CRM Design Note: Payback Obligation

April 2024

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1 Introduction & context

1.1 Context and Goal of this updated Design Note

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

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

The purpose of this updated design note is to provide all stakeholders with a clear actual view concerning the methodology for determining the Payback Obligation, the Reference Price and Strike Price in the context of the Reliability Option.

Legal Framework

As a reminder, the concept of Reliability Option implying a Payback Obligation originates from the Electricity Act setting up a Capacity Remuneration Mechanism (article 7 undecies), adopted on April 4th 2019[1] (hereafter "CRM Law"), modifying the Electricity law of 29 April 1999 on the organization of the electricity market.

In Art. 2 the following elements are defined:

- The Reliability Option is defined as:" the capacity remuneration mechanism for which the Capacity Provider has to re-imburse the positive difference between the Reference Price and the Strike Price.
- The Reference Price is defined as: "the price reflecting the price that should be obtained by the Capacity Providers on the market".
- The Strike Price is defined as:" the predefined price that determines the threshold above which the Capacity Provider has to pay-back difference with the Reference Price".

[1] LOI - WET (fgov.be)

1.2 Structure of the design note

The purpose of this updated design note is to provide the market actors with the latest relevant evolutions linked to the Payback Obligation and its components.

Section 2 will describe the simplified Payback Obligation formula structure and its main ingredients.

Section 3 describes the main principles of the Reference Price.

Section 4 describes the main principles of the Strike Price.

Section 5 aims to discuss other relevant complementary modalities related to the Payback Obligation.

Finally, section 6 covers the complete presentation of the formula of the Payback Obligation applicable in function of the different CMUs (energy constrained or not, daily schedule or not, ex-ante or ex-post Transactions).

1.3 Concept of Reliability Option & Payback Obligation

The Reliability Options concept in the CRM can be summarized as:

In the Belgian CRM with a Reliability Option, the Capacity Provider receives a fixed Capacity Remuneration in exchange of a commitment to be available in the future, but he is obliged to payback money to society (the so-called "Payback Obligation") whenever the reference energy price (e.g. Day-Ahead price) exceeds a pre-defined Strike Price (i.e. a pre-determined price level expressed in €/MWh) and are deemed excessive.

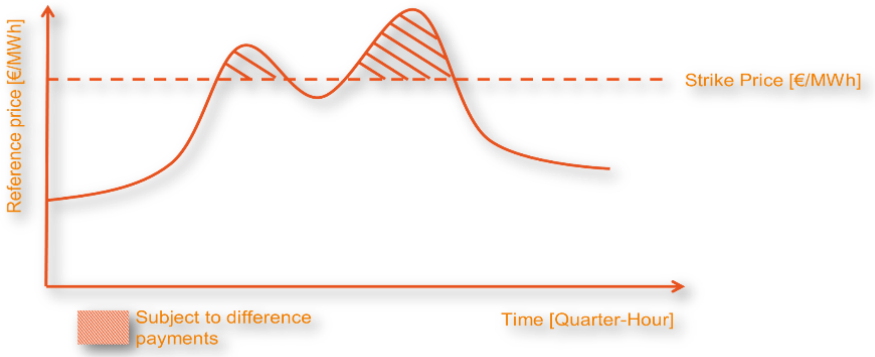


Figure 2: Payback Obligation trigger concept

This approach has two advantages for society:

1) It contributes to the avoidance of windfall profits**.** As the Capacity Provider already receives a fixed Capacity Remuneration to cover for his missing money in exchange of his commitment to be available in the future, capturing extreme energy prices would provide him with an excessive remuneration insofar these revenues have not been accounted for when determining his offer price in the CRM. This would constitute a windfall profit which would go beyond the objective of the CRM.
2) It strengthens the availability incentive for capacity providers. It can be assumed that Payback moments (when the reference energy price exceeds the Strike Price) will be strongly correlated with moments of (near-) scarcity during which Capacity Providers will be expected to be available (AMT MTUs). During such moments, the Payback Obligation can be seen as an extra incentive for Capacity Providers to be available for the system. Indeed, as they would have to payback an amount based on assumed energy market revenues, they have the incentive to actually deliver on energy in the energy market to earn those revenues in the first place.

2 Payback Obligation design

In this chapter, the proposed Payback Obligation formula is defined and its constituting elements are briefly introduced in order to provide already a high-level view. In the upcoming chapters, each of these constituting elements is further explained and detailed.

2.1 Reliability Option & Payback Obligation

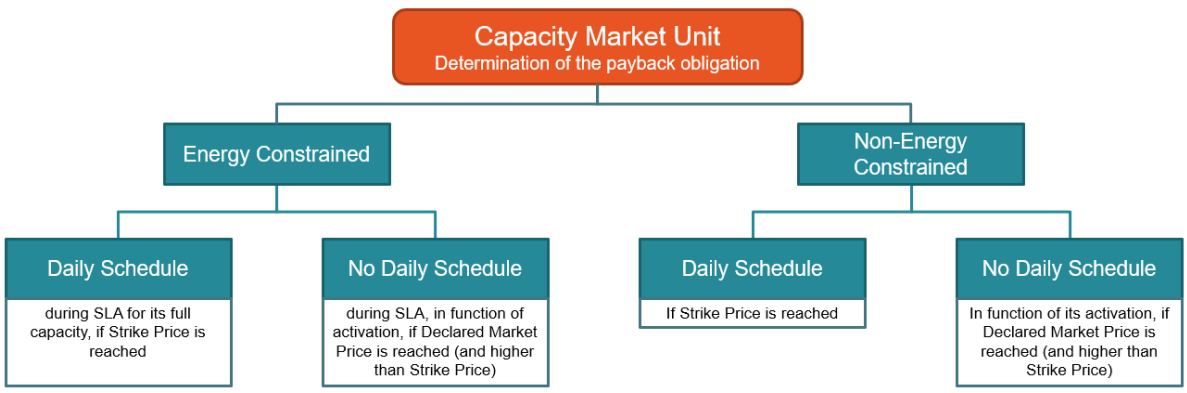
The Payback Obligation formula is representing the Reliability Option principle applicable in the Belgian CRM according to which energy market revenues earned above a pre-defined threshold, the Strike Price, for capacities in the CRM will have to be reimbursed to society during the Delivery.

