# Overview of Belgian CRM Design: list of definitions

**September 2019**

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# 1 Introduction and Context

***Introduction***

For the different methodologies and rules that Elia has to propose, a wide range of definitions are required. At this stage in the process characterized by multiple design notes referring regularly to the same concepts, Elia has opted for a glossary with proposed definitions.

At a later stage, when formalizing the final proposals, these definitions will be integrated into the different deliverables, such as Elia's proposal for Market Rules or Elia's proposal for methodology in a Royal Decree.

For reasons of completeness and informational purposes only, the list of definitions also foresees the relevant terms already defined in the Electricity Law or elsewhere. For these definitions a non-official English translation made by Elia is provided for the sake of clarity. These definitions foreseen in the Electricity Law are clearly marked in the table (marked by an asterisk (*) and included in red & italic). Obviously, by no means, those definitions already defined by the Electricity Law can be altered as a consequence of the public consultation of these CRM design notes.

At the end of this document also a list of abbreviations is provided.

***About the public consultation***

This proposal for definitions is put for formal public consultation and any remark, comment or suggestion is welcomed. It builds further on the discussions and proposals already made in the different TF CRM meetings gathering all relevant stakeholders and in the follow-up committee, the latter consisting of representatives of the CREG and Elia, under the presidency of the FPS Economy.

This public consultation runs in parallel with a public consultation on other design notes. Reactions to this public consultation can be provided to Elia via the specific submission form on Elia's website no later than Friday 11 October 2019 at 6 pm.

Early October also a second set of design notes will be launched by Elia for public consultation.

Note that, in line with their roles and responsibilities and the foreseen governance in the Electricity Law, also the FPS Economy and the CREG will consult on aspects within their competence according to their procedures.

## 2 List of Definitions

| Term | Definition |
|---|---|
| ***Aggregation**** | *According to Directive (EU) 2019/944, article 2, 18°: a function performed by a natural or legal person who combines multiple customer loads or generated electricity for sale, purchase or auction in any electricity market.* |
| **AMT Hour** | An hour for which the DAM price equals or exceeds the AMT Price and during which Availability Monitoring can occur. |
| **AMT Moment** | A series of consecutive AMT Hours. |
| **AMT Price or $p_{AMT}$** | The ex-ante defined price level for a Delivery Period equal to or above which the AMT Hours are determined. |
| ***Auction**** | *According to the Electricity Law, article 2, 73°, the competitive process in which Capacity Holders are offering a price for making available capacity.* |
| **Available Capacity** | The CMU's capacity that is deemed available during an AMT Hour as a result of the Availability Monitoring Process or the Availability Testing. Available Capacity can consist of both Proven Availability and Unproven Availability. |
| **Availability Monitoring Mechanism** | The mechanism that monitors whether the CMU's Available Capacity equals at least its Obligated Capacity during AMT Hours as referred to in article 7undecies § 7 of the Electricity Law. |
| **Availability Monitoring Trigger (AMT)** | A pre-defined trigger price, expressed in €/MWh, in a predefined market segment, equal or above which the Obligated Capacity of a CMU is being monitored. |
| **Availability Obligations** | The obligation of a CMU to have an Available Capacity that equals at least its Obligated Capacity during AMT Hours. |
| **Availability Testing** | The mechanism based on which CMUs have to demonstrate their availability by actually delivering energy upon request of the Transmission System Operator. During Availability Testing it is monitored whether the CMU's delivered energy equals at least its Obligated Capacity. |
| **Bid** | Offer made by a CRM Candidate (in EUR/kW/year) in the Auction, relating to a single CMU. |
| **Bid Cap** | A maximum Bid Price (in EUR/kW/year) that can be made for a Bid in the CRM auction. |

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| **Bid Price** | The price expressed in EUR /kW/year at which CRM Candidates are offering a Bid in the Auction. |
| ***Capacity Category**** | *According to the Electricity Law, article 2, 84°, the category including capacities that are distinguished by the eligible total Investment Thresholds to which different Capacity Contract Durations are linked, during which the Capacity Provider is entitled to a Capacity Remuneration. The different categories that are foreseen in the CRM design are 1-year, 3-years, 8-years and 15-years as referred to in article 7undecies § 7 of the Electricity Law .* |
| **Capacity Contract** | A contract signed between a Capacity Provider and the contracting counterparty that determines the rights and obligations for both parties as referred to in article 7undecies § 7 of the Electricity Law. |
| **Capacity Contract Duration** | The number of Delivery Periods during which the Capacity Provider can receive a Capacity Remuneration. The Capacity Contract Duration cannot exceed the maximum duration assigned to their Capacity Category as determined during the Prequalification Process and is approved by the regulator for each CMU requesting a multi-year contract. |
| ***Capacity Holder**** | *According to the Electricity Law, article 2, 74°, every natural person or legal entity that can offer a certain level of capacity, either on an individual or aggregated basis.* |
| **Capacity Market Unit (CMU)** | One Delivery Point or a combination of Delivery Points, built in order to participate in the CRM. It is the outcome of a positive Prequalification Process and corresponds to the level where the Service is effectively delivered and monitored. |
| ***Capacity Provider**** | *According to the Electricity Law, article 2, 75°, every Capacity Holder selected after closing of the Auction and that will keep available a capacity during the Delivery Period in return for a Capacity Remuneration.* |
| ***Capacity Remuneration**** | *According to the Electricity Law, article 2, 76°, the periodically assigned payment to the Capacity Provider in return for keeping available their capacity.* |
| ***Capacity Remuneration Mechanism* (CRM)*** | *According to the Electricity Law, article 2, 71°, the market mechanism based on a system of Reliability Options to ensure the achievement of the country's required level of security of supply to guarantee that the evolution of the different forms of capacities meets the development of the electricity demand, taking into account the import possibilities.* |
| **CRM Candidate** | Capacity Holder willing to participate to an Auction and submit a Bid for the Service delivery with one or several successfully prequalified CMU(s). |

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| **CRM Law** | The law of 04/04/2019 modifying the Electricity Act: « *Wet tot wijziging van de wet van 29 april 1999 betreffende de organisatie van de elektriciteitsmarkt, teneinde een capaciteitsvergoedingsmechanisme in de stellen »,* published in the Belgian National Gazette on 22 April 2019. |
| **Day-Ahead Market (DAM)** | Day-Ahead Market refers to the single day-ahead coupling, being the auctioning process where collected orders are matched and cross-zonal capacity is allocated simultaneously for different bidding zones in the Day-Ahead Market. |
| ***Delivery Period**** | *According to the Electricity Law, article 2, 77°, the period starting from the 1st of November and ending on (but including) the 31st of October of the next year, during which the Capacity Providers are remunerated for making available their capacity.* |
| **Delivery Point** | A point on the electrical grid or within electrical installations of a grid user where the Service is delivered. This point is associated to one or several metering device(s) conform to the technical requirements set by the Transmission System Operator; |
| **Declared Market Price (DMP)** | The Day-Ahead Market price equal to or above which a CMU has declared it would deliver energy in the energy market. |
| ***Demand Curve**** | *According to the Electricity Law, article 2, 78°, a curve that reflects the variation of the procured capacity volume, in function of the price of the capacity.* |
| ***Demand Side Response* (DSR)*** | *According to the Electricity Law, article 2, 66°, the capacity of end users to change their electricity demand upwards or downwards on a voluntary basis, reacting upon an external signal.* |
| **Demand Side Unit (DSU)** | An end user asset that can deliver DSR. |
| ***Derating Factor**** | *According to the Electricity Law, article 2, 83°, a factor that is applied to a certain capacity, determining its contribution to the security of supply and used to calculate the total Eligible Volume that is qualified to participate in the Auction.* |
| **Electricity Law** | Federal Electricity Law of 29 April 1999 on the organization of the Belgian electricity market, as subsequently amended. |
| **Eligibility Criteria** | The criteria to determine which investment costs are eligible to calculate the Investment Threshold as referred to in article 7undecies § 5 of the Electricity Law and to be further specified in a royal decree. |

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| **Eligible Volume** | The Reference Power of each CMU multiplied by the Derating Factor as determined during the Prequalification Process. |
| **Energy Constrained Assets** | An asset or a portfolio of assets that have limited availability because they can only provide capacity availability for a limited number of consecutive hours. |
| **Energy Not Served* (ENS)** | Amount of energy that cannot be supplied, expressed in GWh per year. |
| **Expected Energy Not Served* (EENS)** | Expected amount of energy that cannot be supplied, expressed in GWh per year. |
| ***Direct Cross-Border Participation**** | *According to the Electricity Law, article 2, 86°, capacity outside the Belgian territory, but connected through a specific cable to only the Belgian control zone, after entry into force of the CRM Law, subject to the same rights and obligations as similar capacity inside the Belgian territory.* |
| **Existing Capacity** | Capacity already connected to the electricity grid, equipped with metering device enabling the determination of the Reference Power at the moment of the prequalification. |
| ***Indirect Cross-Border Participation**** | *According to the Electricity Law, article 2, 85°, capacity outside the Belgian control zone that is contributing to the security of supply of Belgium via interconnectors.* |
| **Investment Threshold** | The level of capex investments that meet the Eligibility Criteria, required for a CMU to be entitled to Capacity Contract with a multi-year duration as referred to in article 7undecies § 5 of the Electricity Law. |
| ***Loss of Load Expectation**** ***(LOLE)*** | *According to the Electricity Law, article 2, 52°, the statistical calculation based on which the anticipated number of hours during which it will not be possible for all the Generation resources available to the Belgian electricity grid to cover the load, taking into account also Market Response and the capacity from interconnectors, for a statistically normal year.* |
| **Market Response** | A reduction of electricity consumption behind the meter, independent from the technology, including both Demand Side Response as well as decentralized production and storage facilities. |
| **Market Rules** | The set of rules that provide for the functioning of the CRM, including a.o. the prequalification requirements, the auction's clearing algorithm, opt-out treatment, the Availability Monitoring Mechanism and Penalties as referred to in article 7undecies § 8 of the Electricity Law. |

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| **Missing Capacity** | The positive difference during the Delivery Period between the Obligated Capacity and the Available Capacity, not covered in the Secondary Market. |
| **New Capacity** | Capacity that is not yet connected to the grid at moment of prequalification and for which no Reference Power can be calculated based on 15 minutes measurements. |
| **Non-Eligible Capacity** | Capacity that is not allowed to take part in the CRM including at least the capacities following article 7 undecies §4, 1° of the Electricity Law related to having received or receiving support from other support mechanisms and capacities not meeting the emission standards as defined in RIME. |
| **Non-Energy Constrained Assets** | An asset or a portfolio of assets for which their availability is not limited in terms of the amount of energy that could be provided by the assets |
| **Obligated Capacity** | The capacity for a CMU that is required to be available during an AMT Hour. |
| **Opt-Out Volume** | (Part of) the Eligible Volume of the CMU for which the CRM Candidate formally indicates it is not willing to offer it in the Auction, by the end of the Prequalification Process at the latest as referred to in article 7undecies § 6 of the Electricity Law. |
| **Penalty** | The amount to which the Capacity Provider is exposed in case of a positive difference between the Obligated Capacity and the Available Capacity. |
| ***Prequalification Process**** | *According to the Electricity Law, article 2, 82°, the procedure that enable the Capacity Holders to determine to participate in the Auction.* |
| **Price Cap** | The maximum bid price and the maximum remuneration that can be received for a Bid. |
| ***Price Limit**** | *The maximum price of bids permitted in the Auctions and/or the maximum Capacity Remuneration received by Capacity Providers after auction closure.* |
| **Proven Availability** | Proven Availability is exhibited when (i) a CMU without full scheduling obligation has Available Capacity during AMT Hours where the Day-Ahead Market price exceeds the Declared Market Price, that is consistent with the Obligated Capacity or (ii) a CMU with scheduling obligation is available in the energy market or (iii) a CMU reserving its Obligated Capacity in an ancillary services made up only of Delivery Points associated to the CMU or (iv) a CMU physically delivering its Obligated Capacity output as a result of Ancillary Services activations. |

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| **Reference Power** | Maximal capacity (expressed in kW) that could deliver the Service and resulting from the Prequalification Process before application of relevant Derating Factors. This value is associated to a Capacity Market Unit (CMU). |
| ***Reference Price**** | *According to the Electricity Law, article 2, 81°, the price that is presumed to be received by the Capacity Providers in the energy market.* |
| ***Reliability Options**** | *According to the Electricity Law, article 2, 72°, the CRM based on which Capacity Providers will repay the positive difference between the Reference Price and the Strike Price.* |
| **Reliability Standard** | The Reliability Standard, as described in Article 25 of RIME, is used to define the level of security of supply of a country. In the absence of a European Reliability Standard, is the national Reliability Standard for Belgium is determined in function of a two-fold LOLE criterion: The LOLE for a statistically normal year is not to exceed 3 hours. The LOLE for a statistical abnormal year (LOLE95) is not to exceed 20 hours as referred to in article 7undecies §3 3° of the Electricity Law. |
| **RIME (Regulation EU n° 2019/943 )** | Regulation (EU) n° 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity. |
| **Secondary Market** | The market where Capacity Providers can procure spare capacity from other Capacity Holders to cover their obligations under the Capacity Contract. |
| **Service** | The obligations a CMU has to deliver under its Capacity Contract, i.e. being available during moments that are relevant for Security of Supply. |
| **Service Level Agreement**<br><br>**(SLA)** | The level of service the Energy-Constrained Assets select during the Prequalification Process in function of their duration constraints per calendar day. |
| ***Storage**** | *According to the Electricity Law, article 2, 63°, every process whereby the same installation takes electricity off the grid, to inject the electricity in the grid at a later stage, except for the electrical losses.* |
| ***Strike Price**** | *According to the Electricity Law, article 2, 80°, a pre-defined price that determines the threshold above which the Capacity Provider has to pay-back difference with the Reference Price.* |
| **Unproven Availability** | Unproven Availability arises when a CMU without scheduling obligation is assumed to be available during AMT Hours where the Day-Ahead Market price is below the Declared Market Price, without actual proof of delivery of energy. |

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| **Unsheddable Margin** | Minimal amount of net active power offtake (in kW/MW) that cannot be curtailed (inflexible or unsheddable power) at the Delivery Point(s) concerned |

# 3 List of Abbreviations

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| **AMT** | Availability Monitoring Trigger |
| **CCGT** | Combined Cycle Gas Turbine |
| **CEP** | Clean Energy Package |
| **CHP** | Combined Heat & Power |
| **CIPU** | Contract for the Injection of Production Units |
| **CMU** | Capacity Market Unit |
| **CONE** | Cost of New Entry |
| **CRM** | Capacity Remuneration Mechanism |
| **CWE** | Central West Europe, in particular the countries Belgium, France, the Netherlands, Germany and Luxembourg. |
| **DAM** | Day-Ahead Market |
| **DMP** | Declared Market Price |
| **DSR** | Demand Side Response |
| **DSU** | Demand Side Unit |

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| **EENS** | Expected Energy Not Served |
| **ENS** | Energy Not Served |
| **FOM** | Fixed Operating & Maintenance Costs |
| **LOLE** | Loss of Load Expectation |
| **OCGT** | Open Cycle Gas Turbine |
| **PSP** | Pumped-Storage Plant |
| **RES** | Renewable Energy Sources |
| **RIME** | Regulation (EU) n° 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity. |
| **RoR** | Run-of-River |
| **SLA** | Service Level Agreement |

# Overview of Belgian CRM Design: list of definitions (update)

**October 2019**

# Table of contents

# 1 Introduction and Context

***Introduction***

For the different methodologies and rules that Elia has to propose, a wide range of definitions are required. At this stage in the process characterized by multiple design notes referring regularly to the same concepts, Elia has opted for a glossary with proposed definitions.

At a later stage, when formalizing the final proposals, these definitions will be integrated into the different deliverables, such as Elia's proposal for Market Rules or Elia's proposal for methodology in a Royal Decree.

A first list of definitions was made public during the first consultation phase, which started the 13th of September. The list below is an updated version of this definition list and is to be interpreted as follows:

- Definitions highlighted in red/orange and marked by the asterisks (**) : Definitions were already included in the first batch, but are updated based on feedback that was received after the publication date of the definition list or based on impact from the design notes of the second consultation phase.
- Definitions highlighted in blue/green and marked by the asterisks (***) are new compared to the first list of definitions.

For reasons of completeness and informational purposes only, the list of definitions hereunder also includes the relevant terms already defined in the Electricity Law or in the European legislation. For these definitions already provided under the Electricity Law a non-official English translation made by Elia is provided for the sake of clarity. These definitions foreseen in the Electricity Law and in the European legislation are clearly marked in the table (marked by an asterisk (*) and included in red & italic). Obviously, by no means, those definitions already defined by the Electricity Law or in the European legislation can be altered as a consequence of the public consultation of these CRM design notes. Furthermore, those definitions already provided for under the Electricity Law or the European legislation will not be repeated in the future Royal Decree.

At the end of this document also a list of abbreviations is provided.

***About the public consultation***

This proposal for definitions is put for formal public consultation and any remark, comment or suggestion is welcome (except – as stated above – on the definitions already provided for under the Electricity Law or the European legislation). It builds further on the discussions and proposals already made in the different TF CRM meetings gathering all relevant stakeholders and in the follow-up committee, the latter consisting of representatives of the CREG and Elia, under the presidency of the FPS Economy.

This public consultation runs in parallel with a public consultation on other design notes. Reactions to this public consultation can be provided to Elia via the specific submission form on Elia's website no later than Wednesday 30 October 2019 at 6 pm.

Note that, in line with their roles and responsibilities and the foreseen governance in the Electricity Law, also the FPS Economy and the CREG will consult on aspects within their competence according to their procedures.

# 2 List of Definitions

| Term | Definition |
|---|---|
| **Access Point*** ** | Injection or offtake point to the transmission or distribution grid. The Access Point on the level of the transmission grid is defined in the Federal Grid Code, art.2.29° and on the level of the distribution grids is defined in the relevant regional grid codes. |
| **Additional Capacity*** ** | Capacity that is not yet connected to the grid at moment of the Prequalification Process and for which no Nominal Reference Power can be calculated based on 15 minutes measurements. |
| ***Aggregation**** | *According to Directive (EU) 2019/944, article 2, 18°: a function performed by a natural or legal person who combines multiple customer loads or generated electricity for sale, purchase or auction in any electricity market.* |
| **AMT Hour**** | An hour for which the DAM price equals or exceeds the AMT Price and during which the Availability Monitoring Mechanism applies. |
| **AMT Moment** | A series of consecutive AMT Hours. |
| **AMT Price or $p_{AMT}$** | The ex-ante defined price level for a Delivery Period equal to or above which the AMT Hours are determined. |
| ***Auction**** | *According to the Electricity Law, article 2, 73°, the competitive process in which Capacity Holders are offering a price for making available capacity.* |
| **Available Capacity**** | The CMU's capacity that is deemed available during an AMT Hour as a result of the Availability Monitoring Mechanism or the Availability Testing. Available Capacity can consist of both Proven Availability and Unproven Availability. |
| **Availability Monitoring Mechanism** | The mechanism that monitors whether the CMU's Available Capacity equals at least its Obligated Capacity during AMT Hours as referred to in article 7undecies § 7 of the Electricity Law. |
| **Availability Monitoring Trigger (AMT)**** | A pre-defined trigger in a predefined market segment, equal or above which the Obligated Capacity of a CMU is being monitored. |
| **Availability Obligations** | The obligation of a CMU to have an Available Capacity that equals at least its Obligated Capacity during AMT Hours. |
| **Availability Ratio*** ** | The proportion of the Available Capacity to the Obligated Capacity, calculated for a CMU for at a certain period t. |

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| **Availability Testing** | The mechanism based on which CMUs have to demonstrate their availability by actually delivering energy upon request of the transmission system operator. During Availability Testing it is monitored whether the CMU's delivered energy equals at least its Obligated Capacity. |
| **Average Capacity Remuneration*** ** | The proportion of the sum of the Capacity Remunerations paid for a Delivery Period to the sum of the Contracted Capacity for the same Delivery Period, expressed in EUR/MW/year. |
| ***Balancing Market* / **** | *According to the Commission Regulation (EU) 2017/2195 of 23 November 2017 establishing a guideline on electricity balancing, article 2, 2°, the entirety of institutional, commercial and operational arrangements that establish market-based management of balancing.* |
| **Bid**** | Offer made by a Prequalified CRM Candidate in the Auction. |
| **Bid Cap**** | A maximum Bid Price (in EUR/MW/year) that can be made for a Bid in the CRM auction. |
| **Bid Price**** | The price expressed in EUR/MW/year at which a Prequalified CRM Candidate is offering a Bid in the Auction. |
| **Buyer of an Obligation***** | A Prequalified CRM Candidate that takes over the obligations under the CRM of a Capacity Provider via a Transaction on the Secondary Market. |
| **Calibrated Strike Price***** | The value of the Strike Price applicable at a certain moment as determined as a result of the yearly calibration process as referred to in article 7undecies § 2, 2° of the Electricity Law. |
| ***Capacity Category**** | *According to the Electricity Law, article 2, 84°, the category including capacities that are distinguished by the eligible total Investment Thresholds to which different Capacity Contract Durations are linked, during which the Capacity Provider is entitled to a Capacity Remuneration.*<br><br>The different categories that are foreseen in the CRM design are 1-year, 3-years, 8-years and 15-years as referred to in article 7undecies § 7 of the Electricity Law . |
| **Capacity Contract** | A contract signed between a Capacity Provider and the Contracting Counterparty that determines the rights and obligations for both parties as referred to in article 7undecies § 7 of the Electricity Law. |
| **Capacity Contract Duration**** | The number of Delivery Periods during which the Capacity Provider can receive a Capacity Remuneration. |

