Contribution d'Elia à la consultation publique concernant le projet de note (Z)2024 de la CREG relative aux paramètres permettant de déterminer la quantité de capacité achetée dans le cadre du mécanisme de capacité.

Elia – 6 Décembre 2019

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Introduction

The elements of the 'ontwerpnota' (further on referred to as 'draft note') that the CREG has put for public consultation have been discussed within the 'Comité de Suivi' throughout the past few weeks and a large number of observations, remarks and alternative suggestions were provided by the members of the 'Comité de Suivi'. It was also requested that Elia would provide a formal reaction on the CREG's public consultation, at the same time as the market parties.

Elia agreed with this request as, according to the current Belgian legislative framework, it would be the responsibility of Elia to provide a proposal on these elements. Therefore in this contribution we foresee an overview of our remarks and concerns on the draft note from the CREG and provide in addition an alternative suggestion for these elements.

The contribution builds further on the already shared reactions during the meetings of the 'Comité de Suivi' (on 8/10, 25/10 and 31/10), as well as at several occasions per e-mail.

We invite the CREG and the public authorities to consider these elements and the suggested alternatives.

The document is structured as follows:

First, Elia gives different comments and concrete examples demonstrating that the methodology in the draft note does not allow to ensure the primary objective of the CRM, i.e. a resource adequate system, conform the definition foreseen in the Electricity law. The first part is built around several statements which are developed and justified one by one.

The **second part** of this document provides an alternative suggestion (based on the comments and reflexions made in the first part).

1. Remarks on the draft note of the CREG

In this section we provide an exhaustive overview of our remarks on the key elements of the CREG's draft note. These are structured along several statements which are explained and supported by references and/or examples.

CREG's draft note on determining the target volumes leads - by definition - to contracting much less capacity than may be required by the reliability standard

CREG's draft note in using 'near-scarcity hours' in an Energy-Only Market (EOM) scenario might by definition underestimate the target volume to be contracted and is not consistent with the overall CRM goal and other parts of the CRM design as envisaged by the legislator.

1. In the [point 72 of] CREG's draft note, it is indicated that the target volume to be contracted should be based on the average load during 'near-scarcity' in an 'EOM simulation'. This would - by definition - mean that the target volume to be contracted in the framework of the CRM is based on a simulation where the target reliability standard may not be reached in the market (this is for example the case for the 'EOM simulations' performed by Elia for the considered time horizons and also used by CREG in its examples). This might result in a target capacity that is below the required capacity to meet the reliability standard.

2. There is also some inconsistency in the reference to the targeted hours: in the formula in [point 72 of] the note, reference is made to 'Near-scarcity hours in EOM' whereas in the figure [of point 71] reference is made to 'Scarcity hours in EOM'.

3. Moreover, working with an 'EOM simulation' is inconsistent with other parts of the CRM design (e.g. derating factors) where the scenario to be used is defined to ensure that the 'missing capacity' in the EOM is filled by adding capacity in the simulation until the scenario is one in which the reliability standard is obtained. The objective of the CRM and the determination of the needed capacity to contract is indeed such to achieve the primary goal of resource adequacy.

4. A 'capacity remuneration mechanism' is defined in the CRM law (Art 2°) and stipulates its objective (own underlining):

"71° "mécanisme de rémunération de capacité": le mécanisme de marché basé sur un système d'options de fiabilité permettant de garantir la sécurité d'approvisionnement du pays et de garantir l'adéquation entre l'évolution de toutes les formes de capacité et l'évolution de la demande d'électricité à moyen et à long termes, en tenant en compte des possibilités d'importation d'électricité;

5. In order to ensure that the target volumes for the CRM auctions are defined to meet the reliability standard and in order to keep consistency with other parts of the design, a scenario in which the missing capacity is filled should thus be used in order to determine the average load (in 'near-scarcity hours').

The upward balancing reserve capacity requirements should be taken into account for calculating the target volume for the CRM.

6. CREG's draft note does not take into account any volume to cover upward balancing reserve requirements. This approach is not shared by Elia, nor by the Federal Public Service (FPS) in the recent note published on 2nd October 2019[1] on Elia's recent 'Adequacy and Flexibility study'. The argumentation of the FPS is developed in [points 42 to 46] of their note and concludes in [point 47] with the following statement:

   « Pour tous les points avancés précédemment, la DG Energie du SPF Economie ne soutient pas la demande de la CREG d'intégrer les réserves d'équilibrage aux hypothèses du modèle d'Elia pour le scénario de référence ».

7. Indeed, balancing reserves are contracted for the operational security of the entire electricity system as a system cannot be reliably operated without sufficient operational reserves to keep the balance at all times (and balancing reserves for the system can be required at any time, also when the country faces 'adequacy' issues). Therefore these balancing reserves should be reserved for their initial purpose and not as adequacy means.

8. Accounting for balancing reserve requirements is standard practice when performing adequacy studies. This is done in the current European methodology used in the MAF (Mid-Term Adequacy Forecast) of ENTSO-E, other national adequacy studies and also in-line with how those reserves are taken into account in other CRMs across Europe (see Annex 1).

9. From a market (design) perspective, it also makes fully sense to include upward balancing reserves in the volume to be secured by the CRM. Not taking into account those volumes in the CRM volume, would also imply that those volumes should be secured outside the CRM. As the CRM has a forward character (four and one year ahead) and balancing reserves are only procured as from month ahead (and in the near future even closer to real time), it would require market participants to decide

[1] https://economie.fgov.be/sites/default/files/Files/Energy/Mecanisme-remuneration-capacite-Note-E2-02-10-2019.pdf

long beforehand on the participation to either reserve markets or the CRM. This would not only clearly and unnecessarily distort the good functioning of the energy and reserve market, it would also result in suboptimal welfare outcome results as market parties are deprived from the opportunity to make good arbitrage between both the energy and reserve markets. Towards the CRM, the inclusion of balancing reserves should in principle also not lead to an additional cost, as any expected revenues resulting from providing balancing reserves should rationally be accounted for in the estimation of the missing money and hence the CRM bid price of a capacity provider. The idea of including such revenues in the missing money has also been considered by CREG before, as can for instance be clearly understood from CREG's reaction to Elia's public consultation on the design of the intermediate price cap[2].

10. It is also worth noting that the approach of including upward balancing reserves is supported by the EC's view on the interaction between operational security and adequacy (as well as how to consider reserves) detailed in a report from 2016[3] (section 3, from p22 – own underlining):

> *"As explained in CIGRE (1987): 'Adequacy is a measure of the ability of a bulk power system to supply the aggregate electric power and energy requirements of the customers within component ratings and voltage limits, taking into account scheduled and unscheduled outages of system components and the operating constraints imposed by operations". […]*
> *In order to achieve reliability, both adequacy and security should be targeted. In particular, adequacy must be complemented with a generation mix that ensures the availability of enough generation necessary to provide AS, especially for frequency regulation. […]*
> *Security and adequacy are closely related notions but are not identical. Without system security, the output of the generation resources, no matter how abundant they may be, cannot be delivered to customers. Correspondingly, a high degree of security is of little value if there are insufficient generation and transmission resources to meet customer needs […]*
> *It should be made clear that generation adequacy means not merely the generation sufficient to meet the load, but also reserves that can allow the system to withstand outages of major facilities, extreme dry periods, or possible shortages of fuel availability.' " […]*

11. On top of this definition, the 'perfect foresight' modelling of the electricity market used for adequacy studies (all the system knows at least one week in advance the exact generation of wind, PV, outages, …) does not take into account any forecast error nor unexpected events. All the generation and storage facilities are optimized in such a way to cope with the expected and known generation of variable RES and known outages but not to cope for any deviations from those values.

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[2] CREG, Réponse de la CREG à la consultation d'Elia du CRM Design note (Part 1), https://www.elia.be/-/media/project/elia/elia-site/public-consultations/20190913/part1/creg.pdf

[3] https://ec.europa.eu/energy/sites/ener/files/documents/Generation%20adequacy%20Final%20Report_for%20publication.pdf

12. The above elements provide a strong evidence that upward balancing reserves requirements should be included on top of the load for assessing the capacity need to be contracted. We therefore suggest to add those volumes on top of the volume to be contracted. In either case this element might also be part of EU-methodology on resource adequacy assessments, which will be applied when it enters into force. As long as not known/applicable, we suggest to use same method as currently applied (which nowadays includes the upward balancing requirements).
13. Based on the points developed from 1 to 12, Elia suggests therefore to **add the upward balancing requirements** to the target volume found by averaging the load during 'near-scarcity hours' **in an adequate scenario**. This will be further elaborated in section 2.2.2 on the 'alternative proposal' and is illustrated in Figure 10.

There is no guarantee that the reliability criteria will be met via CREG's 'budget approach'.

First, CREG's approach is a novelty with regards to what is done in other CRMs in which the objective of ensuring adequacy is reached via constructing demand curves around a 'target capacity' instead of via a pre-defined budget.

14. Elia welcomes innovative ideas and novelties in the market design which serve the main purpose(s) of the associated mechanism and improve its functioning. Despite the good intentions behind the idea, in the context of the CRM, the proposed idea for the 'demand curve' by the CREG contains fundamental flaws as it is unable to deliver the needed capacity to ensure an adequate system. This will further be demonstrated in the next points.

15. In order to compare the approach with other CRMs in Europe, BOX 1 provides more information on the different demand curves used in centralized market-wide CRMs across Europe.

BOX 1: comparison of demand curves across EU

As capacity markets have existed for some years now in Europe, as early as 2014 for the UK, there are some precedents for capacity mechanisms demand curve methodologies used in practice and approved by the European Commission under the state aid guidelines. While the details of the methodologies may differ, there are some common elements:

- The point reflecting the economic equilibrium, where the reliability standard is met at a value of Net-CONE, is present in all demand curves;
- The demand curve is established by linear interpolation between points, most commonly 4:
  - The vertical axis intersect at the price cap
  - The start of an elastic part between price cap and Net-CONE (Point A)
  - The target volume at the Net-CONE value (point B)
  - A cut-off point at the horizontal axis intersect beyond which no more capacity will be procured
- The application of a global auction price cap

Figure 1 shows an illustrative comparison of the different European demand curve methodologies, including the proposal from the CREG's draft note. For clarity of illustration, the 'target volume' has been aligned for all demand curves, as it is pivotal in each of the designs. It was also assumed that it is reached in CREG's proposal if our points from 1 to 13 are taken into account.

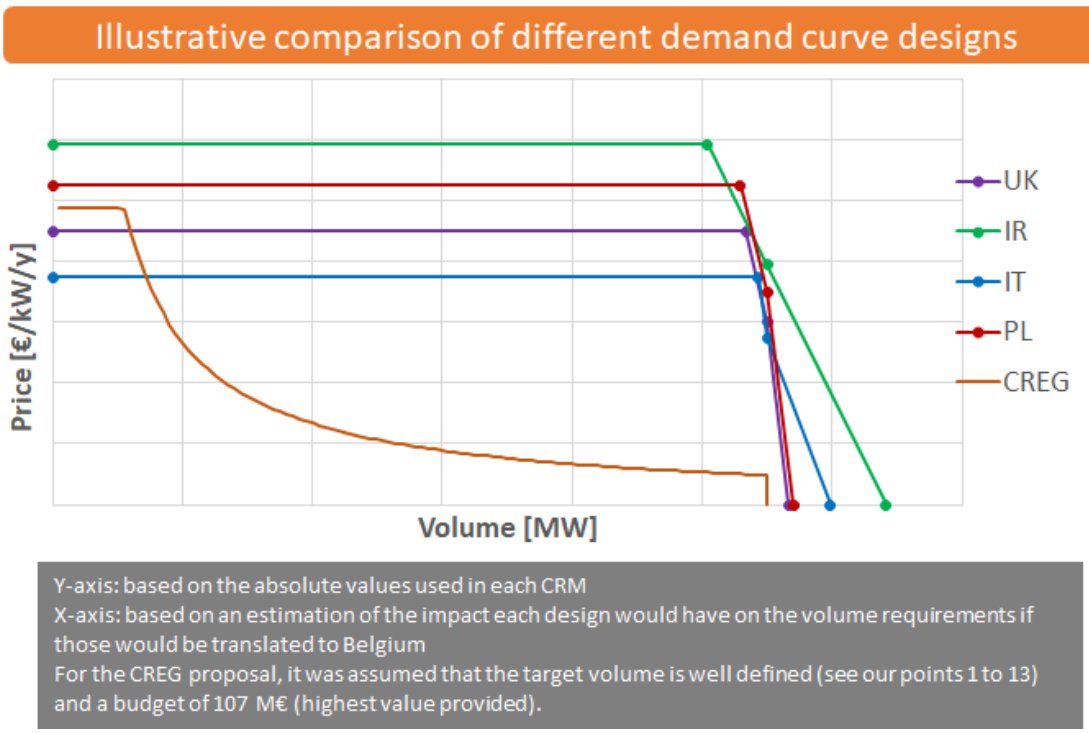

Figure 1: Comparison of different demand curve designs

While merely illustrative, the differences in the vertical axis are representative for historical practices and, in the case of the CREG proposal, the curve under the hypothesis of a 107 M€ budget as also used below. The actual methodologies, however, are more accurately set out in Table 1. Points A, B and C in the table can be found in the Figure 2.

	Ax	Ay	Bx	By	Cx	Cy
GB	Y-4: Target – 1,5 GW Y-1: Target – 1 GW	1,5*Net-CONE	Target LOLE = 3h	Net-CONE	Y-4: Target + 1,5 GW Y-1: Target + 1 GW	0 €/kW/y
IR[4]	Y-4: Upon proposal of the TSO and approved by NRA Y-1: Target LOLE = 8h	1,5*Net-CONE	Target LOLE = 8h	Net-CONE	Upon proposal by the TSO and approved by NRA	0 €/kW/y
IT	LOLE < LOLE target Based on relation CONE = VoLL*LOLE and that the difference in volume is not larger than the loss of one generation group	Max(Gross CONE)	Target LOLE = 3h	Min(Gross CONE)	LOLE = 0h	0€/kw/y
PL	(1-X%)*Target	1,5*Net-CONE	Target LOLE = 3h	Net-CONE	(1+Y%)*target	0 €/kW/y

Table 1: High-level demand curve methodologies in EU Member States

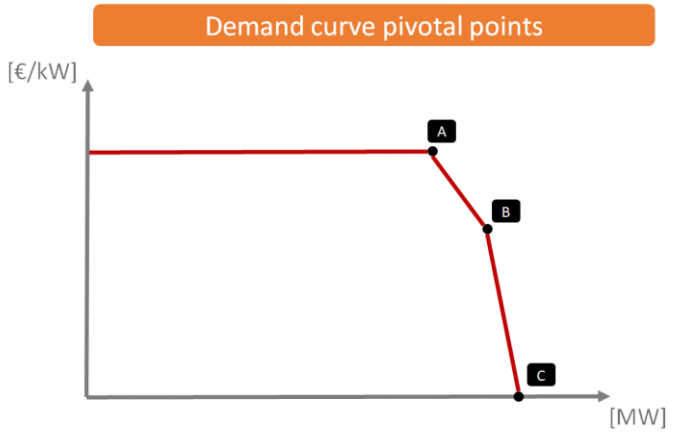

Figure 2: Demand curve pivotal points

It is clear that the CREG proposal differs drastically from the (commission approved and practically tried) established methodologies. Furthermore, the economic equilibrium point of [target volume; Net-CONE] cannot be achieved in CREG's proposal. When comparing it to the other methodologies, it shows a much more constraining solution space and risks procuring well below the requirement to meet the reliability standard.

Country	Reference	Author
GB	*Security of Electricity Supply: Confirmation of Capacity Auction Parameters*	*BEIS*
	Capacity Market Five-year Review (2014-2019)	*BEIS*
IR	*Capacity Market Code [Section F.3]*	*SEM committee*
	Parameters for T-4 2022/23 Capacity Auction	*SEM committee*
IT	*MERCATO ITALIANO DELLA CAPACITÀ ULTIMI PARAMETRI TECNICO-ECONOMICI*	*ARERA*
	Mercato della Capacità Allegato 1 alla DTF n. 2 (anno di consegna 2022)	*Terna*
PL	*State aid No. SA.46100 (2017/N) – Poland – Planned Polish capacity mechanism*	*European commission*
	Aukcja główna na rok dostaw 2023	*PSE*

Table 2: References for other CRMs in Europe

[4] In fact, the Irish mechanism allows to define more than three points. However, one must be the Net-CONE-target volume and in practice they commonly retain 3 points, as for example: https://www.sem-o.com/documents/general-publications/Final-Auction-Information-Pack_FAIP1920T-1.pdf

More specifically for Belgium, there is new capacity needed in order to meet the defined reliability standard. This need is not decreasing in the long run as confirmed by different studies.

16. Based on several studies, the need for new capacity in order to reach the current reliability criteria is not decreasing over time, in contrast to what CREG seems to suggest in [point 31] and [point 32] of their draft note. The following figure provides the need for new capacity from the latest 10-year ahead 'Adequacy and flexibility' study performed by Elia in June 2019[5], combined with the longer term (up to 2040) study 'Electricity scenarios for Belgium toward 2050' of November 2017[6]. The numbers in those studies were confirmed by different studies covering similar horizons (cf. studies of the Federal Planning Bureau and academics like Energyville and the University of Ghent – see figure 4-8 of the most recent Elia adequacy and flexibility study).