This calculation will occur for all types of units participating to the CRM without distinction. However, the way to apply and calculate the Payback Obligation may differ depending on whether or not the CMU has a daily scheduling obligation. Furthermore, an exemption for the payback obligation for Demand Side Management (DSM) or more general pure offtake points is under development.

Following the Royal Decree Methodology, the calculation of a Payback Obligation always results out of the **positive** delta between the Reference Price and the Strike Price and has to be applied on a transaction basis, potentially at each moment of the delivery period during which there would be a Payback Obligation. The modalities and possible exemptions related to the volume used for the calculation will be further detailed in section 5. The amount that should be reimbursed in case of Payback is calculated **ex-post** in euro (€) when comparing the relevant Reference Strike & Strike Price and is limited by an upward limit called the Stop-loss amount.

The figure below gives an overview of the applicability of the Payback Obligation in function of the type of CMU (constrained in energy or not, subject to a Daily Schedule obligation or not). More information is provided later in the document on the concepts applicable for:

- CMUs not subject to a Daily Schedule Obligation and to ability provide a Declared Market price (see section 4.3).
- CMUs that are energy-constrained (see section 5.3).



2.2 The Payback Obligation formula

The Payback Obligation formula is applicable for each capacity of a Capacity Provider being contracted in the CRM. However, within a CMU, a distinction must be made between its different transactions. Indeed, a CMU could provide, during the same delivery period “t”, obligations coming from one or more auctions and/or obligations coming from one or more secondary market transactions as well.

Since each transaction is always linked to a specific strike price (calculated towards the Auction and applied to all transactions following the relevant Auction), each of these transactions are likely to trigger different *Payback Obligation calculations* in function of the parameters applicable to the targeted Transactions (strike price for example). In other words, each different transaction (either primary or secondary) might have a different strike price for the same delivery period.

As a conclusion, the simplified formula for a CMU Payback Obligation can be described as the sum of its Payback Obligations (being the positive delta between the Reference Price and its Strike Price linked to the Transaction of the CMU) multiplied by the Contracted Capacity linked to the same transaction.

The Payback Obligation Formula

The Payback Obligation formula for a given CMU is:

For all t moments covering the Transaction of the CMU,

Payback Obligations (CMU, t) =

Sum on all Transactions of the CMU:

(Reference Price (t) – Strike price (CMU, Transaction) Contracted Capacity (CMU, t, Transaction Id) [in €]*

As mentioned above, the formula highlighted is simplified and will be further detailed and explained in this document. It is already worth mentioning that a Payback Obligation is to be paid in function of the relevant capacity to be considered. Stated otherwise, a CMU does not always to payback for its entire Contracted Capacity due to a potential announced unavailability (Availability ratio) or to a partial activation (Activation ratio).

The Reference Price formula is defined in section 3 whereas section 4 describes the Strike Price in detail.

More light is shed on the capacity for which a CMU has to payback by taking into account her Availability and/or (partial) activation in section 5.

3 Reference Price

The Reference Price must represent the most relevant energy market price signal (€/MWh) of the Belgian energy market **capturing relevant moments for adequacy**, while sufficiently distinguishing with moments that are *not* relevant for adequacy.

It is one of the key parameters of the Payback Obligation formula as it will be compared to the Strike Price level in order to calculate the amount of the Payback Obligation.

For the elements highlighted above, the choice was made to select the Day-Ahead Market as the reference price. In a nutshell, this market was selected because:

- It provides relevant signals related to adequacy in moments of (near-) scarcity given that most of the drivers of the market actors' positions are incorporated in the production planning and forecasts at the moment of DAM-clearing;
- It is liquid and transparent thanks to a strong price signalling function and represents currently the strongest, most liquid spot market in Belgium;
- It is technology neutral and allows all technologies to react upon.

Some additional elements are to be listed hereunder to complement this choice:

Each CMU participating to the CRM must provide a Nominated Electricity Market operator (hereafter NEMO) active on the Belgian Day-Ahead market for each Market Time Unit (hereafter MTU) of the Delivery Period. This means in other words that every capacity provider from the Belgian CRM must provide a NEMO which is active on the Day-Ahead Market for which prices will be expressed in €/MWh and from where prices from the Day-Ahead market will be compared at a later stage when the payback amount has to be calculated.

The NEMO selected by the capacity provider before the start of the Delivery Period (during the pre-delivery period) will be applicable to the transactions of his CMUs for their full contracted period.

As an example, a capacity provider can select either EPEX spot or Nord Pool Spot as NEMO for his Reference Price in the Belgian CRM. This does not obviously prevent the arrival of other NEMOs in the future of the Belgian landscape. As a complementary information, it is worth adding that in case of absence of NEMO determination, they Day-Ahead Market Price published by Elia is used as fallback.

Finally, for foreign capacities, the reference price applicable is also the Day-Ahead Price. The only difference lies in the selection of the NEMO selected as he must be active in the country of the Foreign Capacity and observed for each MTU. Any contracted CMU can during the delivery period notify a modification of the NEMO choice for the Reference Price to Elia.

Reference Price definition & NEMO selection

The Reference Price must be observed for each Market Time unit of the Payback Obligation in the Belgian Day-Ahead Market segment.

A Capacity Provider or Prequalified CRM Participant shall choose for each of its CMUs in the Prequalification process, a NEMO operating in Belgium in the Day-Ahead time frame for setting his Reference Price.