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|---|---|
| ***Capacity Holder* / **** | *According to the Electricity Law, article 2, 74°, every natural person or legal entity that can offer capacity, either on an individual or aggregated basis.* |
| **Capacity Market Unit (CMU)**** | One Delivery Point or several Delivery Points. It corresponds to the physical localization of the certified metering device used by ELIA to verify the effective Service delivery. |
| ***Capacity Provider**** | *According to the Electricity Law, article 2, 75°, every Capacity Holder selected after closing of the Auction and that will keep available a capacity during the Delivery Period in return for a Capacity Remuneration.* |
| ***Capacity Remuneration* / **** | *According to the Electricity Law, article 2, 76°, the periodically assigned remuneration to the Capacity Provider in return for keeping available their capacity.* |
| ***Capacity Remuneration Mechanism* / ** (CRM)*** | *According to the Electricity Law, article 2, 71°, the market mechanism based on a system of Reliability Options allowing to ensure the country's required level of security of supply and to guarantee that the evolution of the different forms of capacities meets the development of the electricity demand in the medium to long term, taking into account the electricity import possibilities.* |
| **Contracted Capacity***** | The volume of a CMU (expressed in MW) selected consecutive to an Auction and subject to a Capacity Remuneration. |
| **Contractual Counterparty***** | The legal entity that signs the Capacity Contract with the Capacity Providers that are selected in the Auction as referred to in article 7quaterdecies § 1 of the Electricity Law. |
| **CRM Candidate**** | A Capacity Holder willing to participate to an Auction and submit a bid for the Service delivery with one or several CMUs. |
| **CRM Law**** | The law of 22/04/2019 amending the Electricity Act: « *Wet tot wijziging van de wet van 29 april 1999 betreffende de organisatie van de elektriciteitsmarkt, teneinde een capaciteitsvergoedingsmechanisme in de stellen » / « Loi modifiant la loi du 29 avril 1999 relative à l'organisation du marché de l'électricité portant la mise en place d'un mécanisme de rémunération de capacité »*, published in the Belgian National Gazette on 16 May 2019. |
| **CRM Required Volume***** | Volume that should be contracted by an Auction for a certain Delivery Period. |
| **Cross-border Contribution***** | Contribution to the Belgian electricity market from electrically directly connected market zones during near-scarcity moments. |

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| ***Day-Ahead Market (DAM)*/**** | *The single day-ahead coupling, as defined in article 2.26° of Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management.* |
| **Declared Market Price (DMP)** | The Day-Ahead Market price equal to or above which a CMU has declared it would deliver energy in the energy market. |
| ***Delivery Period**** | *According to the Electricity Law, article 2, 77°, the period starting from the 1st of November and ending on (but including) the 31st of October of the next year, during which the Capacity Providers are remunerated for making available their capacity.* |
| **Delivery Point** | A point on the electrical grid or within electrical installations of a grid user where the Service is delivered. This point is associated to one or several metering device(s) conform to the technical requirements set by the transmission system operator. |
| ***Demand Curve* / **** | *According to the Electricity Law, article 2, 78°, a curve that reflects the variation of the capacity volume to be procured, in function of the price level of the capacity.* |
| ***Demand Side Response* (DSR)*** | *According to the Electricity Law, article 2, 66°, the capacity of end users to change their electricity demand upwards or downwards on a voluntary basis, reacting upon an external signal.* |
| **Demand Side Unit (DSU)** | An end user asset that can deliver DSR. |
| ***Derating Factor* / **** | *According to the Electricity Law, article 2, 83°, a factor that is applied to a certain capacity, determining its contribution to the security of supply and used to calculate the Eligible Volume that is qualified to participate in the Auction.* |
| **DSO-CRM Candidate Agreement***** | Agreement between the CRM Candidate and the concerned DSO(s) confirming the technical possibility for specific Delivery Points connected to the distribution grid to participate to the Service. |
| **Electricity Law**** | Federal Electricity Law of 29 April 1999 on the organization of the Belgian electricity market: "*Wet van 29 april 1999 betreffende de organisatie van de elektriciteitsmarkt*" / "*Loi du 29 avril 1999 relative à l'organisation du marché de l'électricité*", published in the Belgian National Gazette on 11 May 1999, as subsequently amended. |
| **Eligibility Criteria**** | The criteria to determine which investment costs are eligible to calculate the Investment Threshold as referred to in article 7undecies § 5 of the Electricity Law. |
| **Eligible Volume**** | The Reference Power (expressed in MW) of a CMU multiplied by the Derating Factor as determined during the Prequalification Process. |

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|---|---|
| **Energy Constrained Assets** | An asset or a portfolio of assets that have limited availability because they can only provide capacity availability for a limited number of consecutive hours. |
| **Energy Not Served (ENS)** | Amount of energy that cannot be supplied, expressed in GWh per year. |
| **Expected Energy Not Served (EENS)** | Expected amount of energy that cannot be supplied, expressed in GWh per year. |
| ***Direct Cross-Border Participation**** | *According to the Electricity Law, article 2, 86°, capacity outside the Belgian territory, but connected through a specific cable to only the Belgian control zone, after entry into force of the CRM Law, subject to the same rights and obligations as similar capacity inside the Belgian territory.* |
| **Existing Capacity** | Capacity already connected to the electricity grid, equipped with metering device enabling the determination of the Reference Power at the moment of the prequalification. |
| ***Flow based * / ***** | *According to the Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management, article 2, 9°, a capacity calculation method in which energy exchanges between bidding zones are limited by power transfer distribution factors and available margins on critical network elements;* |
| **Global Auction Price Cap***** | The Price Cap applicable in an Auction to all Bids. |
| **Headmeter***** | Measurement of electrical energy association with the Access Point as determined by the transmission system operator, or the DSO, by means of one or more meters installed by the TSO for the transmission grid and the DSO for the distribution grid. |
| ***Indirect Cross-Border Participation**** | *According to the Electricity Law, article 2, 85°, capacity outside the Belgian control zone that is contributing to the security of supply of Belgium via interconnectors.* |
| ***Intraday Market* / ***** | *The single intraday coupling, as defined in article 2, 27° of Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management.* |
| **Investment Threshold** | The level of capex investments that meet the Eligibility Criteria, required for a CMU to be entitled to a Capacity Contract with a multi-year duration as referred to in article 7undecies § 5 of the Electricity Law. |
| **Load Following Ratio***** | The proportion of the Total Load to the Reference Peak Load. |

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|---|---|
| ***Loss of Load Expectation* / ***** <br><br> ***(LOLE)*** | *According to the Electricity Law, article 2, 52°, the statistical calculation based on which the anticipated number of hours during which it will not be possible for all the Generation resources available to the Belgian electricity grid to cover the load, taking into account the capacity from interconnectors, for a statistically normal year.* <br><br> Note that the TSO also takes into account Market Response and Storage in the calculation of the LOLE. |
| **Market Response** | A reduction of electricity consumption behind the meter, independent from the technology, including both Demand Side Response as well as decentralized production and storage facilities. |
| **Market Rules**** | The set of rules that provide for the functioning of the CRM, in particular the prequalification requirements, the auction's clearing algorithm, opt-out treatment, the financial guarantees that the Capacity Provider has to deliver, the Availability Monitoring Mechanism and Penalties, the mechanism for the organization of the Secondary Market, the transparency rules, as referred to in article 7undecies § 8 of the Electricity Law. |
| **Missing Capacity** | The positive difference during the Delivery Period between the Obligated Capacity and the Available Capacity, not covered in the Secondary Market. |
| **Missing Volume***** | The difference between the Obligated Capacity and the volume resulting from the pre-delivery monitoring process applicable between the Auction and the start of the Delivery Period. |
| **Near Scarcity Hours (NSH)***** | Hours in which there is simulated Energy Not Served and where no more margin is left in Belgium, meaning that any additional load would not be served. |
| **Nominal Reference Power***** | Maximal capacity (expressed in MW) that could be considered in the CRM, before application of relevant Derating Factors. |
| **Non-Eligible Capacity**** | Capacity that is not allowed to take part in the CRM including at least the capacities referred to under article 7 undecies §4, 1° of the Electricity Law and capacities not meeting the emission standards as defined in RIME. |
| **Non-Energy Constrained Assets** | An asset or a portfolio of assets for which their availability is not limited in terms of the amount of energy that could be provided by the assets. |
| **Obligated Capacity** | The capacity for a CMU that is required to be available during an AMT Hour. |
| **Opt-Out Volume**** | (Part of) the Nominal Reference Power of a CMU for which the CRM Candidate formally indicates it is not willing to offer it in the Auction, by the end of the Prequalification Process at the latest as referred to in article 7undecies § 6 of the Electricity Law. |

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| **Payback Obligated Volume*** ** | The total of capacity (in MW) on which the Payback Obligation will be applied. |
| **Payback Obligation*** ** | A Capacity Provider's obligation to pay back part of the Capacity Remunerations received under the CRM. |
| **Penalty** | The amount to which the Capacity Provider is exposed in case of a positive difference between the Obligated Capacity and the Available Capacity. |
| **Prequalified CRM Candidate*** ** | A Capacity Holder able to participate to an Auction thanks to successfully prequalified Capacity Market Unit(s). |
| ***Prequalification Process* / ** *** | *According to the Electricity Law, article 2, 82°, the procedure aiming to determine the possibility for Capacity Holders to participate in the Auction.* |
| **Price Cap** | The maximum bid price and the maximum remuneration that can be received for a Bid. |
| ***Price Limit* / ** *** | *According to the Electricity Law, article 2, 79°, the maximum price of bids permitted in the Auctions and/or the maximum Capacity Remuneration received by Capacity Providers after Auction closure.* |
| **Primary Market*** ** | The market where the Availability Obligations are created as a result of the Auctions and based on a Capacity Contract. |
| **Proven Availability** ** | The situation in which (i) a CMU without full scheduling obligation has Available Capacity during AMT Hours where the Day-Ahead Market price exceeds the Declared Market Price, that is consistent with the Obligated Capacity or (ii) a CMU with scheduling obligation is available in the energy market or (iii) a CMU reserving its Obligated Capacity in an ancillary services made up only of Delivery Points associated to the CMU or (iv) a CMU physically delivering its Obligated Capacity output as a result of Ancillary Services activations. |
| **Reference Peak Load** | The maximum Total Load as observed in the scenarios used for the calibration of the Demand Curve for a given Delivery Year. |
| **Reference Power** ** | Capacity (expressed in MW) that must be considered in the CRM according to the CRM Candidate, before application of relevant Derating Factors, but after deducting the Opt-Out Volume (if applicable). |
| ***Reference Price* / ** *** | *According to the Electricity Law, article 2, 81°, the price that is reflecting the price that is presumed to be received by the Capacity Providers on the energy markets.* |
| ***Reliability Options**** | *According to the Electricity Law, article 2, 72°, the CRM based on which Capacity Providers will repay the positive difference between* |

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| | *the Reference Price and the Strike Price.* |
| **Reliability Standard**** | The standard, as described in Article 25 of RIME, used to define the level of security of supply of a country. As long as there is no methodology to calculate the Reliability Standard at European level (as described by Article 25 of RIME), the national Reliability Standard for Belgium is determined in function of a two-fold LOLE criterion: The LOLE for a statistically normal year is not to exceed 3 hours. The LOLE for a statistical abnormal year (LOLE95) is not to exceed 20 hours as referred to in article 7undecies §3 3° of the Electricity Law. |
| **RIME (Regulation EU n° 2019/943 )** | Regulation (EU) n° 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity. |
| **Scarcity Hours (SH)***** | Hours with Energy Not Served. |
| **Secondary Market**** | The market where a Buyer of an Obligation takes over (part of) the obligations of a Seller of an Obligation based on a Transaction. |
| **Seller of an Obligation***** | A Capacity Provider that transfers (part of) the obligations under the CRM to a Capacity Prequalified CRM Candidate Provider via a Transaction on the Secondary Market. |
| **Service** | The obligations a CMU has to deliver under its Capacity Contract, i.e. being available during moments that are relevant for security of supply. |
| **Service Level Agreement (SLA)** | The level of service the Energy-Constrained Assets select during the Prequalification Process in function of their duration constraints per calendar day. |
| **SLA Hours***** | The N AMT Hours with the highest Proven Availability for the CMU over one day, where N corresponds to the number of hours in the CMU's SLA. |
| **Stop Loss***** | Mechanism that caps the amount that a Capacity Provider has to pay under the CRM. |
| ***Storage* / ***** | *According to the Electricity Law, article 2, 63°, process whereby the same installation takes electricity off the grid, to inject the electricity in the grid in its entirety at a later stage, except for the electrical losses.* |
| ***Strike Price**** | *According to the Electricity Law, article 2, 80°, a pre-defined price that determines the threshold above which the Capacity Provider has to pay-back difference with the Reference Price.* |

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| **Submetering*** ** | Measurement of the electrical energy consumed or injected by a CMU by means of one or more meters situated downstream of the Headmeter. |
| **Title Transfer Facility*** ** | The mechanism that allows the notification of the transfer of obligation between the Buyer of the Obligation and the Seller of the Obligation on the Secondary Market. |
| **Total Load ($P_{load}$)*** ** | The total load includes all the electrical loads on the TSO grid and on the distribution systems connected to it. It also takes into account the estimated power losses. |
| **Transaction*** ** | An operation in the Primary Market or the Secondary Market at a Transaction Date, identified by a Transaction ID and for a Transaction Capacity, covering a Transaction Period. |
| **Transaction Capacity*** ** | For a Transaction on the Primary Market, Transaction Capacity equals the Contracted Capacity (expressed in MW), for a transaction on the Secondary Market the Transaction Capacity equals the volume (expressed in MW) that is transferred from the Seller of an Obligation to the Buyer of an Obligation resulting from a Transaction. |
| **Transaction Date*** ** | The date of a Transaction. |
| **Transaction Period*** ** | The period that a Transaction covers. |
| **Unproven Availability** | The situation when a CMU without scheduling obligation is assumed to be available during AMT Hours where the Day-Ahead Market price is below the Declared Market Price, without actual proof of delivery of energy. |
| **Unsheddable Margin** | Minimal amount of net active power offtake (in kW/MW) that cannot be curtailed (inflexible or unsheddable power) at the Delivery Point(s) concerned |
| ***Winter* / **** | *According to the Electricity Law, article 2, 51°, the period from 1 November to 31 March.* |

# 3 List of Abbreviations

| | |
|---|---|
| **AMT** | Availability Monitoring Trigger |
| **BRP*** ** | Balancing Responsible Party |
| **CCGT** | Combined Cycle Gas Turbine |
| **CEP** | Clean Energy Package |
| **CHP** | Combined Heat & Power |
| **CIPU** | Contract for the Injection of Production Units |
| **CMU** | Capacity Market Unit |
| **CONE** | Cost of New Entry |
| **CRM** | Capacity Remuneration Mechanism |
| **CWE** | Central West Europe, in particular the countries Belgium, France, the Netherlands, Germany and Luxembourg. |
| **DAM** | Day-Ahead Market |
| **DMP** | Declared Market Price |

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| **DSR** | Demand Side Response |
| **DSO*** ** | Distribution System Operator |
| **DSU** | Demand Side Unit |
| **EENS** | Expected Energy Not Served |
| **EFET*** ** | Electricity Master Agreement & Annexes |
| **ENS** | Energy Not Served |
| **EPEX*** ** | European Power Exchange |
| **FOM** | Fixed Operating & Maintenance Costs |
| **IDM*** ** | IntraDay Market |
| **LOLE** | Loss of Load Expectation |
| **NEMO*** ** | Nominated Electricity Market Operator |
| **NSH*** ** | Near Scarcity Hours |
| **OCGT** | Open Cycle Gas Turbine |
| **PSP** | Pumped-Storage Plant |
| **RES** | Renewable Energy Sources |
| **RIME** | Regulation (EU) n° 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity. |
| **RoR** | Run-of-River |

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|---|---|
| **SH*** ** | Scarcity Hours |
| **SLA** | Service Level Agreement |
| **SoS*** ** | Security of Supply |
| **TSO*** ** | Transmission System Operator |
| **OTC*** ** | Over The Counter |

# CRM Design Note:

# Derating factors

## Table of contents

ABOUT THE PUBLIC CONSULTATION

This design note is put for formal public consultation and any remark, comment or suggestion is welcome. It builds further on the discussions and proposals already made in the different TF CRM meetings gathering all relevant stakeholders and in the follow-up committee, the latter consisting of representatives of the CREG and Elia, under the presidency of the FPS Economy.

This public consultation runs in parallel with a public consultation on other design notes. Reactions to this public consultation can be provided to Elia via the specific submission form on Elia's website no later than **Wednesday 30 October 2019 at 6pm**.

On 13 September 2019 a first set of design notes has already been launched by Elia for public consultation[1].

Note that, in line with their roles and responsibilities and the foreseen governance in the Electricity Law, also the FPS Economy and the CREG will consult on aspects within their competence according to their procedures.

[1] https://www.elia.be/en/public-consultation/20190913_formal-public-consultation-on-the-crm-design-notes-part-i

# Introduction

This design note will serve as basis for Elia's proposal regarding the methodology, as referenced in Article 7undecies, §2 of the CRM Law[2]. In particular, the principles included at the end of each chapter of this note, will serve as guidance for Elia when preparing its proposal of methodology.

In accordance with Article 7undecies, §2 of the CRM Law, a yearly calibration for the parameters will take place. At the end, a yearly Ministerial Decision is taken in order to instruct the TSO to organize the auction and according to which parameters.

The purpose of this document is to present the methodology and the process that will be followed to determine the derating factors associated with every capacity, hence reflecting its expected contribution to adequacy. In addition, it will also provide the maximum cross-border contribution per border. The multiplication of the associated derating factor and the reference power upon prequalification results in the derated capacity, i.e. the maximum capacity that could take part in the auction.

An overview of the whole process is illustrated on Figure 1.

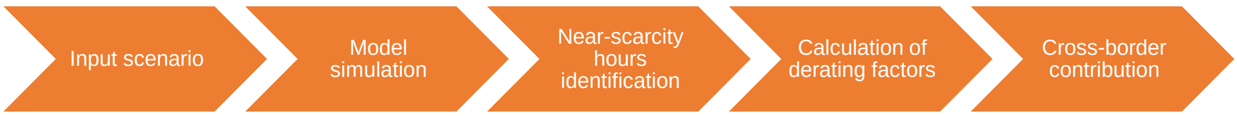


*Figure 1: Methodology overview*

**The first step** of the methodology is to select an input scenario on which the derating factors will be calculated. Such scenario must contain at least information about the expected hourly consumption profiles, thermal generation facilities, RES capacities, storage capacities, market response and cross-border market capacities between considered countries. In addition associated weather profiles, energy limitations and technology characteristics are also required.

**The second step** consists in performing a 'Monte-Carlo' probabilistic simulation to dispatch the different facilities to meet the electricity demand following a cost optimization approach. The output of the model will first provide all the data needed to calibrate the input scenario installed capacities to comply with the legal adequacy criteria, as referenced in Article 7undecies, §3 of the CRM Law. The model will also provide dispatch indicators necessary to calculate the contribution of each technology, like countries net position or the hourly generated energy per technology.

**The third step** consists of determining the near-scarcity hours. These hours represent the time periods which are critical for the Belgian electricity adequacy.

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[2] http://www.ejustice.just.fgov.be/doc/rech_n.htm

Once this set of hours is known, **the fourth step** is to calculate model-based derating factors for all technologies. A derating factor is calculated as the ratio between the average contribution during near-scarcity hours (the contribution to security of supply) and the reference power of every technology.

Following the same methodology, the maximum entry capacity for cross-border participation for each border is calculated in **the last step**.

All these steps, and if applicable any other relevant input, will be provided for the determination of the capacity to be procured.

# 0 Legal framework

This design note is based on the CRM Law from 22nd of April 2019 that modifies the Electricity Law of 29th April 1999 on the organization of the electricity market.