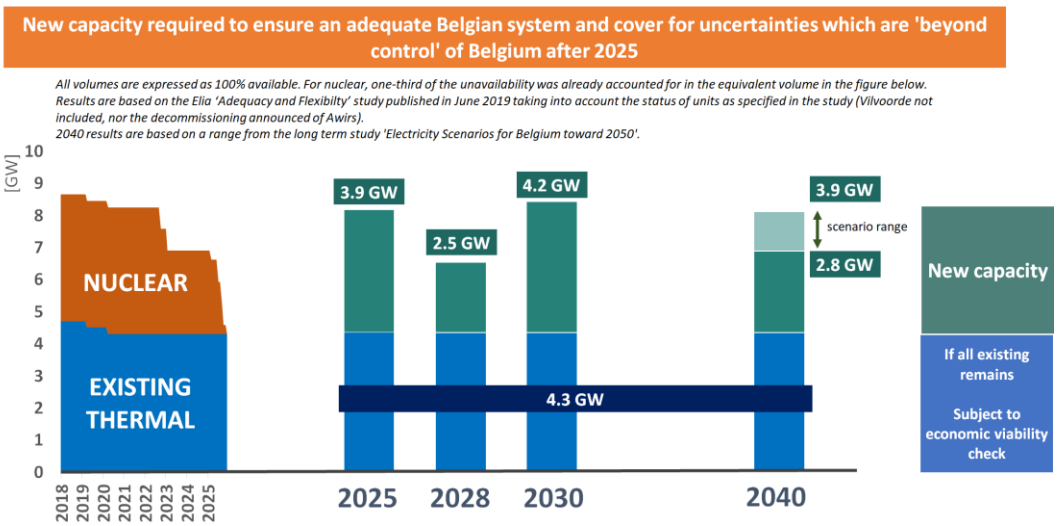

Figure 3: Need for new capacities from Elia's studies

17. The economic results have also demonstrated that the entire new capacity need is not economically viable. Hence, it is very likely that a large share of this capacity would be invested in without further measures. The same conclusions also hold for part of the existing thermal units. In the long run, very old capacities will anyway need to be decommissioned (or the unit will have to be completely refurbished or re-built, also requiring significant investment amounts and hence sufficient market incentives to trigger them).

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[5] https://www.elia.be/-/media/project/elia/elia-site/company/publication/studies-and-reports/studies/13082019adequacy-and-flexibility-study_en.pdf
[6] https://www.elia.be/-/media/project/elia/elia-site/company/publication/studies-and-reports/studies/elia-vision-paper-2018_front-spreads-back.pdf

18. These points have also been validated by the note of the FPS Economy[7] and in the Implementation Plan[8] of the Belgian State (Chapter 3 – Resource Adequacy), as sent to the European Commission and made publicly available on the website of the FPS Economy.

The missing money of new capacity (i.e. of the best new entrant technology) is defined by the Net-CONE (fixed costs reduced by the expected market revenues). A well designed 'demand curve' should ensure that the point defined by the 'target volume' and the Net-CONE can be reached.

19. The Net-CONE defines the expected 'bid' of the best new entrant in the CRM. This is estimated based on the fixed costs and expected market revenues. The Net-CONE is a well-known concept in relation to CRM design and is used throughout different CRMs in Europe.

20. In order to estimate the Net-CONE and given that this parameter has not been defined yet in the framework of the Belgian CRM, Elia looked at the values used in other CRMs. Note that this neither represents an Elia estimation nor Elia advocacy regarding the choice of any specific reference technology regarding Net-CONE for Belgium. A proper study would be required to calibrate this parameter accurately. See Example BOX 1 for more details.

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7 https://economie.fgov.be/sites/default/files/Files/Energy/Mecanisme-remuneration-capacite-Note-E2-02-10-2019.pdf

8 https://economie.fgov.be/sites/default/files/Files/Energy/Belgian-electricity-market-Implementation-plan.pdf

Example BOX 1: Estimating the Net-CONE

As no value is yet known for Belgium, a quick comparison with Net-CONE values used in other European CRMs has been performed (see table below).

Country	Net-CONE	Origin
GB[9]	49[10] GBP/kW/y	large scale CCGT
Ireland[11]	79 €/kW/y	large scale CCGT
Poland[12]	70 €/kW/y	large scale OCGT
Italy[13]	55 €/kW/y	large scale OCGT

Table 3: Overview of Net-CONE values in other CRMs

Although a detailed study for Belgium would be needed, based on the above table, a value of Net-CONE of around 60 to 70 €/kW may be a good first approximation based on this benchmark.

Nevertheless, a sensitivity with significantly lower Net-CONE values of 30€/kW will also be used to illustrate the robustness of the conclusion on this point. The value of 30€/kW is derived from a Gross-CONE of 60€/kW, mentioned in CREG's draft note in [point 33], and an estimated value of revenues from the energy market and ancillary services of 30€/kW.

We will therefore continue using a range between 30 and 70€/kW for the quantified examples.

[9] DECC, Electricity Market Reform – Capacity Market (24/10/2013), https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/252743/Capacity_Market_Impact_Assessment_Oct_2013.pdf

[10] Erratum : In Elia's first reaction to CREG's proposal, a value of 60 GBP/kW had been mentioned. This value was not correct. 49 GBP/kW is the correct one.

[11] SEM committee, Capacity Remuneration Mechanism Parameters and Auction Timings - Decision Paper (10/04/2017), https://www.semcommittee.com/sites/semcommittee.com/files/media-files/SEM-17-022%20CRM%20Parameters%20Decision%20Paper_1.pdf

[12] European Commission, State aid No. SA.46100 (2017/N) – Poland – Planned Polish capacity mechanism (07/02/2018) https://ec.europa.eu/competition/state_aid/cases/272253/272253_1977790_162_2.pdf

[13] This value does not take into account revenues as the Italian mechanisms takes the hypothesis that the clearing unit will be a peaker with not have any revenues under the reliability option. Defined in MERCATO ITALIANO DELLA CAPACITÀ ULTIMI PARAMETRI TECNICO-ECONOMICI: https://www.arera.it/it/docs/17/592-17.htm

21. As the Net-CONE represents the expected 'bid' of the best new entrant in the CRM, it should be the expected crossing of the 'demand curve' and 'offer curve' if new capacity from the assumed 'best technology' is required in the system (which is the case for Belgium). Therefore, this point should clearly be realistically reachable in the demand curve in order to ensure that the CRM auctions can clear in a way that adequacy can be ensured.

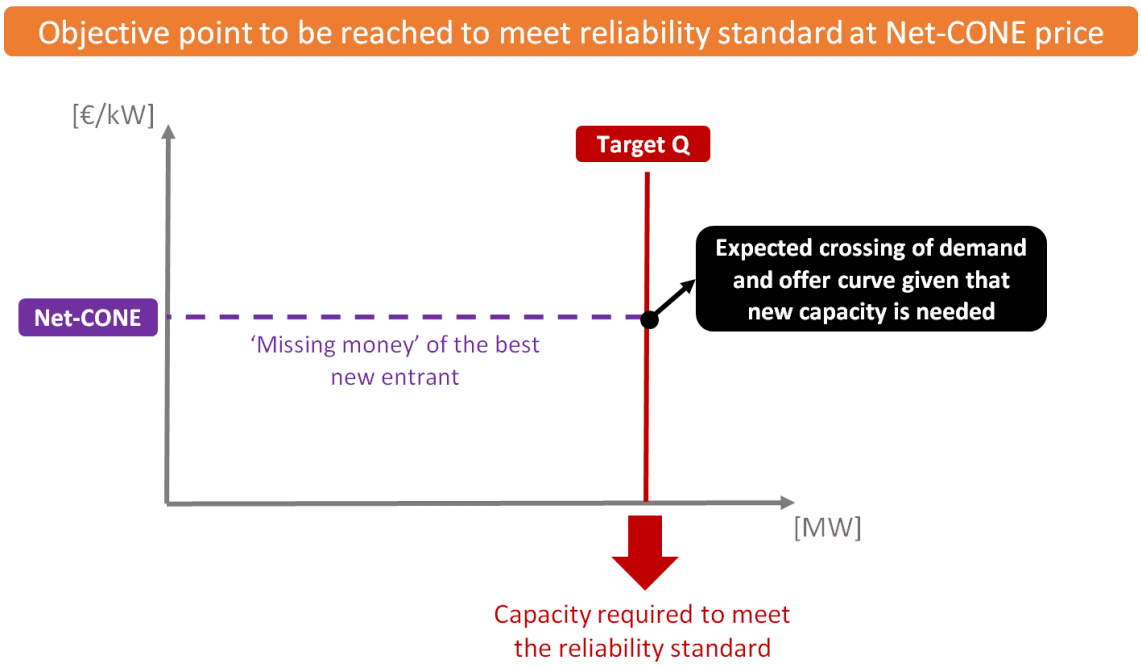

Figure 4: Objective point to be reached to meet reliability standard at Net-CONE price

The 'budget approach' from the CREG leads to a capacity value [€/kW] which is lower than the expected range for Net-CONE. This would lead - by definition - to underprocurement of capacity and hence would fail in meeting the reliability standard for Belgian's resource adequacy.

22. The CREG's demand curve in its draft note is represented by 3 lines (Figure 5):

- An horizontal line from y-axis to point A, calibrated at a price cap equal to X*Net-CONE (brown line);
- A vertical line from x-axis to point B, calibrated at the volume cap to meet the adequacy criteria, called 'Target Q' (red line);
- An hyperbolic line from A to B (green line), defined by:

$$\text{price} = \frac{\text{EENS} * \text{VoLL}}{\text{Capacity to be procured}}$$

  - EENS is the avoided EENS (from EOM to CRM); and
  - VoLL is the value of load load.

The intersection of the hyperbolic line and the vertical one defines point B (which refers to the target volume to be contracted, noted 'Target Q', in order to meet the reliability standard). The price at point B can therefore be defined by:

$$\text{price (Yaxis)} = \frac{\text{EENS} * \text{VoLL}}{\text{Target Q}}$$

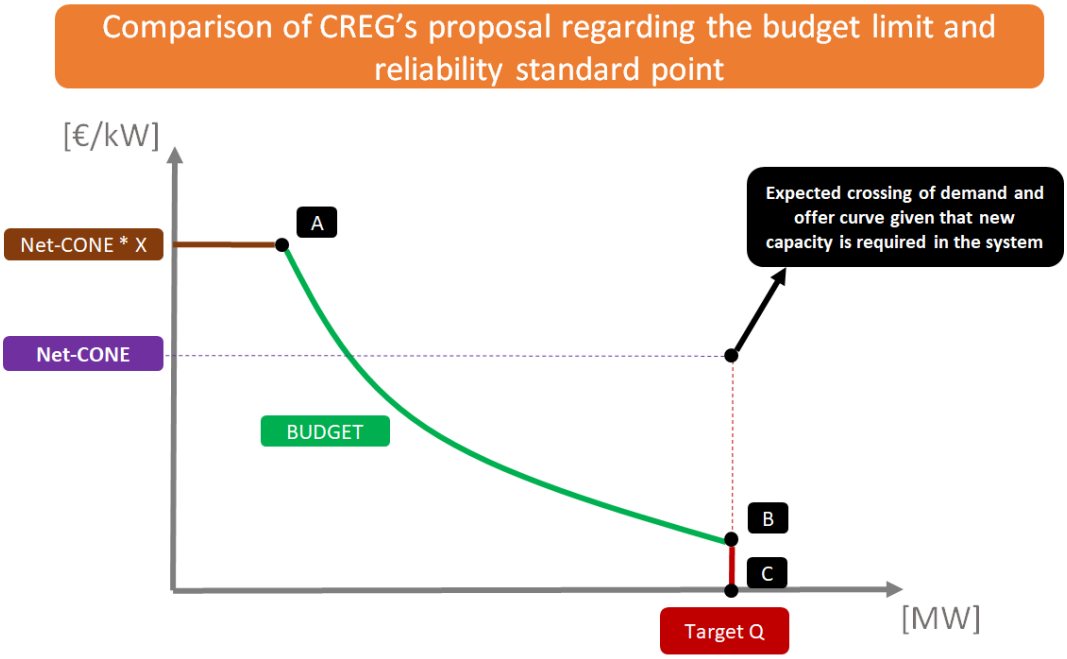

Figure 5: Comparison of CREG's proposal regarding the budget limit and reliability standard point

23. In order to illustrate the adequacy level to be expected with the proposed 'budget' demand curve, the following realistic example will be used (see below Example BOX 2 and 3). This example is based on the data provided in CREG's draft note (cf. [point 33] for the CONE, [points 27 to 29] for the VoLL, [point 41] for the annual budget, [point 56] for the capacity to be procured).

Example BOX 2: Annual budget from CREG's draft note

To illustrate the implication of this hyperbolic line, the different parameters are estimated in order to give a realistic estimation of the price that could be reached at point B.

In this example, the annual budget provided in [point 41] of CREG's draft note and shown in Figure 5 below is used (the assumed values for VoLL taken into account are also further discussed in points 56 to 59 of this document).

We will use the highest and lowest values for 2025: 107 M€ and 46 M€.

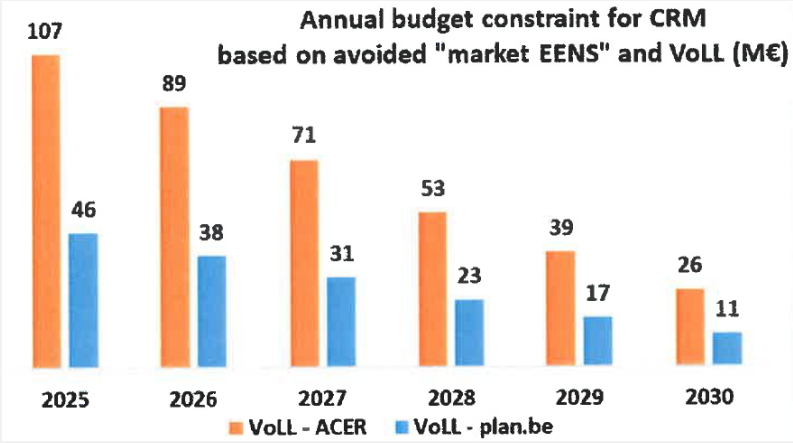

Figure 6: Annual budget estimation from CREG's draft note proposal

Example BOX 3: Target Q from CREG's draft note

For target Q (capacity to be procured), a value between 11 and 13 GW for target year 2025 is assumed (CREG' draft note, [point 56]). It is also assumed that no capacity has already been contracted (the volume to be contracted will also vary depending on the reliability standard). An assumed volume of 2 GW of non-eligible capacity is removed (e.g. due to the fact that some capacities may already be benefitting from other aid systems that are not to be combined with the aid provided through the CRM). This results in a value of capacity to be procured between 9 and 11 GW.

We will therefore use a range between 11 GW and 13 GW.

24. Based on the example (see below Example BOX 4 for details), the price at point B (the Y-axis) for 2025 would be between 3.5 and 12 €/kW. Hence the target volume that is required to be 'adequate' would be reached if the offer curve reaches the required volume at a lower or equal price.

Example BOX 4: Target Q from CREG's draft note

The budget's equation proposed by CREG is then used in order to calculate the value of point B for 2025. As the purpose of the CRM is to be compliant with the Belgian reliability standard, it is assumed that all the capacity should be contracted, e.g. 9 to 11 GW (see the 'target volume' range on Example BOX 3, 11 to 13 GW minus the assumed non-eligible 2GW).

The associated price can then be calculated by:

$$price = \frac{Budget}{Capacity\ to\ be\ adequate} = \frac{[46-107]\ [M€]}{[9-11]\ [GW]} = [3.5-12]\ [€/kW]$$

This means that all the needed capacities should participate in the CRM with a bidding limit fixed at maximum 3.5 to 12 €/kW (red dot on Figure 7). This represents the maximum allowed clearing price for the auction in order to be compliant with the Belgian reliability standard.

However, this value is far below the Net-CONE of new built capacities that can be assumed to be between 30 €/kW (assumption derived from CREG's proposal of CONE after an estimate of revenues and to test the proposal) and 70 €/kW (based on a benchmark of other European CRM), as presented in Example BOX 1.

