# CRM Design Note:

# Payback Obligation

February 2025

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# 1 Introduction & context

## 1.1 Context and Goal of this updated Design Note

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

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

By reading and using this Design Note, you acknowledge and accept the terms of this disclaimer. This design note was last updated in April 2024 following Elia's submission of the Functioning Rules to the CREG on January 31st 2025.

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.
For this purpose, and for the sake of understandability, some elements of the Payback Obligation might have been phrased differently compared to the CRM Functioning Rules. This is only for explanatory purposes and does not detract from the provisions in the Functioning Rules.

**Legal Framework**

As a reminder, the concept of a 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 (non-official English translation):

- 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] (NL) Wet betreffende de organisatie van de elektriciteitsmarkt
(FR) Loi relative à l'organisation du marché de l'électricité

Moreover, the Royal Decree Methodology[2] includes in Article 23 – 27 the practical modalities of the Reference Price, the Strike Price and the calculation of the Payback Obligation.

**Payback Exemption**

In its approval of the Belgian CRM, the European Commission decided that the Payback Obligation shall no longer be applicable to DSM or energy storage capacities. As a result, CMUs that consist completely of these technologies are no longer subject to the Payback Obligation.

For Aggregated CMUs that partially consist of DSM or energy storage capacity, the CRM foresees a pro-rata application of the Payback Obligation. This is further elaborated in section 5.3 of this design note.

The Payback Exemption only applies to DSM capacities that were contracted in the 2024 Auctions or DSM and energy storage that were contracted as from 2025. Section 8 provides some more information regarding the Payback Exemption for Capacity Contracts concluded ahead of the entry into force of the Payback Exemption.

The Payback Exemption is subject to the timely amendment of the RD Methodology and the Electricity Act in accordance with the European Commission's decision.

[2] (NL) Koninklijk Besluit Methodologie
(FR) Arrêté Royal Méthodologie

## 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 established the general concept of the Payback Obligation and how it relates to the other elements of the Belgian CRM. By giving an overview of the Payback Obligation the building blocks that constitute the it are presented, which are then further elaborated in the subsequent sections.

Section 3 defines the Reference Price and why it serves as a trigger for the Payback Obligation.

Section 4 involves the Strike Price. It is first explained how this core parameter is calibrated, and subsequently how it is actualized to take into account the most recent energy market developments.

Section 5 involves the volume that is subject to the Payback Obligation based on the Capacity Contract.

Section 6 combines all the aforementioned elements into the Payback Obligation formula, which determines how much a CRM Capacity Provider actually has to pay back.

Section 7 delves into the Stop-Loss, a mechanism that prevents Capacity Providers from incurring excessive amounts of Payback.

Finally, section 8 and section 9 conclude with a brief note on the impact of the Payback Exemption on already signed Capacity Contracts as well as some explanation on the Activation Ratio.

# 2 Concept of the Payback Obligation

Along with the Availability Obligation, The Payback Obligation is one of the two obligations that a Capacity Market Unit (CMU) has to follow during the Delivery Period.

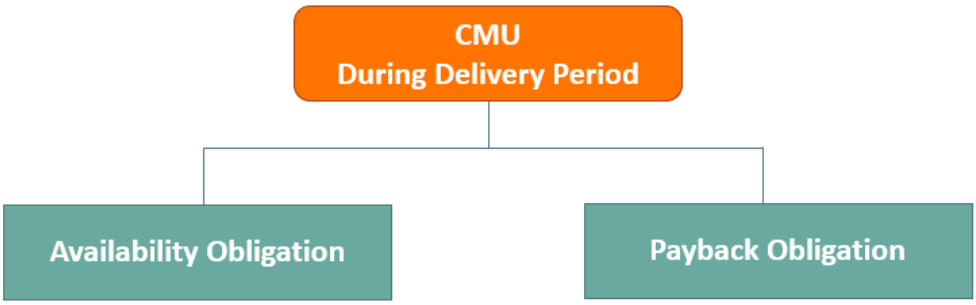


*Figure 1: Obligations of a CMU during the Delivery Period*

Without going too much into detail, the Availability Obligation seeks to provide Capacity Providers with the necessary incentives to contribute during moments of scarcity and apply penalties when they fail to do so. The reader who is interested to learn more about the Availability Obligation is invited to read the dedicated design note.

The Payback Obligation runs in parallel to the Availability Obligation. Seeing as a Capacity Provider already receives a fixed remuneration, if he were to also capture excessive profits on the energy market when prices briefly skyrocket this would be considered as a windfall profit. Indeed, by participating in the CRM the Capacity Provider effectively trades the (uncertain) possibility of occasional high profits by a constant revenue stream originating from Capacity Remuneration.

In order to determine these windfall profits, a Strike Price is determined which defines the price threshold above which revenues are deemed excessive. The Capacity Provider is then obliged to pay back any revenues captured when the Reference Price exceeds this Strike Price, as illustrated by Figure 2 below:

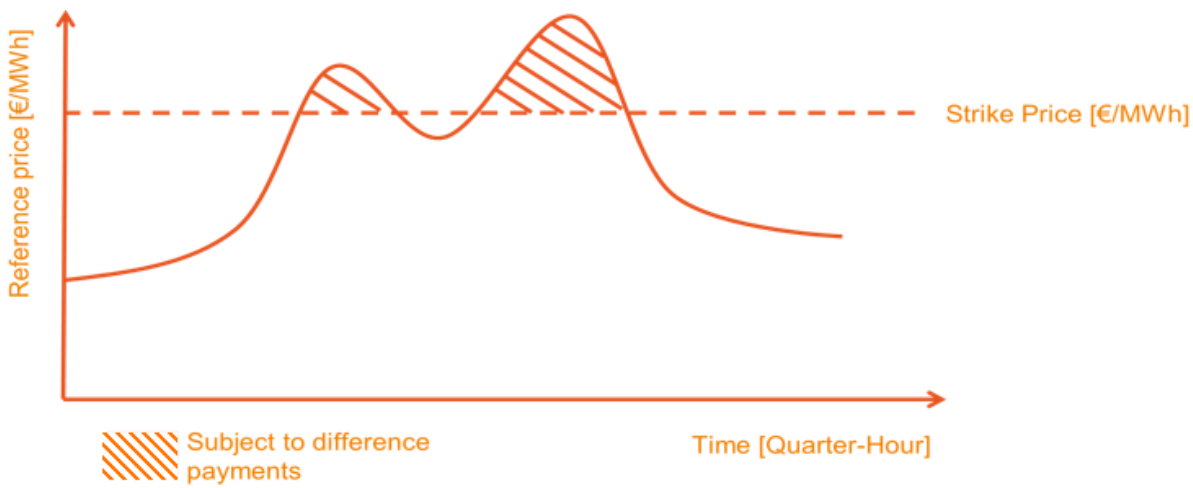


*Figure 2: Concept of the Payback Obligation*

This approach has two advantages for society:

1) By avoiding windfall profits and obliging Capacity Providers to pay back excessive profits, it helps minimizing the cost of the CRM for society. Seeing 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. By paying back these excessive revenues, the cost of the CRM is reduced.
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.