The main articles concerning the derating factors are the following:

| **22 April 2019**<br>**Wet tot wijziging van de wet**<br>**van 29 april 1999 betreffende de organisatie**<br>**van de elektriciteitsmarkt, teneinde**<br>**een capaciteitsvergoedingsmechanisme**<br>**in te stellen** | **22 avril 2019**<br>**Loi modifiant la loi**<br>**du 29 avril 1999 relative à l'organisation**<br>**du marché de l'électricité portant**<br>**la mise en place d'un mécanisme**<br>**de rémunération de capacité** |
|---|---|
| **Ch.2, Art 2, §78** | |
| **"vraagcurve": de curve die de variatie weergeeft van het te contracteren capaciteitsvolume in functie van het prijsniveau van de capaciteit** | "courbe de demande": la courbe représentant la variation du volume de capacité à contracter en fonction du niveau de prix de la capacité |
| **Ch.2, Art 2, §83** | |
| **"reductiefactor": de wegingsfactor van een bepaalde capaciteit, die diens bijdrage aan de bevoorradingszekerheid bepaalt, teneinde het volume vast te leggen dat in aanmerking komt om deel te nemen aan de veiling** | "facteur de réduction": le facteur de pondération d'une capacité considérée, déterminant sa contribution à la sécurité d'approvisionnement afin de fixer le volume éligible à participer à la mise aux enchères |
| **Ch.2, Art 6, §2** | |
| **Op basis van een methode die wordt vastgesteld door de Koning, op voorstel van de netbeheerder, opgesteld na raadpleging van de marktspelers en na advies van de commissie, stelt de netbeheerder, na raadpleging van de marktspelers over met name de basishypotheses, de twee volgende verslagen op:** | Sur la base d'une méthode fixée par le Roi, sur proposition du gestionnaire du réseau, formulée après consultation des acteurs du marché et après avis de la commission, le gestionnaire du réseau établit, après consultation des acteurs du marché notamment sur les hypothèses de base, les deux rapports suivants: |
| **1° een eerste verslag […] dat de berekeningen bevat van het noodzakelijke capaciteitsvolume en het aantal uren tijdens dewelke deze capaciteit gebruikt zal worden ten behoeve van de toereikendheid, met het oog op het verzekeren van het vereiste niveau aan bevoorradingszekerheid zoals bepaald in paragraaf 3, voor de veilingen van één jaar en van vier jaar vóór de periode van capaciteitslevering. Dit verslag omvat eveneens een voorstel voor een minimaal te reserveren volume voor de veiling die één jaar voor de periode van capaciteitslevering plaatsvindt. Dit minimaal te reserveren volume is minstens gelijk aan de capaciteit die gemiddeld minder dan 200 draaiuren heeft per jaar teneinde de totale piekcapaciteit af te dekken; en** | 1° un premier rapport contenant un calcul du volume de capacité nécessaire et du nombre d'heures pendant lesquelles cette capacité sera utilisée à des fins d'adéquation, en vue d'assurer le niveau de sécurité d'approvisionnement requis conformément au paragraphe 3, pour les mises aux enchères quatre ans et un an avant la période de fourniture de capacité. Ce rapport contient également une proposition de volume minimal à réserver pour la mise aux enchères se déroulant un an avant la période de fourniture de capacité. Ce volume minimal à réserver est au moins égal à la capacité nécessaire, en moyenne, pour couvrir la capacité de pointe totale pendant moins de 200 heures de fonctionnement par an; et |
| **2° een tweede verslag dat een voorstel bevat van parameters, berekend op basis van het volume bedoeld in het 1°, die noodzakelijk zijn voor de organisatie van de veiling van vier jaar vóór de periode van capaciteitslevering, met name de vraagcurve, de prijslimiet(en), de referentieprijs, de uitoefenprijs en de reductiefactoren. Dit verslag bevat eveneens de noodzakelijke aanpassingen voor de veiling van één jaar vóór de periode van capaciteitslevering.** | 2° un second rapport contenant une proposition des paramètres, calculés sur la base du volume visé au 1°, nécessaires à l'organisation de la mise aux enchères quatre ans avant la période de fourniture de capacité, notamment, la courbe de demande, le ou les plafond(s) de prix, le prix de référence, le prix d'exercice et les facteurs de réduction. Ce rapport contient également les ajustements nécessaires pour la mise aux enchères un an avant la période de fourniture de capacité. |
| Voorafgaand aan de opmaak van het verslag bedoeld in het | Préalablement à l'établissement du rapport visé à |

| | |
|---|---|
| eerste lid, 1°, stelt de Algemene Directie Energie alle informatie die nuttig is voor die analyse en waarover het beschikt, ter beschikking van de netbeheerder.<br>Uiterlijk op 15 december van elk jaar worden de in het eerste lid bedoelde verslagen voor advies bezorgd aan de commissie en aan de Algemene Directie Energie.<br>De Algemene Directie Energie en de commissie maken uiterlijk op 15 februari hun respectieve adviezen met betrekking tot deze verslagen over aan de minister.<br>Uiterlijk op 31 maart van elk jaar, op basis van de verslagen en de adviezen bedoeld in het eerste en het vierde lid, met het oog op het verzekeren van het vereiste niveau aan bevoorradingszekerheid zoals bepaald in paragraaf 3, na overleg in de Ministerraad, geeft de minister instructie aan de netbeheerder om de veilingen te organiseren voor de onderzochte perioden van capaciteitslevering, stelt de parameters vast die nodig zijn voor hun organisatie en bepaalt het minimaal te reserveren volume voor de veiling die één jaar voor de periode van capaciteitslevering georganiseerd wordt. Dit minimaal te reserveren volume is minstens gelijk aan de capaciteit die gemiddeld minder dan 200 draaiuren heeft per jaar teneinde de totale piekcapaciteit af te dekken, vermeerderd met de onzekerheidsmarge vervat in de initiële volumeberekening uitgevoerd door de netbeheerder in het verslag bedoeld in het eerste lid, 1°. | l'alinéa 1er, 1°, la Direction générale de l'Énergie met à disposition du gestionnaire du réseau toute information utile pour cette analyse et dont elle dispose.<br>Au plus tard le 15 décembre de chaque année, les rapports visés à l'alinéa 1er sont transmis pour avis à la commission et à la Direction générale de l'Energie.<br>La Direction générale de l'Énergie et la commission transmettent leurs avis respectifs relatifs à ces rapports au ministre au plus tard le 15 février.<br>Au plus tard le 31 mars de chaque année, sur la base des rapports et des avis visés aux alinéas 1er et 4, afin d'assurer le niveau de sécurité d'approvisionnement requis conformément au paragraphe 3, après concertation en Conseil des ministres, le ministre donne instruction au gestionnaire du réseau d'organiser les mises aux enchères pour les périodes de fourniture de capacité considérées, fixe les paramètres nécessaires à leur organisation et détermine le volume minimal à réserver pour la mise aux enchères organisée un an avant la période de fourniture de capacité. Ce volume minimal à réserver est au moins égal à la capacité nécessaire, en moyenne, pour couvrir la capacité de pointe totale pendant moins de 200 heures de fonctionnement par an, augmentée de la marge d'incertitude prévue dans le calcul du volume initial effectué par le gestionnaire du réseau dans le rapport visé au 1° de l'alinéa 1er. |
| **Ch.2, Art 6, §3** | |
| **Het te bereiken niveau van bevoorradingszekerheid dat wordt vooropgesteld voor het capaciteitsvergoedingsmechanisme, komt overeen met de vraagcurve, die gekalibreerd wordt met als referentie:**<br>**1° desgevallend, de geharmoniseerde normen vastgesteld door de in deze aangelegenheid bevoegde Europese instellingen;**<br>**2° bij het ontbreken van geharmoniseerde normen op Europees niveau, desgevallend de geharmoniseerde normen vastgesteld op regionaal niveau, inzonderheid op het niveau van de Centraal-West-Europese elektriciteitsmarkt;**<br>**3° bij het ontbreken van zulke normen, een berekening van een LOLE van minder dan 3 uur en van een LOLE95 van minder dan 20 uur.** | Le niveau de sécurité d'approvisionnement à atteindre visé par le mécanisme de rémunération de capacité correspond à la courbe de demande calibrée avec comme référence:<br>1° le cas échéant, des normes harmonisées établies par les institutions européennes compétentes en la matière;<br>2° en l'absence de normes harmonisées au niveau européen, les normes harmonisées fixées le cas échéant au niveau régional, en particulier au niveau du marché de l'électricité du Centre Ouest de l'Europe;<br>3° en l'absence de telles normes, un calcul de LOLE inférieur à 3 heures et de LOLE95 inférieur à 20 heures. |

**Disclaimer:**

The above-mentioned legal framework is subject to evolution, in particular to align it with the European 'Clean Energy Package-legislation'. This could impact the process of the determination of the reliability standard for Belgium and the competences in the volume determination process. This design note already anticipates the possible future changes, to the best of knowledge of Elia, following discussion in a working group consisting of representatives of CREG, FPS Economy and Elia.

# 1 Input scenario


The derating factors shall always be calculated based on a given input scenario. To develop a coherent scenario, some information must be provided regarding on the one hand the national consumption and on the other hand the different capacity sources and their characteristics (volume, energy limitations…). These data should be available for Belgium but also for at least the electrically directly connected market zones included in the simulation perimeter. Moreover, the interconnection capacity between the different considered market zones must also be determined.

An example of input scenario to calculate the derating factors for Belgium could be the latest available 'central scenario' from the European Resource Adequacy Assessment (ERAA) defined at ENTSO-E level.

The input parameters that are required to determine derating factors are [I]:

- The consumption (growth) and hourly normalized consumption profiles;
- The installed capacity of thermal generation facilities with their associated availability parameters for per-unit modeled generators and hourly generation profiles for distributed thermal capacities;
- The installed solar, wind and hydroelectric capacity;
- The installed storage facilities with their associated efficiency and reservoir constraints;
- The installed demand flexibility/market response capacity with their associated energy or activation limits;
- The interconnection capacity between market zones (e.g. 'flow-based' domains, 'NTC' capacities).

To correctly calibrate the derating factors and given that the CRM is designed to procure the needed capacity to be adequate, the input scenario has to be made adequate following the adequacy criteria defined for Belgium (cf. section on model simulation). It means that the defined reliability standard has to be respected, as referenced in Article 7undecies, §3 of the CRM Law.

![elia logo]

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*Example: Case study from the Adequacy & Flexibility study [I]*

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*Throughout this note, an example is used to illustrate the different concepts and the process to be followed when calculating derating factors.*

*For this example a scenario is used from the latest 10 year Adequacy & Flexibility study [I]. The input scenario used is the 'CENTRAL/EU-BASE' scenario for 2025, which also takes into account the 'flow-based' model implemented for CWE countries (including the CEP min 70% rule) and the adequacy patch.*

*The main assumptions for Belgium of this example scenario are summarized on Figure 2.*

**Summary of assumptions for Belgium**

| Key assumptions for Belgium | | 2018 | 2020 | 2023 | 2025 | 2028 | 2030 |
|---|---|---|---|---|---|---|---|
| | Energy efficiency<br>Economic growth | In line with WAM scenario from draft NECP submitted by Belgium to the EC | | | | | |
| | Amount of EV | 20k | 88k | 306k | 518k | 919k | 1310k |
| | HP (elec/hybrid) penetration | 1.3k | 5.5k | 25k | 68k | 170k | 249k |
| | Total Demand (incl. electrification) [TWh] | 85.5 | 86.2 | 86.4 | 86.9 | 87.8 | 88.8 |
| Market response | Shedding* [GW] | 1.2 | 1.4 | 1.5 | 1.6 | 2.2 | 2.6 |
| Market response | Shifting [GWh/day] | ≈0 | ≈0 | 0.3 | 0.5 | 1.1 | 1.5 |
| Storage | in pumped storage [GW] | 1.3 | 1.3 | 1.3 | 1.4 | 1.4 | 1.4 |
| Storage | in stationary batteries and EV [GW] | ≈0 | 0.1 | 0.6 | 1 | 1.4 | 1.6 |
| RES [GW] | | 3.9 | 5 | 6.9 | 8.3 | 9.9 | 11 |
| RES [GW] | | 2.3 | 2.8 | 3.3 | 3.6 | 4.1 | 4.5 |
| RES [GW] | | 1 | 1.6 | 2.3 | 2.3 | 4 | 4 |
| RES [GW] | Hydro RoR | 0.12 | 0.12 | 0.13 | 0.14 | 0.14 | 0.15 |
| RES [GW] | Biomass | 0.8 | 0.8 | 0.7 | 0.5 | 0.5 | 0.5 |
| Existing thermal [GW] | CHP + waste | 2.3 | 2.4 | | | | |
| Existing thermal [GW] | Nuclear | 5.9 | 5.9 | 3.9 | 0 | | |
| Existing thermal [GW] | Existing CCGT/OCGT | 4.4 | 4.0 | Economic viability check (all existing units are considered unless their closure has been announced) | | | |
| Existing thermal [GW] | Existing CCGT-CHP** | 0.5 | 0.5 | | | | |
| Existing thermal [GW] | Turbojets | 0.1 | 0.1 | | | | |
| Existing thermal [GW] | New capacity (DSM, Diesels, CCGT, OCGT, Storage,...) | | | Possibility to invest in any new capacity (if viable) | | | |

** including ancillary services volume*
*** Zandvliet and Inesco are categorised in CCGT-CHP to reflect their ability to operate in CHP mode*

Figure 2: Assumptions for Belgium for the illustrational example [I]

**Main principles which serve as input for the Royal Decree proposal**

1. The Minister shall determine on an annual basis and no later than 31 March of every year, the derating factors and cross-border entry capacity for every auction on the basis of a scenario.
2. The scenario shall include input parameters on consumption, supply and interconnection capacity for Belgium and at least electrically connected market zone.

# 2 Model simulation


Once the input scenario has been defined, a ‘Monte-Carlo’ simulation is performed with a unit commitment tool for the given year. The purpose of this tool is to optimally dispatch the different technologies on the market to meet the hourly consumption for each considered market zone. The simulation methodology that will be applied shall be in line with the relevant sections of the ‘European Resource Adequacy Assessment’ methodology, provided that such an approved methodology exists at the time of performing the calculations. The simulation shall apply the requirements described in this methodology, insofar they are implemented in the most recently published ENTSO-E ERAA report at the time of performing the calculations on derating factors. For the latter, the most recently published ‘ENTSO-E Mid-Term Adequacy Forecast’ report at the time of performing the calculations on derating factors is used as a benchmark.

A ‘Monte-Carlo’ method is used to perform simulation of the electricity market. This requires the construction of a large number of future states (called ‘Monte-Carlo’ years). The different variables which are needed to perform the simulations can be subdivided into two categories: weather variables and the availability of generation or interconnection facilities (more information can be found in Annex 1: Correlation of climatic conditions).

First, periodic values for wind energy generation, solar generation, hydro inflows and temperature-dependent electricity consumption are mutually correlated. These climatic variables are modelled on the basis of a representative number of historical years. The forecasts of installed capacity for each simulated market zone are combined with this historical data to obtain production time series for onshore wind, offshore wind, photovoltaic production and hydroelectric ‘run-of-river’ production. The temperatures of the historical years have an impact on the electricity consumption.

Second, parameters related to the availability of thermal generation or HDVC links (in a non-meshed grid) are assumed to be independent from climatic data and therefore not correlated to the others. Thermal generation can be subdivided in two categories. On the one hand, large thermal generation units, independent of their generation types, are modelled individually, with their specific technical characteristics. Their individual availability is determined by a probabilistic draw for each 'Monte Carlo' year based on historical availability rates. This way, a sequence of availabilities can be drawn for each unit to be used in the simulations. On the other hand, small thermal generation units are modelled in an aggregated way by using a fixed generation profile based on historical metering data. The availability of these smaller units is directly taken into account in the generation profile, and is therefore the same for all ‘Monte Carlo’ years.

The generation output of climate independent technologies is optimized by the simulator.

This category also contains flexible technologies such as storage or market response. Storage capacity is economically optimized, storing electricity in some form when prices are low and releasing electricity when those are higher. Market response is also introduced in the model with a certain number of constraints. The model optimizes their dispatch, taking their specific characteristics and limitations into account.

The above variables are combined into a number of 'Monte-Carlo' years so that the correlation between the various renewable energy sources (wind, solar, hydroelectric) and the temperature remains intact. Both geographical and time correlations are present. Consequently, the climatic data relating to a given variable for a specific year shall always be combined with data from the same climatic year for all other variables, with this applying to all market zones involved. In contrast, for power plant and HVDC link availability, random samples are taken by the model, by considering the parameters of probability and length of unavailability (in accordance with the 'Monte Carlo' method). Availability thus differs for each future state. Since each 'Monte Carlo' year carries the same weight in the assessment, the different availability samples have equal probability of occurrence.

Based on the defined inputs and parameters, the optimization problems are solved with an hourly time step and a weekly timeframe, making the assumption of perfect information at this weekly time horizon but assuming that the evolution of load and RES is not known beyond this weekly horizon. Fifty-two weekly optimization problems are therefore solved in a row for each 'Monte-Carlo' year. The simulation ends when it reaches a convergence criterion by combining the results of all these future states.

The optimal dispatch, minimizing overall ENS, is based on market bids reflecting the marginal costs of each unit (be it generation, storage or demand/market response) [€/MWh]. When this optimum is found, the following output can be analysed in order to derive the derating factors and cross border contribution:

- Hourly dispatch by technology (generation, storage or demand/market response);
- Hourly net position for all market zones within the 'flow-based' zone (only Belgium and electrically directly connected market zones data will be used);
- Hourly cross border exchanges on links modelled with 'net transfer capacities' (links between market zones inside the 'flow-based' zone and outside of this zone).

Following the simulations, the output data provided by the model enables a large range of indicators to be determined. In the framework of this design note, the main parameters of interest will be dispatch indicators:

- market exchanges between market zones;
- generated energy per fuel/technology.

Figure 3 summarizes the global process.

**Input and output data for the model**

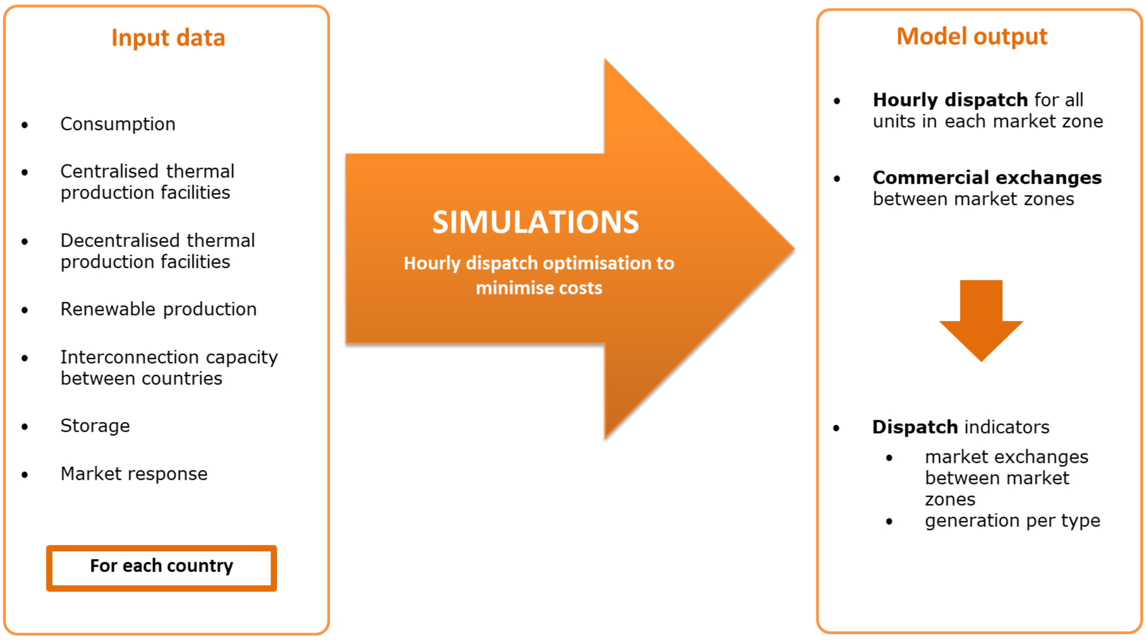


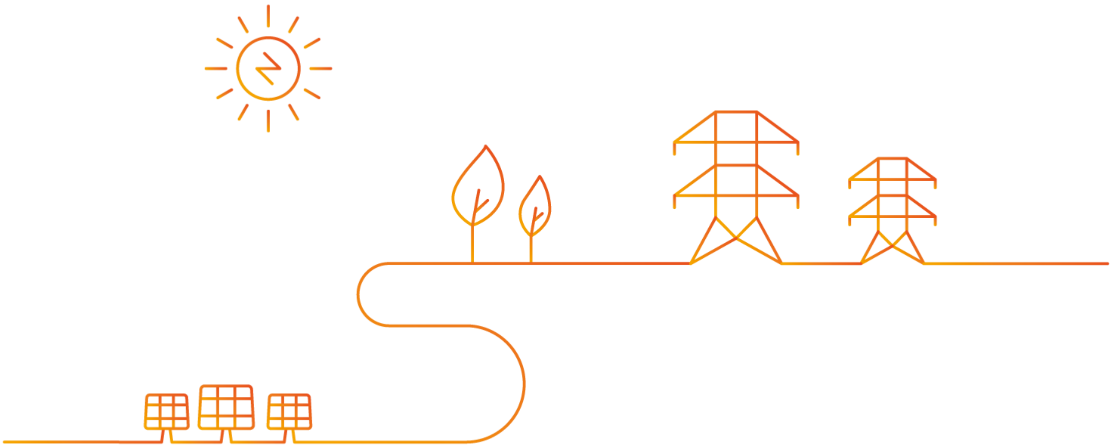

*Figure 3: Hourly electricity market model [I]*

The hourly generated energy per technology and the hourly imports/exports are furthermore required to calculate the derating factors and the maximum entry capacity for cross-border participation for each border.