- ⇨ *There is a major risk that the methodology proposed by the CREG would not lead to contract the required new built capacities needed to meet the Belgian reliability standard.*

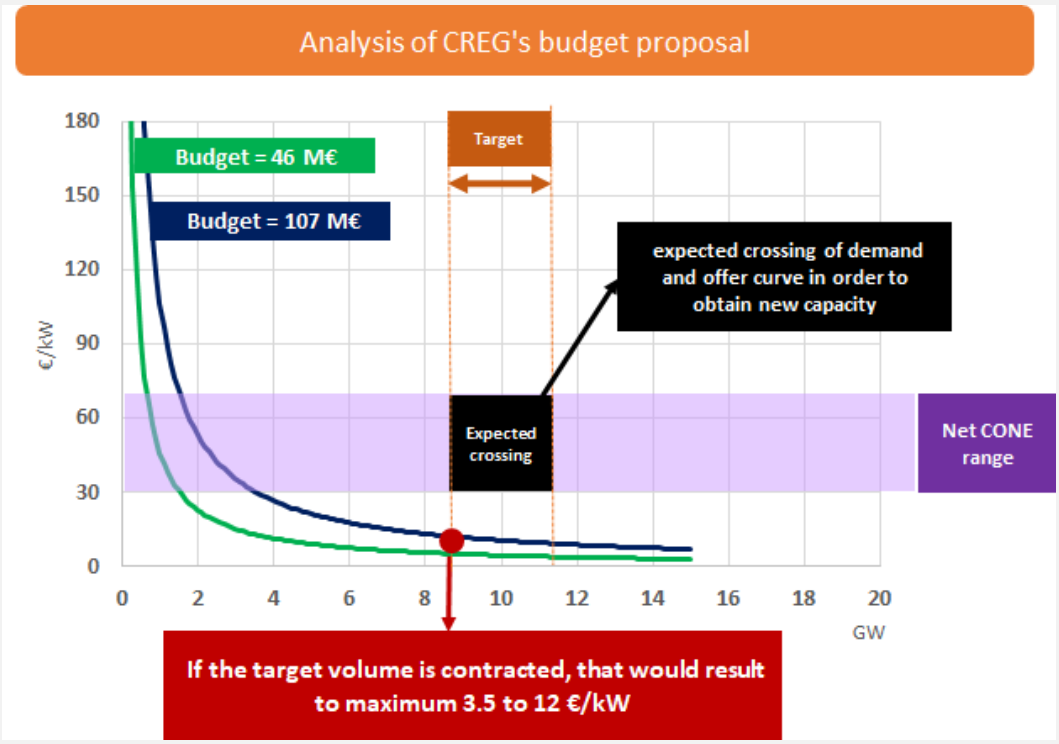

Figure 7: Analysis of CREG's budget proposal

25. As a consequence, there is a significant risk that the CRM does not meet its initial purpose to ensure adequacy, as defined in the Law (see point 8 of the present note).

26. In addition, CREG introduces a new concept of refinement of the demand curve with [point 101] of their draft note. In our understating, the proposed loop (EENS → budget → volume → new EENS → adapted budget → …) provides an unclear signal to the investors as the target is not fixed. Moreover, it is not mentioned when and how Elia should determine the different EENS values associated with the contracted capacities. As the volume contracted and the type of capacity is only known after the auction, Elia assumes that this re-run will be performed after the auction and asks therefore to CREG what is the idea behind such loop. In Elia's view, it makes no

sense to calculate such value calibration before the auction as it is an iterative approach, based on the procured volume and type of capacity. Stated otherwise, in our understanding the proposal put forward by CREG seems to assume the result and impact of the CRM prior to the CRM auctions taking place in order to calibrate the inputs needed to calibrate these CRM auctions. Such approach is therefore very vulnerable to wrong assumptions.

27. As a side point relating to the 'demand curve' in CREG's draft note, the [point 91] is unclear as it mentions in the text that a multiplier would be used, but then does not include the multiplier in the formula (stating :'*Plafond de prix = Net-CONE*).

Indicative numbers from CREG's note lead to underprocurement hence most probably only supporting existing capacities and not guaranteeing the required adequacy level.

28. As demonstrated with a simple example in Example BOX 1 to 4, the amount of capacity that can be procured via a 'budget approach' is very likely to be inadequate to contract sufficient (if any at all) new capacities and might therefore be significantly lower than the capacity needed to meet the reliability standard. We believe therefore that the 'demand curve' methodology from the CREG's draft note is unable to guarantee the compliance with the legal adequacy criteria, which is the primary purpose of the CRM.

29. In that respect, it is important to set the objective of the CRM correctly. Following the intentions of the legislator, the goal of the CRM is to ensure Belgian adequacy in line with a reliability standard defined for Belgium. This goal is to be met in a least cost manner as also required by the Electricity Law. It is important not to mix the goal and the way to achieve it. Elia fully understands and supports the intention to design the CRM in a least cost manner and to establish that any state aid granted is done so in a proportional and appropriate way, and in line with the other requirements set out by the EEAG State Aid Guidelines and the recent Clean Energy Package Regulation (EU) 2019/943. Also in these European rules, the goal of a CRM is to ensure adequacy, which is recognized particularly by the EEAG State Aid Guidelines as an objective of common interest which may be legitimately pursued. Also in those rules, only after putting forward the objective function (i.e. meeting adequacy concerns), the way to reach it is required to be proportional, appropriate, etc. At no instance the objective function may be made conditional to the proportionality. Stated otherwise, the European rules fully recognize that a CRM should be designed such that the reliability standard can actually be met without being pre-conditional to a predefined budget or other proportionality objective.

It can be therefore concluded that CREG's proposal does not guarantee the adequacy level deemed optimal for society

The socio-economic optimal adequacy level is defined by the welfare maximization between the cost of new entry and the value of lost load.

30. The reliability standard that will be defined for each country results from a welfare maximization equation where the 'value of lost load' (VoLL) is compared to the 'cost of new entry' (Gross-CONE). The results from the optimum between the CONE and VoLL is the so-called 'Loss of Load Expectation' (LOLE). More information can be found in BOX 2.

BOX 2: Socio-economic optimal adequacy level for society

The economic optimal adequacy level for society can be determined through the following formula: LOLE * VoLL = CONE (References can be found in literature[14]).

This relationship is based on the optimization of the total cost of the system. The total cost of the system is equal to the sum of the cost of incremental capacity and the cost due to a lack of security of supply, as presented in relation [1].

[1] C = Cost of incremental capacity + Cost due to lack of SoS
C = CONE * Q + EENS * VoLL

In this relationship, Q is the amount of capacity, expressed in MW, and EENS is the amount of energy not served, expressed in MWh.

An optimum solution can be found by taking the derivative of relation [1] with respect to the capacity. This is presented in relation [2].

[2] $$\frac{\partial C}{\partial Q} = \frac{\partial (CONE.Q)}{\partial Q} + \frac{\partial (EENS.VoLL)}{\partial Q} = 0$$

If the CONE is assumed to be independent of the volume variation and the VoLL is assumed to be constant, the relation [3] is obtained.

[3] $$CONE + \frac{\partial (EENS(Q))}{\partial Q} * VoLL = 0$$

The marginal reduction of EENS can be expressed in terms of LOLE (relation [4] assumes, that Q refers to "derated" capacity, i.e. 'firm' capacity effectively

[14] S. Stoft, "Power System Economics: Designing Markets for Electricity" (Book) Wiley, 28 May (2002); LJ. De Vries, "Securing the public interest in electricity generation markets: The myths of the invisible hand and the copper plate " PhD Thesis (2004), Delft University of Technology; Department of Energy & Climate Change (DECC) "Annex C. Reliability Standard Methodology" (2013); E-bridge, AF Mercados, Ref4e, "Identification of Appropriate Generation and System Adequacy Standards for the Internal Electricity Market", Final report for the European Commission, Directorate B— Internal Energy Market, March (2016).

reducing EENS at any hour of shortage).

[4] $\frac{\partial(EENS(Q))}{\partial Q} = -LOLE$

We then obtain the relation LOLE * VoLL = CONE by replacing [4] in [3]. This relation represents therefore an economic equilibrium.

31. It is important to fully understand the impact of the above. Given that the reliability standard defined as LOLE-target (e.g. 3 hours LOLE / year) represents already a socio-economic optimum relating to adequacy, if the CRM would be designed such that it would be structurally unable to reach this optimum, this would result in a suboptimal result in overall welfare.

32. The above reasoning and the underlying relationship between LOLE, CONE and VOLL is also underlying the Clean Energy Package Regulation (EU) 2019/943 Art. 25. It is clearly stipulated in Art. 25 (1) that "

    When applying capacity mechanisms Member States shall have a reliability standard in place. A reliability standard shall indicate the necessary level of security of supply of the Member State in a transparent manner. […]".

    In the above article it is explicitly said that – when calibrated following the methodologies also set out by the same regulation – the necessary level of security of supply is reached when the reliability standard is met. Hence, once more, not being able to reach the reliability standard due to a structural design choice, would not allow to reach the rightful level of security of supply.

33. The volume procured in a CRM should be sufficient to ensure adequacy according to the reliability standard. Definition and calibration of the reliability standard should be based on the principle of maximization of the net social benefit (welfare). Only looking at the cost of the CRM does not take into account its benefits for society (lower electricity prices) and hence will lead to suboptimal outcomes (in terms of security of supply and overall welfare).

CREG's proposal does not allow – by design – to ensure the optimal adequacy level.

34. In the CREG's draft note for the 'demand curve', there are different parameters (detailed in the above points) defined, which most probably will result into under-procurement of capacity, leading to a situation in which the reliability standard, and hence the optimum level of adequacy for the country, is not reached. This is contradictory to the prime objective of the CRM (security of supply) and would result in paying out capacity remuneration fees without obtaining the required level of adequacy.

35. Given the identified flaws in CREG's proposal, Elia suggests therefore to define the 'demand curve' based on best practices across Europe which aim to contract the needed capacities to ensure an adequate system. This will be further elaborated in the 'alternative proposal':

- sections 2.2, 2.3 presents the determination of the required volume to be compliant with the reliability standard ;
- sections 2.5 and 2.6 presents Elia's proposal regarding the demand curve ;
- Figure 17 presents an illustration of the demand curves for Y-1 and Y-4 auctions.

The dimensioning scenario should be based on the 'central scenario' from the ERAA, modified if needed, and submitted to public consultation. It should also foresee the possibility to include 'High Impact, Low probability' events if judged appropriate. The final choice to include those events should be made by the Belgian authorities.

CREG proposes to choose the scenario or sensitivity giving the lowest capacity requirements as basis for the calculations.

36. CREG's note doesn't however precise how exactly will the scenario for the Y-4 auction be defined and who will be in charge of it. CREG estimates that it is realistic to take other possible scenarios into account to avoid an overestimation, but there is no methodology to explain how to select them. It is not to be forgotten that often scenarios are created to test robustness of conclusions or to test extreme events, without any consideration on the actual likelihood of such scenario also really taking place. Therefore, Elia would like to have a more detailed definition and view on the establishment and governance related to the '*autres scenarios plausibles*', as mentioned in [point 65] of CREG's note.

37. We note that this point has changed in comparison with earlier versions as a reply on the raised questions for more clarity. In its initial proposal, CREG mentioned, on the one hand, that it reserves its right to use the outcome of a sensitivity and, on the other hand, it is mentioned that it should be determined based on a cost analysis. However in the current CREG's draft note, it is not further elaborated why and how such a sensitivity could be chosen by the CREG. Is this still foreseen? In addition, in the current CREG's draft note, a third methodology is presented based on the minimization of the volume. It is thus unclear what the exact proposal is.

38. In either case, Elia is not supportive of an approach leading to selecting a scenario with the lowest total volume. The purpose of a scenario should not be to limit the volume **but to provide the most realistic expectation based on the planned evolutions that are expected in the year of delivery, while accounting for uncertainties**. The scenario choice should not be a menu based on the results. The risk can then be that the scenario choice will be based on the outcome of the simulation rather than on the relevant assumptions taken into account as input. Moreover, the proposal does not take into account the likelihood of the different scenarios. If there is no method to define the different scenarios and no analysis of their likelihood, this could lead to the situation presented on Figure 8. If the scenario is wrongly calibrated to fit the Belgian context, the CRM would be designed on a wrong basis and will not ensure Belgian adequacy.

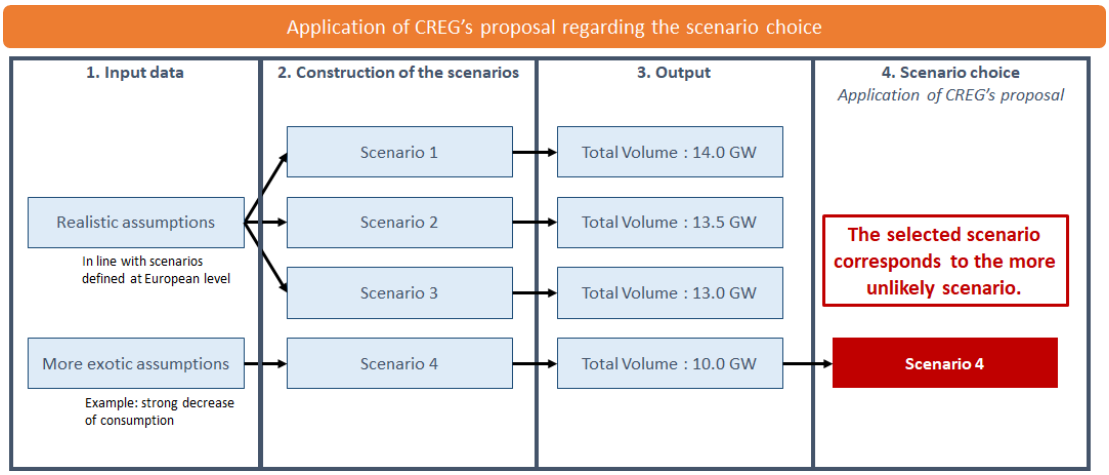

Figure 8: Application of CREG's proposal regarding the scenario choice

39. Moreover, in its note, CREG refers to a national resource adequacy assessment to be performed in the framework of the CRM. According to Elia, such studies are performed in order to determine and evaluate the overall need and Belgium's adequacy situation. Whereas within the framework of a CRM (which has been introduced by the authorities on the basis of a need to install such a mechanism), a yearly exercise is done in order to determine the exact volume and the parameters for the CRM auctions. These are not the same exercises.

The final scenario choice should be left to the Belgian authorities responsible for the security of supply of the country after public consultation of the scenario parameters.

40. The scenario and its sensitivities should be considered as a risk assessment regarding security of supply rather than a way to optimize the cost of the system or to reduce the volume to be procured. Therefore, the choice of the scenario should be the prerogative of the authorities, formally responsible for Belgium's security of supply policy.

41. Indeed, as an essential element determining the level of security of supply of the country, Elia is of the opinion that it is up to the Belgian authorities (i.e. Minister/Administration) to determine the scenario that must be used for the volume determination (as well as for the other CRM volume parameters). In that respect the scenario could be determined in the Royal Decree (with exact parameters to be filled in via a public consultation) or via another act of the authorities (e.g. in a formal advice by the Administration during or following the public consultation).

42. In line with current practices for adequacy analyses for Belgium, and previously validated by the European Commission, we believe that the scenario to be used for the volume determination should include 'High Impact, Low probability' events to capture particular situations impacting Belgium's security of supply on which Belgium has no influence.

43. Especially in the Belgian context such ‘High Impact, Low probability’ approach is crucial. Being a small and highly interconnected country and market and at the same time being structurally dependent on imports to ensure its security of supply (more than other countries), it is important to correctly assess and take into account risks related to major evolutions and events in neighbouring countries on which Belgium has no impact, but which are in contrast extremely impacting for Belgium. Whereas in the past especially the availability of the nuclear fleet in France was deemed crucial, some new evolutions with a similar impact are coming up. As further elaborated in Elia’s 2019 ‘Adequacy and Flexibility study’, this may include policy measures linked to the (early) decommissioning of coal plants in Germany or The Netherlands, the likelihood of (not) being able to timely deliver on the Clean Energy Package requirements on available transmission capacity, etc.

The proposed Y-4/Y-1 split of capacity is not in line with the legislator's intention. In addition, the outcome in terms of quantities to be reserved for the Y-1 puts adequacy seriously at risk.

The idea behind the amendment in the 'CRM law' on the '200 hours', was to ensure that a sufficient minimum capacity is reserved to Y-1, which enables demand response to participate.

44. Elia does not believe it was the intention from the decision makers to foresee a volume in the order of magnitude as currently suggested by CREG, i.e. 6-8 GW for the Y-1 auction; neither to consider that a Y-4 tender would possibly be redundant. Indeed, the law proposal was modified on this point following the acceptance by a majority of Parliament members of a submitted amendment[15]. The amendment which refers to the 200 running hours was motivated as follows (see page 18-19):

    "VERANTWOORDING

    In de analyse die Elia maakte met het oog op het voorzien van voldoende capaciteit, werd de notie structureel blok geïntroduceerd. Daarbij werden ook vermoedelijke draaiuren vooropgesteld van afzonderlijk blok. Uit de presentatie die de CREG gaf naar aanleiding van het Energy Forum van Febeliec, blijkt dat de gegevens van ELIA wijzen op een zeer laag gebruik van ***ca. 2700 MW*** *aan capaciteit. Deze capaciteit opvullen met nieuwe productie leidt zonder twijfel tot zeer onrendabele centrales. Dit kan wel opgevuld worden door vraagbeheer, batterijen en elektrische voertuigen die capaciteit aan het net kunnen leveren.[…]"*

45. The referred volume of ca. 2700 MW is indeed very significantly different from the 6000-8000 MW now proposed by CREG and also more in line with what could result from the alternative design suggestion put forward by Elia (§2.3.3).