In order to accurately calculate the Payback Obligation, several elements are needed. First and foremost, a Reference Price must be agreed upon that reflects the revenues that were captured by the CMU. Secondly, this Reference Price must be compared to a Strike Price, which represents the price level above which revenues are considered excessive. Lastly, the amount of capacity is required to determine the total revenues that were captured. For any MTU $t$ these elements are summarized in Figure 3:

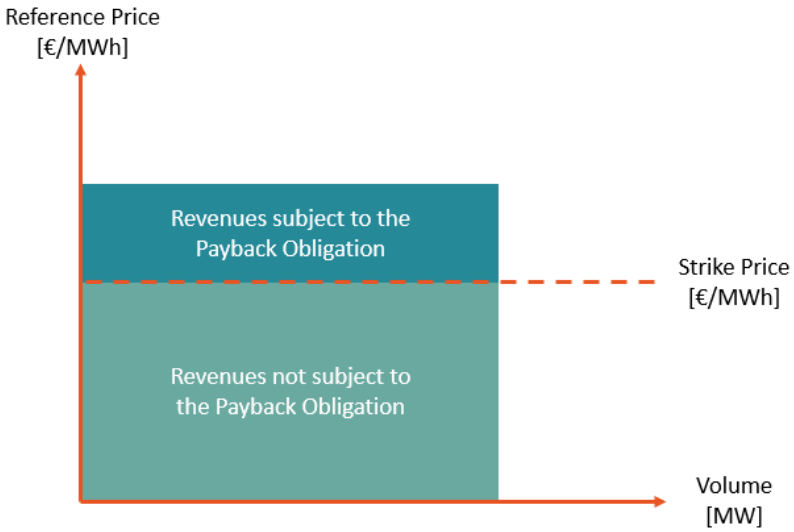


*Figure 3: Components of the Payback Obligation*

This simplified representation of the Payback Obligation can also be described by the following formula:

$$Payback\ Obligation = \max\left((Reference\ Price - Strike\ Price); 0\right) \times Volume\ subject\ to\ Payback\ Obligation$$

The remainder of this design note is structured along these elements.

- In section 3, the Reference Price of the CMU is discussed.
- In section 4, more details concerning the Strike Price are presented. This includes the actualization mechanism that ensures that the Strike Price remains at a fair level.
- In section 5, the volume of capacity that is subject to the Payback Obligation is discussed. This varies in function of Primary and/or Secondary Market Transactions, as well as whether or not the Capacity Provider submitted declarations of Announced Unavailabilities.
- In section 6, the complete Payback Obligation formula is presented.
- In section 7, the Stop-loss mechanism is explained, which ensures that the amount of Payback Obligation that is applied is not too excessive.
- In section 8 and 9, two annexes are included with some explanation regarding the retro-activity of the Payback Exemption and the Activation Ratio, respectively.

The Payback Obligation is evaluated on a Transaction basis. In case a CMU has multiple Transactions with overlapping Transaction Periods in Annex A of its Capacity Contract, the Payback Obligation is calculated based on the Strike Price and volume subject to the Payback Obligation of that specific Transaction. The total Payback Obligation is then determined as the sum over all individual Transactions. Having explained all different elements of the Payback Obligation, the Transaction-based nature of the Payback Obligation is also illustrated in section 6.3.

# 3 Reference Price

## 3.1 Selection of Reference Price for the Belgian CRM

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 Day-Ahead Market (DAM) is used as the reference price seeing as:

- 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.

Based on these considerations, the Reference Price is also defined based on the DAM in the RD Methodology[3].

The Capacity Provider needs to select the NEMO[4] where his Reference Price is observed for every CMU. For every Auction, ELIA includes in its calibration report[5] the different NEMOs that can be selected by the Capacity Provider.

Upon selection of a NEMO, its DAM prices are used to calculate the Payback Obligation. This means that CMUs that have selected different NEMOs can, in case of price divergences between the NEMOs, have different amounts of Payback Obligations.

Identical to domestic CMUs, Foreign CMUs also need to provide a NEMO of their choosing. This NEMO must be active in a bidding zone of their respective country. Similar to Belgian CMUs, price divergences between the DAM prices of different NEMOs can result in different amount of Payback Obligations.

As will be discussed later, different Transactions with overlapping Transaction Periods for the same CMU can have different Strike Prices. However, the Reference Price that is applied to them for the calculation of the Payback Obligation is the same across the different Transactions.

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[3] (NL) Art. 24 & Art. 25 van het KB Methodologie
(FR) Art. 24 & Art. 25 de l'AR Méthodologie

[4] Nominated Electricity Market Operator

[5] For example, the 2024 calibration report includes the NEMOs for 2026-27/Y-1, 2027-28/Y-2 and 2029-30/Y-4

## 3.2 Practical modalities

A Capacity Provider needs to provide a NEMO of his choosing for each of his CMUs with a contract via the CRM IT Interface prior to the start of the Delivery Period. If he fails to do that, ELIA will use the Day-Ahead Market Price as published on the ELIA website[6].

The Capacity Provider can freely change its NEMO via the CRM IT Interface via the CRM IT Interface. From the moment of its notification, the newly selected NEMO is used in the calculation of the Payback Obligation.

[6] Day Ahead Market Price

# 4 Strike Price

## 4.1 Basic principles

The Strike Price indicates the price thresholds above which the Capacity Provider is obliged to pay back the difference with the Reference Price. As a result, it is an essential parameter in the framework of the CRM.

For Capacity Holders participating in the Auction, knowing the Strike Price is of great importance. Indeed, knowing the price level above which one needs to reimburse revenues is important to calculate the level of the missing money, which in turn translates in their Bid Price. As a result, the Strike Price forms an integral part of the Auction parameters, and is included in the Ministerial Decree holding the instruction for the Auction[7]. Upon selection in the Auction, the Strike Price is included in the Capacity Contract.

As such the Strike Price is calibrated for each Auction separately. The goal is to arrive at a price threshold that on the one hand is sufficiently high, so that everyone agrees that revenues above the Strike Price are considered excessive, and on the other hand is not too high so that there remains a decent probability that the Payback Obligation is triggered and provides the envisaged incentives. This calibration process thus follows a couple of steps and is further detailed in section 4.2.

Seeing as a Capacity Provider can have several Transactions for the same CMU with overlapping Transaction Periods, it is entirely possible that different Transactions have different Strike Prices. This principle is also illustrated by the example in section 6.3.

Furthermore, the Strike Price is established based on historical bids prices in the DA market. That, combined with the fact that there is a time gap between the conclusion of the Y-1, Y-2 and Y-4 Auction and the start of the actual Delivery Period, means that in case of a significant shift of price levels on the energy markets there is a possibility that the originally calibrated Strike Price does no longer accurately represents a price level above which revenues are excessive. To that end, an actualization mechanism exists that updates the Strike Price ex-post in order to remain accurate at all times. This actualization mechanism is explained in section 4.3. the Actualized Strike Price that is thus obtained is used for the final calculation of the Payback Obligation.

## 4.2 Calibration of the Strike Price

The Strike Price is calibrated in the framework of the yearly report of the grid operator[8], in line

[7] Example of Ministerial Decree triggering a CRM Auction:
(NL) MB van 28 maart 2024
(FR) AM du 28 mars 2024

[8] (NL) Art. 6 van het KB Methodologie
(FR) Art. 6 de l'AR Méthodologie

with the RD Methodology[9]. In general, this calibration takes place in two steps.

In a first step, the so-called calibration curve is established based on historical Day-Ahead prices. This results in a calibration window which will be used in step 2. The process of setting up the calibration curve and calibration window is further elaborated in section 4.2.1.

In a second step, from the aforementioned calibration window, a value must be selected for the Calibrated Strike Price. This selection process takes place based on a set of criteria, which are explained in section 4.2.2.