The CMU chosen Belgian Day-Ahead market price reference will be used as CRM Reference Price in the Payback Obligation calculation: Reference Price (t)

4 Strike Price design

4.1 Basic principles

Like the Reference Price, the Strike Price definition is fundamental for the Payback Obligation. The Strike Price must be calibrated for each Auction according to a methodology that is defined in articles 23 to 27 of the Royal Decree Methodology[2]. A proposal for the calibrated strike price is first done for each Auction by Elia in the calibration report drafted for the 1st of December of the year preceding the Auction, after which the CREG prepares an advice on the proposal. Finally, the Minister determines the strike price for each auction in the Ministerial Decree setting up the instruction for the auction[3].

The calibrated strike price is a fixed value that has to be considered by all market actors participating to a CRM Auction which will be associated to the Transaction done via the Auction (or via the Secondary Market).

It is expressed in €/MWh and will be actualized monthly & ex-post during the Delivery Period (for all capacities contracted: single & pluriannual) as detailed in section 4.2.

Determination of the Strike Price

For a capacity contracted in a Y-4, Y-2 or Y-1 Auctions, the Strike Price for the relevant Delivery Period as decided by Ministerial Decree is determined no later than 31/3 of the year that Auction applies.

As a CMU may face different obligations linked to different Auctions (or Secondary Market Transaction(s) during the same Delivery Period, it is important to distinguish the Strike Price respectively applicable for these Transactions in the Payback Obligation calculation.

Example 1: Primary Auction

[2] LOI - WET (fgov.be)
[3] Example of Ministerial Decree triggering a CRM auction: Moniteur belge (fgov.be)

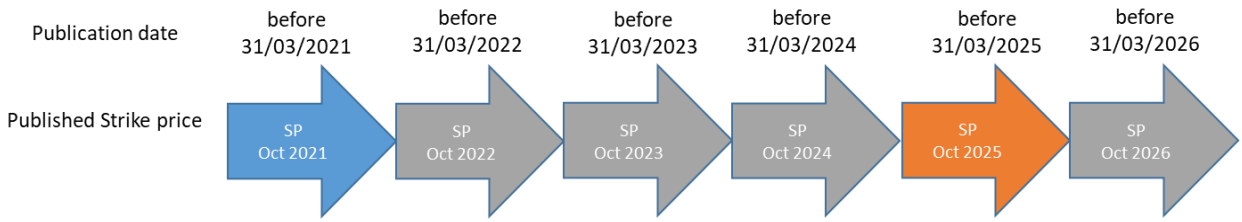


Figure 7: Strike Price update considered for an Auction

CMU1 is awarded in Auction 2021 (Y-4) for a 15 years contract starting in Nov 2025 (SP 2025 of Y-4)

CMU2 is awarded in 2021 (Y-4) for one year delivery starting in Nov 2025 (SP 2025 of Y-4)

CMU2 is awarded in 2025 (Y-1) for one year delivery starting in Nov 2026 (SP 2026 of Y-1)

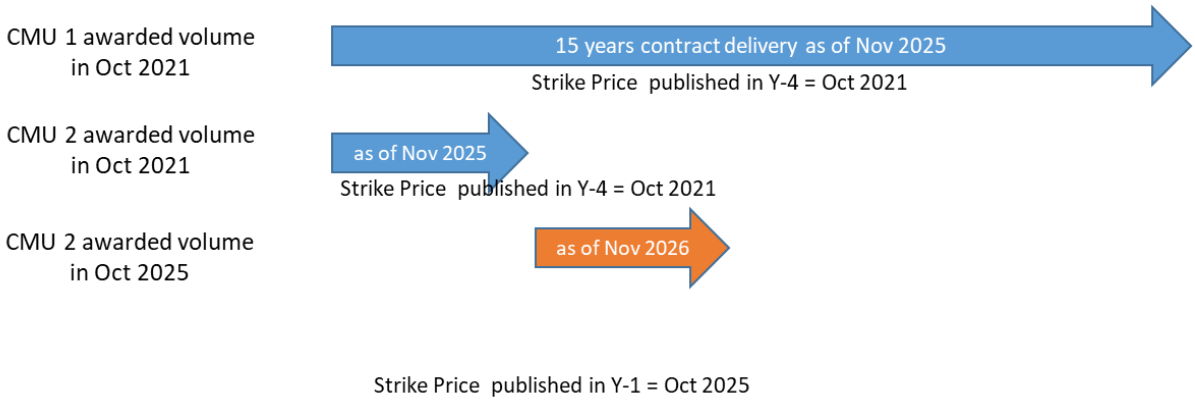


Figure 8: Example 1: different Strike Prices for the same Delivery Period

- ⇨ CMU1 will be guaranteed on the same Strike Price for the Delivery Period [Nov 2025 – Oct 2039]. As explained later, that strike price will be actualized during the Delivery Period ongoing.
- ⇨ Both CMU1 and CMU2 will have the same Strike Price for the Delivery Period [Nov 2025 - Oct 2026]
- ⇨ Possibly, CMU1 and CMU2 will have different Strike Prices for the Delivery Period [Nov 2026-Oct 2027]

4.2 Actualization of the strike price

The previous actualization methodology foresaw that only capacities with a multi-year contract in the CRM would have their strike price actualized during the Delivery Period. Moreover, it was foreseen that the actualization would only take place once a year creating potentially a lagging effect between the moment of actualization of the strike price and the price evolutions observed. The actualization has thus evolved to a more dynamic system taking place monthly.