46. Note that also in other CRMs, the volume for Y-1 is rather around 10% of the total volume (e.g. split in UK: 48,2 GW in Y-4 and 4,9 GW in Y-1), whereas CREG's proposal would lead to more than 50%, without removing non-eligible and already contracted capacities.

The reserved volume should be seen as 'derated', hence the effective volume (based on nominal reference power) that will be contracted can be much higher than the derated volume (based on eligible capacity) and will depend on the technologies offering this capacity.

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[15] https://www.dekamer.be/FLWB/PDF/54/3584/54K3584002.pdf .

47. Elia reminds that the '200h reserved volume' is meant in derated capacity just as every capacity used to build the demand curve. It does not refer to volume determined based on the nominal reference power, meaning that this volume is after applying the appropriate derating factors to the different technologies that would constitute this volume, defined as the eligible capacity. It means that when counting in terms of 'installed' capacity, the volume is even (significantly) higher than when counting in terms of 'derated' capacity, especially when demand response is assumed to deliver on this volume.

Example BOX 5: Nominal reserved capacity for Y-1

As an example, if a derating factor of 50% is applied (which is in line with the numbers for the UK derating factors published in 2019[16]), it means that to fill up CREG's Y-1 volume with market response, this would require 12 to 16 GW market response! Note that this is more than the entire Belgian peak consumption of around 13 or 14 GW.

The proposed Y-4/Y-1 split jeopardizes the level playing field for all technologies to realistically compete in the CRM

48. It is important to ensure a sufficient level playing field for all technologies and both new/refurbished and existing capacities to participate in all auctions. This is a requirement clearly put forward by the European rules and which has already resulted in court cases when this was not believed to be guaranteed.

49. A situation where no Y-4 auction would be held – a situation hinted upon by CREG in [point 78] of their note – would clearly impede such a level playing field as it significantly blocks the participation of new capacity for several technologies. This reasoning has clearly been followed in other CRMs and has been judged appropriate and proportionate by the European Commission in relation to the State Aid Guidelines. The Y-4 auction is crucial for technologies which face lead times to develop the capacity which are longer than 1 year. This is typically true for several more capital-intensive technologies which can provide economies of scale towards the system and which are often also linked to lower short-run marginal activation costs. The latter elements are not to be overlooked as capacities built following the CRM are participating in the energy market during all hours of the year, not just at adequacy-relevant moments. This means that not realistically allowing such technologies to compete in the CRM would restrict competition and limit the overall welfare function to be maximized as the capacity mix would be inherently limited.

[16] NationalGridESO (31 May 2019), Electricity Capacity Report https://www.emrdeliverybody.com/Capacity%20Markets%20Document%20Library/Electricity%20Capacity%20Report%202019.pdf

50. Elia does not agree with the sentence in [point 54]: *"La CREG estime dès lors que l'organisation d'une enchère T-4 devrait être envisagée seulement si la capacité requise ne peut être comblée que par des unités dont le délai de construction est compris entre 1 et 4 ans."*
    As the proposed methodology leads to a low volume to be contracted in Y-4, there is a high probability that it will be filled almost entirely with existing capacities with lower missing money. Indeed, existing capacities are likely to be more profitable and exhibit less missing money due to the fact that they have no investment cost to factor in their bid. Their investment is already made and considered sunk. Consequently, the result would be no or too limited opportunities for new capacity to be developed following the Y-4 auction (only existing capacities will be granted a contract in the Y-4 auction if the overall needed volume would be limited).
    Whereas reserving a volume towards Y-1 is clearly useful and desirable, as also supported by Elia, the level of this volume could create an adequacy risk in case it would be over-dimensioned. When new capacity (with likely longer lead times to develop than 1 year) is deemed required to ensure adequacy, a too low volume in Y-4 risks foreclosing the market for these capacities as existing capacities are likely to be selected first in the CRM auction. This would fully transfer the risk of securing such new capacity to the Y-1 auction, where possibilities may be far more limited due to shorter remaining lead times and, on top of increasing the overall cost of the system, risking a non-clearing and hence non-adequateness of the system.

51. The technology-neutral principle would not be met, which is not in line with the principles described in the Law, as some capacities won't be able to take part in the CRM due to their long lead time and the absence of guarantee to be contracted in Y-1 auction.

52. This relates also to the specific situation for Belgium and the identified and confirmed need for new capacity to ensure the resource adequacy of the Belgian system, as one of the main drivers to adopt the CRM-law. The need for new capacities and according long-term contracts is specifically addressed in the explanatory note of the CRM-law:

    « Il est possible et même recommandé, compte tenu de la situation particulière de la Belgique ci-avant évoquée, de conclure certains contrats pour des durées à long terme, pour inciter en particulier à la construction de nouvelles capacités, afin qu'elles puissent concurrencer efficacement les capacités déjà construites et rénovées. »[17]

CREG's proposal is not technology neutral as it gives priority to imports when determining the amount of hours during which a certain capacity is required.

[17] https://www.dekamer.be/FLWB/PDF/54/3584/54K3584001.pdf (pg.18)

53. The CREG's note is based on the figure 4-43 from the most recent Adequacy and flexibility study from Elia. This figure (which is truncated in the CREG's draft note), represents the amount of hours during which a certain type of technology would be dispatched based on its marginal cost (economic running hours). Running hours are the result of the economic dispatch and the original figure shows a much broader range of values depending on the associated technology. The CREG only took into account technologies running at market price cap (the most expensive in the market). Given that there is capacity abroad pricing at lower levels (than the market price cap), by using such figure, priority is given to imports with such reasoning.

54. An alternative suggestion (as already suggested to the CREG in the Follow-up Committee and per e-mail) is elaborated in the second part of this note. This alternative suggestion is constructed from a 'technology neutral' point of view (assuming no priority of imports). Its wording is much more in line with the wording of the Law and corresponds to an order of magnitude as referred to in the "Verantwoording" of the amendment which has introduced the notion of 200 running hours (cf. supra).

Calibration examples used by CREG in its draft note rely systematically on optimistic estimates, while the overall range available for several parameters is typically wider.

The current reliability standard of Belgium (in particular the LOLE of 3 hours) is in line with most other European countries.

55. The CREG refers only to the Irish case in its draft note, which uses a higher LOLE of 8h per year. Table 4 provides an overview of the current applicable reliability standards throughout Europe. It is worth noticing that for countries that use LOLE as criteria, most of them use a similar criteria to the one used in Belgium.

Table 2: Metrics used within EU Member States to assess generation adequacy at the national level in 2019

Member state	AT	BE	BG	CH	CY	CZ	DE	DK	EE	ES	FI	FR	GR	HR	HU
LOLE (h/y)	-	3	-	-	3	-	5	-	-	-	-	3	3	-	-
ENS (h/y)	-	-	-	-	Yes	-	-	-	-	-	-	-	-	-	-
Capaciy margin	-	-	-	-	Yes	-	-	-	Yes	-	-	-	-	-	-
Member state	**IE**	**IT**	**LT**	**LU**	**LV**	**NL**	**NO**	**PL**	**PT**	**RO**	**RS**	**SE**	**SI**	**SK**	**UK**
LOLE (h/y)	8	3	-	-	-	4	-	3	5	-	-	-	-	-	3
ENS (h/y)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Capaciy margin	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Comments

CY	*0.001 (% of annual demand); Capacity margin 20-40-%*
BE	*20h of LOLE95*
BG	*Optimized LOLE*
DE	*Latest Monitoring report from BMWi*
EE	*Capacity margin 10%*
ES	*LOLE of 0.2 only applicable on islands*
FR	*Consumer power cut expectation < 2h (draft NECP)*
HU	*LOLP < 1%*
LT	*Energy not delivered 6.3 MWh/year; Average interruption time <0.29 min*
NL	*Not officialy requested but target in national generation adequacy report*
PT	*Load Supply Index ≥1; Load Supply Index includes inadequacy risk looking at the day-ahead market only; LOLE value includes inadequacy risk looking to reserves close to real-time*

Table 4: Metrics used within EU Member States to assess generation adequacy at the national level in 2019, from ENTSOE[18]

18 https://docstore.entsoe.eu/Documents/SDC%20documents/MAF/2019/MAF%202019%20Appendix%202%20-%20Methodology.pdf

VoLL estimates used in calibration examples in the note do not seem to reflect the full range available of such estimates

56. Whereas in Elia's view, as also outlined in its alternative suggestion (cf. infra), the VoLL should not be a direct calibration parameter in the CRM, it is nevertheless a relevant parameter when defining the reliability standard, as put forward by the Clean Energy Package Regulation (EU) 2019/943 Article 25.

57. Although the European methodology for determining the VoLL is yet to be defined following the implementation of Regulation (EU) 2019/943, there have been various estimates on the VoLL for Belgium in the past. In this respect the CREG refers to the Federal Planning Bureau, which indeed is an important reference on this matter.

58. CREG refers to a study of 2014 of the Federal Planning Bureau[19] which puts forward an average VoLL of 8300 €/MWh, in case of an unannounced outage. Whereas in an adequacy context one could indeed argue whether an unannounced outage cost provides the best reference, it is as important to recognize that in an adequacy context, it is not the plain average VoLL that should be referred to. The Federal Planning Bureau has recognized this aspect, more particularly in its study of 2017[20] where it defines a VoLL which could rather be called an 'adequacy'-VoLL. For this purpose, the Federal Planning Bureau also refers to a methodology used in Great Britain to this end. The result of this estimate provides a VoLL which is significantly higher, i.e. 23300 €/MWh. This is explained by the fact that in case of adequacy issues, a lot of demand may already have reduced its consumption by means of market signals. For the consumption then remaining it could be fairly assumed that they have had insufficient incentives to already curtail their load voluntarily as their associated cost is higher. In the study of the Federal Planning Bureau it is stated as follows[21]:

"*In the calculations made by DECC, however, the 'average' VOLL is not taken into consideration. They chose to exclude some categories that are or should be able to participate in the reserve market through demand side response or else be able to change their electricity use in response to price signals (price-sensitive demand). Large commercial and industrial consumers are therefore not included in their reliability calculation. With this in mind, the Belgian VOLL was recalculated by excluding a number of sectors (ex. manufacturing). A weighted average VOLL at times of winter peak demand then is estimated to amount to 23300 €/MWh*".

[19] https://www.plan.be/uploaded/documents/201403170843050.WP_1403.pdf
[20] https://www.plan.be/uploaded/documents/201709280927450.Addendum_CBA.pdf
[21] Cf. Section 3.3.1 (b) of https://www.plan.be/uploaded/documents/201709280927450.Addendum_CBA.pdf

59. Whereas also the Federal Planning Bureau in the above methodology does not look at the entire economy, any direct link between the VoLL and the curtailment plan should be considered carefully. Since the objective of the VoLL calculation is to reflect the cost for society in case of adequacy issues, it is key to know how these situations would be dealt with in reality. A TSO might need to activate the emergency plan, not only to cope with a lack of adequacy but also in order to avoid uncontrolled frequency drops and grid instabilities.

    Load shedding does not only target minimization of costs, hence not only focus on customers with the lowest VoLL to be disconnected first-only, but shedding plans also need to disconnect loads in order to keep transits and voltages within their technical limits. Therefore the TSO will shed blocks of load by disconnection of High Voltage substations or at least by disconnection parts of the substations, including a mix of different type of customers, and hence with different types of economic VoLL.

    Load shedding plans cannot and do not only follow a pure economic logic since they have several technical limits to account for also and sometimes even in priority. The "final VoLL" cannot be simply the VoLL of the sector with lowest economic VoLL, because this would not reflect the reality of what happens in case of adequacy issues.

60. It is also to be recognized that any load shedding cost can be assumed to be higher than the grid users' pure economic cost of not disposing of energy, often determined in a narrow sense. Load curtailment cost should also factor in indirect and societal aspects (e.g. increased number of deceases). The above reasoning is also recognized by other parties, including at Belgian level[22].

61. Finally, the reasoning put forward appears contradictory to the current market organization and particularly the price caps foreseen. In particular the Intraday price cap is currently set at 10.000 €/MWh following an ACER decision and the Belgian Balancing price cap at 13.500 €/MWh following a CREG decision. Following the reasoning of CREG given the values of VoLL and their justification put forward, it would create more welfare to shed load at lower price levels than price levels at which today for instance balancing bids should be activated by the TSO. In Elia's view this is not only contradictory, but it is rather an indication that the VoLL levels should indeed by assumed in other price ranges than those suggested now by CREG.

[22] Tirez A., Gheury J. & Woitrin D., , "Le role du marché dans le maintain de l'équilibre de réseau", Revue E Tijdschrift 129ste jaargang, June 2013

CREG's methodology does not allow multi-year contracts to take part in the CRM

The price limit for long-term contracts is not in line with the rest of the CRM design.

62. As also pointed out by Elia in its design note on intermediate price caps which was consulted upon recently, Elia argues that additional (intermediate) price-caps on top of the global price-cap applying to all multi-year contracts and the intermediate price-cap already foreseen for 1-year contracts (i.e. capacities not requiring (significant) investments) are not desirable and risk to be discriminatory and distorting.

63. The main argument is that in the CRM auction the bid of a capacity provider should be driven by its level of missing money, i.e. the difference (put generally) between its costs and energy market revenues. As being granted a multi-year contract only depends on the cost-side and not the revenue side and as revenues (or better: inframarginal rents) are not proportionate to the CAPEX-intensity of technologies, there is no clear relationship to build on to calibrate any additional intermediate price cap for multi-year contracts. Note that in any case the global price cap already applies in a non-discriminatory way on all multi-year capacities.

64. It is also useful to refer to the European Commission and their reasoning on why to allow long-term contracts in a CRM. Whereas long-term contracts may result in a commitment for a longer period during which conditions may evolve, long-term contracts particularly allow newly developed capacity to compete in an auction where standard contracts are only covering one year. The European Commission, in accepting other CRMs, has systematically accepted the idea of long-term contracts as a key enabler to foster competition. In this respect, the allowance of a long-term contract is typically linked to the underlying cost of the investment. Simply put, the higher the (eligible) investment cost, the longer the allowed contract duration. This principle is also underlying the CREG's proposal for the Royal Decree on investment thresholds and cost eligibility criteria. Adding additional price caps on long-term contracts related to the evolution of expected ENS levels undermines the above reasoning. Long-term contracts help to foster competition and bring new investments on equal competitive footing as existing capacity, but adding extra price caps risks to distort again this effect as the economic risks faced by investors are again increased by a mere reliance on a scenario related to the future.

65. It should also not be overlooked that a cleverly designed global auction price cap may also capture some future effects. Indeed, to the extent the global auction price cap would be based on the estimation of Net-CONE (e.g. (1+X) * Net-CONE) and the estimation of the Net-CONE takes into account a future perspective on the market evolution, a downward pressure is already foreseen in the auction parameters when the expectation would be that the energy market would be more bullish in the future.

The methodology proposed by CREG leads to a bidding limit for new built capacities which is much lower than its Net-CONE.

66. In its proposal, CREG introduces a price limit on long-term contracts. This proposal is based on the fact that long-term contracts need to take into account the decreasing available budget in later years correlated to a potential adequacy concern decrease.

    This price limit is defined as the minimum between:
    - Price cap
    - Average total cost . $\frac{\text{LT-capacity share}}{\text{LT-capacity}}$
        - Average total cost = average of the total cost of EENS over the period where the adequacy concern is decreasing
        - LT-capacity share = part of capacity with LT-contracts compared to total capacity needed
        - Volume of LT-capacity is unknown before auction (proxied by need for new capacity)

    The result of this limit is that, when adequacy concerns decrease, 1-year contracts will be able to bid at higher price than LT-contracts.

67. Elia believes that such limit can prevent new built capacities to take part in the CRM. Indeed, if we take the assumption that the Net-CONE is equal to 30€/kW (much less than the 70€/kW presented in CRMs abroad – see Example Box 1), the limit couldn't lead to a lower value. Otherwise, it will be discriminatory for technologies that would need a higher contract value to be profitable.

Example BOX 6: Nominal reserved capacity for Y-1

This can be illustrated by an example based on the data mentioned by CREG.

A value of lost load equal to 5.33 k€/MWh is taken into account according to point 29 of CREG's note and 9 to 11 GW to be contracted (11-13 GW of target volume minus 2 GW of non-eligible capacities).

First, let's calculate the maximum volume of new built capacities allowed to participate in the CRM due to the budget limit, assuming that all other capacities will bid at 0 €/kW.
For this calculation, a range will be used for the Net-CONE, between 30 €/kW (assumption from CREG's proposal) and 70 €/kW (based on a benchmark of other European CRMs), as presented in point 20 (see the 'Net-CONE' range on Example Box 1).
The maximum volume of new-built capacities:

$$Capacity = \frac{Budget}{[net - CONE]} = \frac{[46 - 107]\ [M€]}{[30 - 75]\ [€/kW]} = 0.6 - 3.6\ [GW]$$

This corresponds to the maximum long-term capacity share.

The average budget can be determined based on the annual budget constraint for CRM based on avoided market EENS and VoLL (point 41 of CREG's

proposal). For the years 2025 to 2030, a range between 28 and 64 M€ is obtained.