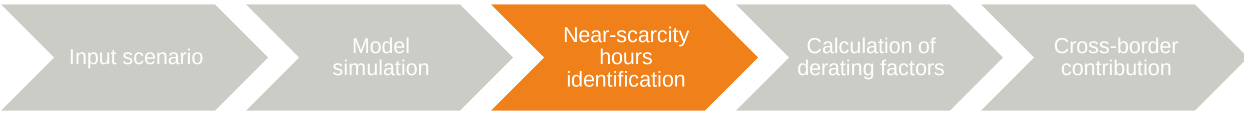
As mentioned before, the applicable adequacy criteria of Article 7undecies, §3 of the CRM Law needs to respected. If the input scenario already complies with the criterion, then it is assumed to be adequate and the analysis can continue. In contrast, if the criterion is not reached, a virtual capacity (100% available capacity) will be added, or vice-versa, if the scenario is 'over-adequate', a volume of assumed new capacity will be removed to the point where any additional removal would lead to a non-compliance with the criteria.

**Main principles which serve as input for the Royal Decree proposal**

3. Elia shall perform a simulation of the electricity market. The simulation shall be based on the relevant sections as determined by the TSO of the European Resource Adequacy Assessment methodology referenced in Article 23 of Regulation (EU) 2019/943, provided such methodology has been adopted at the time of the simulation. The simulation shall apply the requirements described in this methodology, insofar they are implemented in the most recently published ENTSO-E ERAA report at the time of performing the calculations on derating factors.
4. The simulation shall provide the hourly dispatch per technology and net positions of Belgium and at least electrically connected market zone.
5. In case the simulation demonstrates that the scenario does not comply with the applicable adequacy criteria for Belgium, the Belgian installed capacity in the scenario shall be recalibrated as follows:
   - i. if one or more of the applicable adequacy criteria of Article 7undecies, §3 of the CRM Law are not reached, an additional virtual capacity shall be added until the criteria is reached;
   - ii. if one or more of the applicable adequacy criteria of Article 7undecies, §3 of the CRM Law are exceeded, a volume of assumed new capacity shall be removed to the point where any additional removal would lead to a non-compliance with the criteria.



# 3 Identification of near-scarcity hours




The purpose of this step is to select from the simulation output the critical hours for the Belgian adequacy. These hours correspond to situations where the sum of the available capacity on the market and the imports from electrically directly connected market zones is insufficient to meet the domestic consumption or close to the limit.

In the remainder of this note, the term ‘near-scarcity hours’ refers to both those hours with ENS (scarcity) and those hours that are close to a situation of scarcity (near-scarcity). Near-scarcity refers to situations where any additional increase of the load will lead to energy not served.

## 3.1 Choice of a criterion

The criterion used for the determination of the near-scarcity hours is a situation where any additional load in Belgium would not be served and would therefore lead to ENS. This criterion leads to an identification of hours where a scarcity situation with ENS exists, as well as hours with a near-scarcity situation where no margin is left.

## 3.2 Justification

The consideration of near-scarcity hours while calculating the derating factors is deemed necessary as relying only on the hours with ENS would not take into account situations where the system is close to its limits. As these situations are also critical for the adequacy of Belgium, the contribution of each technology to system adequacy should also account for such near-scarcity hours.

Basing the criterion on a given threshold (in [€]) for the marginal price introduces the difficulty of fixing this threshold value. It is very difficult to objectively select such a threshold, also given that simulated prices will depend on assumptions taken in the scenario regarding generation mix in Belgium and abroad, economic parameters, etc.

Therefore, an approach is proposed where the identification of near-scarcity situations is based on the appearance of ENS when for the given hour any additional consumption would be introduced in Belgium. This approach does not require setting a specific threshold value on simulated prices while allowing to capture the critical time periods from different ‘Monte-Carlo’ years.

**Main principles which serve as input for the Royal Decree proposal**

6. Near-scarcity hours shall mean hours in which there is simulated Energy Not Served and in which no more margin is left in Belgium, meaning that any additional load would not be served.

# 4 Calculation of derating factors


The purpose of derating factors is to evaluate the contribution of different technologies (generation/demand flexibility/storage facilities) to the Belgian adequacy for a particular input scenario. In the framework of the CRM, this contribution is evaluated in situations where Belgium is facing near-scarcity, as defined in §3. In such situations, the total generation combined with imports are insufficient to cover either the actual load (scarcity) or any additional load (near-scarcity).

The derating factors are technology specific and expressed as the percentage of the reference power that contributes to adequacy. It represents the fact that technologies are not assumed to be available to generate 100% of the time at 100% of their reference power during near-scarcity hours, due to breakdowns, maintenance cycles, economical constraints, technical constraints or weather conditions. In order to determine the contribution to adequacy of each unit, the capacity within each technology category is derated.

In the framework of the CRM, 4 main categories of contribution to adequacy are considered (Figure 4). The different technologies taken into account for the derating factors are divided into these 4 categories. They are based on the currently available technologies and could evolve in the future. The maximum entry capacity for cross-border participation for each border forms a particular case since their contribution is expressed in [MW] rather than in [%]. Cross-border contribution is therefore not represented in this figure and is presented in chapter 5.

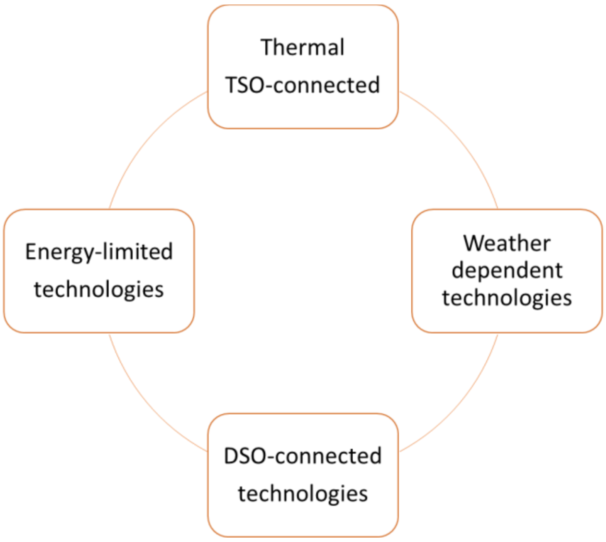



*Figure 4: Derating factors categories*

## 4.1 Thermal TSO-connected technologies

### 4.1.1 Concept

The first category takes into consideration technologies that contribute to adequacy independently from the weather conditions and without energy limitations. In the framework of the CRM, this category mostly refers to thermal units.

Thermal units consist in fossil fuel generation including TSO-connected combined heat and power (CHP), biomass and waste units, CCGT and OCGT. Turbojets, gas engines or diesel generators are also considered in this category. The main parameters impacting these units are their planned and unplanned unavailabilities (Figure 5). On the one hand, for planned outages, it is assumed that no maintenance is applied during winter months (or more specifically when near-scarcity situations occur). Therefore, planned outages will have no impact on the derating factors since no planned outage are assumed during near-scarcity periods. On the other hand, forced outage events are, within the probabilistic approach, assumed independent from the specific climate conditions occurring within the set of near-scarcity hours identified.

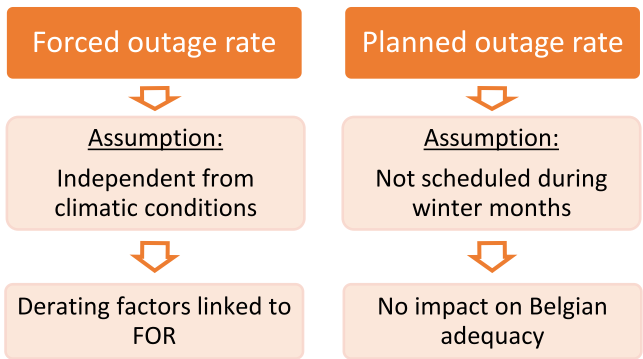



*Figure 5: Thermal units' parameters*

For the thermal generation, the assumed yearly average forced-outage rates (FORs) are provided as input to the model (combined with an average duration of such FORs). Given their independence from climatic variables and that these technologies are not constrained by activation limitations, the model-based approach will lead to the result that the average contribution of each thermal technology during the near-scarcity hours is equal to its reference power reduced by the given FOR percentage. The associated derating factors of these technologies can therefore simple be inferred from the input parameters provided to the model (i.e. historical FO data).

The thermal derating factors are thus computed from forced outage rates through the following formula:

$$\mathrm{DRF}\ [\%] = \frac{\text{Average contribution during near} - \text{scarcity hours [MW]}}{\text{Reference power [MW]}}$$

which is equivalent to:

[1] DRF [%] = 100 [%] - Forced Outage Rate [%]

### 4.1.2 Categories

This methodology is applied for the technologies for which the historical FO data are sufficient, trustworthy and assumed independent from the weather/seasonal conditions.

In the framework of the CRM, it will therefore be applied for the technologies defined on Figure 6.

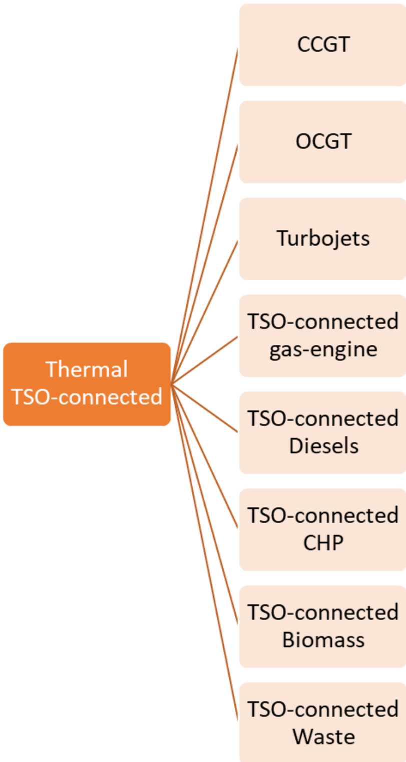



*Figure 6: Thermal TSO-connected categories*

*Example: Derating factors for thermal TSO-connected technologies*

*As an illustration, the input data from the Adequacy and Flexibility report* [I] *can be used. The different forced outage rates are determined and formula* [1] *is applied. The results are presented in Table 1.*

| Technologies | Forced outage rate [%] | Derating factors [%] |
|---|---|---|
| **CCGT** | 8,9 | 91,1 |
| **OCGT** | 12,3 | 87,7 |
| **TJ** | 4,3 | 95,7 |
| **TSO-connected CHP** | 6,4 | 93,6 |
| **TSO-connected Biomass** | 6,4 | 93,6 |
| **TSO-connected Waste** | 1,5 | 98,5 |

*Table 1: Example of historical-based derating factors*

# 4.2 Weather dependent technologies

## 4.2.1 Concept

For weather dependent technologies, the derating factors are calculated after analysis of the results of the model-based approach (Figure 7). Their contribution cannot be easily inferred from the input provided to the model. In this case, the contribution comes from the output of an associated 'Monte-Carlo' simulation including all technologies as input data. In the context of the CRM, the derating factors for these technologies are calculated on their contribution (from the simulation output) on near-scarcity hours, as defined in §3.

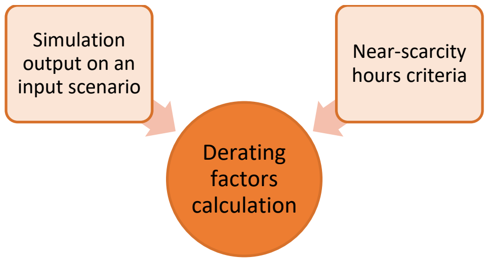



*Figure 7: Derating factors calculation – required data*

The derating factors are determined by dividing the average contribution of a particular technology during near-scarcity hours by its reference power.

The derating factors for weather independent technologies are computed through the following formula:

$$[2] \qquad \text{DRF [\%]} = \frac{\text{Average contribution during near−scarcity hours [MW]}}{\text{Reference power [MW]}}$$

## 4.2.2 Categories

In the framework of the CRM, this approach shall be applied for the technologies presented on Figure 8.

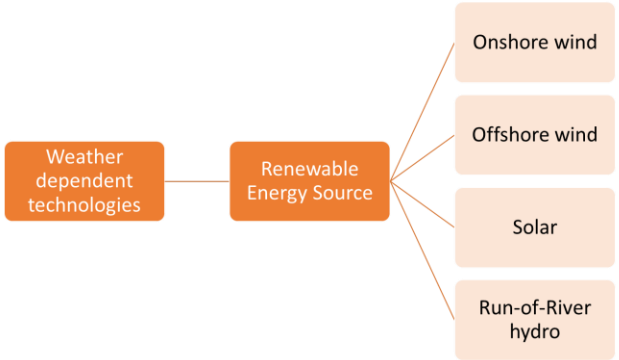



*Figure 8: Weather dependent technologies categories*

## 4.3 Energy-limited technologies

### 4.3.1 Concept

For energy-limited technologies, the derating factors are calculated by applying the same approach as for weather dependent technologies. Their derating factors are determined by dividing the average contribution of a particular technology during near-scarcity hours by its total reference power [2].

### 4.3.2 Categories

In the framework of the CRM, this approach shall be applied for categories defined on Figure 9.

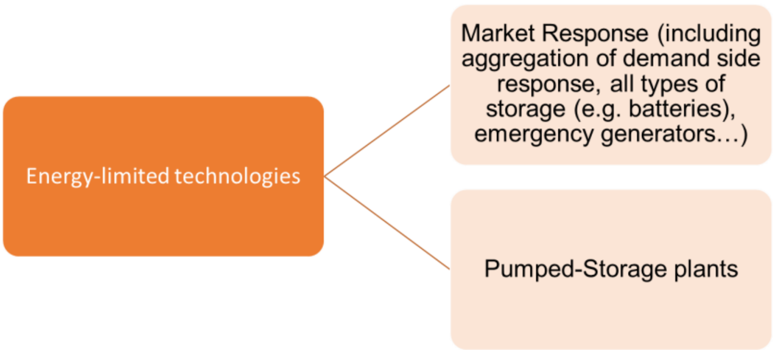



*Figure 9: Energy-limited technologies categories*

For flexible technologies (pumped-storage plants (PSP), market response, batteries or any other storage technology), the model optimizes their use so that they can maximally contribute to adequacy in near-scarcity hours when the price is the highest (and as such lead to the lowest overall ENS). Flexible sources are cost-optimized so that the pumping/loading cost is lower than the turbining/unloading revenue. Therefore, the optimization considers that pumping/loading can be interesting because there is a possibility to turbine/unload later at a higher price.

The contribution of market response and storage with high round trip efficiency (above 90%) subject to activation or reservoir constraints can be considered as equal as long as their availability duration is similar.

From the latest '10 year adequacy and flexibility study' performed by Elia [I], it can be shown that both a Market Response (MR) and a battery category with the same duration constraint have the same energy-constrained derating factor. Any aggregation of x% of MR and y% of battery (x% MR + y% battery) will qualify in principle under the same aggregation category.

A list of 'SLA categories' is therefore defined. Categories can be composed of any mix of MR (= DSR + generation +…), batteries or any other storage technology subject to similar activation constraints. For each 'aggregation category' a given activation limit is defined (Table 2). The derating factors for 'aggregation categories' can be therefore presented as so-called different 'service level agreements' (SLAs) based on hourly activation constraints (as most constraining limits). Moreover, every aggregation category is assumed to be available once a day.

In order for the aggregator or individual demand/market response provider to select the SLA category that best fits its portfolio/profile, the choice of SLA is left open and left to the aggregator/individual demand/market response provider.

| 'SLA category' | Duration | Limits |
|---|---|---|
| **SLA #1** | 1h | |
| **SLA #2** | 2h | |
| **SLA #3** | 3h | 1 activation / day |
| **SLA #4** | 4h | |
| **SLA #5** | 8h | |
| **SLA #6** | No Limit | NA |

*Table 2: MR categories*

The derating factors associated with each aggregation category is to be considered as a maximum threshold. Its value is associated with the contribution of the SLA category to the Belgian adequacy. Furthermore, it is up to the aggregator to define the level of the reference power of each aggregated CMU, according to the principles set up in the prequalification and availability monitoring parts of the design.

Pumped-storage cannot be associated to a SLA category, even if both energy-limited technologies can be in principle activated with the same duration[3] because the derating factors are different. This is explained by two main parameters:

- a pumping/turbining efficiency ratio of around 75% (value for Coo power plant in Belgium);
- a forced outage rate in the same logic as for thermal units.

These parameters lead to the definition of a specific derating factor for pumped-storage units.

[3] For PSP, the duration of activation is linked to the size of the reservoir and to the turbining capacity.

## 4.4 DSO-connected technologies

### 4.4.1 Concept

For DSO-connected units, available historical metering datasets are used as input in the simulation. Due to a lack of information[4], it is not feasible to model the exact behaviour of such units. One of the main characteristics of these technologies is that their generation is not always linked to the electricity price only because it has frequently other purposes as well (e.g. the production of heat or steam). Nevertheless, it is assumed that these units will maximize their electricity generation in case of high electricity prices. The derating factors are consequently obtained by dividing the maximum contribution of a particular technology during near-scarcity hours by its total installed capacity.

Since it is assumed that those units are able to maximally produce electricity in case of high electricity prices, their derating factors shall be computed by taking the maximum contribution of the technology during near-scarcity hours from the simulation output through the following formula:

$$[3] \qquad \text{DRF}\ [\%] = \frac{\text{Maximum contribution during near-scarcity hours [MW]}}{\text{Total installed capacity [MW]}}$$

Nevertheless, if relevant and sufficient metering data are available in the future, the calculation of derating factors for DSO-connected units could evolve to be closer to reality. These derating factors will then be determined by the ratio of their average contribution during near-scarcity hours to the reference power [2].

### 4.4.2 Categories

For the DSO-connected units, a detailed analysis has been performed to compare the contribution to adequacy of different categories. On the one hand, the units can be divided by fuel type:

- waste,
- biomass, and
- gas-fired.

From applying the first categorization it could be concluded that the data for waste were not representative due to a too small number of units in this category.

[4] E.g. all DSO-connected are not metered, the TSO does not have access to the metering data … Only relevant available metering are used but it only represent a part of the capacity.

On the other hand, they can be divided by the contract type that has been awarded:

- Gtrad[5]
- Gflex[6]
- Gint[7]

When applying the second categorization, most units have a Gtrad contract. The number of units with Gflex and Gint contracts is not large enough and the available data are not sufficient to be representative[8].

Therefore, two main categories of derating factors have been taken into account for DSO-connected technologies (that are not weather dependent): RES and non-RES (Figure 10). These categories could be subject to evolution in case of additional available information or data in the future.

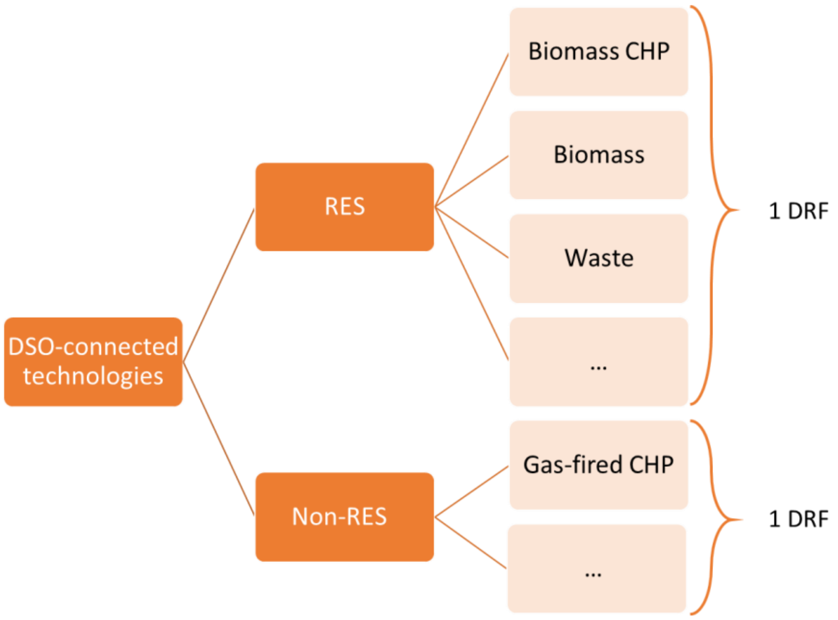



*Figure 10: DSO-connected technologies categories*

[5] Possibility to produce without any grid constraint.
[6] Possibility to produce subject to grid constraints. In case of planned or unplanned constraints on the grid, there can be a necessity to reduce the production.
[7] Interruptible production. The unit is connected through only one grid element to the transmission system (non-redundant connection). An interruptible unit can have either a Flex or a Trad contract.
[8] TSO-connected also have that kind of contract but the categorization does not apply since derating factors are determined based on forced outage rates.

