has to be computed from the combination of Bids considered. To this end, a weighted average emission factor will be calculated based on the carbon emission factor of individual Bids, as determined during the Prequalification Process. The weighing is done based on the volume of each Bid as offered into the Auction.

In order to apply the second tie-breaking rule that aims to select the combination of Bids with the lowest contract duration of Bids considered, an overall contract duration parameter has to be computed from the combination of Bids considered. To this end, a weighted average capacity contract duration is calculated based on the capacity contract durations of individual Bids. The weighing is done based on the Bid Volume of each Bid as offered into the Auction.

Finally, when tie-breaking rules 1 and 2 did not resolve in a unique combination of bids to be selected. A combination of bids is chosen based on the “First come, first served” principle. This principle is applied as follows:

1. All unique Bids within all remaining combinations after the application of the first two tie-breaking rules are sorted according to their submission time.
2. Based on the sorted list of bids, and in order of submission time of the Bids:

- a. The combination(s) of bids that do not include the first submitted Bid are discarded
- b. If more than one combination of bids remains, step a. is applied using the next submitted bid, until a single combination of Bids remains.

6 Validation of auction results and transparency

This section aims to provide all stakeholders with an overview of the general principles regarding the validation of the Auction results and transparency regarding the CRM Auction results in general.

6.1 Validation of auction results

It is important that the Auction results are correctly determined and that the market parties and society as whole have the necessary comfort on the correctness of the result. In this respect, Elia (appointed as auctioneer for the CRM Auctions, cf. Electricity Law Art 7undies §6) relies on several options, including the involvement of a third party, e.g. as an external auditor during the Auction process. Also, CREG is involved in this validation process.

6.2 Transparency on Auction results

The general goal regarding transparency is to provide all stakeholders with sufficient information such that the market can follow up on the CRM and learn from subsequent Auctions, while at the same time avoiding that too much information is shared to the extent that it could negatively impact the CRM. Therefore, as a main principle, only aggregated information is shared on the different CRM aspects in a transparent way to all market parties. Furthermore, information is only shared after Auction closure, i.e. by 31 October when the final and validated Auction results are available.

In what follows, the information that will be shared on the Auction results is further detailed into the following categories: information on the Auction clearing price, on the offered and selected capacity, and on the Opt-Out Volume.

6.2.1 Auction clearing price

- The **Auction clearing price**, *in €/MW/year*. In case of pay-as-bid, the price of the most expensive selected Bid will be shared, as an approximation of the would-be Auction clearing price under pay-as-cleared.

6.2.2 Offered & selected capacity

The following information will be shared separately for all offered and all selected capacity, allowing to compare these information elements specifically between offered and selected capacity.

Information on capacity volumes⁵:

- Capacity per Capacity **Contract Duration**, in #MW with 1-year contract, #MW with 2-year contract, etc.
- Capacity per **technology** according to the derating categories, in #MW DSR (per SLA), #MW CCGT, etc.
- Capacity **TSO-connected vs. DSO-connected**, in #MW TSO-connected and #MW DSO-connected

On Bids into the Auction:

- **Weighted average price of all Bids**, in €/MW weighted by the capacity volume of the Bids
→ This element allows to compare the average price of Bids to the price of the price-setting (or highest price) Bid, i.e. Auction clearing price, as such giving information on the shape of the offer curve. By providing this information both on all offered Bids and on all selected Bids, information is given also on the share of the offer curve that has not been selected.
- **Average capacity volume of all Bids**, in #MW
- **Number of Bids**
→ This element provides information on competition in the CRM
- **Number of CMUs**
→ This element provides information on competition in the CRM
- **Number of unique Prequalified CRM candidates**
→ This element provides information on competition in the CRM

Specifically related to the monitoring process following up on new capacity being developed towards the Delivery Period and hence relevant for selected capacity only, a reporting will be done on the **evolution of selected capacity that requires monitoring** towards the Delivery Period, in #MW monitored and #MW Missing, etc. on a yearly basis.

6.2.3 Opt-Out Volume

Specifically regarding Opt-Out Volume, information on capacity volumes will be shared for both the total volume of Opt-Out considered as “IN” or “OUT”. With regards to the Opt-Out Volume considered as “OUT”, the volume will be given for each separate reason that leads to a volume being classified as “OUT”.

Note that although no aggregated information is shared to all stakeholders at the end of the Prequalification Process, the information on offered capacity related to the Auction together with the information on Opt-Out Volume does give a full overview of the results of the Prequalification Process.

⁵ Capacity volumes will be reported as derated capacities, unless stated otherwise.