The price limit on long-term contract is then calculated by multiplying the budget by the long-term share and dividing it by the capacity to be procured. As the price limit only applies to long-term contract, it can be divided by the long-term share in order to obtain the bidding limit, expressed in [€/kW], that can be compared with the Net-CONE values.

$$bidding\ limit\ [\frac{€}{kW}] = Av.\ budget\ [M€].\frac{\cancel{LT-share\ [GW]}}{Capacity\ to\ be\ procured\ [GW]}.\frac{1}{\cancel{LT-share\ [GW]}}$$

$$bidding\ limit\ [€/kW] = \frac{Average\ \ budget\ [M€]}{Capacity\ to\ be\ procured\ [GW]} = \frac{[46-107]\ [M€]}{[9-11]\ [GW]}$$
$$= [2.5-7]\ [€/kW]$$

CREG's proposal leads to a bidding limit for long-term contracts of 2.5 to 7 €/kW, which is far below the Net-CONE values estimated. Therefore, the methodology provided by CREG does not seems to allow new-built capacities to take part in the CRM with long-term contracts, which can be considered as discriminatory.

68. Therefore, Elia does not understand how the CREG would justify and calibrate in a non-discriminatory and technology-neutral manner such price-caps for multi-year capacities other than the already foreseen global auction price cap.

Miscellaneous remarks.

69. Elia understands that the timing for the public consultation is limited as the notification to the European Commission is foreseen for December of this year. We regret however that the consultation on this important topic was only launched on November 22nd even though that the topic was already touched upon in the Follow-up Committee during the summer holidays.

70. Elia understands that the current Belgian regulatory framework does not give the responsibility to make a proposal on the matter to the CREG, and that the 'Clean Energy Package' is not yet entered into force. It would however have been more convenient to have some summary of the rules to be applied following the draft note. Given the lack of such summary, and the lack of a proposal of 'Royal Decree', it is sometimes hard to distinguish if the note puts forward a 'rule' or an 'opinion'.

71. Chapter 2 « Antécédents » of the CREG's draft note does not mention neither the feedback on principles regarding demand parameters from the FPS Economy sent by mail the 9th of October neither the second written reaction by Elia sent the 31st of October in which Elia already mentions some crucial concerns and doubts related to CREG's proposed methodology.

72. In relation to the cost of the CRM, the CREG refers to estimations from Elia. Elia wishes to point out that, although Elia indeed refers to the figure of 300-500 M€/yr in its 2019 Adequacy and Flexibility study, this figure has been based on the estimations of PWC in the context of their study work for the FPS Economy, as also transparently mentioned in Elia's study. It is as such not an estimation from Elia. We would even belief that it could be an interesting exercise for PWC to perform an updated estimation, taking into account the further design choices aiming at lowering the overall cost of the CRM, that in the meantime have been made.

73. For long-term contracts, the budget limit is calculated on the contract duration [point 46]. First, this proposal is not in line with the proposal on [point 106] (average on the decreasing years). Secondly, this has to be calculated for each year. It means that for a 15 years contract for an asset to be delivered in 2025, Elia has to make yearly simulations from 2025 to 2040. This is much more work than previously estimated by Elia and it means that Elia should use data and assumptions for a scenario up to 20 years in advance, leading to huge uncertainties which also goes beyond the framework of the European Resource Adequacy Assessment. It should then at least be specified how the scenario framework should be considered in that case.

74. In addition, the [point 108] specifies the data that CREG would need to perform the calculations to obtain the demand curve. We propose that the set of data is clearly known and communicated upfront and therefore the list should not be 'non exhaustif'. We fully agree that a number of data needs to be exchanged between Elia and the CREG in order to perform their respective tasks. However, the elements that the CREG puts forward in their draft note, goes far beyond what is needed in order to calculate the demand curve. In the chapter 2 of this note, an overview is provided of the data that is suggested to exchange (see section 2.8 for more details).

75. Elia would like CREG to clarify the following sentence in [point 69] of the note : *« Une norme de fiabilité différente entre les enchères T-4 et T-1 entrainerait en effet une perturbation de norme de fiabilité moins sévère pour la fixation de la capacité pour l'enchère T-1 mais signifierait en effet une perturbation de la concurrence entre les deux offres. »*

76. In §5.5.5, CREG presents an argument for a pay as bid rather than a pay as cleared auction mechanism. However, CREG's argumentation is based on the assumption that the intermediate price cap is removed. According to Elia, this argument cannot be used to promote a system since it does not represent the entire presented design and it overlooks the overall debate on pay-as-bid and pay-as-cleared and the advantages of the approach of switching from pay-as-bid over time to pay-as-cleared.

77. CREG discusses pay-as-bid versus pay-as-cleared and in particular states that when applying a pay-as-bid pricing rule, a higher (and only worst case the same) capacity volume can be procured for the same total cost. With this statement, CREG does not take into account the fact that bidding incentives are different under a pay-as-bid pricing rule compared to a pay-as-cleared pricing rule. While the rational bidding behavior under pay-as-cleared is to bid in at true costs (i.e. at missing-money in case of a CRM auction) since all selected bidders get the market price (where necessary limited to the applicable intermediate price cap) anyhow, under pay-as-bid, bidders have an incentive to bid in just below their anticipated would-be pay-as-cleared market price. Therefore, the (blue) offer curve as presented by CREG in its illustration cannot be assumed valid under both the pay-as-cleared and the pay-as-bid pricing rule. Even more, in case of perfect information, because of the different bidding incentives, the two pricing rules would result in exactly the same outcome in terms of price and volume.

78. Under more realistic market conditions and without perfect information, the would-be pay-as-cleared market price is uncertain and not known to the market players. The fact that bidders under pay-as-bid attempt to estimate an uncertain market price on which to base their bids, can lead to further inefficiencies compared to a pay-as-cleared pricing rule. For instance, a bidder who misjudges the would-be pay-as-cleared market price can be rejected while actually being an in-merit bidder based on actual costs. Moreover, the fact that bidders have to estimate an uncertain market price is already an administrative burden on its own and an additional risk, while being especially challenging for smaller market players who are worse-equipped to assess would-be pay-as-cleared market prices. Hence, assume that in the worst case the pay-as-cleared result is achieved and in all other cases it is better seems to overlook the above effects, which are also commonly known in auction theory.

79. As CREG seems to assume that new investments should be developed particularly following the Y-1 auction, Elia wonders whether the underlying assumption would then also be that some of these capacities – to the extent they would even be able to bear the risk related to such uncertainty – inevitably start the development of their project (including significant capital expenditures) prior to the Y-1 auction? This seems contradictory with the rules on cost eligibility proposed by CREG in its

proposal for Royal Decree on investment thresholds and cost eligibility criteria. It is there stipulated that any cost made prior to the auction would not be considered eligible for determining whether the investment thresholds linked to multi-year contracts would be exceeded. This would imply that for such investments, due to the consequences of the proposal related to the Y-4/Y-1 split, de facto the possibilities for obtaining a long-term contract and hence to be realistically competitive in the auction have been strongly reduced or even eliminated.

2. Alternative suggestions

Given the large amount of comments and the imminent deadline towards the European Commission, it has been requested that Elia provides not only an overview of remarks, but also constructively formulates them into concrete suggestions. In essence this chapter provides a complete overview of an alternative approach, based on the remarks and observations of chapter 1.

We have been able to provide such an extensive overview, as reflections on the matter had already taken place within Elia on the basis of the current applicable Belgium legislative framework (article 7undecies, §2, 1° of the CRM Law), which assigns Elia as authority to make a proposal on the matter. Without prejudice to the upcoming framework of the Clean Energy Package (which we acknowledge comprises different modalities for the roles and responsibilities in this matter), the alternative suggestions could be used as inspiration for the final Royal Decree to be adopted in the matter. The vast majority of text of this chapter has already been shared with the Follow-up Committee.

We recall that in any case, in accordance with Article 7undecies, §2 of the CRM Law, in addition to the methodology to be adopted by Royal Decree, a yearly calibration exercise is foreseen to determine the exact parameters for the volume (parameters), during which a public consultation is foreseen. At the end, a yearly Ministerial Decree is taken in order to decide for which volume and on the basis of which parameters the TSO has to launch the auction.

This chapter has been elaborated in close interaction with the choices for the derating factors. Both are indeed closely correlated as on the one hand, the multiplication of the associated derating factor and the reference power upon prequalification results in the derated capacity, i.e. the maximum capacity that could take part in the auction. On the other hand, derating factors will be used in the determination of the required derated volume for each auction as:

- part of the installed capacity will not participate to the auction but contributes to adequacy (cf. ‘opt-out’ rules);
- part of the installed capacity might be non-eligible for participation in the CRM but nevertheless has a contribution to adequacy;
- part of the installed capacity might already be contracted in previous auction(s).

Given the above points, it is key to ensure the consistency between the volume to be contracted in the auctions of the capacity remuneration mechanism, the demand curve and the derating factors. The suggestion is built around a methodology consisting of eight main steps:

The first step will focus on the scenario to take into account for performing all the required calculations. This scenario will allow to determine, on the one hand, the demand curve parameters including the volume to be procured, the derating factors and the maximum entry capacity for cross-border participation and, on the other hand, the market revenues, needed to calibrate the Net-CONE and the intermediate price cap.

The second step consists in determining the required volume needed to be compliant with the reliability standard. This volume is called the 'Target Volume'.

Then, **the third step** presented the methodology to determine the volume to be contracted, called the 'CRM Required Volume', in order to reach the 'Target Volume'. This step also presents the difference between Y-1 and Y-4 auctions as a part of the Y-4 auction volume is reserved for the Y-1 auction.

The fourth step consists in determining the Net-CONE. This parameter is required to ensure that new-built capacities are able to take part in the CRM, regarding their missing money.

The fifth step is dedicated to the fundamental parameters required by a demand curve in Elia's view, around a reference point defined by the 'CRM Required Volume' and the Net-CONE.

The sixth step presents the shape of the demand curve in Y-1 and Y-4 auctions and the way the 3 main points required to build it are determined in a consistent way with the concept previously presented.

The seventh step consists in determining point A in Y-4 auctions. The two parameters linked to this point are: the global auction price cap and the 'CRM Maximum Volume at global auction price cap'.

The last step presents the data to be provided by the TSO in order for the CREG to establish the required parameters for the demand curve.

2.1. Scenario choice

The choice of the scenario to be used is an important element underlying the demand curve. Based on this scenario, a Monte-Carlo simulation is performed in order to obtain the dispatch indicators required for the derating factors[23] but also some economic parameters needed to calculate market revenues (§2.4.2).

Elia suggests to use the latest 'central' scenario (which takes into account the latest policy developments related to capacity mechanisms) available from the European Resource Adequacy Assessment (ERAA) which will be defined at ENTSO-E level as mentioned in Article 23, §5 b) of Regulation (EU) 2019/943.

This scenario serves as basis for the adequacy assessment in the framework of the CRM, but can be further adjusted with the latest relevant policy developments in Belgium or abroad (to the extent those are not yet included in the 'central' scenario, e.g. given the time between data collection and publication of the study).

The scenario for the adequacy assessment in the framework of the CRM should also foresee the possibility to include 'High Impact, Low Probability (HiLo)' events to capture particular situations impacting Belgium's adequacy. We assume that, given that ultimately the responsibility for security of supply lies with the Minister responsible for energy and its administration, these public authorities want to decide or give guidance on which scenario to choose for the country regarding national adequacy. This is in line with Elia's remarks on the draft note of the CREG's, points 41 to 44.

From the retained scenario, an 'adequacy check' is then performed for Belgium and, if the scenario does not comply with the Belgian reliability standard, capacity is added in the scenario to the Belgian market to make it compliant. The needed gap shall be filled in an iterative way, based on an economic loop adding new capacity from pre-selected types. These types of capacity are in line with point 539 of the Final Report of the Sector Inquiry on Capacity Mechanism from the European Commission[24] (mentioned in CREG's proposal, footnote 11) and will be submitted to public consultation.

Once the scenario is made adequate, the capacity mix in Belgium is fixed and will be used for the determination of the different CRM parameters:

- Volume determination and derating factors (where the eventual HiLo events abroad are applied to calibrate the volume with an estimation of the cross-border contribution);
- Maximum entry capacity for cross-border participation (where the eventual HiLo events abroad are applied to avoid an overestimation of the maximum

[23] Elia (2019). Formal public consultation on the CRM design notes (Part II). https://www.elia.be/en/public-consultation/20190902-formal-public-consultation-on-the-crm-design-notes-part-ii

[24] https://ec.europa.eu/energy/sites/ener/files/documents/swd_2016_385_f1_other_staff_working_paper_en_v3_p1_870001.pdf

contribution to adequacy from other countries);

- Other parameters of the CRM (where the eventual HiLo events abroad are not applied to provide an estimation of the economic numbers in an average scenario).

A public consultation will be organized on a yearly basis by the TSO during at least one month and will involve FPS Economy, CREG and all relevant stakeholders. This public consultation will include:

- The parameters of the Belgian market zone:
  - Electricity consumption;
  - Electricity generation, storage and market response;
  - Interconnection parameters (flow-based and NTC);
  - Technical parameters (efficiency, reservoir level, …);
  - Fuel prices, CO2 prices, …;
- Any relevant update from the ERAA 'central' scenario for other market zones (given the time between data collection and publication of the report);
- Sensitivities applied to the scenario (HiLo events);
- The preselected capacity types needed to make the scenario adequate.

This process to determine the scenario is summarized on Figure 9. This whole methodology is based on a relevant choice of the input data of the scenario, as mentioned in points 37 to 40 of Elia's remarks.

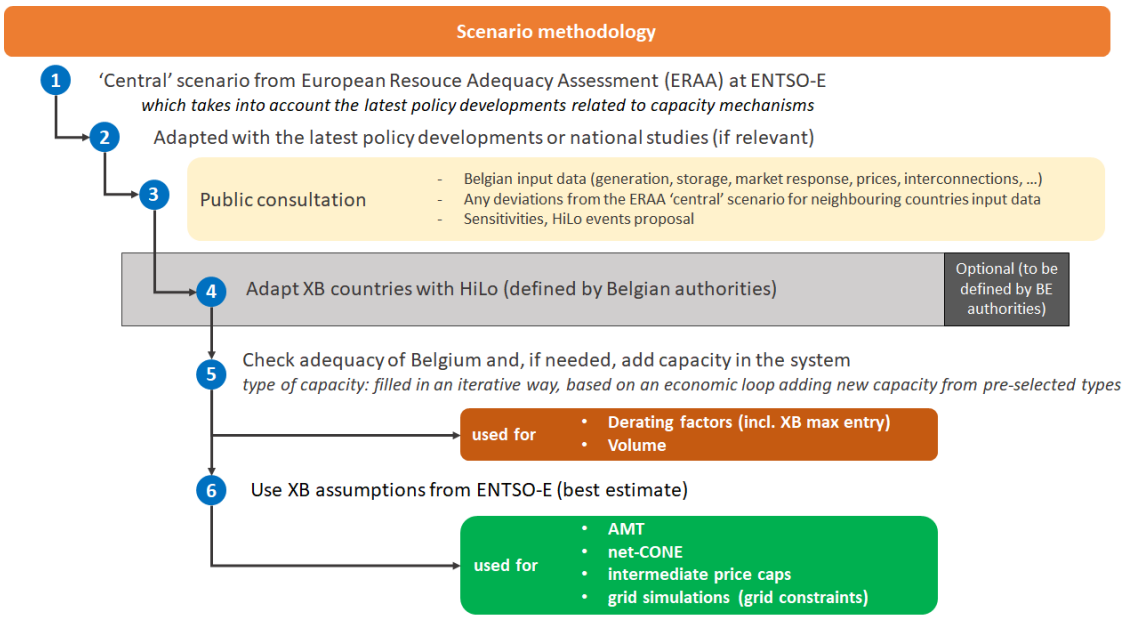


Figure 9: Scenario methodology

2.2. Target Volume

The purpose of the CRM is, by definition, to be compliant with the Belgian reliability standard, as referenced in Article 7undecies, §3 of the CRM Law. Therefore, the determination of a volume that meet this reliability standard is required. This volume is called the 'Target Volume'.

The 'Target Volume', expressed in [MW], is to be determined through the steps presented on Figure 10. The **first step** is to determine the average load in near-scarcity hours. This volume is determined on an adequate scenario, as described in §2.1, in order to provide a volume that meets the appropriate reliability standard. Then, a volume should be added on top of the capacity needed for balancing requirements in a **second step**. The **last step** is to remove the average Energy Not Served corresponding to the reliability criteria in order to obtain the so-called 'Target volume'.

The main differences with CREG's proposal are the following characteristics:

- Average load calculated clearly on near-scarcity hours;
- Load determined on an adequate scenario;
- Addition of balancing reserve.