### 4.2.1 Strike Price calibration curve and calibration window

The calibration curve is set up based on data from the Day-Ahead market from the last three years. In particular, the aggregated curves from the Day-Ahead market are used, which are then filtered so that only adequacy-relevant moments are retained. This means that only data from the winter period (spanning from November 1st until March 31st), working days, peak hours (08:00 until 20:00) with positive prices is used. Seeing as only data from the winter periods is used, this is often used to refer to the calibration process[10].

The data is then compiled to reach a normalized average aggregated curve per winter period. Finally, the weighted average is taken over the winter periods in scope to establish the calibration curve. As an example, Figure 4 represents the calibration curve used for the 2024 calibration process. The attentive reader will note that by relying on data of previous winters, the calibration curve effectively becomes a moving average. Indeed, during every calibration exercise the earliest winter period is removed and the most recent one is added.

[9] (NL) Art. 27 van het KB Methodologie
(FR) Art. 27 de l'AR Méthodologie

[10] For example, for the Calibrated Strike Price of 2024 it is said that it is based on the winters of 2021-2022, 2022-23 and 2023-24

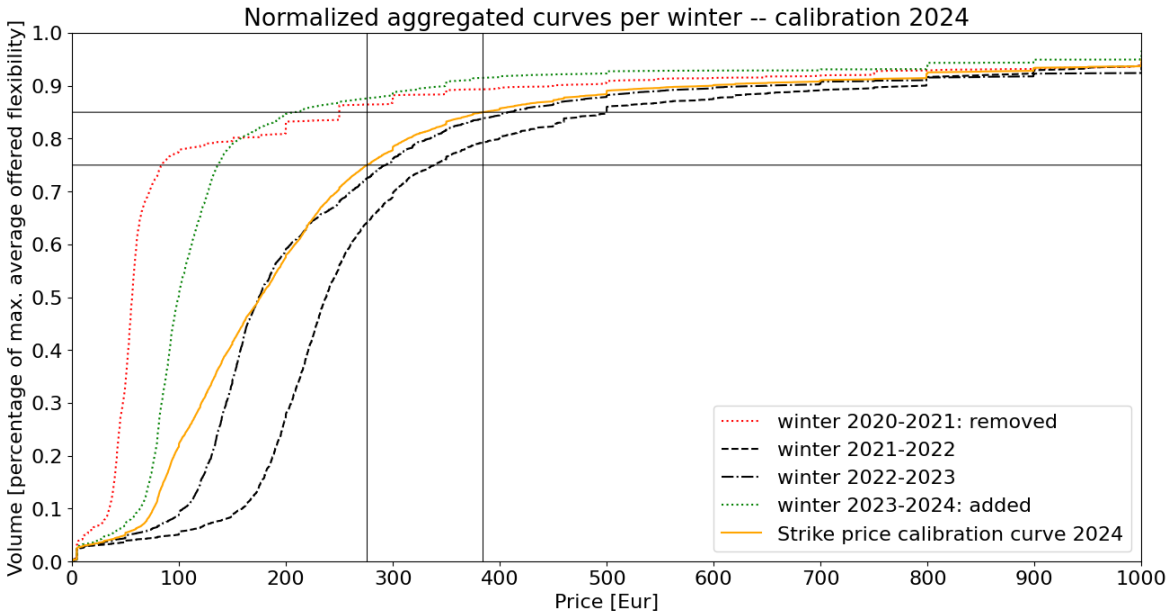


*Figure 4: example of a calibration curve of the Strike Price from the 2024 calibration report*

From this calibration curve, the calibration window is set up as the [75% - 85%] window. The establishment of this window can also be seen in Figure 4 above[11].

### 4.2.2 Selection of the Calibrated Strike Price from the calibration window

Based on the aforementioned calibration window the Strike Price is established based on an evaluation of 5 criteria. These criteria are that:

- The variable cost of Daily Schedule units on the Belgian market must be covered by the Strike Price; and
- The shape of the calibration curve must be considered; and
- The evolutions on the energy market must be taken into account; and
- There is stability of the Strike Price between the different Auctions, thereby taking into account the actualization mechanism as per section 4.3; and
- There is a reasonable probability that the Strike Price will be reached during the Delivery Period.

The reader who is interested in an example of the consideration of these criteria is invited to read section 3.3.2 of the 2024 calibration report[12].

It is worth noting that the Strike Price in this calibration report is but a proposal from Elia. The legal framework foresees that the Federal Public Service and the CREG can provide their

[11] For example, in the 2024 calibration report a calibration window of [276 - 384] €/MWh was obtained
[12] 2024 calibration report

comments and concerns, after which the Minister takes the final decision.

Table 1 below presents the Strike Prices that were used in the Auctions that have thus far been concluded. Even though the aim is to have a Strike Price that is relatively stable through time, these values are presented without prejudice to Strike Prices for future Auctions.

| | Y-4 Auction | Y-1 Auction |
|---|---|---|
| **Delivery Period 2025-2026** | 300 | 410 |
| **Delivery Period 2026-2027** | 300 | |
| **Delivery Period 2027-2028** | 417 | |
| **Delivery Period 2028-2029** | 431 | |

*Table 1: Strike Prices of previous CRM Auctions*

## 4.3 Actualized Strike Price

The Strike Price that is included for each Transaction in the Capacity Contract is not the Strike Price that is eventually used for the final determination of the Payback Obligation. Rather, it serves as an input in order to calculate this final value.

This so-called actualization mechanism splits the Strike Price in two components, a fixed component and a variable component. As the name suggests, the fixed component remains stable throughout the Delivery Period. In contrast, the variable component is calculated monthly. In doing so, the Strike Price is effectively adapted every month of the Delivery Period, ensuring that it remains an accurate representation of the price threshold above which revenues are excessive.

The fixed component can be calculated at the same moment as the Strike Price. It is obtained by deducting from the Strike Price the average Day-Ahead prices from the same winter period that was used to set up the calibration curve, to which the same filters (working days, peak hours) are applied. Seeing as this fixed component is determined based on historical prices, it can be calculated at the same time as the Strike Price, and Elia includes it as such in its calibration report.

The variable component is calculated for each month as the simple average of the Day-Ahead market prices of that month. As a result, the variable component can't be calculated in advance. For every month of the Delivery Period, the final value of the Actualized Strike Price (consisting of the sum of the fixed component and the variable component) is only determined ex-post and included in the monthly delivery activity report.

Figure 5 below illustrates the actualization of the Strike Price.

1. The original Strike Price is established as per the decision of the Minister.
2. At the same moment, the fixed component can be calculated. The fixed component remains constant throughout the Delivery Period for all CMUs contracted in the Auction to which it is linked.
3. At the end of every month M of the Delivery Period, Elia calculates the simple average of the Day-Ahead market prices of that month, which is the variable component.
4. The sum of the fixed and variable component forms the Actualized Strike Price.

Whenever Day-Ahead prices exceeded this price threshold, the Payback Obligation kicks in.