To keep a clear link between the auction for which the calibrated strike price is an important parameter and the Delivery Period, the new actualized strike price is composed of 2 different

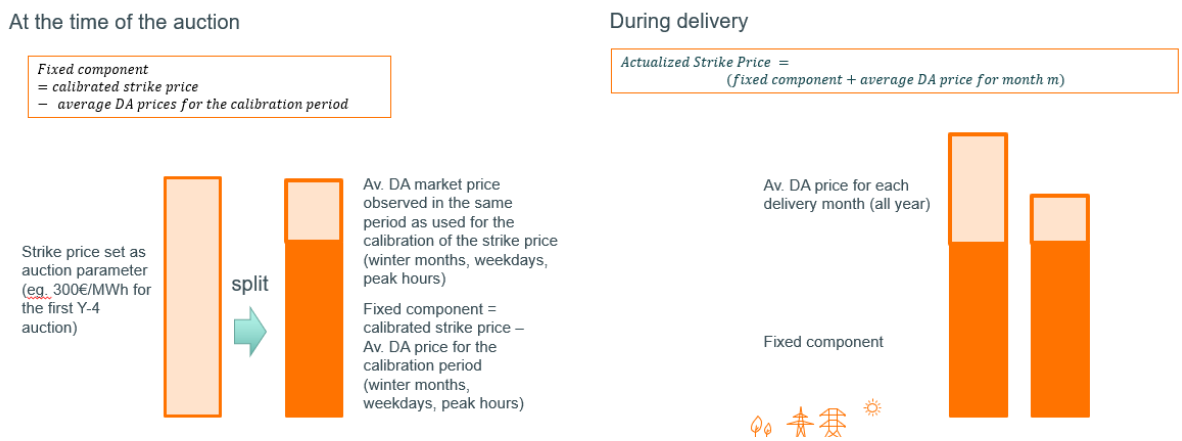
components:

- **A fixed component**: the fixed component consists of the difference between the value of the calibrated strike price set by the Minister (in its Ministerial Decree as explained above) and the average of Day-Ahead Market prices to which the same filters (winter months, weekdays peak hours) than the ones used for strike price calibration are applied as well. The fixed component maintains the link between the Auction period and the delivery period given that the calibrated strike price is an important component to be considered by market actors in their bidding whereas the fixed component remains an important part of the actualized strike price during the delivery. The fixed component can thus be calculated already after the Ministerial Decree giving the instruction for the auction has been published. As indicated by its name, the value of the fixed component remains fixed during the whole duration of a capacity contract.

- **A variable component**: the variable component consists of the average of Day-Ahead market prices for all hours (without any additional filters applied) of the month M of the ongoing Delivery Period. It is every time calculated right after the relevant month M has passed during the Delivery Period and is simply added to the fixed component calculated earlier to find the value of the actualized strike price.

The actualized strike price is thus calculated ex-post after each month of the Delivery Period to then calculate the Payback obligation that apply for that month. Such dynamic actualization allows to capture the short-term evolution of electricity market prices and avoids the time lag issues which could have arisen with the previous mechanism. Another advantage of this mechanism is that it can follow market trends and can evolve in both directions: downwards and upwards in function of the prices witnessed for a month during the Delivery Period. Finally, it will prevent market actors to book windfall profits as it should properly reflect the evolution of electricity markets whereas it will still allow some of them to book inframarginal rents.

In case of Transaction engaged on the Secondary Market, the actualization mechanism of the strike price remains applicable and is applied to the Calibrated Strike Price of the Seller of the Obligation (listed in Annex A of his Capacity Contract).



Taking a small fictive example:

A capacity was contracted in the first Y-4 auction which took place in November 2021 and

which was linked to the first Delivery Period 2025-26. That capacity was contracted for 1 year only but can still benefit from the actualization mechanism of the strike price which is applicable to all contracted capacities.

- The calibrated strike price set by the Minister for that Auction was 300 €/MWh[4].
- The fixed component is equal to the difference between:
    - The calibrated strike price: 300 €/MWh
    - The DA average market price for winter months[5], weekdays, peak hours of the months used for the calibration of the strike price (following the Royal Decree Methodology): 55 €/MWh.
    - So the fixed component: 300€/MWh – 55 €/MWh = 245 €/MWh. As explained above, it can already be calculated by market actors after the publication of the Ministerial Decree instructing the Y-4 Auction of 2021 as all elements are already public.

- Then, assuming as (again fictive) a variable component for the first month of the Delivery Period in November 2025 of 100 €/MWh taking into consideration all the hours and days of that month.

- We sum up the fixed and the variable components to arrive to the value of the actualized strike price as of which there will be a Payback Obligation calculated ex-post for the month of November every time it is exceeded by the Day-Ahead Price (being the reference price presented earlier):

    - Actualized strike price = Fixed component (245 €/MWh) + Variable component (100 €/MWh) = 345 €/MWh.

4.3 Strike price and Declared Market Price

The way the Payback Obligation is calculated depends also on the status of the CMU subject to it.

For capacities that are not subject to a daily schedule obligation[6], there is a possibility to provide a **Declared Market Price** which might replace the strike price in the calculation of the Payback Obligation if the value of the Declared Market price exceeds the value of the strike price.

The underlying reason lies behind the fact that smaller units typically may have higher short run marginal costs than the value of the strike price. This could lead to situations where the

[4] LOI - WET (fgov.be)
[5] So for that calibration, the winter months considered were respectively: November 17 – March 18 / November 18—March 19, November 19 – March 20.
[6] Typically demand side units or smaller generation/storage units that don't currently exceed the 25 MW threshold.

CMU might have a Payback Obligation although he was not activated in the first place due to high marginal costs. These units must then activate at loss if they were subject to the classic Availability Monitoring Trigger Price (AMT Price) meaning that they would lose money twice in this situation: one for having to activate at loss and the other for having to payback something that was not earned in the first place. To avoid situations like the one just mentioned, units without a daily schedule have thus the possibility to provide a Declared Market Price.