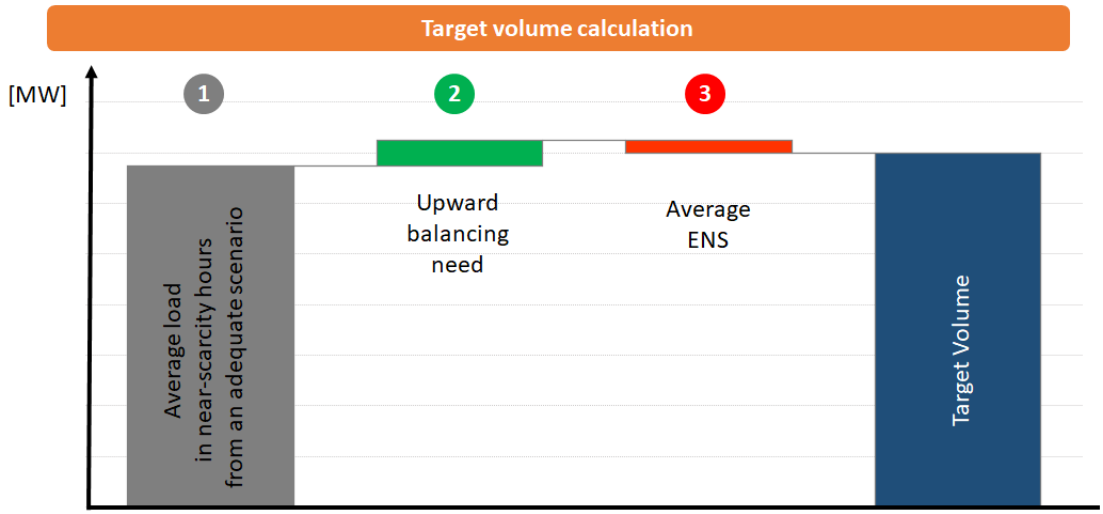


Figure 10: Determination of the 'Target Volume'

2.2.1. Average load in near-scarcity hours from an adequate scenario

The starting point stems from the Belgian load curve which is implemented in the 'Monte-Carlo' simulation, performed on the scenario defined in §2.1, taking into account the potential HiLo event recommended by the Belgian authorities. Based on the near-scarcity hours criterion[25], the average load in near-scarcity hours can be calculated. The

[25] Elia (2019). Formal public consultation on the CRM design notes (Part II), CRM Design Note - Derating Factors, §3, https://www.elia.be/en/public-consultation/20190902-formal-public-consultation-on-the-crm-design-notes-part-ii

principle is illustrated on Figure 11. First, every near-scarcity hour for every 'Monte-Carlo' year is taken into account. Then, the mean of the load during these hours is calculated through formula [1].

$$[1] \quad \text{Average load} = \frac{1}{n}\sum_{i=1}^{n} \text{load in a near} - \text{scarcity hour}$$

where n = amount of near-scarcity hours in all 'Monte-Carlo' years

The load profiles that are used in the simulations represent the total consumption of the country (including TSO-connected, DSO-connected, 'auto-consumption' and losses). Note that demand reductions such as 'demand response' or consumption from storage facilities are not included in the profiles (hence should be counted separately such as done in the CRM design).

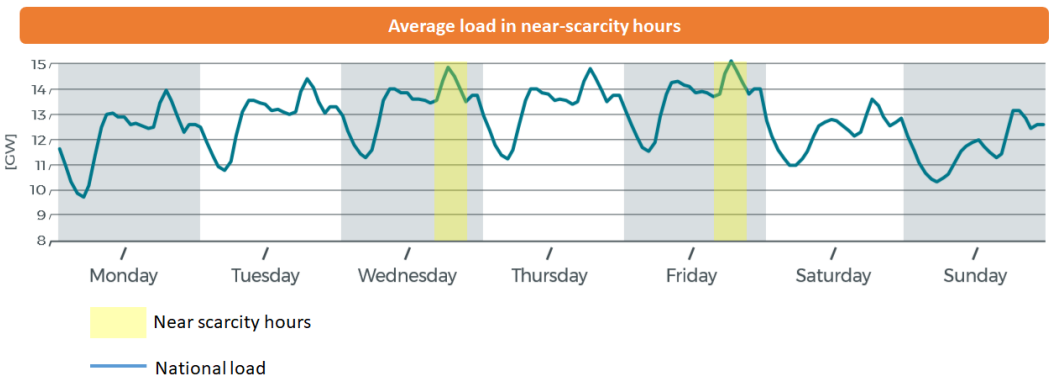


Figure 11: Average load in near-scarcity hours[26]

2.2.2. Upward balancing need

The average load in near-scarcity hours refers only to adequacy purposes. Adequacy looks at the capability of the system to cope with expected variations (RES forecasts, outages …) on hourly basis. Hence, adequacy assesses whether the system has enough capacity to meet the total consumption when knowing everything in advance (in the case of the TSO study this is one week in advance – this is also known as 'perfect foresight').

However, balancing needs are also required for each hour of the year. Points 6 to 13 of the present note provide a strong evidence that upward balancing reserves requirements should be included on top of the load for assessing the capacity need to be contracted (as done in other CRMs or in adequacy studies). Therefore, those volumes are added on top of the volume to be contracted. In either case, this element might also be part of the EU-methodology on adequacy resource assessments, which will be applied when it enters into force. As long as not known/applicable, the same method as currently applied for similar studies (which includes the upward balancing requirements) will be used.

[26] Elia (2019). Adequacy and flexibility study for Belgium 2020-2030. http://www.elia.be/~/media/files/Elia/publications-2/studies/20190628_ELIA_Adequacy_and_flexibility_study_EN.pdf

2.2.3. Average ENS in near-scarcity hours

As this average load occurs in near-scarcity hours, it means that it happens when some energy might not be served in the system (i.e. during the scarcity hours). This average amount of energy not served (Figure 11, Average ENS) should be subtracted from the average load plus the balancing need in order to obtain the 'Target Volume' needed to satisfy the Belgian reliability standard, in accordance with Article 7undecies, §3 of the CRM Law. If this reliability standard would be defined as to avoid any LOLE hours and any energy not served, this volume to be subtracted would be equal to 0. In any other case, the reliability standard will lead to an amount of energy considered as an acceptable risk for society regarding possible shortages.

2.3. CRM Required Volume

The 'CRM Required Volume', expressed in [MW], is defined as the volume to be procured in the auctions. It is determined based on the 'Target Volume', presented in §2.2. The purpose of the 'CRM Required Volume' is to remove the capacities that won't take part in the auction. It consists of:

- the capacity already contracted in previous auctions;
- the non-eligible capacity.

Then, an additional step is included to take into account the reserved volume from Y-4 for the Y-1 auction. A split between the volume between Y-1 and Y-4 auctions is therefore performed in order to obtain the 'CRM Required Volume (Y-1)' and 'CRM Required Volume (Y-4)'. The split is made by removing the 200h reserved capacity, as mentioned in Article 7undercies, §2 of the CRM Law.

The main differences with CREG's proposal are the following characteristics:

- Capacity already contracted determined by the sum of the contracted capacity of all CMU that have been already contracted ;
- 'Total Auction Volume' is renamed as 'CRM Required Volume';
- A different methodology is applied to determine the 200h reserved capacity (based on our comments in points 44 to 54 of the present note).

2.3.1. Non-eligible capacity

Non-eligible capacity refers to CMU:

- that already receive(d) subsidies, according to Article 7undercies, §4, 1° of the CRM Law ;
- with an eligible capacity (thus after application of the appropriate derating factor) below the minimal threshold, expressed in MW, according to Article 7undercies, §4, 2° of the CRM Law ;
- that is non-eligible after prequalification.

According to article 7undecies, §4 of the CRM Law, a Royal Decree will define the criteria and rules regarding the participation of capacities that already receive(d) subsidies. These capacities are commonly known as "Non-eligible capacities".

The non-eligible capacity associated volume is calculated by multiplying the nominal reference power by the associated derating factors from CRM Design Note - Derating Factors[27], §4.

The total derated non-eligible capacity will be subtracted from the 'Target Volume'.

[27] Elia (2019). Formal public consultation on the CRM design notes (Part II), https://www.elia.be/en/public-consultation/20190902-formal-public-consultation-on-the-crm-design-notes-part-ii

2.3.2. Capacity already secured in previous auctions

Capacity already secured in previous auctions refers to capacity granted with a long-term contract (> 1 year) in a previous auction process and, for Y-1 auction, the capacity granted in Y-4 auctions already having a contract for the same delivery year. This capacity cannot take part in the next auctions and has to be removed from the capacity to be procured.

For capacity already secured in previous auctions, the derated volume is equal to the sum of the contracted capacity of all CMU that have already been contracted.

The capacity already secured in previous auctions will be subtracted from the 'Target Volume'. After reducing the 'Target Volume' with both the total derated non-eligible capacity and the total derated capacity already secured in previous auctions, the 'CRM Required Volume' is obtained.

2.3.3. 200h reserved volume (only subtracted in Y-4 auctions)

In Part 1, points 44 to 54, Elia has provided an extensive explanation why it believes the CREG's interpretation of the wording from article 7undecies, §2bis is not the appropriate one.

As alternative, Elia suggests the following interpretation:

"For each block of 100 MW, the average running hours needed to meet the reliability standards shall be calculated on the basis of the consumption duration curve. These are the hours during which a certain capacity is required to cover the total peak consumption."

This can be interpreted in the following way. If C(h) represents the consumption duration curve (Figure 12, in orange). C(h) is the hth highest consumption during the year. Then, the 200h reserved volume can be expressed with the relation [2]. This formula takes also into account the LOLE hours (as defined by the reliability standard (below referred as 'LOLE RS').

[2] 200h reserved volume = C(LOLE RS) – C(200+LOLE RS)

The two-steps methodology is graphically illustrated on Figure 12.

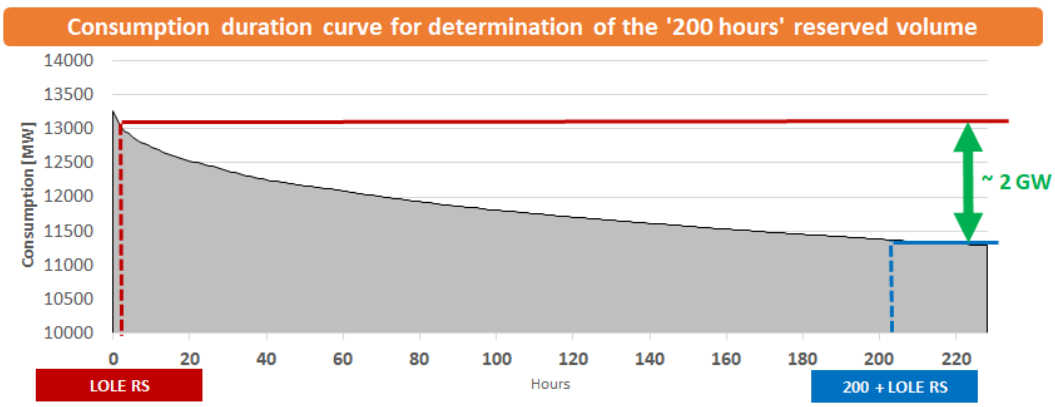


Figure 12: 200h reserved capacity - example

This suggestion would lead to an estimate amount of reserved capacity between 1.5 and 3 GW, which is in line with the amount of capacity expected by the Parliament to be reserved (cf. supra)[28].

Such a formulation ensures:

1) higher likelihood to be **compliant with the reliability standard,** as this formulation avoid the risk to have not enough capacity to be contracted in the Y-1 auction in order to reach the 'CRM Required Volume'.
2) **technology neutrality**. There cannot be any discrimination against capacity with high marginal costs, like demand response. Technology neutrality is guaranteed by the fact that every technology can participate in the Y-4 auctions which includes also CMUs with a long lead time that will apply for long-term contracts.
3) **enough liquidity** in the Y-4 auction and in the Y-1 auction. This suggestion will allow technologies with a long lead time to participate in the Y-4 auction and therefore increase the competition and reduce the prices.
4) **price reduction**. Reporting a lot of capacity to Y-1 can lead to less competition. Having a lot of capacity in Y-1 is not in line with methodologies in other countries and can lead to be obliged to contract much more expensive solutions that would not have been contracted with a higher competition in Y-4 auction.
5) **limited risk of overprocurement** for the Y-4 auction regarding the volume reserved for the Y-1 auction. Contracting 2 to 3 GW (see chapter 1, 45-47) in Y-1 on 11 to 13 GW to be contracted in the mechanism is in line with the mechanisms developed in other countries.
6) **overall design consistency**. The suggestion is in line with the 'CRM Required Volume' and other concepts of the overall CRM Design as this solution does not depend on the fixation of a price for the capacities that fill the gap.
7) **consistency with other European CRM design** (see part I, point 47). The relative split is in line with the one of the existing CRM design.

[28] It needs to be reminded here that, considering an illustrative derating of 50%, this 1.5 to 3 GW range would, if filled with Demand side response, correspond to a volume of 3 to 6 GW, **the equivalent of one fourth to one third of Belgium's peak consumption**! This goes far beyond the targets in terms of Demand side response as expressed in Energy Pact, and hence demonstrates that, on top of the advantages listed hereunder, the proposed interpretation of the 200h is fully in line with the purpose as expressed in Article 7undecies, §2 of the CRM Law.

2.3.4. Y-1 Auctions

The whole process to determine the 'CRM Required Volume for Y-1' auctions can be summarized by Figure 13.

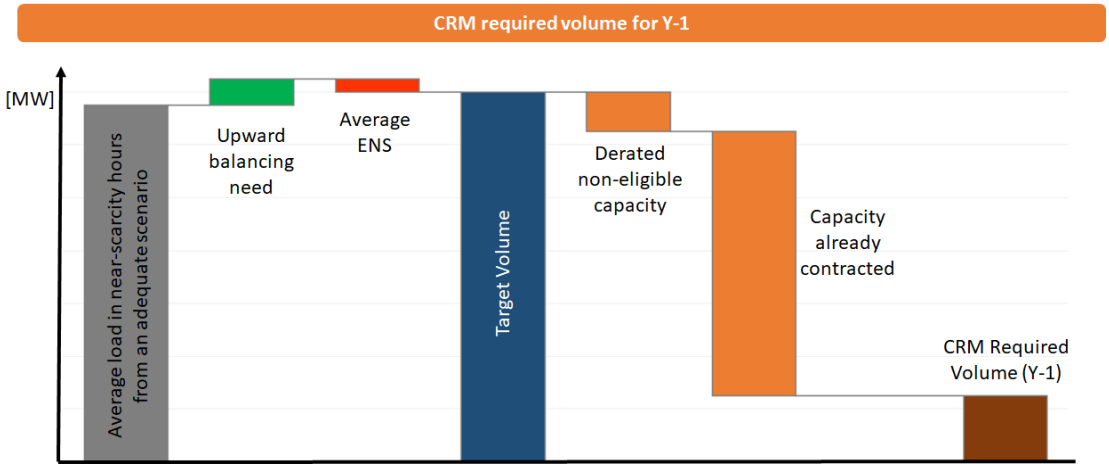


Figure 13: 'CRM required volume' calculation (Y-1 auctions)

2.3.5. Y-4 Auctions

The whole process to determine the 'CRM Required Volume for Y-4' auctions can be summarized by Figure 14.

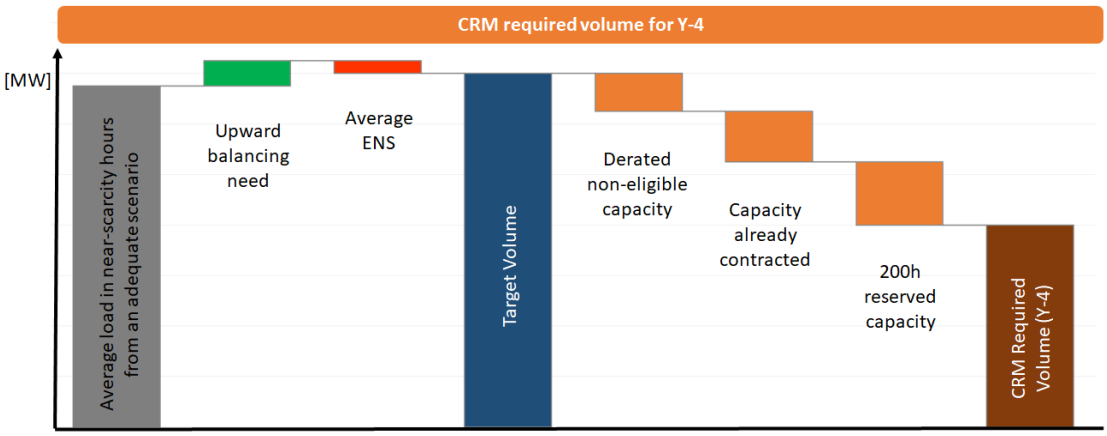


Figure 14: 'CRM required volume' calculation (Y-4 auctions)

2.4. Net-CONE

The CRM methodology should ensure that new-built capacities are able to take part in the CRM. As explained in point 16 to 18 of the remarks of the draft note of the CREG, there is new capacity needed in order to meet the desired reliability standard. This need is not decreasing in the long run as confirmed by different studies (see points 16 to 18 of the present note).

Therefore, the concept of Net-CONE is introduced. It represents the revenues that the best new entrant technology would need to earn in the capacity market to compensate for its 'missing money' in the energy market for 1 year.