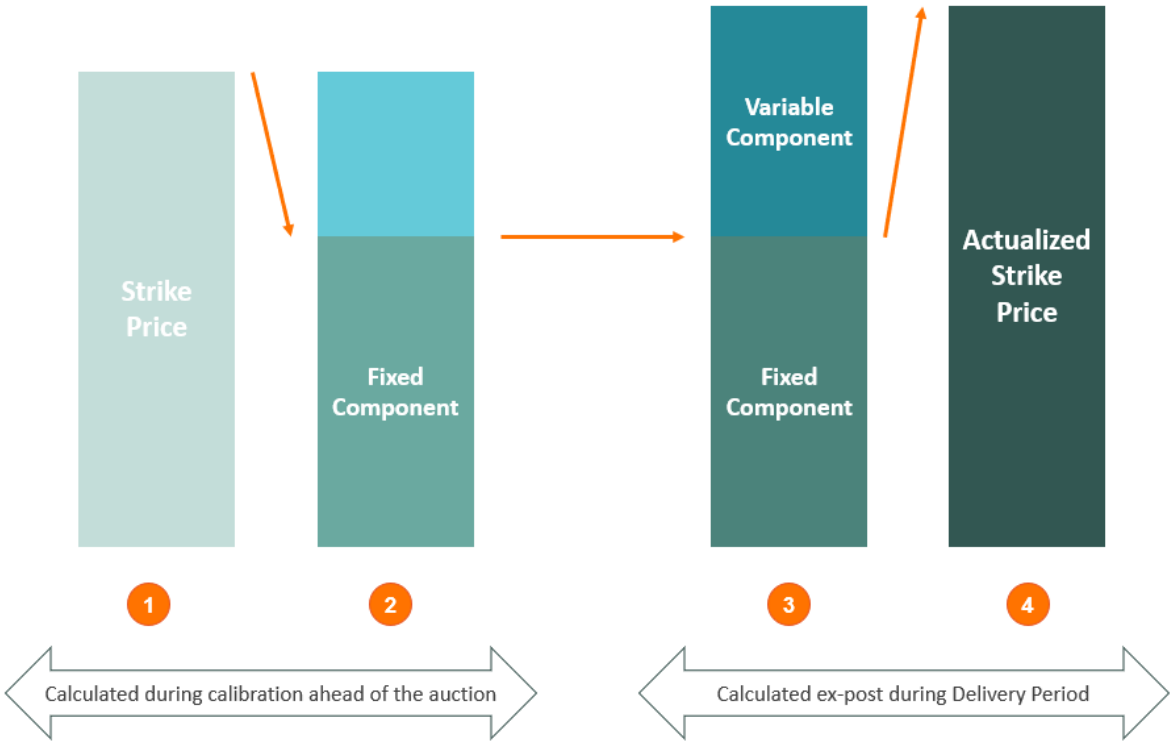


*Figure 5: Actualization of the Strike Price*

## 4.4 Illustrative example

The following section presents an example of several CMUs that have Capacity Contracts with different Strike Prices, and how evolving prices on the Day-Ahead market impact the final calculation of the Payback Obligation. Note that for simplicity's sake, no details are given concerning the volume that is subject to the Payback Obligation, which is explained more in detail in section 5.

The example covers 2 CMUs:

- CMU A acquired a Capacity Contract with a Strike Price of 300 €/MWh in the Auction. The fixed component of this Transaction is 245 €/MWh.
  In the month of January that is part of the Transaction Period, the average Day-Ahead price is equal to 80 €/MWh, which is thus the variable component. The sum of the fixed component and the variable component equals 325 €/MWh, which is the Actualized Strike Price. Whenever this price threshold was exceeded in the course of January, revenues above that need to be reimbursed.
- CMU B acquired a Capacity Contract with a Strike Price of 431 €/MWh. The fixed component of this Transaction is 266 €/MWh. Moreover, in the course of the Transaction Period the CMU acquires another Obligation via the Secondary Market. The Strike Price of this Obligation is equal to 417 €/MWh, with a fixed component of 303 €/MWh.

In the month of March that is part of the Transaction Period of both the Primary Market and the Secondary Market Transaction, the average Day-Ahead price is equal to 70 €/MWh, which is thus the variable component. This variable component is applied to both fixed components of the Transactions. For the Primary Market Transaction, the final Actualized Strike Price is thus equal to 336 €/MWh. For the Secondary Market Transaction, the Actualized Strike Price is equal to 373 €/MWh.
In this case of multiple Transactions, the Payback Obligation is calculated separately in function of the Strike Price and the Contracted Capacity of each Transaction. Indeed, for CMU B it is possible that if the Reference Price is between 336 €/MWh and 373 €/MWh, only the Primary Market Transaction will be subject to the Payback Obligation.

## 4.5 A note on Strike Price and AMT Price

The attentive reader might know that similar to the Payback Obligation, which is triggered when the Reference Price exceeds the Actualized Strike Price, the Availability Monitoring is also triggered when the Reference Price exceeds the so-called AMT Price.

The Strike Price and AMT Price are two different price thresholds that signify different things. As already discussed, the Strike Price represents the price threshold above which revenues are concerned excessive. In contrast, the AMT Price is the price level that triggers the Availability Monitoring process. It serves as an indicator for scarcity, and when the Reference Price reaches the AMT Price Contracted Capacities can be penalized if they were not contributing to Belgium's security of supply at that moment.

Even though they look similar at first glance, both prices and the processes they trigger are independent. Moreover, only the Strike Price disposes of an actualization mechanism (see section 4.3) and the AMT Price remains constant for each Delivery Period.

In general, the AMT Price and Strike Price are calibrated in such a way that the AMT Price is always lower than the Actualized Strike Price, which *ceteris paribus* means that every Payback Moment is an AMT Moment, but not the other way around. However, due to the actualization mechanism of the Strike Price, in case of an exceptional price shock in the course of a Delivery Period it is theoretically possible that the Strike Price reaches a value that is lower than the AMT Price.

# 5 Volume subject to the Payback Obligation

Similar to the Strike Price, the volume that is subject to the Payback Obligation is also evaluated on a Transaction basis. This means that depending on the characteristics of the Contract the Contracted Capacity might be taken into account differently. In this section it will be shown how different types of capacities and Transactions can result in a different calculation of this volume. In particular, it is useful to make a distinction between Non-energy Constrained CMUs (section 5.1.1) and Energy Constrained CMUs (section 5.1.2).

It is particularly important to make this distinction seeing as it means that Elia will consider the derated or non-derated capacity for the Payback Obligation. In case a Derating Factor must be used to determine the relevant volume, it is always the Derating Factor associated to the Transaction under consideration. In case of multiple Transactions with different Derating Factors, it is as such possible that each Transaction of the CMU uses a different Derating Factor.

It is possible that due to forced outages or scheduled maintenance the unit was not available on the energy market, and as such was also not able to capture windfall profits in the first place. To cover this case the Availability Ratio is presented in section 5.2 to take into account these events.

Lastly, in case of an Aggregated CMU it is possible that some of the Delivery Points participate in the CRM as either storage or DSM. As discussed in section 1.1, these technologies are exempted from the Payback Obligation, and a factor is calculated in section 5.3 to reflect his.

## 5.1 Contracted Capacity

### 5.1.1 Contracted Capacity from Non-energy Constrained CMUs

For Non-energy Constrained CMUs the capacity that is taken into account for the Payback Obligation is equal to the derated capacity, i.e. the Capacity that is included in the Capacity Contract.

As a result, for each Transaction the volume that is used for the calculation of the Payback Obligation is equal to:

$$Volume\ subject\ to\ Payback\ Obligation = Contracted\ Capacity$$

### 5.1.2 Contracted Capacity from Energy Constrained CMUs

For Energy Constrained CMUs it is important to understand the concept of the SLA MTUs. Due to their nature, Energy Constrained CMUs are not capable of contributing non-stop to security of supply. As a result Elia establishes the so-called SLA MTUs, a subset of MTUs that respects their technical capabilities and is limited to one activation per day.