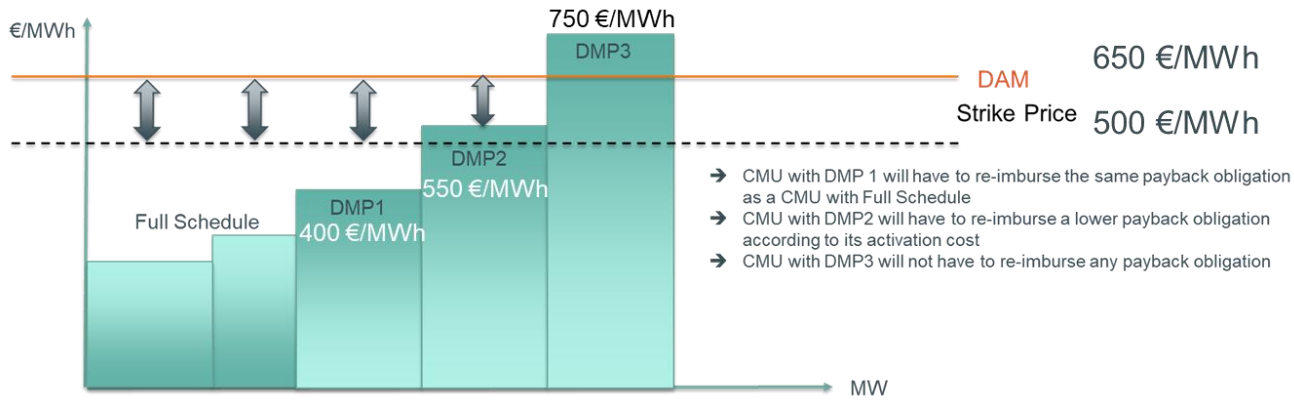
The concept of Declared Market price is defined as '*the Day-Ahead Market Price equal to or above which the CMU delivers the Required Volume. It is a result of (Partial) Declared Prices and Associated Volumes declared by the Capacity Provider (…)*' This concept allows thus capacities that are not subject to a daily schedule obligation to provide Declared Prices with an Associated Volume. The highest Associated Volume linked to a Declared Price will lead to that Declared Price being retained as the Declared Market Price. This Declared Market Price will replace the actualized strike price in the calculation of the Payback Obligation. The selection between the Declared Market Price and the strike price is based on the following:

$$Strike\ Price\ (CMU\ id, Transaction\ id, t) = max\ (DMP(CMU\ id, t); Actualized\ Strike\ Price\ (CMUid, Transaction\ id, t))$$

leading then to an adaptation of the calculation of the Payback Obligation as follows:

(Reference Price (t) – max (DMP; Actualized Strike price (CMU, Transaction)) Contracted Capacity (CMU, t, Transaction Id) [in €]*

The concept of Declared Market price and its underlying reasoning are highlighted on the figure below:



5 Modalities of the Payback Obligation

The price ingredients of the Payback Obligation, i.e. the Reference and Strike Price, have been described in the previous sections. It is, however, key to complete the Payback Obligation with the volume and quantities on which the Payback Obligation is due.

As starting point, in principle the Payback Obligation calculation will be continuous and is valid

for all hours during the Delivery Period (depending on the fact that a CMU is energy constrained or not). Nevertheless, in the Payback Obligation part of the formula introduced earlier in this document, it is crucial to clearly determine the exact capacity for which the CMU will have to Payback according to his Transaction(s).

In this section, we further introduce the concepts of:

1. The Availability Ratio
2. The Activation Ratio
3. Application of the Payback Obligation on CMUs with an Energy-Constrained based on its Service Level Agreement (SLA)
4. Stop-Loss limit on the Payback Obligation

The total capacity in MW on which the Payback obligation will be applied initially is based on the capacity contracted by the CMU in the Auction (or via the Secondary Market). However, it is not always correct to assume that that entire capacity should be subject to a Payback Obligation. Indeed, several exemptions can occur in the calculation of the Payback Obligation in order to reflect the fact no Payback Obligation should be paid for the entire capacity of the CMU. It will be of course related to the Transaction Capacity of the CMU but should also include all types of exemption.

5.1 Availability Ratio

The Availability of a capacity influences the calculation of the Payback Obligation. It makes sense not to require a payback during moments where the capacity was not available in the market and had notified it early enough. Otherwise, this would unnecessarily increase risks for market actors that would be priced in the bids in the Auction, thereby risking to increase the overall cost of the mechanism.

Therefore, planned unavailability notified in due time (e.g. planned maintenance, forced outages,…) are taken into account when the Payback Obligation is calculated. Note that this only concerns unavailability that have been duly communicated to Elia before the Day-Ahead closure time (11 AM the day before the unavailability).

The determination of the (required) availability of a CMU and its associated concepts (SLA Moments, Maximum Remaining Capacity, …) are explained in details in the design note on Availability Obligation. The reader of this design note is therefore encouraged to look at these concepts before reading this section.

In practice, the calculation of the Availability Ratio may take place during moments where the concept of Obligated Capacity does not apply. As an example, an energy-constrained CMU that may have some margin may decide (if it has sufficient capacity) to acquire some capacity outside of its SLA Moments on the Secondary Market.

Since the concept of Obligated Capacity (explained in the design note on Availability Obligation) does not apply for an energy-constrained CMU outside of his SLA moments and since that capacity should still payback excessive revenues captured (if any) in case of Payback Obligation, we use the concept of $P_{Equivalent}$ to calculate that capacity.

$P_{Equivalent}$ defines the amount of capacity that the CMU would have to deliver if the moment

during the Delivery Period was an SLA Moment. Its calculation depends on the status of the CMU:

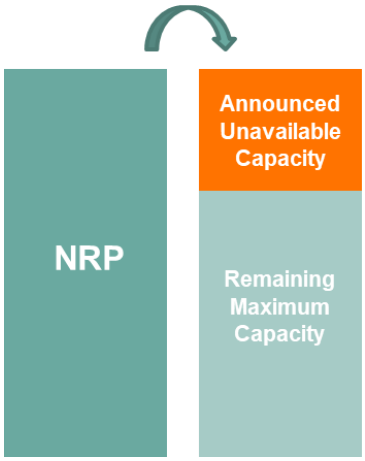
- For a non-energy constrained CMU, $P_{Equivalent}$ is equal to the capacity contracted by that CMU (for example the volume contracted in an Auction complemented by an obligation traded on the Secondary Market) meaning that the capacity for which the CMU may have to payback should equal the sum of the capacity contracted in the Auction and via the Secondary Market (if any) in case there is no Unavailability announced.