It is calculated by removing market revenues and ancillary service revenues from the Gross-CONE (Figure 15). The Gross-CONE is defined by the sum of the annual total fixed operational and maintenance (FOM) and annualized investment cost of the best new entrant technology on its entire lifetime in the electricity market and is expressed in [€/(kW.year)].

Note that the Net-CONE and Gross-CONE are closely linked to a particular technology. A derating factor is associated to this technology, as explained in the appropriate design note[29]. Therefore, these values must be also derated in order to be consistent with the whole design. In the present document, the units used for the Net-CONE and Gross-CONE should be understood as derated power.

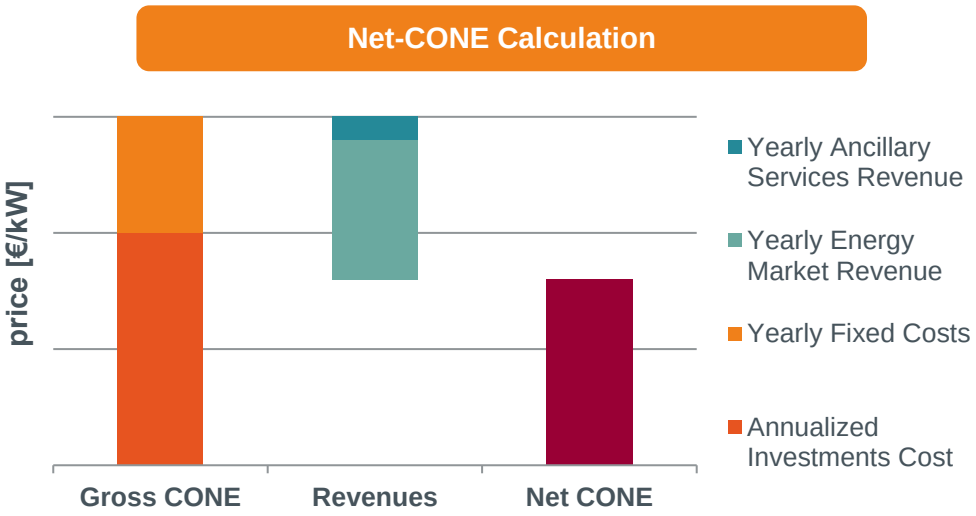


Figure 15: Net-CONE calculation

The purpose of the Net-CONE is to guarantee the complementary nature between the electricity market and the capacity market. Indeed, if the revenues from the electricity

[29] Elia (2019). Formal public consultation on the CRM design notes (Part II), https://www.elia.be/en/public-consultation/20190902-formal-public-consultation-on-the-crm-design-notes-part-ii

market increase, the CRM needed revenues will decrease, since the Net-CONE will be lower.

The calculation of Net-CONE will be calibrated each year. On the one hand, the Gross-CONE will be subject to an assessment that can be updated if relevant based on latest available data (investment cost estimation, arrival of new technologies…), or every three years. On the other hand, the energy market and ancillary services revenues will be determined each year. Market revenues calculation will be based on the appropriate scenario defined in §2.1. Ancillary service revenues estimation will also be yearly updated in order to comply with the latest available assumptions.

2.4.1. Gross-CONE

The methodology to determine the Gross-CONE will be described in the European methodology '*Methodology for calculating the Value of Lost Load, the Cost of New Entry for generation, or demand response, and the Reliability Standard'*, according to the 'Clean Energy Package'.

The European methodology is currently at draft stage and under public consultation. As long as is not final, submitted and approved by ACER, Elia proposes to determine the Gross-CONE by the methodology presented below. The methodology presented shall be updated if necessary to comply with the European methodology by ENTSO-E.

A **first step** is to scope technologies that could be considered for Net-CONE out of all eligible technologies based on solid reasoning. The eligible technologies for the capacity remuneration mechanism shall be assessed in a technology-open, non-discriminatory way. The purpose of this step is to provide an argued short-list of technologies. This shortlist will be established on the following criteria:

1) The technology should be a "new" entrant, i.e. the required infrastructure to deliver energy is not in place yet.
2) A list of potentially eligible technologies will be done based on all current power sources in Belgium and technologies that could become reasonably available for the target year.
3) For the listed power generating technologies a basic assessment but strongly supported by assumption descriptions in terms of their profitability is made. This shall allow focusing on the most cost-efficient technologies and subsequently assess their Cost of New Entry. A possible measure for a first, order-of-magnitude screening of profitability can be the Levelized Cost of Electricity (LCOE). The calculation of the LCOE assumes a certain number of full-load hours, which has to be taken into account. However, they are a reliable measure for a first general assessment of the costs incurred by running a certain type of power unit. For capacity-providing technologies such as storage and Market Response adequate calculations are to be provided to quantify their costs of supply. Cost parameters like LCOE should be considered per derated MW, as this is the product bought in the CRM.
4) The listed technologies are reduced to a smaller selection based on financial performance but also on general requirements such as not being able to comply with CO2-emission limits or any legal constraints related to the technology.

5) The technology should be a qualitative reference, i.e. it should a generic representation which accurately reflects costs and revenues of other units of the same technology and based on reliable data.

Reference technology shall be reviewed upon revision of the KB methodology on yearly basis.

A **second step** is to perform a detailed cost study on the short-listed technologies. This study results in the determination of the Gross-CONE. The study will be performed by a relevant expert. Regular updates and exchanges with the relevant stakeholders are envisaged in order to reach a global agreement on the process and the results for the first iteration and above mentioned revisions.

2.4.2. Market revenues

Market revenues shall be calculated for the entire lifetime of the reference technology based on the scenario defined in §2.1 and subsequently annualized. If no scenario exists for at least one target year, pivotal years will be determined and a linear interpolation will be performed for the years with unavailable data.

Figure 16 presents an example of market revenues. In this case, only 4 scenarios have been developed (2025, 2028, 2030 and 2035) at European level (ERAA or TYNDP). The yearly market revenues are calculated for these so-called pivotal years (dark blue points). For the other years, a linear interpolation is made between the available years (light blue points). As no data is available after 2035, the market revenues are assumed to be constant (no extrapolation assumption).

The market revenues for a given year are calculated by taking into account the strike price as upper threshold and as defined in CRM Design Note – Payback obligation[30], §4-5, the marginal cost of the technology [€/MWh], as lower threshold, and P-50 on every 'Monte-Carlo'.

The revenues are expressed in [€/MW]. For a specific CMU, the total yearly market revenues are determined by multiplying the yearly revenues by the nominal reference power, expressed in [MW]. Then, the total market revenues on the lifetime of the contract is calculated by the sum of the yearly market revenues on each year subject of the contract.

[30] Elia (2019). Formal public consultation on the CRM design notes (Part II), https://www.elia.be/en/public-consultation/20190902-formal-public-consultation-on-the-crm-design-notes-part-ii

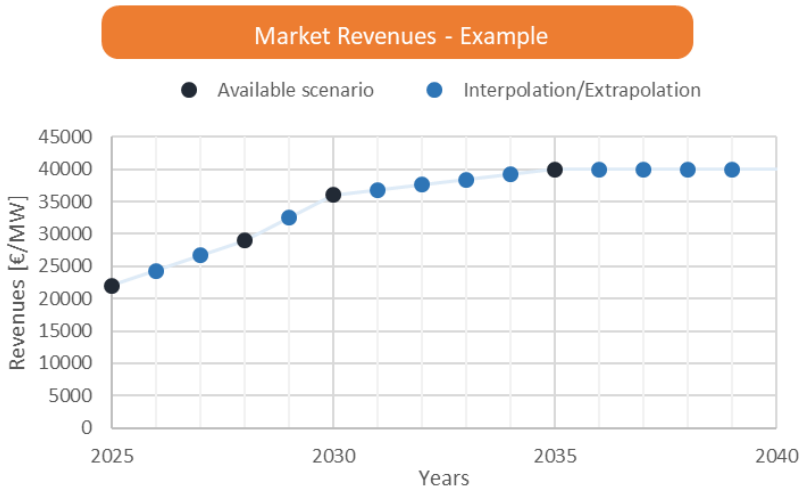


Figure 16 : Example of market revenues calculation

2.4.3. Ancillary services revenues

Not all capacity participates in the ancillary service markets as either they may technically not be capable of delivering the respective services and/or the volumes needed are far below the level of installed capacity (order of magnitude of 1 GW compared to a peak load of about 14 GW to be covered)[31]. Furthermore, it should be kept in mind that participation in ancillary service products such as FCR, aFRR and mFRR requires capacity to be available while not necessarily being used. Although activation costs can be covered in some ancillary service products and depending on the market design could result in an extra revenue, by being reserved for those products the energy that could be delivered by the capacity can no longer be sold in the energy market and therefore no revenue can be earned there. This implies that there is a trade-off to be made and that by opting for participation (and revenues) from the ancillary services market, the opportunity for revenues from the energy market is lost. So one should remain careful not to double count some revenues.

At overall market level the reservation costs of ancillary services in any case remains limited. In 2017 and 2018 the total reservation cost for FCR, aFRR and mFRR amounted to approximately 70 M€/yr and 125 M€/yr, respectively. Note that 2018 was characterized by particularly higher prices due to the specific winter situation. Assuming an installed capacity in Belgium of about 15 GW, this would only amount to 4 to 8.5 €/(kW.year), while bearing in mind that this may come with an opportunity loss of not

[31] See also in Elia's adequacy and flexibility study, §2.9.7, p.85
Elia (2019). Adequacy and flexibility study for Belgium 2020-2030. http://www.elia.be/~/media/files/Elia/publications-2/studies/20190628_ELIA_Adequacy_and_flexibility_study_EN.pdf

capturing revenues from the energy market.

To make for a robust inclusion of these revenues, Elia proposes to include net ancillary services revenues in the same way as described in the royal decree proposal concerning the intermediate price cap[32]:

- They correspond to the average historical costs of reservations by the TSO for balancing services, based on the last thirty-six months;
- They are reduced by the costs of delivering these ancillary services for balancing (including “must-run”);
- They take into account the opportunity loss associated to participation in the Ancillary Services.

The addition of this revenue component is on the condition that the chosen reference technology is technically capable of participating in Ancillary Services.

[32] https://www.elia.be/-/media/project/elia/elia-site/ug/crm/20191122_royal-decree-methodology-elia-proposal_fr_nl.pdf

2.5. Concept of a demand curve

The demand curve can be understood as representing society's willingness to buy different levels of capacity in order to avoid adequacy issues as a function of the cost of this capacity and is defined by a yearly Ministerial Decree.

In the framework of the Belgian CRM, the demand curve is a crucial aspect to calibrate the auction. Therefore, the demand curve will be constructed around a reference point characterized by two parameters:

- the 'CRM Required Volume' to meet the legal reliability criteria, as presented in §2.3;
- the net-CONE needed to ensure that new-built capacities are able to take part in the CRM, as presented in §2.4.

The 'CRM Required Volume', as mentioned in §2.3, is dependent of the definition of the legal reliability standard, expressed in this case in terms of loss of load expectation (LOLE). The purpose of the following paragraphs is to demonstrate the relevance to construct the demand curve around this point (more detailed argumentation can also be found in points 30 to 33 and BOX 2 of the present note).

The argumentation will be based on the relation [3]:

[3] LOLE [h/year] * VoLL [€/MWh] = Gross-CONE [€/(MW.year)]

This relation would ensure an optimal level of security of supply determined by the point at which the incremental cost of additional capacity insuring customers against load curtailments (Gross-CONE) is equal to the incremental cost of load curtailments to customers (incremental volume of Expected Energy Not Served expressed as LOLE, valued at VOLL). This is demonstrated in Box 2 in the remarks on the draft note of the CREG. For this reason, the demand curve will be calibrated around the optimal point, defined by a LOLE.

<u>In the formula [3], the different parameters are:</u>

- **Gross Cost Of the best New Entrant** (Gross-CONE or CONE), defined by the sum of the technology-specific annualized investment cost and the annual Operation & Maintenance (O&M) costs of new facilities. It is expressed in [€/MW/year]. The Gross-CONE doesn't take into account market revenues and ancillary service revenues, which are removed from Gross-CONE to determine the Net-CONE;
- **Value of Lost Load (VoLL)**, defined as an estimation of the maximal electricity price that the final client would consent to pay in order to avoid an electricity supply shortage. It is expressed in [€/MWh];
- **Loss of Load Expectation (LOLE)**, defined as the anticipated number of hours during which it will not be possible for all the Generation resources available to the Belgian electricity grid to cover the load, taking into account the capacity from interconnectors, for a statistically normal year. It is expressed in [h/year].

In this suggestion, the demand curve is constructed around the ‘CRM Required volume’. This point is assumed to be at economic equilibrium since the associated reliability standard is reached. The calibration of the rest of the curve should also be constructed in such a way that this fundamental relationship is still met.

2.6. Determining points of a demand curve

The demand curve is characterized by two main parameters, the capacity on the abscissa, expressed in [GW], and the price on the ordinate, expressed in [€/(kW.year)].

The shape of the demand curve will be different depending of the auction (Figure 17).

For the Y-4 auction, the demand curve should be more elastic and will be calibrated around the reference point that meets the reliability standard. The Y-4 demand curve has a downward slope. This does not only reflect the willingness to pay concept, but it also generally allows to mitigate market power. A sloped curve also allows to avoid contracting capacities whatever the price and to increase the competition in the Y-4 auction, since there still is a second opportunity to contract capacity in Y-1 in order to reach the reliability standard. On the left side, less capacity could be contracted if the price is higher than the price associated with the required volume to be contracted. On the other side, the demand curve should not allow to contract more volume than strictly necessary to meet the reliability standard to avoid overprocurement. Therefore, the demand curve will be designed with a vertical line once the required volume for the Belgian adequacy is met.

For the Y-1 auction, the demand curve should be a vertical line with a maximum price level because the 'CRM Required Volume' need to be met to be compliant with the reliability standard, as Belgium is required to be adequate after the auction process. However, a price limit is needed to avoid contracting too expensive technologies, mainly if the sum of all bidding capacities in the auction is lower than the 'CRM required volume'.

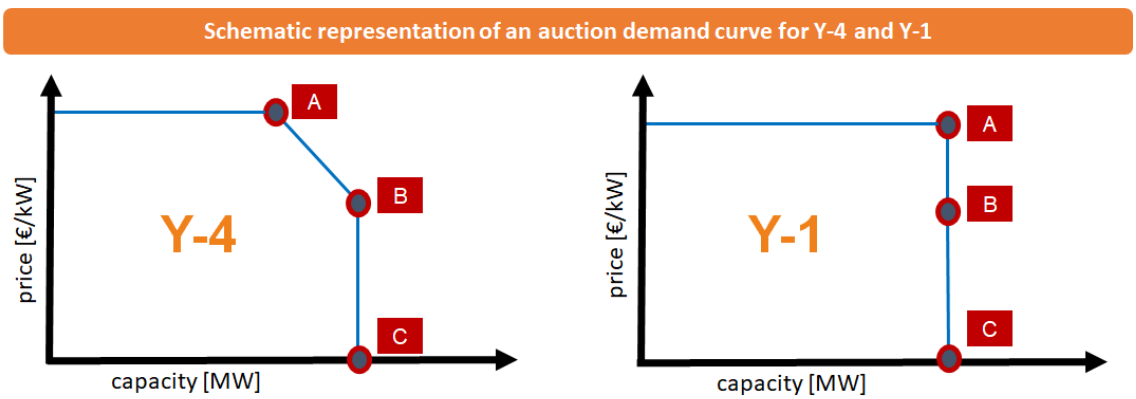


Figure 17: Schematic representation of an auction demand curve

The demand curve suggested in this chapter will therefore be defined by three points.

- **Point A:** represents the maximum capacity that can be contracted at the maximum price the society wishes to pay. This price is called **'global auction price cap'**. The associated volume depends on the auction. It will be equal to the **'CRM Required Volume'** in Y-1 auction and to a lower volume called the **'CRM Maximum Volume at global auction price cap'** in Y-4 auction;
- **Point B:** represents the targeted capacity to be contracted, called the **'CRM Required Volume'** in this design note. This volume is calculated to be compliant with the Belgian reliability standard, as referenced in Article 7undecies, §3 of the CRM Law. The associated price is called the **'Net Cost Of New Entrant' ('Net-CONE')**.
- **Point C:** represents the **'CRM Required Volume'** with a price set to 0. The line B-C is implemented in order to avoid overprocurement. No additional capacity is required to meet the reliability criteria.

This suggestion is in line with the demand curves proposed in CRMs implemented in other European countries (see Box 3.1) and also with the one used by PWC in its analysis[33] (see Box 3.2).