The reader who is interested to learn more about SLA MTUs is invited to read the design note concerning the Availability Obligation.

The SLA MTUs play a vital role in the determination of the Payback Obligation for Energy

Constrained CMUs. Their use differs depending on whether the Transaction is ex-ante (section 5.1.2.1) or ex-post (section 5.1.2.2).

#### 5.1.2.1 Ex-ante Transactions

Ex-ante Transactions include both Primary Transactions and Secondary Transactions that have been concluded ahead of the actual Payback event.

As discussed previously, the SLA MTUs limit the Service that the CMU is supposed to delivery to its technical capabilities and only one activation per day. At first glance the fact that only one activation per day is required could seem like an unfair advantage compared to Non-energy Constrained CMUs, who are expected to be present at all times. However, an important feature of Energy Constrained CMUs is that for both the Availability Obligation and the Payback Obligation their non-derated Capacity is taken into account, which is higher than the Contracted Capacity. As a result, Energy Constrained CMUs are indeed expected to be present less to the system, but they are subject to both the Availability and Payback Obligation.

As a result, for each ex-ante Transaction during the SLA MTUs the volume that is used for the calculation of the Payback Obligation is equal to:

$$Volume\ subject\ to\ Payback\ Obligation = \frac{Contracted\ Capacity}{Derating\ Factor}$$

For each ex-ante Transaction outside of the SLA MTUs the volume that is used for the calculation of the Payback Obligation is equal to zero:

$$Volume\ subject\ to\ the\ Payback\ Obligation = 0$$

#### 5.1.2.2 Ex-post Transactions

The Secondary Market allows to carry out Transactions ex-post, i.e. when the moment of delivery has already passed. This is useful when a Capacity Provider notices that contrary to his expectation his Availability turned out lower than expected and still wants to trade some Obligations away before he is penalized. Likewise, CMUs that noticed that their Availability was higher than expected can acquire some additional Capacity Remuneration by acquiring an ex-post Obligation.

The reader who is interested to learn more about the modalities concerning ex-post and ex-ante Secondary Market Transactions is invited to read the design note concerning the Secondary Market.

Ex-post Transactions are taken into account differently compared to ex-ante Transactions. Indeed, the entire goal of Derating Factors is to calculate how much a nominal capacity can contribute on average to security of supply. However, in the case of an ex-post Transaction a Derating Factor is no longer needed seeing as it is based on historical observations, not on how much the capacity is expected to deliver.
Moreover, the SLA MTUs are no longer considered either based on a similar logic.

As a result, for each ex-post Transaction, regardless of whether it was an SLA MTU or not, the volume that is used for the calculation of the Payback Obligation is equal to:

$$Volume\ subject\ to\ Payback\ Obligation = Contracted\ Capacity$$

It is worth highlighting that the Transaction Period of an ex-post Transaction can overlap with a pre-existing ex-ante Transaction. In this case, the Contracted Capacity from both Transactions are taken into account, albeit in different ways:

$$Volume\ subject\ to\ Payback\ Obligation =$$

$$\frac{Contracted\ Capacity_{ex-ante}}{Derating\ Factor} + Contracted\ Capacity_{ex-post}$$

### 5.1.3 Illustrative example

The following section presents an example of several CMUs that have Capacity Contracts with different Contracted Capacities, and how these are taken into account for the determination of the Payback Obligation. Note that for simplicity's sake, no details are given concerning the Strike Price, which is explained more in detail in section 4.

The example covers 2 CMUs:

- CMU A is a Non-energy Constrained CMU with a Nominal Reference Power of 100 MW. In the Auction, a Derating Factor of 90% was applicable. The Capacity Provider did not offer all Eligible Volume in the Auction and only contracted 70 MW, resulting in a Transaction with a Contracted Capacity of 70 MW.
  Whenever the Strike Price of the Transaction is exceeded, the volume that is taken into account for this Transaction for the Payback Obligation is 70 MW (as per section 5.1.1).
- CMU B is an Energy Constrained CMU with a Nominal Reference Power of 50 MW. In the Auction, a Derating Factor of 50% was applicable. The Capacity Provider offered and contracted all Eligible Volume, resulting in a Transaction with a Contracted Capacity of 25 MW.
  During every MTU where the Strike Price of the Transaction is exceeded and when these MTUs are also SLA MTUs, the volume that is taken into account for this Transaction for the Payback Obligation is 50 MW (as per section 5.1.2.1).
  On top of its original ex-ante Transaction, CMU B occasionally also dabbles in ex-post Transactions. At some point, an ex-post Transaction of 5 MW is acquired. If during the Transaction Period of that ex-post Transaction its Strike Price was exceeded, the volume that is taken into account for this Transaction for the Payback Obligation is 5 MW (as per section 5.1.2.2).

## 5.2 Availability Ratio

### 5.2.1 Main principles and calculation

In the framework of the Availability Obligation process, the Capacity Provider has to notify Elia whenever there is a limitation to the Nominal Reference Power of the CMU due to forced outage, scheduled maintenance, etc. Upon receiving a correct notification of such unavailability it is taken into account for the calculation of the Payback Obligation as well. Indeed, seeing as (part of) the capacity was unavailable, it does not need to pay back revenues it never made in the first place.

In order for notified unavailabilities to be taken into account for the Payback Obligation, they need to be submitted by the Capacity Provider before 11:00 the day before the Payback event. This prevents that a Capacity Provider can quickly declare some unavailabilities after the Day-Ahead market prices have been published, thereby effectively dodging the Payback Obligation.

The submission of Unavailable Capacity[13] results in the determination of the Remaining Maximum Capacity DA, which is the amount of capacity that remains available after taking into account the unavailabilities, as can be seen in Figure 6.

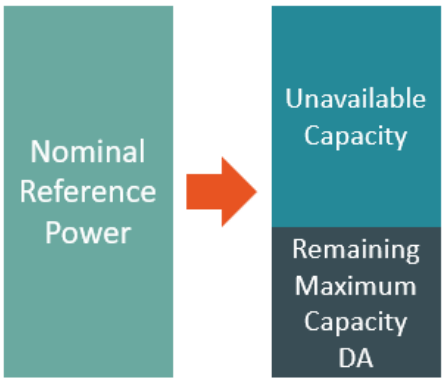


*Figure 6: Remaining Maximum Capacity*

The Remaining Maximum Capacity DA is calculated for the CMU as a whole. Seeing as the Availability Ratio is based on the Remaining Maximum Capacity DA, its value also represents the total CMU and is then applied to calculate the Payback Obligation for each Transaction separately.

For any MTU $t$, the Availability Ratio is then calculated as the ratio of the Remaining Maximum Capacity DA compared to the total volume that is subject to the Payback Obligation. The latter includes all Transactions that have a Transaction Period covering MTU $t$. It is represented by the following formula:

$$\frac{Min(total\ volume\ subject\ to\ Payback\ Obligation; Remaining\ Maximum\ Capacity\ DA)}{total\ volume\ subject\ to\ Payback\ Obligation}$$

Where:

- $total\ volume\ subject\ to\ the\ Payback\ Obligation(CMU, t)$ in this formula is equal to the sum of the volume that is subject to the Payback Obligation as per section 5.1.1 and 5.1.2 for all the CMU's Transactions with a Transaction period covering MTU $t$.
- $Remaining\ Maximum\ Capacity(CMU, t)$ is as explained above.