## 4.5 Synthesis

Table 3 presents a synthesis of each category of derating factors and the formula used to determine those. Every technology taking part to the CRM has to be classified into one of these categories and the appropriate derating factor shall be applied to its reference power. These categories are based on the current available technologies and could evolve in the future.

| Categories | Formulation | Sub-category | Technology | SLA Duration |
|---|---|---|---|---|
| **Weather-dependent technologies** | Average contribution during near-scarcity / Maximum capacity [%] | RES | Onshore wind | / |
| | | | Offshore wind | / |
| | | | Solar | / |
| | | | Run-of-River | / |
| **Energy-limited technologies** | | Market Response | Aggregation (MR + small-scale storage) | 1h |
| | | | | 2h |
| | | | | 3h |
| | | | | 4h |
| | | | | 8h |
| | | | | No Limit |
| | | Large-scale storage | PSP | / |
| **DSO-connected technologies** | Maximum contribution during near-scarcity / Maximum capacity [%] | RES | DSO-connected RES | / |
| | | Thermal | DSO-connected non-RES | / |
| **Thermal TSO-connected technologies** | 100 - Forced Outage Rate [%] | / | CCGT | / |
| | | | OCGT | / |
| | | | TJ | / |
| | | | TSO-connected gas-engines | / |
| | | | TSO-connected Diesels | / |
| | | | TSO-connected CHP | / |
| | | | TSO-connected Biomass | / |
| | | | TSO-connected Waste | / |

*Table 3: Synthesis of derating factors categories*

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*Example: Derating factors calculation*

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*The Adequacy and Flexibility study [I] presents (Figure 11) some global results of derating factors that would be obtained by applying the explained methodology to each technology (note that the derating factors depend on the scenario applied, and will therefore vary depending on the chosen scenario).*

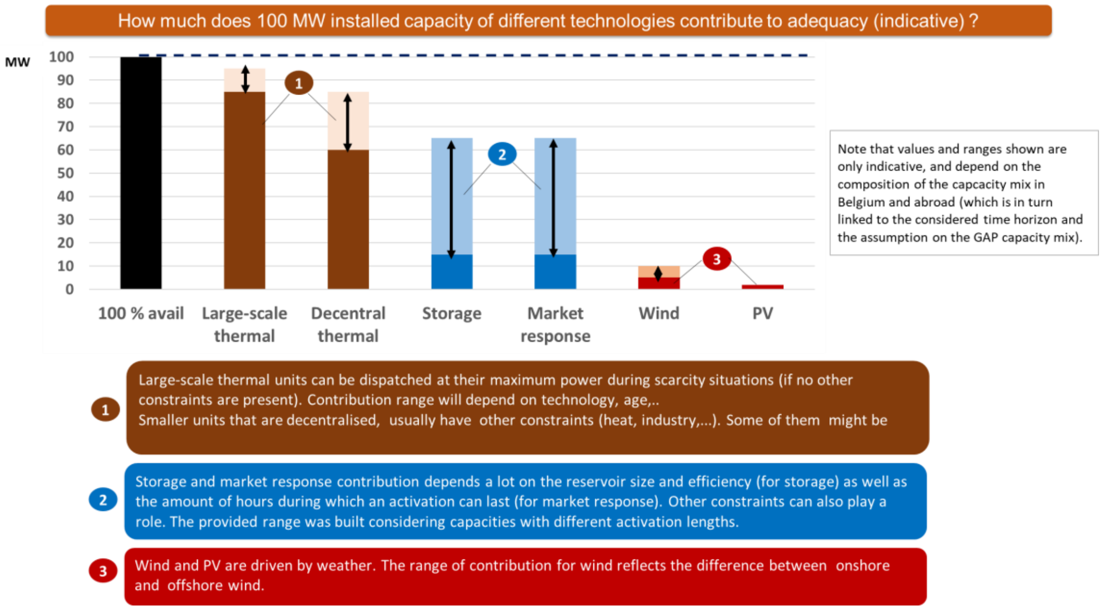
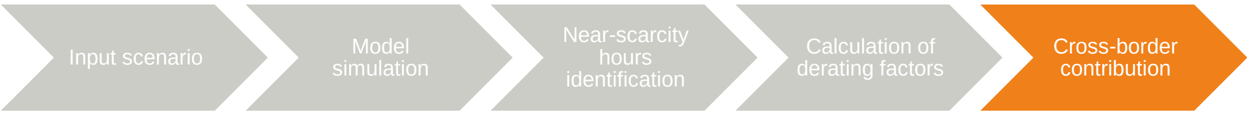



*Figure 11: Results from the Adequacy and Flexibility report [I]*

**Main principles which serve as input for the Royal Decree proposal**

7. For the purpose of calculating the derating factor applicable to each technology, the different technologies shall be divided into 4 different categories as follows:
    i. The category of thermal TSO-connected technologies shall comprise ”CCGT”, ”OCGT”, ”Turbojets”, “TSO-connected gas-engine”, ”TSO-connected Diesels”, ”TSO-connected CHP”, “TSO-connected Biomass” and “TSO-connected Waste”.
    ii. The category of weather-dependent technologies shall comprise “Onshore wind”, “Offshore wind”, “Solar” and “Run-of-river hydro”.
    iii. The category of energy-limited technologies shall comprise “Market Response”, including at least aggregation of demand side response, all type of small-scale storage technologies and emergency generators, and “Pumped-Storage plants”.
    iv. The category of DSO-connected technologies shall comprise “renewable energy sources”, including at least biomass CHP, biomass and waste, and “non-renewable energy sources”, including at least gas-fired CHP.
8. Derating factors for thermal TSO-connected units shall be calculated by subtracting the forced outage rate, based on historical data, and expressed in [%], from 100 [%].
9. Derating factors for weather dependent technologies shall be calculated by dividing their average contribution during near-scarcity hours from the simulation output by the relevant technology’s reference power.
10. Derating factors for energy-limited technologies shall be calculated by dividing their average contribution during near-scarcity hours from the simulation output by the relevant technology’s reference power, it being understood that, for “Market Response” the input data for the simulation shall first be divided into aggregation categories, represented by different “service levels” (SLAs), on the basis of hourly activation constraints or any other relevant technical constraint, as shall be proposed by the TSO in the yearly parameter report prior to the auction.
11. Derating factors for DSO-connected technologies shall be calculated based on available metering data. Derating factors for DSO-connected units shall be determined by the ratio of their average contribution during near-scarcity hours from the simulation output to the reference power. If insufficient relevant metering data are available as determined by the TSO, these derating factors shall be determined by the ratio of the technologies’ maximal contribution during near-scarcity hours from the simulation output to the reference power.

# 5 Cross-border contribution




Belgium is very dependent on imports to ensure its adequacy. Additionally, when scarcity situations occur in Belgium, they are mostly linked to scarcity in at least one electrically directly connected market zone. In the future, this interaction of scarcity situations between countries will further increase (see [I], Figure 4-12).

The contribution of interconnections is based on the simulation output. A post-processing methodology is implemented to determine the maximum entry capacity for cross-border participation in the context of adequacy, as the most relevant parameter for estimating the contribution to adequacy via interconnections with electrically directly connected market zones is the amount of energy that can be imported rather than the available interconnection capacity. Therefore, the contribution of other market zones to the Belgian adequacy shall be expressed in [MW].

The net position of Belgium during near-scarcity hours will be determined and the capability of electrically directly connected market zones (France, Germany[9], Netherlands and United Kingdom)[10] to export energy during those moments will be used to determine the average contribution of each electrically directly connected market zone to Belgian adequacy.

For interconnections, the different categories shall therefore be related to the contribution of these market zones, as presented on Figure 12.

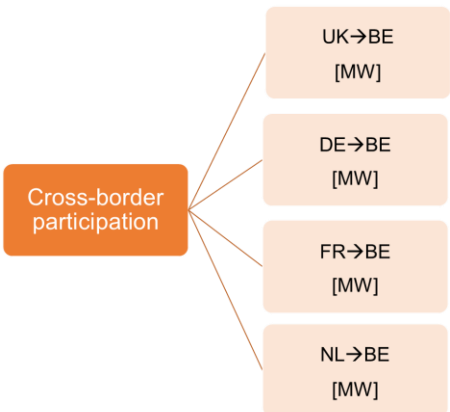



*Figure 12: Interconnections categories*

[9] Through the Allegro connection that will be available for the first delivery year.
[10] Luxemburg is not considered because it is part of the same market zone as Germany.

The approach to determine cross-border contributions for the input scenario is presented on Figure 13.

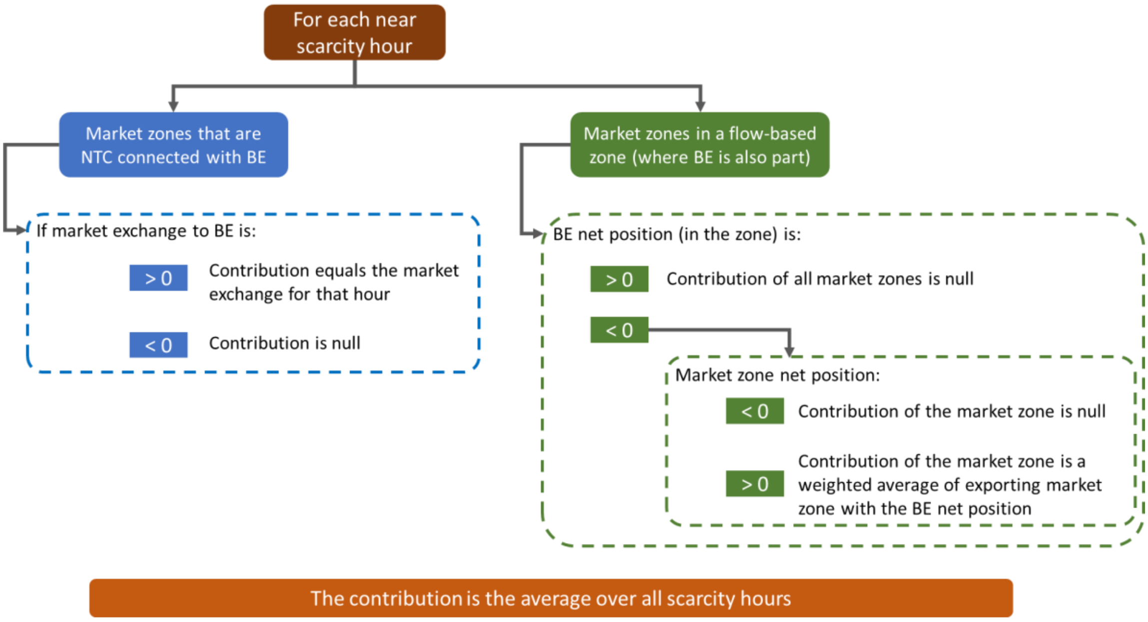



*Figure 13: Interconnection contribution calculation*

This methodology could further evolve when the methodology for the determination of the maximum entry capacity following the Regulation Internal Market for Electricity (RIME) Art. 26.11 (a) becomes available. Note that according to Art. 26.7 of RIME in the future also the RSC (Regional Security Coordinator center) (Coreso) will have to provide a recommendation.

*Example of interconnection contribution calculation*

*Let's assume a situation where Belgium is in scarcity and is importing 1 GW of available energy in electrically directly connected market zones.*

*On this particular hour, other market zones can also be in scarcity situations and have no capacity to export electricity abroad. The electrically directly connected market zones net position (for 'flow-based' domain, in red) and market exchange to Belgium (for 'NTC-connected' market zone, in blue) are presented on the figure to the side. In this case, only Germany and Netherlands are exporting whereas France and United Kingdom are importing. Therefore, the contribution of these countries can be calculated:*


- $FR \rightarrow BE = 0$
- $UK \rightarrow BE = 0$
- $NL \rightarrow BE = BE_{import} \cdot \frac{NL_{export}}{NL_{export}+DE_{export}} = 1 \cdot \frac{3}{3+2} = 0.6\ GW$
- $DE \rightarrow BE = BE_{import} \cdot \frac{DE_{export}}{NL_{export}+DE_{export}} = 1 \cdot \frac{2}{3+2} = 0.4\ GW$

*On average, the latest Adequacy and Flexibility report of Elia [I] gives some insights of the capability of other countries to export energy during Belgian scarcity moments (Figure 14)*

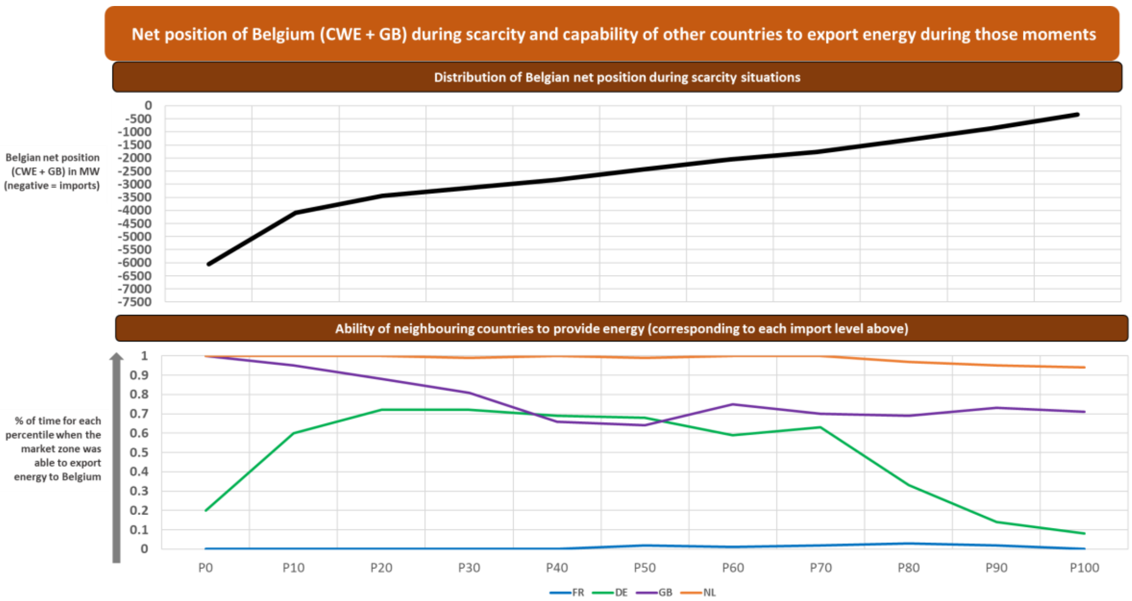



*Figure 14: Example of electrically directly connected market zones contribution to Belgian adequacy from the Adequacy and Flexibility report [I]*

Main principles which serve as input for the Royal Decree proposal

12. The contribution of interconnections to adequacy is expressed in power [MW].
13. The contribution of each electrically directly connected market zone is determined by averaging the contribution of each market zone over all near-scarcity hours.
14. The contribution of a market zone in the same “flow-based” zone as Belgium at a specific hour is determined as the weighted Belgian net position for exporting market zones, and zero for importing market zones.
15. The contribution of a market zone connected with a “net transfer capacity” with Belgium at a specific hour is determined by the market exchange for that hour if positive (from the market zone to Belgium) and zero if Belgium exports.

# References

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

# Annex 1: Correlation of climatic conditions

The various meteorological conditions having an impact on renewable generation and electricity consumption are not independent of each other. Wind, solar radiation, temperature and precipitation are correlated for a given region. In general, high-pressure areas are characterized by clear skies and little wind, while low-pressure areas have cloud cover and more wind or rain. Given the very wide range of meteorological conditions that countries in Europe can experience, it is very hard to find clear trends between meteorological variables for a given country. Figure 15 attempts to show the non-explicit correlation between wind production, solar generation and temperature for Belgium. The graph presents the seven-day average for these three variables for Belgium based on 34 climatic years. The hourly or daily trends cannot be seen as the variables were averaged by week but various seasonal and high-level trends can be observed:

- The higher the temperature, the lower the level of wind energy production. During the winter there is more wind than in the summer;
- The higher the temperature, the higher the level of PV generation. This is a logical result from the fact that more solar generation goes on during the summer and inter-season months;
- When the level of wind energy production is very high, the level of PV generation tends to fall;
- In extremely cold periods, wind energy production falls while there is a slight increase in PV generation. This is a key finding that will affect adequacy during very cold weather.

The various meteorological data are also geographically correlated as countries are close enough to each other to be affected by the same meteorological effects. A typical example of this is the occurrence of a tight situation due to a cold spell which first spreads over western France, then over Belgium and after that over Germany. It is essential to maintain this geographical correlation between countries in terms of climate variables.

Given the high amount of renewable energy from variable sources that is installed each year in Europe and the high sensitivity to temperature of some countries' electricity demand, it is essential to maintain the various geographically and time-correlated weather conditions in the assessment.

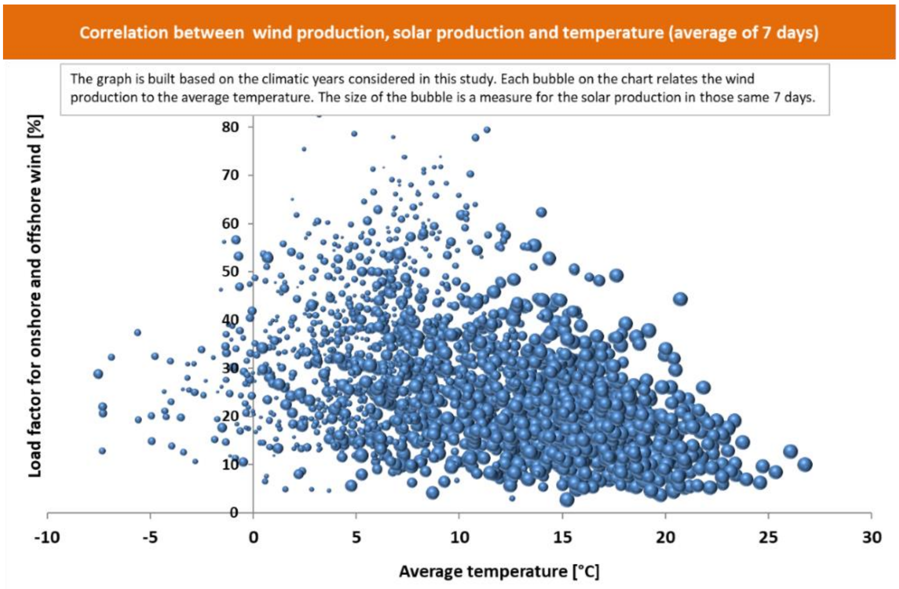



*Figure 15: Correlation between wind production, solar production and temperature*

# CRM Design Note: Intermediate Price Cap

September 2019

# Table of contents

# Introduction and context

The purpose of the present design note is to provide all stakeholders with a clear view concerning on the one hand the rationale for having an intermediate price cap in the auctions and on the other hand, the scope and the methodology for calibration of this intermediate price cap.

In addition to this design note, a single detailed list of definitions will be provided and publically consulted upon. As several concepts are relevant for different design options, a centralized approach via a single list is opted for.

***About the public consultation***

This design note is put for formal public consultation and any remark, comment or suggestion is welcomed. It builds further on the discussions and proposals already made in the different TF CRM meetings gathering all relevant stakeholders and in the follow-up committee, the latter consisting of representatives of the CREG and Elia, under the presidency of the FPS Economy.

This public consultation runs in parallel with a public consultation on other design notes. Reactions to this public consultation can be provided to Elia via the specific submission form on Elia's website no later than **Friday 11 October 2019 at 6 pm**.

Early October also a second set of design notes will be launched by Elia for public consultation.

Note that, in line with their roles and responsibilities and the foreseen governance in the Electricity Law, also the FPS Economy and the CREG will consult on aspects within their competence according to their procedures.

***Legal Framework***

The Law setting up a Capacity Remuneration Mechanism, adopted on April 4th 2019[1] (hereafter "CRM Law"), modifying the Electricity law of 29 April 1999 on the organization of the electricity market (hereafter "Electricity law") defines in Art. 2 a price limit ("prijslimiet/plafond de prix") as "the maximum price of bids permitted in the auctions and/or the maximum capacity remuneration received by capacity providers after auction closure."