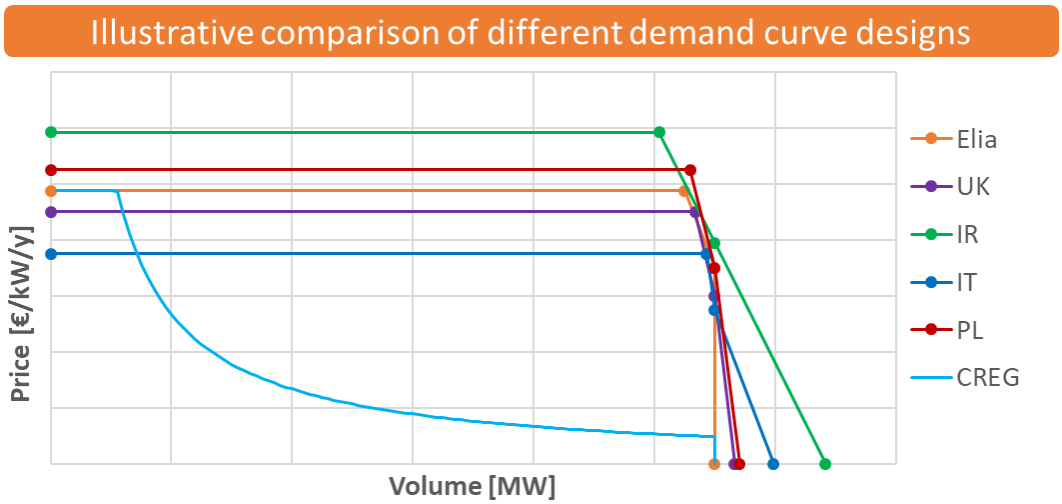
Moreover, this suggestion is only based on parameters associated with the demand side. It does not require to make assumptions on the offer curve and the capacities that would be contracted by the mechanism. It is therefore more robust to deal with adequacy concerns.

[33] https://economie.fgov.be/sites/default/files/Files/Energy/Rapport-Determination-du-mecanisme-de-remuneration-de-la-capacite-belge-et-preparatio-du-cadre-legislatif.pdf

BOX 3.1 : Demand curve – Comparison with other countries

In the same manner as presented in BOX 1, Elia's suggestion can be compared to other existing demand curve from other countries CRM.

Figure 18 presents a Y-4 auction demand curve. It shows that Elia's suggestion is in line with the design from existing CRMs.



Y-axis: based on the absolute values used in each CRM
X-axis: based on an estimation of the impact each design would have on the volume requirements if those would be translated to Belgium
For the CREG proposal, it was assumed that the target volume is well defined (see our points 1 to 13) and a budget of 107 M€ (highest value provided).

Figure 18: Comparison of different Demand Curve Designs

BOX 3.2 : Demand curve – PWC proposal

In the report from the 9th of March 2018 "Détermination du mécanisme de rémunération de la capacité belge et préparation du cadre législatif", §2.1 and §2.2.9.2, PWC already mentioned a demand curve with a shape based on 3 points (in blue, below). This curve had been built based on a benchmark of other existing CRMs. Elia's suggestion differs in the way that a vertical line is assumed when the 'CRM Required Volume' is reached.

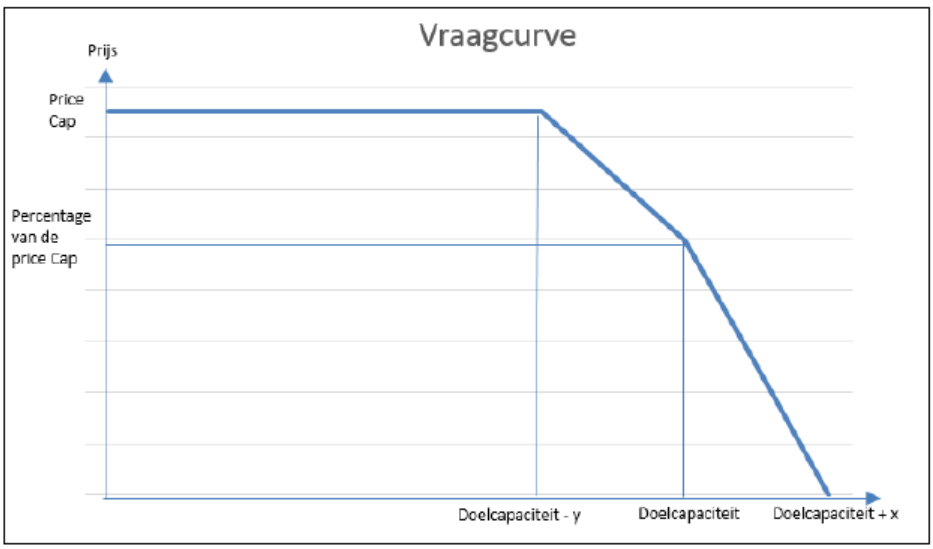


Figure 19: Demand curve from PWC study

« Si l'objectif de capacité est déterminé, deux volumes de capacité, s'ajoutant à l'objectif de capacité, sont calculés et divergent de cet objectif de capacité, à savoir un volume se situant X MW au-delà de l'objectif de capacité et un autre se situant Y MW sous ledit objectif de capacité. Ces capacités reflètent la volonté de payer pour un critère plus strict relatif à la sécurité d'approvisionnement ou à partir d'un prix auquel un critère moins strict peut être accepté. Le choix de X ou Y est un choix social, dépendant de la valeur attribuée à la sécurité d'approvisionnement. Dans un cas extrême, X et Y peuvent même être égal à 0. Dans ce cas, le pays est disposé à payer un prix se situant entre le price cap et 0 euro/MW afin de satisfaire au critère de sécurité d'approvisionnement. Dans certains mécanismes (par exemple, le mécanisme irlandais), la possibilité existe de définir plusieurs autres points, s'ajoutant à ces trois points, pour lesquels une volonté de payer est déterminée, de telle sorte que la courbe soit plus détaillée. (…)

La courbe de la demande doit également tenir compte des engagements déjà pris, tels que, par exemple, les contrats de capacité pluriannuels dans le cas de la nouvelle capacité. Le volume de capacité souscrit de cette manière doit donc être déduit du volume de capacité devant encore être acheté. (…)

L'objectif de capacité total dépend de la capacité nécessaire afin de respecter le critère prédéfini relatif à la sécurité d'approvisionnement. »

2.7. Point A in Y-4 auctions

2.7.1. Global auction price cap

The global auction price cap is defined as the maximum price the society wishes to pay and corresponds to point A ordinate. This maximum price takes into account some uncertainties on the estimation of the Net-CONE, like technology choice, assumptions on cost or assumptions on revenues.

Therefore, it can be expressed as a percentage of the Net-CONE, as presented in equation [4]:

[4] Global auction price cap = (100+X [%]) * Net-CONE

According to parameters from other European CRMs, the X-value is between 25% (UK) and 50% (IR, PL).

Elia would suggest to establish a first value of X based on the observed order-of-magnitude variability of Gross-CONE and revenues that go into calculating Net-CONE in different assumptions, compared to the Net-CONE reference value. In either case a public consultation will yearly be held on these matters, prior to being adopted by Ministerial Decree.

2.7.2. Proportionality

The points A and B will be linked in order to provide a proportionality between the prices and the capacity.

The value of the global auction price cap (ordinate of point A), will be expressed as a percentage of the net-CONE (ordinate of point B), in order to take into account some uncertainties on the estimation of the Net-CONE. The same value will be used to link the abscissa of points A and B, through the associated reliability criteria. The global relation between point A and B can be expressed as:

[5] $$\begin{cases} Global\ auction\ price\ cap = (100 + X\ [\%]).Net - CONE_B \\ LOLE_A = (100 + X[\%]).LOLE_B \end{cases}$$

These two relations guarantee the proportionality between the cost and the adequacy criteria in the framework of the CRM. If the X value increases, meaning that there are more uncertainties on the Net-CONE determination, the global auction price cap will be higher. In the same way, the reliability standard will also be set to a higher value, meaning than more near-scarcity hours are accepted in the system. Therefore, the average load in near-scarcity hours will be lower and the average energy not served in near-scarcity hours will be higher, leading to a lower capacity to be contracted, called the ‘CRM Maximum Volume at global auction price cap’.

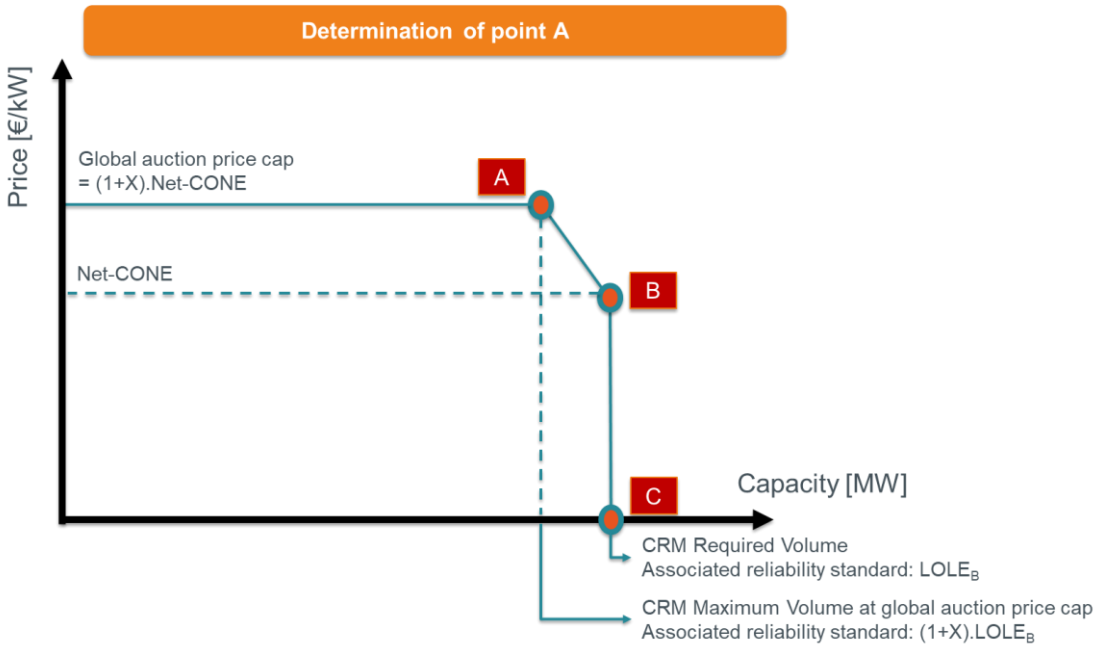


Figure 20: Proportionality in the determination of point A.

2.7.3. CRM Maximum Volume at global auction price cap

The 'CRM Maximum Volume at global auction price cap', expressed in [MW], corresponds to point A abscissa of the auction demand curve. As a reminder, the principle presented hereunder on the 'CRM Maximum Volume at global auction price cap' only applies to the Y-4 auction, since point A abscissa in the Y-1 auction is equal to the 'CRM Required Volume' (§2.3).

This point will be determined in a consistent way with point B but using the relation from formula for the LOLE at point A [5].

In the **first step**, the average load in near-scarcity hours has to be determined, following the same logic as defined in §2.2.1 . The main difference with the average load at point B is that another criterion (based on formula [5]) is taken into account defined as a number of LOLE hours corresponding to a percentage of the LOLE hours in point B (§2.7.2).

The balancing needs are added to this volume in a **second step**.

The **third step** consists in removing the average ENS during near-scarcity hours (with the criterion defined in the first step). The ENS at point A is determined as an output of the simulation.

The **last step** of the methodology is to remove some capacity that will not take part in the auction process from the new 'Target Volume', in the same way as for the calibration of point B (§2.3):

- The non-eligible capacity will be removed by multiplying the reference power of each capacity by its derating factors, as defined in CRM Design Note - Derating Factors[34], §3;
- The capacity contracted from previous auctions will be removed by taking into account the derated contracted capacity;
- For the Y-4 auction process, the same 200h reserved capacity has to be removed to be consistent with the point B methodology.

The comparison between points A and B abscissa is summarized in Table 5.

Criteria	'CRM Required Volume' Point B	'CRM Maximum Volume at global auction price cap' Point A
LOLE [h/year]	$LOLE_B$, depending on reliability standard	(100+X [%]).$LOLE_B$
Target Volume [MW]	Volume_B	$\text{Volume}_A < \text{Volume}_B$
Non-eligible capacity [MW]	Same for all points since the reference power of this capacity and derating factors remain the same.	
Capacity from previous auction [MW]	Same for all points since this capacity is based on previous contracted values.	
200h reserved capacity (Y-4 auction) [MW]	Same for all points since this capacity is defined only once for a Y-4 auction.	

Table 5: CRM Volume parameters

[34] Elia (2019). Formal public consultation on the CRM design notes (Part II), https://www.elia.be/en/public-consultation/20190902-formal-public-consultation-on-the-crm-design-notes-part-ii

2.8. Data from the TSO

As mentioned in the introduction of this chapter 2, the Clean Energy Package implies that also the NRA has a role to play in the determination of the demand curve and its parameters. In order to ensure that both the TSO and the NRA can perform their respective tasks, Elia will provide the set of necessary data to the CREG in order for them to perform their assigned tasks. The exchange of information is particular relevant in the framework of proposing the following parameters:

- the net-CONE;
- the X parameter to determine the global auction price cap;
- the 'CRM Required Volume';
- the 'CRM Maximum Volume at global auction price cap'.

Therefore, in the report(s) that the TSO will provide, the following information will be included:

- a suggestion for the gross-CONE as mentioned in §2.4.1
- a suggestion for the market revenues for the reference technology as mentioned in §2.4.2;
- a suggestion for the ancillary services revenues as mentioned in §2.4.3;
- a suggestion for the X parameter, after public consultation as mentioned in §2.7;
- the average load during near-scarcity hours, based on the simulation output, for the 'CRM Required Volume' as mentioned in §2.2.1, and for the 'CRM Maximum Volume at global auction price cap' as mentioned in §2.7.2;
- the average energy not served during near-scarcity hours, based on the simulation output, for the 'CRM Required Volume' as mentioned in §2.2.1, and for the 'CRM Maximum Volume at global auction price cap' as mentioned in §2.7.2;
- the consumption duration curve, needed to determine the 200h reserved capacity, as mentioned in §2.3.3.

In addition, also the derating factors for each technology are foreseen to be provided by Elia, as well as all available information on non-eligible capacities and already contracted volumes.

ANNEX 1: Balancing reserves in other CRMs

	Source: National Grid EMR, Electricity Capacity Report, 31 May 2017 *A.5.5 Reserve to cover largest infeed loss (Reserve for Response)* *National Grid has to hold capacity in reserve in order to maintain system operability if a loss of generating capacity occurs. This capacity has to be accounted for in the LOLE calculation and is added to the peak demand assumptions.*
	Source: I-SEM, Capacity Remuneration Mechanism (CRM): Parameters for T-4 2022/23 Capacity Auction, 28 September 2018 *4. Capacity Requirement* *4.1 Introduction* *4.1.1* *In the Capacity Requirement and De-rating Factor decision (SEM-16-082) the SEM Committee decided that operating reserve will not initially be included in the CR; pending further evidence from the TSOs supporting the need for such inclusion* *4.1.3* *However, the SEM Committee decided to consult again on the approach to inclusion of operating reserves in the CR, and on the LOLE standard, recognised that (…)the TSOs have recently provided new evidence on how they will operate the system at times when available operating reserve is less than target levels, which provided more concrete evidence on incidences of lost load.* *4.2 Consultation summary* *4.2.4* *There are two key reasons why the SEM Committee may consider including an operating reserve requirement in the CR:* *• Moves to harmonise the definition of the CR across the EC discussed above; and • Suggestions that a "theoretical" 8-hour LOLE standard will not be achieved in practice, unless at least some proportion of the operating reserve requirement is included in the CR.* *4.5 SEM Committee decisions* *4.5.2* *The SEM Committee has decided to reflect a measure of operating reserve in the demand curve for T-4 auctions. The level of reserve to include will be no less than 100MWs, and no more than 500MW at the all-island level. However, the final decision on the precise measure to include in the All-Island demand curve will be taken following the supplemental consultation regarding inclusion of reserves in constrained regions* *4.5.3* *The IAIP for the CY2022/23 T-4 auction which was published on 28 September 2018, did not reflect any measure of reserve in the Capacity Requirement. The Capacity Requirement for any given*

	auction is fixed at the IAIP stage. However, the SEM Committee will use it powers under the CMC to direct the TSOs to adjust the demand curve included in the FAIP to reflect the decision on the level of reserves to include at AllIsland level made following the supplemental consultation.
	Source: European Commission, State Aid SA.42011 (2017/N) – Italy – Italian Capacity Mechanism, 7 February 2018 *(32)* *Assumptions and methodologies used by the TSO in its adequacy assessment model are essentially the same as the ones used in the ENTSOE's Mid-term Adequacy Forecast (MAF).* *(…)* *Moreover, the TSO's assumptions regarding reserves and demand growth are less conservative than ENTSO-E's.* Source: Terna, Rapporto Adeguatezza Italia, 2019 *Il margine di adeguatezza individua per ciascun'area geografica e periodo di analisi la differenza tra:* *- la somma tra la capacità produttiva disponibile e l'importazione di energia elettrica dalle aree contigue;* *- il fabbisogno di energia elettrica aumentato della necessaria riserva terziaria di sostituzione (intesa come capacità produttiva resa disponibile al Gestore ai fini dell'incremento o del decremento dell'immissione di energia elettrica nell'ambito del bilanciamento).*