- For an energy-constrained CMU, $P_{Equivalent}$ will be equal to the capacity contracted in the auction divided by the Derating Factor of the CMU. This means that that CMU will have to deliver its full capacity during (and up to) its SLA Moments during the Delivery Period. That capacity will therefore not be expected to deliver its full capacity outside of these moments defined in its SLA. However, that CMU may have to payback outside of its SLA Moments in case, as an example, of margin translated into a Transaction on the Secondary Market. So in conclusion, the capacity for which the CMU may have to payback should equal her Nominal Reference Power during SLA Moments and should equal to the capacity resulting from the Transaction realized ex-post via the Secondary Market (outside of SLA Moments).

Both cases are expressed in formulas in the table below:

Energy-Constrained CMU	**Non-energy constrained CMU**
$\boldsymbol{P_{Equivalent}(CMU,\ t)}$ $\boldsymbol{= Total\ Contracted\ Capacity\ (CMU_{id},\ t)}$	$P_{Equivalent}\ (CMU,\ t) =$ $\frac{Total\ Contracted\ Capacity\ _{ex-ante}(CMU_{id},\ t)}{Derating\ Factor\ (CMU, t)}$ $+ Total\ Contracted\ Capacity\ _{ex-post}(CMU_{id},\ t)$

Next to the concept of $P_{Equivalent}$, the concept of Remaining Maximum Capacity is key for the determination of the Availability Ratio. As briefly raised above, capacities participating to the CRM may notify Elia about (un)expected Unavailabilities limiting their capacity up to a certain amount of days per Delivery Period (more explanations in the Design Note on the Availability Obligation). When this notification is done in due time, it has to be considered for the capacity for which there might be a Payback obligation. In this situation, the capacity provider must notify Elia of a Remaining Maximum Capacity for that CMU. The Remaining Maximum Capacity will be equal to the difference between the Nominal Reference Power of that CMU.



Based on the Announced Unavailability, the Remaining Maximum Capacity is calculated and can then be considered in the calculation of the Availability Ratio.

Availability Ratio definition

For a CMU the Availability Ratio (t) equals:

$$Availability\ ratio\ (CMU_{id},\ t) = \frac{Min\ (P_{Equivalent}\ (CMU_{id}, t)\ ;\ Max.\ Remaining\ Capacity\ DA\ (CMU_{id}, t))}{P_{Equivalent}\ (CMU_{id}, t)}$$

This value is always lying between 0 and 100% and reflects the availability of the capacity during a moment where is has to payback.

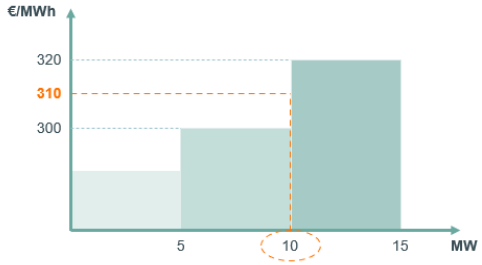
5.2 Activation Ratio

Another case for which a Payback Obligation may not have to be considered boils down to the question: was the CMU in question activated/dispatched at the moment of Payback Obligation?

As explained previously, CMUs that are not subject to a Daily Schedule Obligation can provide (Partial) Declared Prices which illustrate which part of these capacities would activate at which price. It can be perfectly assumed that an aggregated CMU gathering different technologies in its portfolio won't activate its full capacity at a single price. In such case, requiring for that CMU a Payback Obligation during a Payback moment for the entire capacity would not make sense and would somehow discriminate towards aggregated capacities with respect to the others.

Therefore, an activation ratio accounting for the proportion of the CMU that is activated/dispatched in the market is considered in the calculation of the Payback Obligation.

As a fictive example, a CMU without daily schedule obligation that was contracted for 15 MW in the CRM Auction provides different couples of Declared Prices and Associated Volumes at which he will activate:



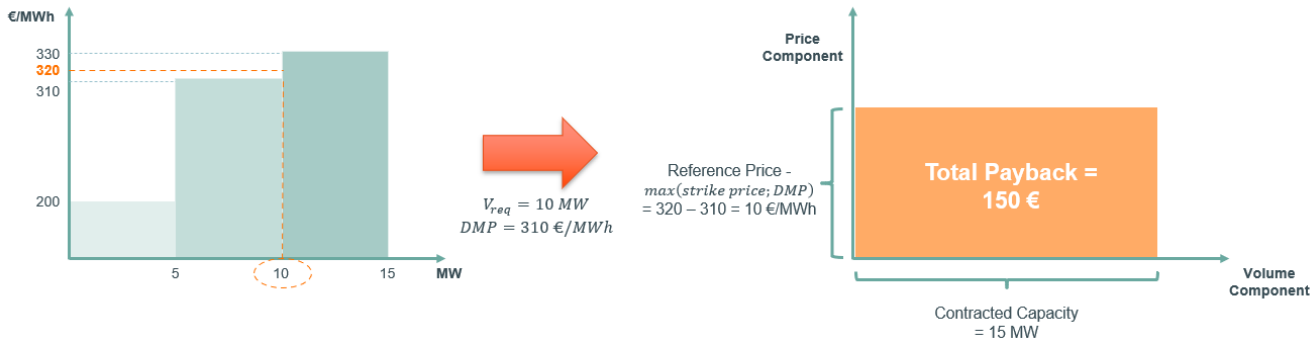
partial Declared Price	Associated Volume
300	5
310	**10**
330	15

The highest price that is surpassed sets the Associated Volume that is expected to be delivered, which is called the **Required Volume** V_{Req}

The price associated to this Required Volume is the **Declared Market Price** DMP

The part of capacity of the CMU that will have to be activated will depend on the price observed on the Day-Ahead Market. In this example, the strike price applicable to that Transaction lies at a value of 300 €/MWh.

In this example, the price observed on the market reaches 310 €/MWh leading (based on the above) to the selection of the Declared Price of 310 €/MWh becoming the Declared Market Price with the same value and with an Associated Volume of 10 MW. That Associated Volume linked to that price becomes then the Required Volume (being the volume that the CMU is expected to deliver based on its Declared Prices). In this situation, it is therefore important to observe that the Required Volume (10 MW) associated to the Declared Market Price does not represent the entire capacity contracted by the CMU (15 MW).