The Electricity Law Art. 7undecies §2 foresees the introduction of one or more such price limits, which are to be interpreted as comprising both the global auction price cap and an intermediate price cap. This design note only focuses on the intermediate price cap, the global auction price cap is out of scope.

The CRM law further foresees the governance framework of the intermediate price cap

[1] https://www.dekamer.be/FLWB/PDF/54/3584/54K3584001.pdf

parameter, foreseeing a vast consultation procedure of market actors, the FPS Economy and the regulator, prior to determining on the one hand the methodology for the calculation of the proposal of this parameter (scope of this design note) and on the other hand the yearly calibration (based on the methodology in this design note, translated into a Royal Decree) and decision of this parameter.

***Bid caps or price caps?***

For the sake of clarity and building further on the legal definition of a price limit, in this design note, an explicit distinction is made between a bid cap and a price cap. **While a bid cap only determines the maximum bid price for a bid in the auction, a price cap additionally also limits the maximum remuneration that capacity providers can receive from the auction for this bid to the level of this cap.** These principles are illustrated in Figure 1 below, in which also a distinction is made between a pay-as-bid and pay-as-cleared pricing rule.

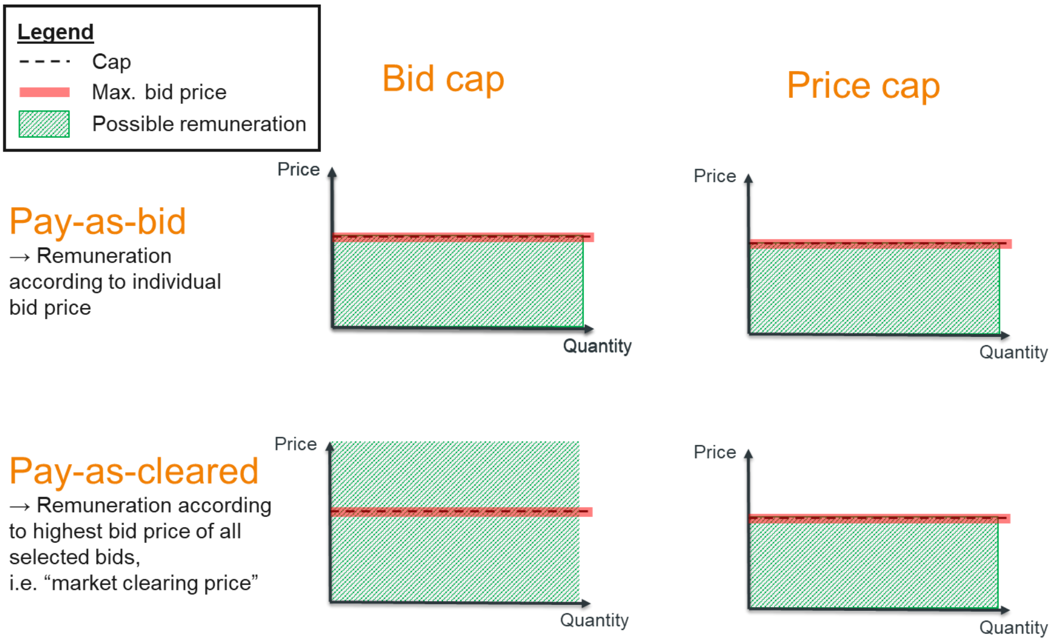



*Figure 1: Implications for bids subject to a bid/price cap under a pay-as-bid/pay-as-cleared pricing rule in terms of maximum bid price and possible remuneration*

From Figure 1, it can be derived that in case a pay-as-cleared pricing rule applies (cf. discussed in *CRM Design Note: Auction Algorithm*[2]), a bid cap (down, left on the figure)

[2] This design note will be launched for public consultation together with the second set of design notes early October.

limits the bid price for a bid but not the possible remuneration that can be received for this bid. Indeed, in case the market clearing price is higher than the bid cap (because of an accepted high price bid not subject to the bid cap), and since under pay-as-cleared this market clearing price applies to all bids, bids that are subject to the bid cap would receive a remuneration that is higher than this bid cap. This contrasts with the case of a price cap (below, right on the figure), whereby not only the bid price but also the possible remuneration for a bid is limited to the level of this price cap.

Also illustrated in Figure 1 (up on the figure), in case a pay-as-bid pricing rules applies (cf. discussed in *CRM Design Note: Auction Algorithm*), there is no additional impact of a price cap compared to a bid cap, as capacity providers are remunerated according to their individual bid price anyway.

Note that both the intermediate price cap (scope of this design note) and the global auction price cap (out of scope for this design note) fall into the category of price caps and not bid caps. The intermediate price cap will apply regardless of the implemented pricing rule, i.e. in both a pay-as-bid and pay-as-cleared mechanism.

***Structure of the design note***

In what follows, firstly the rationale for applying an intermediate price cap in the auctions is provided. Secondly, the scope of the proposed intermediate price cap is discussed, specifying which bids shall be subject to the intermediate price cap and explaining its enduring character. Finally, the calibration methodology of the intermediate price cap is outlined.

In annex, an overview is given of the complete set of proposed principles of this design note, which shall form the basis for drafting the proposal of Royal Decree articles with respect to the methodology for setting the intermediate price cap.

# 1 Rationale for intermediate price cap

In general, the introduction of an intermediate price cap serves two purposes.

Firstly, as further explained in section 1.1, by means of an intermediate price cap, windfall profits that may otherwise arise from disproportionate capacity remuneration can – at least partly – be avoided. As such, an intermediate price cap contributes to the overall objective as defined in the CRM law to keep the cost of the CRM as low as possible while at the same time ensuring a proportionate and appropriate remuneration for capacity providers.

The windfall profit avoidance reasoning, i.e. avoiding that capacity providers obtain a higher than necessary remuneration as a consequence of the auction design, is valid under both a pay-as-cleared and pay-as-bid pricing rule.

Secondly, as further explained in section 1.2, but only in case a pay-as-cleared pricing rule applies, an intermediate price cap also acts as a market power mitigation measure, discouraging and in some ways even preventing improper strategic behavior from CRM candidates in the auction. In particular, an intermediate price cap avoids so-called 'economic withholding' of capacity and discourages CRM candidates from engaging into strategic mothballing/closure behavior.

## 1.1 Limiting the CRM cost by avoiding inframarginal CRM rents

A CRM as being deployed in Belgium is conceived as a remuneration mechanism complementary to the energy market (incl. ancillary services) to ensure that capacity providers are capable to cover their costs including a reasonable and fair rate of return. Being complementary to the energy market implies that the initial sources of revenues should come from the energy market and that only the residual part, i.e. the so-called missing money, is ensured via the CRM.

As the CRM is complementary to the energy market and residual as revenue stream, there is no economic rationale behind an inframarginal rent resulting from the CRM auctioning mechanism. Indeed, in the CRM auction, competitive bids should correspond with the missing-money levels for the respective Capacity Market Units (CMUs). The missing-money of a CMU can be interpreted as already consisting of the share of investment/refurbishment and fixed O&M costs that cannot be recovered through anticipated revenues from the energy, balancing and ancillary service markets, plus a certain mark-up to secure a fair and sufficient return on investment. Hence, there is no economic rationale for allocating an additional surplus inframarginal rent on top of the bid price of the capacity providers. The bid price of the capacity provider should be driven by its level of missing money. Such surplus inframarginal rent could be considered as a windfall profit and should be avoided in order to limit the overall cost of the CRM.[3]

Inframarginal rent in CRM auctions can arise when the CMUs that compete are characterized by diverging levels of missing-money. It is reasonable to expect that new capacity CMUs requiring substantial capex investments are associated with significantly higher levels of missing-money than existing capacity CMUs currently already operating in the market. As such, especially when new capacity is expected to be selected in the auction given a significant adequacy concern, an important potential for inframarginal rent – and hence windfall profits – arises for existing capacity when no intermediate price cap applies.

This reasoning is valid for both the pay-as-cleared and pay-as-bid pricing rule. Under a pure pay-as-cleared mechanism, where all winning bids receive the same (clearing) price, the higher market clearing price would automatically apply to all accepted bids. In a pay-as-bid mechanism, where each winning bid receives its own bid price, rational bidding behavior implies to bid in close to the anticipated market clearing price thereby directly incorporating an expected inframarginal rent in the price of the bid.

Through the introduction of an intermediate price cap, it is possible to significantly limit the share of the inframarginal rents, as conceptually illustrated in Figure 2 below, and thereby reduce the cost of the CRM. For illustrative purposes and sake of simplicity only, a sloped demand curve and pay-as-cleared pricing rule are assumed.

The intermediate price cap – in line with the proposal explained further in this design note – applies only to bids related to CMUs applying for a 1-year capacity contract. Although the intermediate price cap does not eliminate all inframarginal rents as there could remain differences within the 1-year capacity contract category and/or within the multi-year category, it may manage to avoid a significant part of the otherwise disproportionately allocated inframarginal rents (avoided windfall profits are illustrated by a green rectangle in Figure 2 below).

Note that no additional intermediate price caps are foreseen to differentiate between multi-year contracts of different lengths as - unlike the clear difference between existing and new or refurbished CMUs – there is no necessary correlation between the level of investment and the level of anticipated missing money (see also section 2.1).

[3] Note that unlike in a CRM, inframarginal rents earned via the energy market constitute a crucial part of the revenues of a capacity provider and particularly serve at covering fixed costs, etc.

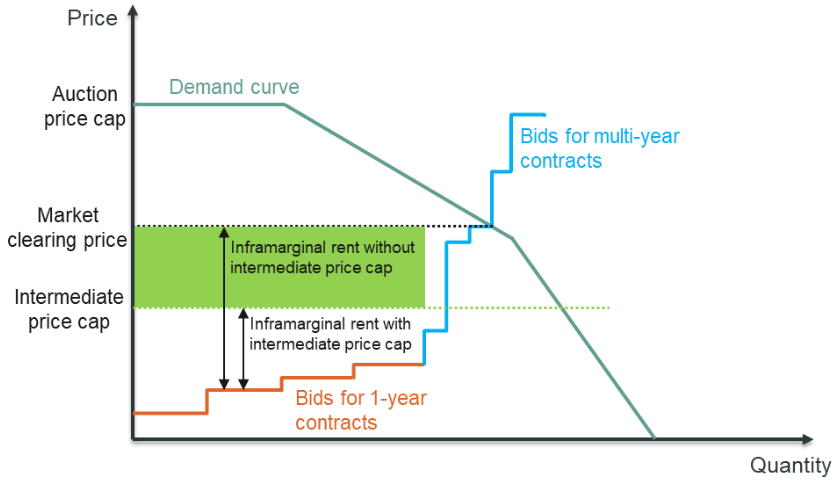



*Figure 2: Conceptual illustration on the windfall profit avoidance through intermediate price cap. The green area indicates the gain for society by introducing the intermediate price cap*

## 1.2 Market power mitigation

In case a pay-as-cleared pricing rule applies, an intermediate price cap acts as a market power mitigation measure, defining both the maximum bid price allowed to bid into the auction and additionally also the maximum capacity remuneration that can be received by capacity providers after closure of the auction.

The determination of a maximum bid price is useful as market power mitigation measure, since it limits the potential for improper strategic behavior of CRM candidates in the form of so-called 'economic withholding' of capacity. Economic withholding occurs when CRM candidates would set the bid price for a certain CMU at such high level that it is effectively priced out of the market. By means of economic withholding, CRM candidates could exploit a pivotal position in the auction, leading to a higher market clearing price that would then benefit other accepted CMUs in their portfolio.

Economic withholding is an alternative to physical withholding, whereby CRM candidates refrain from even offering their CMU into the auction. Physical withholding of existing capacity is neutralized in the CRM design by means of an obligated notification to the grid operator when prequalified capacity – and all eligible production capacity within the Belgian control zone is obligated to prequalify according to Art. 7undecies §4, third paragraph of the Electricity Law – will not (or only partly) be offered into the auction. In line with Art. 7undecies §6, final paragraph of the Electricity Law this allows the grid operator to take the necessary measures to correct for this so-called opt-out capacity, thereby also preventing capacity holders to behave strategically through physical withholding so as to influence the market clearing price. The treatment of opt-out capacity will be discussed in detail in *CRM Design Note: Auction Algorithm*.

An intermediate price cap is additionally useful as market power mitigation measure, to discourage market parties from even more aggressive strategic behavior to influence the market clearing price. By strategically mothballing or closing existing capacity, thereby effectively taking capacity out of the market (hence no contribution to adequacy), market parties could create capacity scarcity, influencing the market clearing price. The intermediate price cap, by determining the maximum capacity remuneration that existing CMUs subject to this price cap can receive, discourages market parties from engaging into strategic mothballing or closing existing capacity as the potential benefit (i.e. via the capacity remuneration for capacity that remains in the market) from doing so is restricted. Also timings foreseen for the notification obligation on definitive or temporary closure following Art. 4bis of the Electricity Law of 1999 contribute to limiting such behavior.

# 2 Scope of intermediate price cap

Firstly, this chapter clarifies the choice for a single intermediate price cap applicable to all CMUs applying for one-year capacity contracts, and no intermediate price cap for CMUs applying for multi-year capacity contracts. Secondly, the enduring character of the proposed intermediate price cap is argued. Finally, it is explained why it is appropriate to apply the intermediate price cap in both Y-4 and Y-1 auctions.

## 2.1 The intermediate price cap is applicable to CMUs applying for one-year contracts

A single intermediate price cap shall be applicable to all CMUs applying for a one-year capacity contract, including CMUs voluntarily applying for a one-year contract despite being eligible for a multi-year capacity category (cf. infra). There will be no intermediate price cap for CMUs applying for a multi-year capacity contract, which are thus only subject to the global auction price cap.

In line with the rules that will be set out by the regulator on investment thresholds, before the auction and in parallel with the prequalification process, a CRM candidate can apply for a multi-year capacity contract for each CMU that requires significant investments. In alternative CRM terminology, this process is defined as the application for another capacity category (max. 3, 8 or 15 years) than the one-year capacity category to which each CMU is assigned by default. By the end of the prequalification process, the CRM candidate has to indicate – for each CMU – the contract duration for which it wants to apply, which can of course not be longer than the capacity category to which it has been assigned. Multi-year contracts facilitate participation to the auction of projects with high capital expenditure, in a way that it provides a level playing field for them compared to projects not requiring substantial investments.

As such, by design, CMUs within the one-year capacity category are confronted with no or minimal investments to cover for and hence also a lower expected level of missing-money. Therefore, to avoid windfall profits for CMUs within the one-year capacity category, it makes sense to apply an intermediate price cap to the one-year capacity category. Indeed, awarding them a capacity remuneration equal to the missing-money level of capacity projects requiring substantial investments would be disproportionate (cf. supra).

Regarding the CMUs applying for multi-year contracts, which all require substantial investments, it is not straightforward to separate projects or capacity categories in terms of missing-money levels. Although, for instance, the investment cost for a new OCGT unit is expected to be lower compared to the required investments to build a new CCGT unit, the missing-money for both units might be similar due to higher anticipated energy market revenues for the CCGT unit, for instance linked to a higher amount of running hours during which it can collect inframarginal rents in the energy market. It is therefore not considered appropriate to differentiate further intermediate price caps to CMUs applying for multi-year contracts, let alone apply a different intermediate price cap to each multi-year capacity category. Note, however, that also CMUs applying for a multi-year contract are in any case subject to the global auction price cap, thereby also putting a cap at their potential revenue from the CRM.

## 2.2 Intermediate price caps are an enduring measure

The intermediate price cap applicable to CMUs within the one-year capacity category is proposed as an enduring measure in the CRM design, meaning that such intermediate price cap shall be defined for each auction that will be organized. The argument concerning the fact that there is no economic rationale behind inframarginal rent in a CRM context as explained above as well as the advantages linked to market power mitigation, remain valid over time.

Assuming a pay-as-cleared pricing rule, the selection of even a limited investment capacity project with high missing-money, would result in disproportionate inframarginal rent allocation to all existing capacity in case no intermediate price cap would be applied.

## 2.3 Intermediate price caps apply in both Y-4 and Y-1 auction

Following the above drivers for an intermediate price cap, there is no reason to differentiate with respect to the application of an intermediate price cap between Y-4 and Y-1 auctions. The appropriate level of the intermediate price cap could however vary per delivery period and per auction (Y-1, Y-4). Indeed, the potential for inframarginal rents can arise in both Y-4 and Y-1 auctions, as CMUs with high levels of missing-money (and possibly applying for multi-year contracts in case substantial investments are required) can participate and be selected in both. Also the potential for market power abuse and hence the need for an intermediate price cap as market power mitigation measure are valid irrespective of the timing of the capacity auction.

**Summary of the proposed principles following from Chapter 2 Scope of the intermediate price cap**

(1) An intermediate price cap is a price cap that applies to all bids related to CMUs applying for a one-year capacity contract

(2) A single intermediate price cap shall be determined for each Y-1 and Y-4 capacity auction organized.

# 3 Calibration methodology of intermediate price cap

A good calibration of the intermediate price cap is key. On the one hand, the intermediate price cap should be sufficiently low to be effective and to ensure that disproportionate inframarginal rents are avoided to a maximum extent possible. On the other hand, the intermediate price cap should also not be too low, as this could obstruct some CMUs – subject to the intermediate price cap and confronted with a higher level of missing-money than the level of this cap – from participating in the CRM and thereby be confronted with a potentially unnecessary market exit signal.

## 3.1 Worst performer analysis among existing technologies

It is considered the most accurate approach to align the intermediate price cap applicable to all CMUs applying for a one-year capacity contract with the missing-money level of the worst performing technology class currently in the market, i.e. the technology class with the highest missing-money.

Although the set of CMUs applying for a one-year capacity contract does not necessarily exclusively correspond with existing capacities, a worst performer analysis among existing technology classes is deemed an appropriate benchmark for missing-money of CMU's requiring minimal investments. Besides, it is neither possible nor desirable from a cost-efficiency point of view to consider all possible technologies with limited investments – hence also new and currently unknown – to calibrate the intermediate price cap.

By looking at both costs and revenues, the proposed calibration methodology results in a decreasing intermediate price cap when market conditions improve and levels of anticipated missing money drop, thereby ensuring that the intermediate price cap remains proportionate. Furthermore, by looking at existing technologies currently in the market, there is a strong correlation between the calibration methodology and the target group of the intermediate price cap – being CMUs requiring minimal investments and thereby largely corresponding with existing capacities.

## 3.2 Different steps of the calibration methodology

In general, on a yearly basis an intermediate price cap will be determined for all auctions that will be organized. The intermediate price cap will be calibrated to the delivery period to which this auctions relates.

In Figure 3 hereunder, the sequential steps of the calibration methodology towards the construction of an intermediate price cap are outlined, also indicating who is responsible for each step and the intended frequency of updating each component. A detailed explanation of each step can be found below.

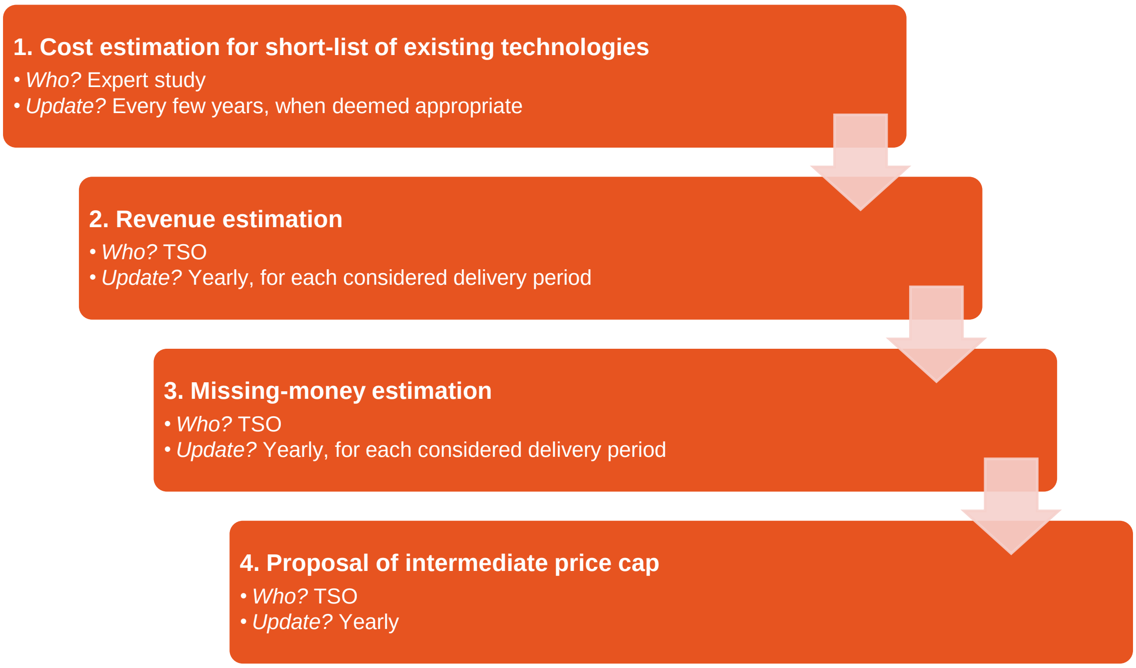



*Figure 3: Steps in calibration process towards intermediate price cap*

### 3.2.1 Step 1: Cost estimation for short-list of existing technologies (see principles (3)-(4)-(5))

A short-list of existing technology classes to be considered in the calibration methodology of the intermediate price cap shall be determined via an independent expert study on behalf of and in collaboration with the TSO and the regulator. This expert study shall include, for each technology on the short-list, the following cost components with respect to a reference delivery period (e.g. 1 November 2025 – 31 October 2026):

- Annualized routine investments not directly linked to a life-time extension or capacity augmentation;
- Yearly fixed O&M costs;
- Short run marginal costs (possibly including but not limited to: primary fuel costs, CO2 costs, variable O&M costs, efficiency rates, etc.).