When no Unavailable Capacity was submitted, the Availability Ratio is equal to 1 and the full

[13] In the framework of the Availability Obligation, Unavailable Capacity can be notified as either Announced or Unannounced. For the calculation of the Remaining Maximum Capacity (and thus, for the Availability Ratio), both are considered.

Payback Obligation is applicable.

### 5.2.2 Illustrative example

Consider a CMU that has a Nominal Reference Power of 100 MW. For a certain MTU $t$, the Capacity Provider has made a correct notification of Unavailable Capacity of 40 MW. Consequently, the Remaining Maximum Capacity DA is equal to 60 MW.

For the same MTU $t$ the CMU has three Transactions with a Transaction Period that cover it. The volume subject to the Payback Obligation for these Transactions is 40 MW, 10 MW and 20 MW, respectively. Figure 7 below illustrates how these volumes compare.

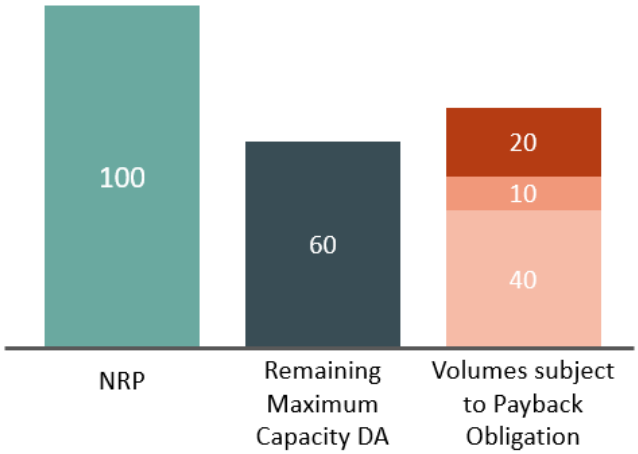


*Figure 7: volumes for the calculation of the Availability Ratio*

The CMU no longer disposes of sufficient Remaining Maximum Capacity DA to cover the total volume that is subject to the Payback Obligation. This is reflected by the Availability Ratio, which is calculated as

$$\frac{Min(70;60)}{70} = 86\%$$

To all the Payback Obligation that is calculated for the different Transactions this Availability Ratio is applied.

## 5.3 DSM and storage capacities

### 5.3.1 Main principles and calculation

As already highlighted in the introduction, an exemption to the Payback Obligation is in force for both DSM and storage capacities.

For CMUs that consist solely of either DSM or storage capacities, the resulting Payback Obligation is thus equal to zero.

However, the CRM also allows the participation of Aggregated CMUs, where Delivery Points of different technologies from one CMU together. It is entirely possible that an Aggregated CMU consists of DSM and/or storage Delivery Points as well as 'regular' Delivery Points that

are still subject to the Payback Obligation. In this case, the Payback Obligation is calculated pro-rata in function of the Nominal Reference Power of the Delivery Points.

To calculate the proportion of the CMU that is still subject to the Payback Obligation, a ratio is established that presents the amount of Non-DSM or storage capacity compared to the total Nominal Reference Power of the CMU. It is calculated as follows:

$$\frac{NRP(CMU, Transaction) - \sum_i DSM\ or\ storage\ NRP_i(CMU, Transaction)}{NRP(CMU, Transaction)}$$

Where:

- $NRP(CMU, Transaction)$ is the Nominal Reference Power of the CMU at Transaction Date; and
- $DSM\ or\ storage\ NRP_i(CMU, Transaction)$ is the Nominal Reference Power of a DSM or storage Delivery Point $i$ that is part of the CMU at Transaction Date.

This ratio is directly used in the calculation of the total Payback Obligation, as explained in section 6.

For both the $NRP$ and the $DSM\ or\ storage\ NRP$, the volumes are used that were relevant at the time of the signature of the Contract for the Transaction rather than the most recently updated one. This prevents a gaming situation where a Capacity Provider adds significant DSM or storage Delivery Points to a CMU that already has a Contract in order to “dilute” its Payback Obligation via this ratio.

The originally calculated Payback Obligation is then multiplied with this ratio to take into account that part of the CMU is exempted.

### 5.3.2 Illustrative example

Consider an Aggregated CMU that has a Nominal Reference Power of 10 MW. It consists of three Delivery Points $DP_1, DP_2$ and $DP_3$. $DP_1$ and $DP_2$ are a battery and a DSM Delivery Point, respectively. The composition of the CMU’s NRP is shown on Figure 8 below:

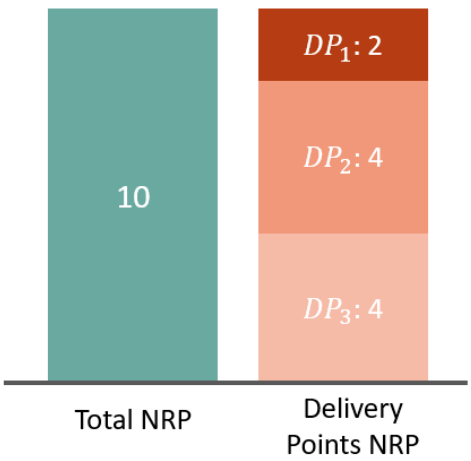


*Figure 8: Composition of an Aggregated CMU*

As a result proportion of capacity not belonging to DSM or energy storage Delivery Points in

the CMU's total NRP is equal to:

$$\frac{10-6}{10} = 40\%$$

Upon calculation of the Payback Obligation for this Transaction, only 40% will need to be paid seeing as the remaining 60% is exempt from the Payback Obligation.

# 6 Calculation of the Payback Obligation

## 6.1 Payback Obligation formula

The final calculation of the Payback Obligation for a CMU's Transaction for each MTU $t$ is established based on the combination of all aforementioned elements. It can be represented by Figure 9, where the Payback Obligation is calculated as the multiplication of the positive difference between the Reference Price and the Strike Price on the one hand, and the Volume subject to the Payback Obligation on the other. This volume can still be reduced by:

1. The Availability Ratio, expressing the amount of capacity that was unavailable due to Forced Outages etc., as per section 5.2; and
2. The proportion of DSM and/or storage capacity of the CMU, as per section 5.3.

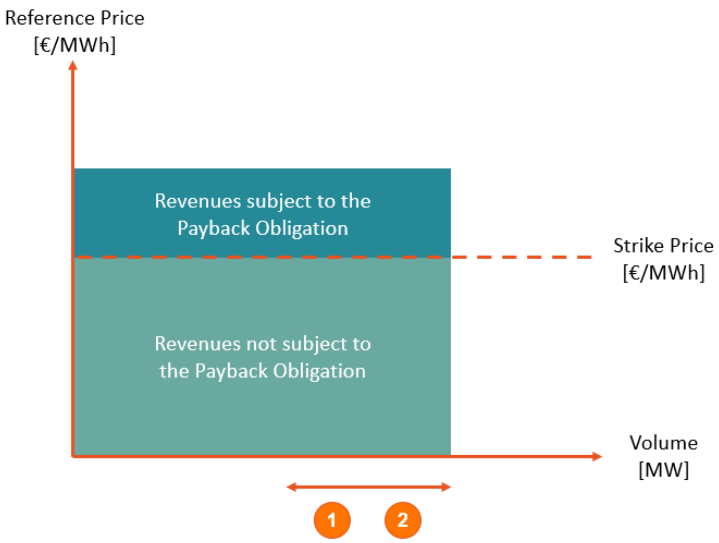


*Figure 9: Determination of the Payback Obligation*

As a result, the Payback Obligation is calculation according to the following formula:

$$Payback\ Obligation(CMU, transaction, t) =$$
$$\left(Reference\ Price(CMU, t) - Strike\ Price(CMU, Transaction, t)\right)$$
$$\times\ Volume\ subject\ to\ the\ Payback\ Obligation(CMU, Transaction, t) \times Availability\ Ratio(CMU, t)$$
$$\times \frac{NRP(CMU, Transaction) - \sum_i DSM\ or\ storage\ NRP_i(CMU, Transaction)}{NRP(CMU, Transaction)} / 4$$