Since the Declared Market Price (310 €/MWh) > strike price (300 €/MWh), it is considered in the formula to calculate the Payback Obligation. Following the classic way to calculate the Payback Obligation (without considering the Availability Ratio here), the total Payback Amount to be reimbursed equal the difference between the reference price and the DMP (10 €/MWh) multiplied by the contracted capacity of the CMU (15 MW) despite of the fact that the CMU was not activated entirely.

To avoid this situation, an Activation Ratio is introduced to account for partial activations of CMUs without Daily Schedule leading to an adaptation of the Payback to be reimbursed here. The Activation Ratio is calculated by looking at the Required Volume of that CMU for that moment (in the example above, given the price observed on the market, the Required Volume was equal to 10 MW out of the 15 MW of the CMU):

$$Activation\ Ratio\ (CMUid, t) = Min((P\ equivalent\ (CMUid,t))\ ;\ (Required\ Volume\ (CMUid,t))\ /\ P\ equivalent\ (CMUid,t)$$

The Activation is thus calculated by taking the minimum between the P equivalent (equal to 15 MW here, concept introduced in the Availability Ratio and being equal to the Capacity that

the CMU would be expected to deliver during an SLA moment) and the Required Volume (10 MW in the example above) meaning that here the Activation Ratio would be equal to:

Activation Ratio = Min (15 MW; 10 MW) / 15 MW = 67%

To conclude this example, the introduction of the Activation Ratio in the calculation of the Payback to be reimbursed during that moment leads to the following:

Payback Obligation = 320 €/MWh (Reference Price) – 310 €/MWh (DMP) * 15 MW (contracted capacity) * 67% (Activation Ratio) = 100 € instead of the 150 € to be paid back in the example highlighted above.

To continue further on the Activation Ratio, it is important to highlight that it will always be equal to 100% for CMUs subject to a Daily Schedule Obligation. There exist mainly 2 reasons for that:

1) One of the criteria to be used for calibration of the strike price as detailed in the Royal Decree Methodology is to take into account the variable costs of daily schedule technologies. Therefore, one might argue that the running costs of such technologies should already be covered by the calibrated strike price and should not lead to undue Payback events.

2) A dynamic actualization of the strike price has been introduced last year. Therefore, in case of Payback events for which the strike price would be exceeded by the reference price, the actualization mechanism will already capture prices increase based on market prices evolution and is expected to strike the right balance for capacity providers between having to payback excessive revenues and leaving some room for inframarginal rents.

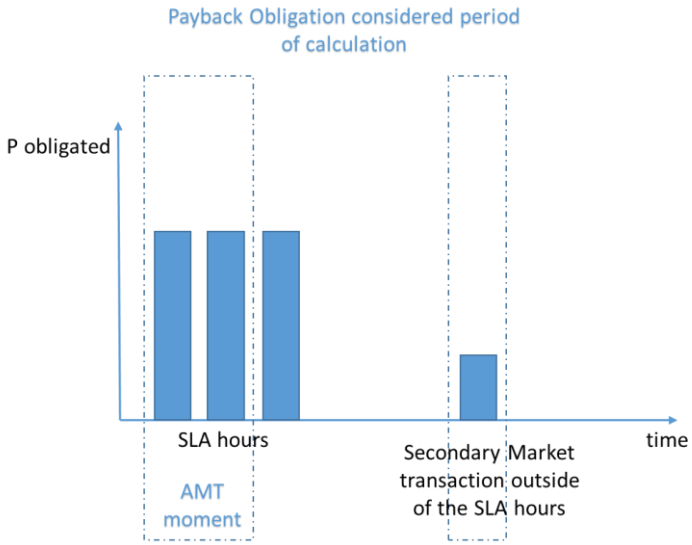
To revert back to the example from above, a CMU subject to a Daily Schedule obligation would not have been able to provide Declared Prices and his Payback Obligation would be calculated thanks to the Actualized strike price. Moreover, the Payback Amount to be reimbursed by such CMU would not consider a partial (or non) activation/dispatch of the CMU. As a reminder, a CMU subject to a Daily Scheduling Obligation cannot aggregate.

5.3 Application of the Payback Obligation on CMUs with an Energy-Constrained service level

In the Prequalification Process (as explained in more details in the design note on the Prequalification Process), it is required for a CRM Candidate prequalifying an Energy Constrained capacity to select an SLA (Service Level Agreement), implying that its contribution to adequacy is limited to a predefined set of consecutive moments in the day. In other words, being energy constrained means that a CMU will only be delivery the capacity within a day up to the number of moments specified in the SLA. This means that an energy constrained CMU is expected to payback only during SLA Moments identified as such in the Availability Obligation Process.

The only exception to this rule is linked to a potential Transaction happening via the Secondary Market. As Energy Constrained CMUs are allowed to trade and take over extra obligations via

the Secondary Market outside of their SLA moments, they may have to payback during these moments as well.



5.4 Stop-Loss Amount of a Transaction

The calibration level of the strike price is an important element to be considered by market actors as it may impact the cost of the CRM. A Strike Price calibrated at a low level will lead capacity providers to payback revenues not deemed excessive influencing potentially negatively their business case. On the other hand, a strike price calibrated at a very high level may leave some room for windfall profits capture which is to be avoided as well.

The risk of having to payback a substantial part of the fixed capacity remuneration received to participate in the CRM is a risk that has to be integrated by market actors in their bidding strategy in the CRM. However, to avoid that this risk would lead to a substantial increase of bids into the CRM auction, the Reliability Option comes with a Stop-Loss limit. The principle of the Stop-Loss limit is straightforward a capacity provider cannot have to payback more for a specific transaction in the Belgian CRM than the fixed capacity remuneration he has received for the entire Delivery Period. It is important to insist on the fact that the Stop-Loss limit applicable to the Payback Obligation is totally independent from the Stop-Loss related to the Availability Obligation.