In addition, the expert study shall determine a methodology to translate each cost component to a delivery period when market or technological conditions have not changed considerably and hence a full update of the study is not required, e.g. by means of an indexation parameter.

This step will be performed at the beginning of the CRM process and updated only when deemed appropriate, e.g. every few years. In case of an update, the cost components will be estimated related to a new reference delivery period and also the methodology to translate each cost component to a delivery period shall be reviewed.

### 3.2.2 Step 2: Revenue estimation (see principle (6))

For each technology listed in step 1, a revenue estimation shall be performed by the

TSO with respect to the applicable delivery period. For each technology, the following revenue components shall be estimated:

- Yearly inframarginal rents earned on the energy market
  - determined based on a probabilistic market modeling tool;
  - taking into account a reference scenario that reflects expected circumstances[4];
  - taking into account the short run marginal costs as determined by the expert study in step 1;
  - considering P50 revenues and taking into account the applicable strike price level, as defined in the Royal Decree methodology meant in Art. 7undecies §2 of the Electricity Law.
- Yearly balancing and ancillary service market revenues
  - determined based on total historical procurement cost for balancing and ancillary services.

This step will be performed during the yearly process defining the auction parameters to be proposed.

### 3.2.3 Step 3: Missing-money estimation (see principle (7))

Based on the results of steps 1 and 2, a missing-money estimation shall be performed by the TSO with respect to the relevant delivery period. For each technology, the missing-money shall be estimated as follows:

Missing-money =

annualized routine investments

+ yearly fixed O&M costs

– yearly energy market revenues

– yearly balancing and ancillary service market revenues

This step will be performed during the yearly process defining the auction parameters to be proposed.

### 3.2.4 Step 4: Proposal of intermediate price cap (see principles (1)-(2))

In this final step, a proposal for the intermediate price cap shall be put forward by the TSO. The proposed intermediate price cap shall be equal to the highest missing-money of the technologies considered for the relevant delivery period. Note that one

[4] The scenario used here shall be consistent with the one(s) determined to calibrate the volume to be procured through the CRM as defined in the Royal Decree methodology meant in Art. 7undecies §2 of the Electricity Law.

intermediate price cap shall be proposed per auction. Therefore, several intermediate price caps will be proposed when more than one auction will be organized (e.g. two when one Y-4 and one Y-1 auction will be organized).

This step will be performed during the yearly process defining the auction parameters to be proposed.

**Summary of the proposed principles following from Chapter 3 Calibration methodology of intermediate price cap**

**When? How many?**

(1) On a yearly basis, an intermediate price cap will be proposed for each auction that will be organized, related to the relevant delivery period to which this auction relates.

**How?**

(2) The intermediate price cap shall be equal to the missing-money of the technology with the highest missing-money among the technologies listed in (3).

The missing-money for each technology listed in (3) shall be estimated according to the formula provided in (7), taking into account the cost estimation as referred to in (4)-(5) and revenue estimation as referred to in (6).

**● technologies**

(3) A list of existing technologies to be considered for the calibration of the intermediate price cap shall be based on an independent expert study on behalf of and in collaboration with the TSO and the regulator. This list of technologies shall be updated only when deemed appropriate, i.e. when market or technological conditions have changed considerably.

**● costs**

(4) For each technology listed in (3), the following cost components shall be estimated based on an independent expert study on behalf of and in collaboration with the TSO and the regulator, with respect to a reference CRM delivery period:

(a) annualized routine investments not directly linked to a life-time extension or capacity augmentation (in €/year),

(b) yearly fixed O&M costs (in €/year),

(c) short run marginal costs (in €/MWh).

The cost component estimation shall be updated only when deemed appropriate, i.e. when market or technological conditions have changed considerably.

(5) A methodology shall be determined by an independent expert study on behalf of and in collaboration with the TSO and the regulator to translate each cost component as determined in (4) to another delivery period.

This methodology shall be updated together with, and hence when deemed appropriate for, the cost estimation as referred to in (4).

● **revenues**

(6) For each technology listed in (3), the following revenue components shall be estimated by the TSO:

(a) yearly inframarginal rents earned on the energy market (in €/year)

i) determined based on a probabilistic market modelling tool

ii) taking into account a reference scenario consistent with the one(s) determined to calibrate the volume to be procured through the CRM as defined in the Royal Decree methodology meant in Art. 7undecies §2 of the Electricity Law base case scenario

iii) taking into account the short run marginal costs as determined in the cost component estimation as referred to in (4) (c)

iv) considering P50 revenues and taking into account the applicable strike price level, as defined in the Royal Decree methodology meant in Art. 7undecies §2 of the Electricity Law  and considering P50 revenues.

(b) yearly balancing and ancillary service market revenues (in €/year) determined based on total historical procurement cost for balancing/ancillary services based on historical data.

The revenue component estimation shall be updated on a yearly basis.

● **missing-money**

(7) For each technology listed in (3), a missing-money estimation shall be performed by the TSO, according to the following formula:

Missing-money =

Annualized routine investments not directly linked to a life-time extension or capacity augmentation, as referred to in (4) (a), if necessary translated to the relevant delivery period according to the methodology as referred to in (5)

+ Yearly fixed O&M, as referred to in (4) (b), if necessary translated to the relevant delivery period according to the methodology as referred to in (5)

- Yearly inframarginal rents earned on the energy market, as referred to in (6) (a)

- Yearly balancing and ancillary service market revenues, as referred to in (6) (b)

The missing-money estimation shall be updated on a yearly basis.

**Annex: Summary of the proposed principles as a basis towards the intermediate price cap articles in the Royal Decree Methodology**

## Scope of the intermediate price cap:

(1) An intermediate price cap is a price cap that applies to all bids related to CMUs applying for a one-year capacity contract

(2) A single intermediate price cap shall be determined for each Y-1 and Y-4 capacity auction organized.

## Calibration methodology of intermediate price cap:

**When? How many?**

(1) On a yearly basis, an intermediate price cap will be proposed for each auction that will be organized, related to the relevant delivery period to which this auction relates.

**How?**

(2) The intermediate price cap shall be equal to the missing-money of the technology with the highest missing-money among the technologies listed in (3).

The missing-money for each technology listed in (3) shall be estimated according to the formula provided in (7), taking into account the cost estimation as referred to in (4)-(5) and revenue estimation as referred to in (6).

**● technologies**

(3) A list of existing technologies to be considered for the calibration of the intermediate price cap shall be based on an independent expert study on behalf of and in collaboration with the TSO and the regulator. This list of technologies shall be updated only when deemed appropriate, i.e. when market or technological conditions have changed considerably.

**● costs**

(4) For each technology listed in (3), the following cost components shall be estimated based on an independent expert study on behalf of and in collaboration with the TSO and the regulator, with respect to a reference CRM delivery period:

(a) annualized routine investments not directly linked to a life-time extension or capacity augmentation (in €/year),

(b) yearly fixed O&M costs (in €/year),

(c) short run marginal costs (in €/MWh).

The cost component estimation shall be updated only when deemed appropriate, i.e. when market or technological conditions have changed considerably.

(5) A methodology shall be determined by an independent expert study on behalf of and in collaboration with the TSO and the regulator to translate each cost component as determined in (4) to another delivery period.

This methodology shall be updated together with, and hence when deemed appropriate for, the cost estimation as referred to in (4).

● **revenues**

(6) For each technology listed in (3), the following revenue components shall be estimated by the TSO:

(a) yearly inframarginal rents earned on the energy market (in €/year)

i) determined based on a probabilistic market modelling tool

ii) taking into account a reference scenario consistent with the one(s) determined to calibrate the volume to be procured through the CRM as defined in the Royal Decree methodology meant in Art. 7undecies §2 of the Electricity Law base case scenario

iii) taking into account the short run marginal costs as determined in the cost component estimation as referred to in (4) (c)

iv) considering P50 revenues and taking into account the applicable strike price level, as defined in the Royal Decree methodology meant in Art. 7undecies §2 of the Electricity Law  and considering P50 revenues.

(b) yearly balancing and ancillary service market revenues (in €/year) determined based on total historical procurement cost for balancing/ancillary services based on historical data.

The revenue component estimation will be performed during the yearly process defining the auction parameters.

● **missing-money**

(7) For each technology listed in (3), a missing-money estimation shall be performed by the TSO, according to the following formula:

Missing-money =

Annualized routine investments not directly linked to a life-time extension or capacity augmentation, as referred to in (4) (a), if necessary translated to the relevant delivery period according to the methodology as referred to in (5)

+ Yearly fixed O&M, as referred to in (4) (b), if necessary translated to the relevant delivery period according to the methodology as referred to in (5)

- Yearly inframarginal rents earned on the energy market, as referred to in (6) (a)

- Yearly balancing and ancillary service market revenues, as referred to in (6) (b)

The missing-money estimation will be performed during the yearly process defining the auction parameters.

# CRM design note: Prequalification and Pre-delivery Monitoring

02/10/2019

# Table of contents

# Purpose of this document

The goal of this present note is to further clarify and receive – via a formal public consultation process - any useful feedback from market parties on the latest CRM design requirements related to the **prequalification period** and the **monitoring process** applicable to the **pre-delivery period.**

These two design elements will be included in the future CRM Market Rules, which will be adopted by the CREG, on proposal by ELIA. There will be another formal consultation on these Market Rules in Q1-2 2020. This design note and the consultation serve as input for the TSO's proposal.

### About the public consultation

This design note is put for formal public consultation and any remark, comment or suggestion is welcomed. It builds further on the discussions and proposals already made in the different TF CRM meetings gathering all relevant stakeholders and in the follow-up committee, the latter consisting of representatives of the CREG and ELIA, under the presidency of the FPS Economy.

This public consultation runs in parallel with a public consultation on other design notes. Reactions to this public consultation can be provided to ELIA via the specific submission form on ELIA's website no later than **Wednesday 30 October 2019 at 6 pm**.

Note that, in line with their roles and responsibilities and the foreseen governance in the Electricity Law, also the FPS Economy and the CREG will consult on aspects within their competence according to their procedures.

# Structure of this document

This design note is organized in two specific parts.

The first part focuses on the **Prequalification Process** which is an absolute pre-requisite for any CRM Candidate willing to prequalify a Capacity Market Unit (CMU) to submit an offer in a CRM Auction (Y-4 or Y-1) or for a possible participation to the Secondary Market.

In this way, ELIA details the Prequalification Process applicable to any CRM Candidate. To provide the reader with the necessary context, it starts with an explanation of the most important “CRM related” terminology and a reminder of the legal framework. It continues then with an overview (including a timeline) of ELIA’s expected interactions with third parties (DSOs, CREG, FOD…) and goes on with a detailed description of administrative and technical requirements verified by ELIA during this Prequalification Process. These prequalification related requirements are organized in **7 sequential steps**.

Finally, ELIA clarifies the three possible methodologies to calculate the Nominal Reference Power of a CMU and presents the rules around possible CMU evolution in time (from one Auction cycle to the other).

The second part of the document presents the monitoring process applicable to the pre-delivery period (hereafter “pre-delivery monitoring process”). This process is applicable from the moment a capacity is contracted following a CRM Auction and ends with the start of the Delivery Period. It consists in a follow-up of the Contracted Capacities in time to guarantee their effective availability as of begin of Delivery Period and concerns both Existing and Additional Capacities[1].

# Out of scope

With this document, ELIA wants to summarize the principles and key requirement applicable to both the prequalification and pre-delivery monitoring processes. The related tools, interfaces and operational organization are not discussed yet with market parties. It will be the case in a later stage of the process, scheduled to start in 2020 once the design consultation phase is over.

[1] As explained in the definition document, an existing capacity is a capacity that is – at the moment of prequalification – effectively measurable with a certified metering device (while an additional capacity is not measurable at that time). Additional capacity covers both new projects and refurbishment projects.

# Terminology

Prior to the description of the prequalification requirements (part 1) and pre-delivery monitoring process (part 2) and to facilitate the reading of this document, ELIA wants to clarify in this section essential CRM–specific terminology used all along the document. This is to be read in complement to the “list of definitions” document that is proposed to market parties as support to this consultation.

The present section is divided in three categories: roles, units and volume. To conclude it, an overview is presented in the table below.

## Roles

Specific roles are needed because rights and obligations will differ depending on the stage of the CRM mechanism. Furthermore, some terms are fixed by the CRM Law. Those terms are therefore not subject to consultation. In this way, ELIA identifies the need to have the following 4 roles:

**Capacity Holder**: According to the CRM Law, article 2, 74°, every natural person or legal entity that can offer **capacity**, either on an individual or aggregated basis.

**CRM Candidate**: Capacity Holder willing to participate to an Auction and submit a Bid for the Service delivery with one or several CMU(s).

**Prequalified CRM Candidate**: Capacity Holder able to participate to an Auction thanks to a successfully prequalified Capacity Market Unit.

A CRM Candidate becomes a prequalified CRM Candidate from the moment the results of the prequalification are communicated and concern a positive (> 0) Eligible Volume for at least on Capacity Market Unit.

**Capacity Provider:** According to the CRM Law, article 2, 75°, every Capacity Holder selected after closing of the Auction and that will keep available a capacity during the Delivery Period in return for a Capacity Remuneration.

## Unit-related terminology

From the moment a Capacity Holder wishes to participate to the CRM, he becomes a CRM Candidate and its capacity (generic term) is identified as a Capacity Market Unit (hereafter also “CMU”). This terminology is independent of the stage of the CRM process.

A Capacity Market Unit consists in **one or several Delivery Points and** corresponds to the physical localization of the certified metering device used by ELIA to verify the effective Service delivery.

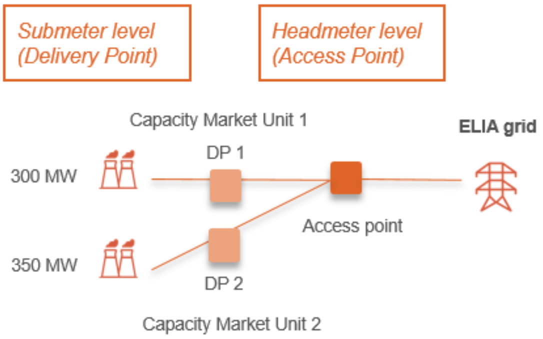
A difference is made between an individual Capacity Market Unit (which consists in only **one Delivery Point)** and an aggregated Capacity Market Unit (which consists in **more than one Delivery Point)**. ELIA reminds the obligation for some capacities to participate as one individual

Capacity Market Unit. The threshold above which this obligation applies is detailed later on in this document (see section 3.4.2.1).

A Delivery Point can either corresponds to a metering point behind an Access Point (i.e: a "Submeter") or to the Access Point (i.e.: "Head Meter"). Two examples are provided below to illustrate it.

In a first example, 2 capacities (one of 300 MW and one of 350 MW) are connected behind an Access Point. Both are equipped with a valid metering device (DP1 and DP2) and fall under the obligation to participate individually (their Nominal Reference Power is higher than the threshold detailed in section 3.4.2.1).

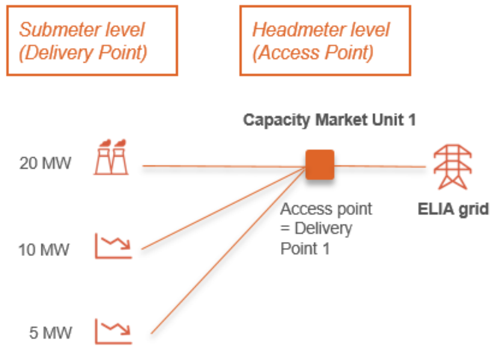
During the CRM Prequalification Process, the CRM Candidate will therefore introduce a prequalification file for CMU 1 (related to the capacity of 300 MW) and a second one for CMU 2 (related to the capacity of 350 MW).




In the second example, three capacities (20 MW, 10 MW and 5 MW) are connected behind the same Access Point. As each individual capacity has a Nominal Reference Power lower than the threshold from which an individual participation in the CRM mechanism is required, the CRM Candidate has **the possibility to** choose between two configurations:

1) Propose a Capacity Market Unit using the metering device of the Access Point in the CRM prequalification. The Capacity Market Unit is then the aggregation of these 3 capacities (total of 35 MW) and will be considered as one entity in the CRM mechanism (illustration below).

2) Propose one Capacity Market Unit for each individual capacity, provided that they are equipped with a valid metering device. In such configuration, the CRM Candidate prequalifies 3 independent CMU (following same illustration than in example 1).




## Volume-related terminology

ELIA identifies the need to define with specific terms the volume related to a capacity. Indeed, these terms are used all along the CRM mechanism and are related to specific obligations. In this way, the following 4 terms are proposed:

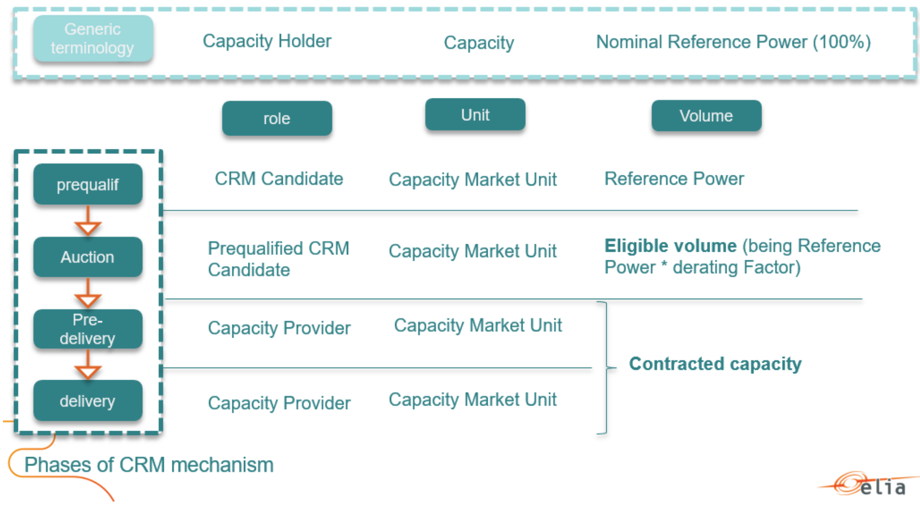
**Nominal Reference Power**: it corresponds to the maximal capacity (expressed in MW) that **could** be considered in the CRM mechanism, before application of relevant Derating Factor.

**Reference Power**: this volume corresponds to the capacity that **must** – according to the CRM Candidate – be considered in the CRM mechanism, before application of the relevant Derating Factor but after deducing the Opt-Out Volume (if applicable).

**Eligible Volume**: this volume corresponds to the Reference Power (expressed in MW) of a CMU multiplied by the Derating Factor as determined during the Prequalification Process.

**Contracted Capacity**: The volume (expressed in MW) selected consecutive to a CRM Auction and subject to a Capacity Remuneration.

To conclude this section, ELIA provides the executive summary in the table below.