Where:

- $t$ is the Market Time Unit; and
- $Reference\ Price(CMU, t)$ is the observed Reference Price for the CMU at MTU $t$, as explained in section 3; and
- $Strike\ Price(CMU, Transaction, t)$ is the Strike Price applicable to the CMU's Transaction as explained in section 4; and

- $Volume\ subject\ to\ the\ Payback\ Obligation(CMU, Transaction, t)$ is the volume subject to the Payback Obligation of the CMU's Transaction, as explained in section 5.1; and
- $Availability\ Ratio(CMU, t)$ is the CMU's Availability Ratio, as explained in section 5.2; and
- $NRP(CMU, Transaction)$ is the Nominal Reference Power of the CMU; and
- $DRM\ or\ storage\ NRP_i(CMU, Transaction)$ is the Nominal Reference Power of a DSM or storage Delivery Point $i$ that is part of the CMU, as explained in section 5.3.

## 6.2 Payback Obligation per hour

The attentive reader will have noted that the Payback Obligation formula of section 6.1 contains a division by four at the end. This division carried out to account for the upcoming developments on the Day-Ahead energy markets, where trades will no longer take place on an hourly basis but a quarter-hourly basis. Indeed, dividing by four allows for the energy calculation to be correct.

Be that as it may, the Payback Obligation is in first instance still calculated for every MTU $t$. Seeing as the evolution towards a quarter-hourly energy market would effectively result in a quadruplication of the MTUs, a simple application of the formula would result in an excessive amount of Payback. To prevent this, the division by four is included.

To illustrate this the calculated amount of Payback is done for every MTU $t$ in Table 2 below for a fictive CMU. For the sake of simplicity, no Availability Ratio or DSM and/or storage is considered.
The Payback Obligation is triggered whenever the Reference Price exceeds the Strike Price. For each MTU $t$ the positive difference is multiplied with the volume subject to the Payback Obligation and divided by four. Finally, the hourly Payback Obligation is calculated as the sum over the MTUs that constitute it.

| MTU | Reference Price [€/MWh] | Actualized Strike Price [€/MWh] | Volume Subject to the Payback Obligation [MW] | Payback Obligation per MTU t [€] | Payback Obligation per hour [€] |
|---|---|---|---|---|---|
| **14:00 – 14:15** | 450 | 400 | 100 | 1250 | 2250 |
| **14:15 – 14:30** | 420 | 400 | 100 | 500 | |
| **14:30 – 14:45** | 380 | 400 | 100 | 0 | |
| **14:45 – 15:00** | 420 | 400 | 100 | 500 | |
| **15:00 – 15:15** | 350 | 400 | 100 | 0 | 1000 |
| **15:15 – 15:30** | 360 | 400 | 100 | 0 | |
| **15:30 – 15:45** | 410 | 400 | 100 | 250 | |
| **15:45 – 16:00** | 430 | 400 | 100 | 750 | |

*Table 2: Payback Obligation calculation*

## 6.3 Payback Obligation per Transaction

As briefly mentioned in section 2, the Payback Obligation is carried out on a Transaction basis. This means that parameters that are unique to each Transaction can result in different amounts of Payback applicable to different Transactions.

As a summary, from all the parameters included in the Payback Obligation formula of section 6.1 the following are the same across the entire CMU, i.e. they apply to all its Transactions:

- Reference Price
- Availability Ratio

In contrast, the following elements are determined per Transaction separately:

- Actualized Strike Price
- Volume subject to the Payback Obligation
- NRP of the CMU at the time of the Transaction Date
- DSM or storage NRP at the time of the Transaction Date

Depending on the difference between each Transaction's Actualized Strike Price, it might even occur that the Payback Obligation is triggered for one Transaction, but not for the other.

To illustrate this the Payback Obligation is calculated for a fictive CMU that has 2 Transactions in Table 3 below. For each MTU t, the total Payback is calculated as the sum of the Payback Obligation each individual Transaction.

For the sake of simplicity no DSM or storage capacities are considered. The Reference Price as well as the Availability Ratio are then the same over the different Transactions. In contrast, the divergences in Actualized Strike Price and volume subject to the Payback Obligation result in different Payback Obligations per MTU and per Transaction.

| MTU | Transaction | Reference Price [€/MWh] | Actualized Strike Price [€/MWh] | Volume Subject to the Payback Obligation [MW] | Availa-bility ratio [%] | Payback Obligation per MTU t [€] |
|---|---|---|---|---|---|---|
| **14:00 – 14:15** | Transaction 1 | 450 | 400 | 10 | 75% | 93,75 |
| | Transaction 2 | | 420 | 5 | | 28,13 |
| **14:15 – 14:30** | Transaction 1 | 430 | 400 | 10 | 75% | 56,25 |
| | Transaction 2 | | 420 | 5 | | 9,38 |
| **14:30 – 14:45** | Transaction 1 | 350 | 400 | 10 | 50% | 0 |
| | Transaction 2 | | 420 | 5 | | 0 |
| **14:45 – 15:00** | Transaction 1 | 410 | 400 | 10 | 50% | 12,5 |
| | Transaction 2 | | 420 | 5 | | 0 |

*Table 3: Payback Obligation per Transaction*

# 7 Stop-Loss

## 7.1 Main principles and calculation of the Stop-Loss

The attentive reader will have noted that the Payback Obligation applies whenever the Reference Price exceeds the Actualized Strike Price. In case of sustained periods of time with excessive prices, this could result in a paradoxical situation where a CMU participating in the CRM would have to pay back more than what he received in terms of Capacity Remuneration. Participation in the CRM would then result in a financial loss. Even though the probability of this event is extremely limited, it could cause Capacity Owners to refrain from offering their capacity in the Auction.

In order to prevent this situation, the Payback Obligation includes a Stop-Loss mechanism. It is an upper limit on the Payback Obligation, ensuring that the total amount that needs to be paid back does not exceed the total Capacity Remuneration that was received. As a result, in the rare case that the Payback Obligation is triggered often, the Stop-Loss guarantees that participation in the CRM at worst results in a break-even situation.

The Stop-Loss is evaluated for each Transaction separately. However, not all Transactions are considered for the Stop-Loss. It only includes:

- Primary Market Transactions; and
- Secondary Market Transactions when they are validated ahead of 31 October preceding the Delivery Period, and their Transaction Period covers at least the full Delivery Period.