This Stop-Loss limit of a Transaction is calculated the very last day before the start of the Delivery Period (31st October) by thus summing up all fixed capacity remuneration foreseen for that Transaction resulting from the CRM Auction over the entire Delivery Period. The only Secondary Market Transactions which can influence the calculation of the Stop-Loss Limit for a Transaction has to be done before the start of the Delivery Period (ex-ante) and has to last for at least a full Delivery Period.

The reason to integrate these Transactions done ex-ante for a minimum of a full Delivery Period is to avoid gaming during the Delivery Period linked to the Payback Obligation. A Transaction realized on the Secondary Market after a Payback Moment during the Delivery

Period will thus not impact the calculation of the Stop-Loss limit realized before the start of the Delivery Period. Obviously, if there is a Payback Obligation during a Secondary Market Transaction, the responsibility of the Payback Obligation will shift to the Buyer of the Obligation who receives the capacity remuneration but also the obligations associated to it.

In practice, during the Delivery Period, a calculation occurs after each month to assess whether there were any Payback event(s) and if any, how much the capacity provider is expected to payback for that month M for his Transaction. This is done via the following formula:

$$Effective\ Payback\ Obligation\ (CMUid, Transaction\ id, M) = \sum_{t=1}^{m} \text{Payback Obligation (CMUid, Transaction id, t)}$$

Then, Elia will calculate the cumulative Payback Obligation of that CMU for her Transaction and will check during the Delivery Period whether the Capacity Provider reaches his Stop-Loss Amount when the Effective Payback Obligation calculated for the last month M (as highlighted above) is added to what was already paid back during the same Delivery Period.

$$Cumulative\ Payback\ Obligation\ (CMUid, Transaction\ id, M) = \sum_{t=1}^{p} \text{Payback Obligation (CMUid, Transactionid, t)}$$

If the cumulative Payback Obligation over the Delivery Period for that Transaction over the Delivery Period reaches the Stop - Loss Amount calculated for that Transaction, then the Capacity Provider will not have to payback anything exceeding his Stop Loss Amount initially calculated.

$$Effective\ Payback\ Obligation\ (CMUid, Transaction\ id, M) = Max\ (0\ ;\ StopLoss\ Amount\ (CMU\ id, Transaction\ id, Delivery\ Period) - \sum_{t=1}^{m} Payback\ Obligation\ (CMUid, Transaction\ id, t)$$

6 Final Payback Obligation formula

As a final step, the formula of the Payback Obligation is highlighted by integrating all elements of the formula for the different types of capacities who might be facing it:

- For CMUs that are not energy constrained with a Daily Schedule Obligation:

$$Payback\ Obligation\ (CMU\ id, Transaction\ id, t) = (Reference\ Price\ (CMU\ id, t) - Actualized Strike\ Price\ (CMU\ id, Transaction\ id, t)) * Contracted\ Capacity\ (CMU\ id\ , Transaction\ id\ , t) * Min(Availability\ Ratio\ (CMU\ id, t); Activation\ Ratio\ (CMU\ id, t))$$

- For CMUs that are not energy constrained nor with a Daily Schedule Obligation, the

Payback Obligation will be calculated by potentially considering the Declared Market Price (DMP) replacing the Strike Price as follows:

$$Payback\ Obligation\ (CMU\ id, Transaction\ id, t) =$$

$$(Reference\ Price\ (CMU\ id, t) - max\ (DMP; Actualized\ Strike\ Price\ (CMU\ id, Transaction\ id, t)) * Contracted\ Capacity\ (CMU\ id, Transaction\ id, t) * Min(Availability\ Ratio\ (CMU\ id, t); Activation\ Ratio\ (CMU\ id, t))$$

Looking now at energy constrained CMUs, the calculation of the Payback Obligation will differ in function of the timing of the Transaction considered (ex-ante or ex-post):

- Energy constrained CMUs with a Daily Schedule Obligation having secured **ex-ante** Transaction(s):

$$Payback\ Obligation\ (CMUid,Transactionid,t)=$$

$$(Reference\ Price\ (CMUid,t) - Actualized\ Strike\ Price(CMUid,Transactionid,t)) * \left(\frac{Contracted\ Capacity\ (CMUid,Transactionid,t)}{Derating\ Factor(\ TransactionidCMU\ id)}\right) * Min(Availability\ Ratio\ (CMUid,t); Activation\ Ratio\ (CMUid,t))$$

The reason of the division of the Contracted Capacity by the Derating Factor only means that the energy constrained CMU is expected to deliver her full capacity (= Nominal Reference Power) during her SLA Moments.

- Energy constrained CMUs with a Daily Schedule Obligation having secured **ex-post** Transaction(s):

$$Payback\ Obligation\ (CMUid,Transactionid,t)=$$

$$(Reference\ Price\ (CMUid,t) - Actualized\ Strike\ Price(CMUid,Transactionid,t)) * Contracted\ Capacity\ (CMUid,Transactionid,t) * Min(Availability\ Ratio\ (CMUid,t); Activation\ Ratio\ (CMUid,t))$$

The fact that the Contracted Capacity is not divided anymore by the Derating Factor is linked to the timing of the Transaction considered here. Since the Transaction was settled ex-post (after the moment of Delivery), we are able to assess exactly how much capacity was delivered at that moment. It's not the case ex-ante as you only know how much capacity will be required to be available but you don't know factually how much capacity will be there in ex-ante.

Besides, it is worth adding again that in case of CMUs that are energy constrained but without a Daily Schedule Obligation, the Actualized Strike Price is replaced by the Declared Market Price in the formulas above if Declared Market Price > Actualized Strike Price.

Finally, as briefly mentioned above in the start of the document, a potential exemption of the Payback Obligation may apply in the future for Demand Side Management Capacities. As it

would represent a significant design change in the Reliability Option mechanism, such exemption must be approved by the European Commission. If it were to be the case, the way to calculate the Payback Obligation for Demand Side Managements capacities or for Aggregated Capacities gathering Demand Side Management in their portfolio would be impacted and would have to be adapted in the formulas above as well.