The Stop-Loss Amount for a Transaction is then calculated as the total amount of Capacity Remuneration received over the Delivery Period, as per the following formula:

$$Stop - Loss\ Amount(CMU, Transaction, Delivery\ Period)$$

$$= \sum_{t=1}^{W} \left( Contracted\ Capacity(CMU, Transaction, t) \times \frac{Capacity\ Remuneration(CMU, Transaction)}{W} \right)$$

Where:

- $t$ is a Market Time Unit part of the Delivery Period; and
- $W$ is the total number of Market Time Units of the Delivery Period; and
- $Contracted\ Capacity(CMU, Transaction, t)$ is the Contracted Capacity of a CMU's Transaction at time t, as per the Capacity Contract; and
- $Capacity\ Remuneration(CMU, Transaction)$ is the total Capacity Remuneration of the CMU's Transaction, as per the Capacity Contract.

## 7.2 Application of the Stop-Loss

The Stop-Loss Amounts for all contracted CMUs' Transactions are calculated every year on 31 October ahead of the start of the Delivery Period. This ensures that the last updated view on the Transactions that are eligible for the Stop-Loss is used. The result is shared with the Capacity Provider via the CRM IT Interface.

Whenever the Payback Obligation is triggered, Elia calculates the cumulative amount of Payback that has been applied per Transaction. When this cumulative Payback reaches the Stop-Loss Amount, the Payback Obligation equals zero for the remainder of the Delivery Period.

The result of the comparison of the hourly Payback Obligation and the Stop-Loss Amount is the so-called Effective Payback Obligation.

It is important to stress that the Stop-Loss is evaluated for each Transaction separately. Indeed, a CMU with multiple Transactions can hit the Stop-Loss for one Transaction but might still have to pay back for others.

# 8 Annex A: retroactivity and the Payback exemption

As mentioned in section 1.1 the exemption of the Payback Obligation is in force for Primary Market Transactions since 2024 for DSM and will be for Primary Market Transactions in 2025 and onwards for both DSM and storage units, subject to the timely amendment of the legal framework.
This Payback Exemption is not applicable retro-actively. CRM Auctions have been taking place since 2021, meaning that there are also DSM and storage units that have been contracted and are still subject to the Payback Obligation. With multiple Auctions and Secondary Market Transactions, it is useful to explain whether and how the Payback Obligation applies to different Transactions.

## 8.1 Primary Transactions

Whether or not the Payback Exemption applies to Primary Market Transactions depends on the Auction year:

- For the Auction that took place in 2021, 2022 and 2023, the Payback Exemption is not applicable;
- For the Auctions that took place in 2024, the Payback Exemption is only applicable to DSM units. For aggregated CMUs that partly consist of DSM, the ratio explained in section 5.3 is used where only DSM capacity is taken into account;
- For any other Auctions, the Payback Exemption is applicable to both DSM and storage units. For aggregated CMUs that partly consist of DSM and/or storage, the ratio explained in section 5.3 is used where both DSM and/or storage capacity is taken into account.

## 8.2 Secondary Transactions

Whether or not the Payback Exemption applies to a Secondary Market Transaction depends on the Transaction Date of the original Transaction. If the Buyer of the Transaction would have been exempted from the Payback Obligation if he had participated with his CMU at this initial Transaction Date, the Payback Exemption also applies to this Secondary Market Transaction. To give a few examples:

- If a DSM or storage CMU acquires an Obligation on the Secondary Market from a Transaction that was originally concluded in either 2021, 2022 or 2023, no Payback Exemption applies;
- If a DSM CMU acquires an Obligation on the Secondary Market from a Transaction that was originally concluded in 2024, the Payback Exemption applies. In contrast, a storage CMU is would for the same Transaction still be subject to the Payback Obligation;
- If a DSM or storage CMU acquires an Obligation on the Secondary Market from a Transaction that was originally concluded in any other Auction, the Payback Exemption applies;

Likewise, the question can be raised whether the Payback Obligation applies to “regular” CMUs when they acquire a Transaction from a DSM or storage CMU that was exempted from the Payback Obligation. The answer is yes: regardless of the initial Transaction Date, the Payback Obligation remains applicable to any CMUs that are not DSM or storage.

# 9 Annex B: Activation Ratio

As already highlighted in section 1, this design note serves as a support document for the CRM Functioning Rules that Elia submitted to the CREG on January 31st, 2025. However, market parties with contracts established based on previous versions of the Functioning Rules might also make use of this document. In particular, the 2024 Functioning Rules[14] include the modalities of the so-called **Activation Ratio**, which has been removed in the latest iteration of the rules. To allow market parties with contracts signed under the 2024 Functioning Rules to fully understand the design elements applicable to them, Elia includes a brief explanation on the Activation Ratio here.

Elia wants to stress that the Activation Ratio is not applicable for Capacity Contracts concluded following the Auctions in 2021, 2022 and 2023, or from 2025 onwards.

As explained in section 5, the total amount of Payback is based on the volume that is subject to the Payback Obligation. With the exception of the Availability Ratio, the implicit assumption is that this entire volume is available to capture windfall profits (that hence need to be paid back). However, for Non-daily Schedule CMUs, the partial Declared Prices offer the possibility to declare a partial activation at different price levels. This is also illustrated on Figure 10.

| Partial Declared Price [€/MWh] | Associated Volume [MW] |
|---|---|
| 100 | 5 |
| 200 | 10 |
| 500 | 15 |

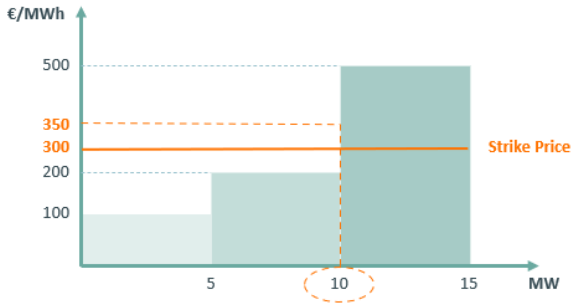


*Figure 10: partial activation during a Payback event*

For the sake of simplicity, consider that the CMU has a Contracted Capacity of 15 MW. The table on the left illustrates the total volume that will react to the different price thresholds. On the right, a market price of 350 €/MWh exceeds the Strike Price of 300 €/MWh. However, this market price is not sufficient for the CMU's last portion of volume to be in-the-money. In the Availability Obligation, this is effectively handled via the Required Volume. However, as just discussed above, the Payback Obligation would still demand windfall profits to be paid back for the entire Contracted Capacity, even though part of it was not in the market to capture these profits.

To deal with this inconsistency, the Availability Ratio calculates the proportion of capacity that

[14] Functioning Rules established by the CREG via decision (B)2273/2 of 13 September 2024 and approved by the Royal Decree of 17 September 2024

was in-the-money and thus captured the windfall profits as per the following formula:

$$Availability\ Ratio(CMU, t) = \frac{Min\big(volume\ subject\ to\ Payback\ Obligation(CMU, t); Required\ Volume(CMU, t)\big)}{volume\ subject\ to\ payback\ obligation(CMU, t)}$$

Where:

- $volume\ subject\ to\ Payback\ Obligation(CMU, t)$ is the total volume of the CMU subject to the Payback Obligation for MTU t, as per section 5; and
- $Required\ Volume(CMU, t)$ is the Required Volume[15] of the CMU for MTU $t$, based on the comparison of the Declared Prices of the CMU and the market price.

The Availability Ratio as calculated above is then added as an extra element in the multiplication of the Payback Obligation Formula in section 6.1.

The most recently submitted Functioning Rules specify that the Required Volume must be equal to the NRP during Payback events. As a result, the Availability Ratio as calculated above will always be equal to 1, making it redundant from this version of the Functioning Rules onwards.

[15] For more information concerning the Required Volume, the reader is invited to read the design note concerning the Availability Obligation