# Part I – Prequalification Process

# 0 Overview of legal framework

On 4 April 2019, the Belgian parliament approved the proposed modifications of the 29 April 1999 electricity law about the organization of electricity market (through the adoption of the CRM Law on 22 April 2019). These modifications concerns the set-up of a Capacity Remuneration Mechanism. Main articles related to the Prequalification Process are the following:

| | |
|---|---|
| 82° "prekwalificatieprocedure": de procedure die ertoe strekt de mogelijkheid vast te stellen voor de capaciteitshouders om deel te nemen aan de veiling; | 82° "procédure de préqualification": la procédure visant à déterminer la possibilité des détenteurs de capacité de participer à la mise aux enchères; |
| § 4. De Koning bepaalt, bij besluit vastgesteld na overleg in de Ministerraad, de criteria en/of nadere regels voor het in aanmerking komen voor de prekwalificatieprocedure. Deze criteria en/of nadere regels beogen: | § 4. Le Roi définit, par arrêté délibéré en Conseil des ministres, les critères et/ou modalités d'éligibilité à la procédure de préqualification. Ces critères et/ou modalités visent: |
| 1° de mogelijkheid voor de capaciteitshouders die genieten of genoten hebben van steunmaatregelen om deel te nemen aan de prekwalificatieprocedure; | 1° la possibilité pour les détenteurs de capacité bénéficiant ou ayant bénéficié de mesures de soutien de participer à la procédure de préqualification; |
| 2° de minimumdrempel in MW, na toepassing van de reductiefactoren, waaronder de capaciteitshouders niet kunnen deelnemen aan de prekwalificatieprocedure; | 2° le seuil minimal, en MW, après application des facteurs de réduction, en-dessous duquel les détenteurs de capacité ne peuvent participer à la procédure de préqualification; |
| 3° de voorwaarden waaronder de houders van rechtstreekse en onrechtstreekse buitenlandse capaciteit kunnen deelnemen aan de prekwalificatieprocedure. Deze voorwaarden worden vastgesteld voor het eerste leveringsjaar, na advies van de commissie en van de netbeheerder; zij houden rekening met de verwachte effectieve bijdrage van deze capaciteit tot de bevoorradingszekerheid van België en met het afsluiten van akkoorden onder de betrokken netbeheerders. | 3° les conditions auxquelles les détenteurs de capacité étrangère directe et indirecte peuvent participer à la procédure de préqualification. Ces conditions sont fixées, après avis de la commission et du gestionnaire du réseau, pour la première année de livraison de capacité; elles tiennent compte de la contribution effective attendue de cette capacité à la sécurité d'approvisionnement en Belgique et de la conclusion d'accords entre les gestionnaires de réseau concernés. |
| De netbeheerder start het prekwalificatieproces uiterlijk op 1 juni op en deelt het resultaat uiterlijk vijftien dagen voor de start van de veilingen aan de capaciteitshouders mee. | Le gestionnaire du réseau lance la procédure de préqualification au plus tard le 1er juin et notifie le résultat aux détenteurs de capacité au plus tard quinze jours avant le début de la mise aux enchères. |

Iedere in aanmerking komende houder van productiecapaciteit gelokaliseerd in de Belgische regelzone moet een prekwalificatiedossier indienen. Elke andere in aanmerking komende capaciteitshouder gelokaliseerd

Tout détenteur de capacité de production éligible localisé dans la zone de réglage belge est tenu d'introduire un dossier de préqualification. Tout autre détenteur de capacité éligible localisé dans la zone de réglage

KAMER • 6e ZITTING VAN DE 54e ZITTINGSPERIODE 2018 2019 CHAMBRE • 6e SESSION DE LA 54e LÉGISLATURE

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in de Belgische regelzone en, onder de voorwaarden bepaald door de Koning krachtens het eerste lid, elke houder van buitenlandse capaciteit is toegestaan om een prekwalificatiedossier in te dienen.

belge et, aux conditions définies par le Roi en vertu de l'alinéa 1er, tout détenteur de capacité étrangère est autorisé à introduire un dossier de préqualification.

In het geval dat een houder van productiecapaciteit bij indiening van zijn prekwalificatiedossier niet beschikt over de individuele vergunning, zoals bedoeld in artikel 4, bevat het prekwalificatiedossier alle noodzakelijke informatie voor het verkrijgen van deze individuele vergunning, die vereist is krachtens artikel 4 en diens uitvoeringsbesluiten.

Dans le cas où un détenteur de capacité de production ne dispose pas, au moment de l'introduction de son dossier de préqualification, de l'autorisation individuelle visée à l'article 4, le dossier de préqualification contient toutes les informations nécessaires à l'obtention de cette autorisation individuelle, requises en vertu de l'article 4 et de ses arrêtés d'exécution.

§ 5. Gelijktijdig met de indiening van het prekwalificatiedossier, dient de capaciteitshouder, die een capaciteitscontract wenst te verkrijgen voor meer dan één periode van capaciteitslevering, een ten opzichte van de criteria bepaald krachtens het vierde lid gemotiveerd en gedetailleerd investeringsdossier in bij de commissie.

§ 5. Concomitamment à l'introduction du dossier de préqualification, le détenteur de capacité qui souhaite obtenir un contrat de capacité pour plus d'une période de fourniture de capacité introduit auprès de la commission un dossier d'investissement détaillé et motivé au regard des critères d'éligibilité déterminés en vertu de l'alinéa 4.

Na onderzoek van het investeringsdossier bepaalt de commissie de klassering van de capaciteit in een capaciteitscategorie. De beslissing van de commissie betreft enkel de investeringsdossiers van capaciteiten die de netbeheerder heeft geprekwalificeerd. Deze laatste verstrekt de commissie, met al de nodige zorgvuldigheid, alle informatie die hiervoor nodig is.

Après examen du dossier d'investissement, la commission détermine le classement de la capacité dans une catégorie de capacité. La décision de la commission ne porte que sur les dossiers d'investissement des capacités que le gestionnaire du réseau a préqualifiés. Ce dernier transmet à la commission, avec toute la diligence requise, toutes les informations nécessaires à cet égard.

De commissie deelt haar beslissing uiterlijk vijftien dagen voor de start van de veiling aan de capaciteitshouder mee.

La commission notifie sa décision au détenteur de capacité au plus tard quinze jours avant le début de la mise aux enchères.

Elke capaciteitshouder die na het doorlopen van de prekwalificatieprocedure in aanmerking komt en geselecteerd is, mag deelnemen aan de veiling. Een capaciteitshouder kan beslissen om geen bieding in te dienen in het kader van de veiling voor het geheel of een deel van zijn capaciteit, op voorwaarde dat hij de netbeheerder er voorafgaand aan de veiling van op de hoogte brengt. De netbeheerder houdt rekening met deze niet-aangeboden capaciteit voor de veiling overeenkomstig de werkingsregels van het capaciteitsvergoedingsmechanisme bedoeld in paragraaf 8.

De werkingsregels van het capaciteitsvergoedingsmechanisme omvatten in het bijzonder:

1° de criteria en modaliteiten inzake prekwalificatie;

Tout détenteur de capacité éligible et sélectionné au terme de la procédure de préqualification peut participer à la mise aux enchères. Un détenteur de capacité peut décider de ne pas remettre offre lors de la mise aux enchères, pour la totalité ou une partie de sa capacité à condition de le notifier au gestionnaire du réseau préalablement au début de la mise aux enchères. Le gestionnaire de réseau tient compte de cette capacité non offerte pour la mise aux enchères conformément aux règles de fonctionnement du mécanisme de rémunération de capacité visées au paragraphe 8.

Les règles de fonctionnement du mécanisme de rémunération de capacité contiennent notamment:

1° les critères et modalités de préqualification;

# 1 Interactions with third parties

As foreseen in the CRM Law and as best practice from similar processes set up in balancing markets, the CRM Prequalification Process is not solely ELIA's responsibility. Indeed, third parties (FOD, regulator, DSOs…) have their role to play and will contribute all along the procedure.

Before further detailing the steps of this Prequalification Process and the requirements applicable to any Capacity Market Unit, ELIA highlights these identified interactions in the figure below and in this section.

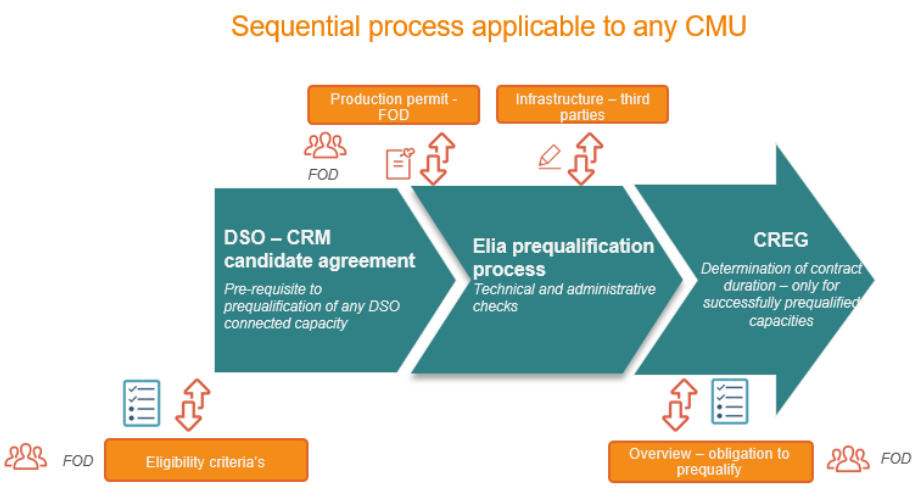


*Figure 1 – Prequalification Process and interactions with third parties*

## 1.1 Prequalification of DSO-connected capacities

DSO connected capacities will more than probably participate to the capacity remuneration mechanism, either as individual CMU or via an aggregated one.

The participation of DSO connected Delivery Points to market services is not a novelty as such. Indeed, Demand Side Response has contributed to deliver successfully balancing services such as FCR and mFRR. In those markets, the related prequalification processes and the collaboration with the DSOs have proven their efficiency. Furthermore, each product design evolution included further operational improvement.

For these reasons, ELIA proposes to use the current operational procedures of balancing services as starting point for the CRM Prequalification Process for DSO-connected capacities. Concretely, **a pre-condition to start the "ELIA part" of the CRM Prequalification Process will be** – similar to the FCR and mFRR process – **to have a signed "DSO-CRM Candidate Agreement" between the CRM Candidate and the concerned DSO(s)**. Of course, this pre-condition only concerns DSO connected Delivery Points.

Obviously, ELIA will follow the upcoming balancing design improvements (e.g: mFRR 2020) to guarantee consistency between energy and capacity market processes and requirements.

Furthermore, ELIA reminds that the exact DSO related requirements within this specific agreement are not part of this design document and will be subject to further clarification by the DSOs.

## 1.2 Interactions foreseen in the CRM Law

### 1.2.1 Obligation to prequalify

The CRM Law specifically foresees (art. 6 §4) an obligation from any Capacity Holder with production excessing the minimal threshold[2] to submit a prequalification file. Even though the entity responsible for the monitoring of this obligation as well as the determination and application of possible penalties in case of non-compliance is still to be determined, it is clear that both ELIA and the DSOs will have a role to play at least as provider of the overview of which Capacity Holder has introduced a prequalification file.

Furthermore and to facilitate the respect of this legal obligation, ELIA foresees a "**prequalification fast track**" (see section 4). In this specific process, ELIA lists the minimal quantity of information required from the Capacity Holder to be compliant with the law.

There are two consequences of this "prequalification fast track":

1) It gives no right to the Capacity Holder to introduce a bid in the Auction nor to participate to the Secondary Market (as only part of the Prequalification Process has been respected) and;
2) The related (de-rated) volumes are considered by default as "Opt-Out Volume" and taken into consideration accordingly in the volume determination.

### 1.2.2 Production permit

In case a Capacity Holder has the obligation to possess a valid production permit for its capacity[3] and provided that this permit has not been given when submitting the related prequalification file, the CRM Law (art.6 introducing an art. 7undecies §4 in the Electricity Law) requires the Capacity Holder to provide in the prequalification file all information required on how to get such a permit. As part of the Prequalification Process, ELIA will verify – based on a checklist provided by FPS Economy - that the CRM Candidate shares all the required information. Once this verification is performed ELIA will send the prequalification file to the FPS (responsible for the production permit delivery) to get their formal confirmation on that specific aspect.

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[2] The minimal threshold will be fixed – along with the Eligibility Criteria's in a Royal Decree
[3] The criteria's to determine which capacities are subject to this obligation along with the process to respect are detailed on the CREG website (https://www.creg.be/fr/professionnels/production/comment-devenir-producteur )

### 1.2.3 Capacity Contract Duration

In parallel to the submission of its prequalification file, a CRM Candidate willing to get a Capacity Contract for a Delivery Period longer than one year introduces a detailed investment file to the CREG and makes sure it contains the information required (cf. Art.7undecies, §5 of the Electricity Law introduced by art. 6 of the CRM Law). The CREG only looks at investment files related to capacities successfully prequalified by ELIA. In this way, the CRM Candidate will notify its will to apply for a longer Capacity Contract Duration at the beginning of ELIA's Prequalification Process (as part of its prequalification file) so the related Eligible Volumes are shared by ELIA with the CREG within the timing foreseen by the CRM Law.

### 1.2.4 Eligibility Criteria

The set-up of the Eligibility Criteria is not ELIA's responsibility and is therefore not discussed in this document. A royal decree, as meant in Art. 7 undecies § 4 of the Electricity Law introduced by art. 6 of the CRM Law will further specify these rules.

However – due to the obvious link with the CRM Prequalification Process, ELIA will require from any CRM Candidate willing to prequalify its **official commitment that the proposed capacities can effectively be part of the CRM mechanism** (i.e. that these capacities respect the Eligibility Criteria set by the above mentioned royal decree). Of course, this commitment may be subject to an audit from the relevant authorities.

## 1.3 Technical possibility to connect the proposed capacity

As some projects are also dependent on (network) **infrastructure work** from third parties other than ELIA (e.g. Fluxys), ELIA must make sure that the related Nominal Reference Power can effectively be connected in time and prior to the start of the concerned Delivery Period. In this way, ELIA also requires a written confirmation from that third party of the project's feasibility within the timeframe imposed by the CRM calendar from these parties. The nature of this written confirmation (e.g. comfort letter, connection study…) will be determined in collaboration with those third parties taking into account their procedures.

# 2 Timing

The timing of the Prequalification Process depends on several elements:

1. **The administrative and technical requirements** verified by ELIA;

   As already implemented in similar processes in energy markets, ELIA foresees its Prequalification Process in two steps:

   a. At first, the CRM Candidate introduces its prequalification file to ELIA **by 15/06** at the latest. Consecutive to this file submission, ELIA **verifies** (in cooperation with impacted third parties if relevant) **its completeness** and **will ask for additional information** from the CRM Candidate if needed. The prequalification file must be completed **by 15/07** at latest to be considered relevant for the second step;
   b. **Between 15/07 and 15/09**, ELIA verifies the technical and administrative requirements described later on in this document to calculate the Eligible Volume of each introduced Capacity Market Unit.

2. The milestones determined in the CRM Law:

   a. At latest **on 15/5**: publication of CRM market rules which include details and requirements of the Prequalification Process applicable for the following Auction (organized in October of the same year);
   b. At latest **on 01/06**; start of the Prequalification Process. However, this deadline is not relevant in practice as ELIA has the ambition to propose **a continuous Prequalification Process** to market parties. This offers the opportunity to quickly participate to the Secondary Market and smoothens the workload of the Prequalification Process over the year.
   c. At latest **on 15/09**; communication on results of Prequalification Process to CRM Candidates;
   d. At latest **on 01/10**; start of the Auction process.

3. The needed interactions with third parties (as explained in previous section). In this way:

   a. As the DSO-CRM Candidate Agreement is a prerequisite to ELIA's Prequalification Process; the CRM Candidate must fulfill these specific requirements **by 01/06**;
   b. As the CREG needs to receive the prequalification results of each introduced project requiring an exemption to the standard one year Capacity Contract Duration prior to the communication of their decision to the CRM Candidate (by CRM Law, at latest on 15/09), ELIA will finalize these prequalification files **by 01/09** at the latest.

The figure below illustrates the timing and includes all the milestones presented above.

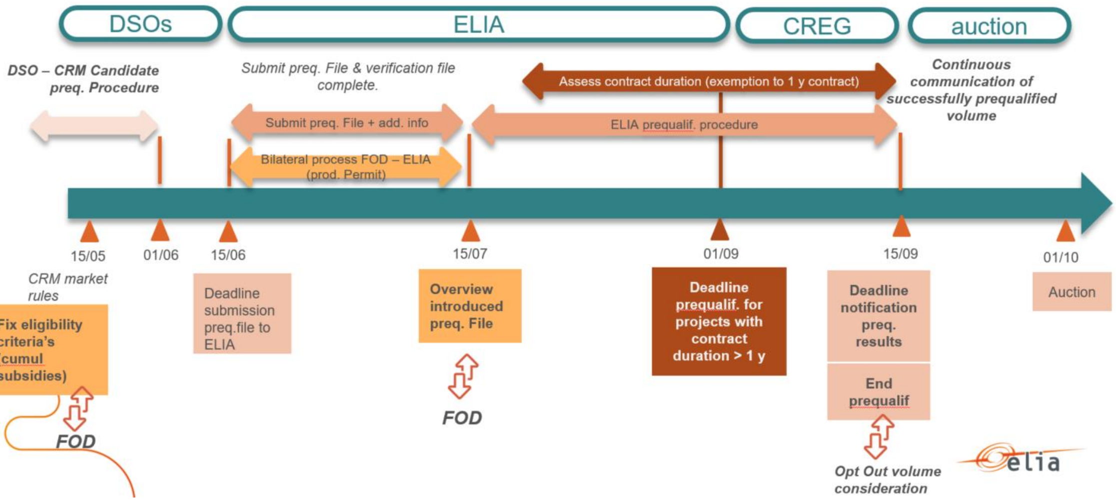



*Figure 2 – timing of the Prequalification Process*

<u>Important remarks:</u>

1) While ELIA confirms its intention to propose a continuous pre-qualification process to facilitate the participation to the Secondary Market, a start date has to be determined for the first prequalification round (summer 2021).

   Considering the need to have the earliest start date possible to smoothen the expected workload on both ELIA and third parties side on one hand and the ambitious implementation trajectory which the set-up of such mechanism supposes (automated tools to support the prequalification operators) on the other hand, ELIA proposes as start date the **1$^{st}$ April 2021.**

   This estimation is of course subject to future evolutions the moment the operational processes and tool-related requirements are known more precisely.

   Finally, this date is only related to the start of the Prequalification Process. No file can be finalized prior to the publication of the market rules (15/5 as set by the CRM Law).

2) The estimated timings proposed in the figure above can be extrapolated to a prequalification file introduced earlier than the deadline. In this way, a CRM Candidate must consider 20 working days for the verification of the file's completeness in addition to 40 working days for the administrative and technical verifications listed in this document.

# 3 ELIA Prequalification Process

In this section, ELIA zooms on the part of the Prequalification Process that falls under its responsibilities as reminded on the Figure 3 below. To start with, ELIA details the **full Prequalification Process** (from section 3.1 to section 3.7 below) before highlighting which steps of this process could be used as part of a light "**fast track" process** (chapter 4) .

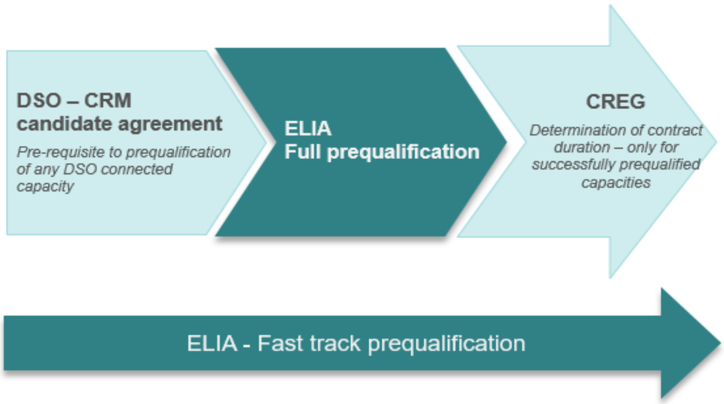



*Figure 3 – CRM Prequalification Process*

Here, ELIA determines the technical and administrative requirements applicable to any CRM Candidate willing to provide the Service with a CMU as well as the possible methodologies to calculate the Nominal Reference Power. Whenever relevant, ELIA makes the distinction between generic requirements (applicable to both Additional Capacities and Existing Capacities) and specific requirements (only related to Additional Capacities).

ELIA's full CRM Prequalification Process consists in seven steps, as illustrated in Figure 4 below:

I. The **CRM Candidate registration**, which consists in registering the CRM Candidate (if not known by ELIA) in ELIA's database following usual procurement processes;
II. The CRM Candidate **commitment with the CRM set of rules;**
III. **The communication tests,** which consist in verifying the connection between ELIA's CRM interfaces and the Capacity Provider's own system. (e.g: prequalification platform; bid submission; nomination tool(s)…)
IV. **The CMU acceptance process.** It is at this stage that ELIA verifies the technical and administrative requirements related to the Delivery Point(s) that compose each CMU (e.g: Grid user declaration; aggregation rules ;…)
V. **The Nominal Reference Power calculation.** In this step, ELIA calculates the maximum volume of capacity (in MW) for each CMU.
VI. **The application of Derating Factor:** based on a specific methodology determined in a separate design document, ELIA will apply the Derating Factors corresponding to the characteristics of the CMU to the Reference Power calculated during the previous step, to get an Eligible Volume that can be offered in an Auction by the Prequalified CRM Candidate;
VII. **The communication of test results (Eligible Volume) to involved parties.**

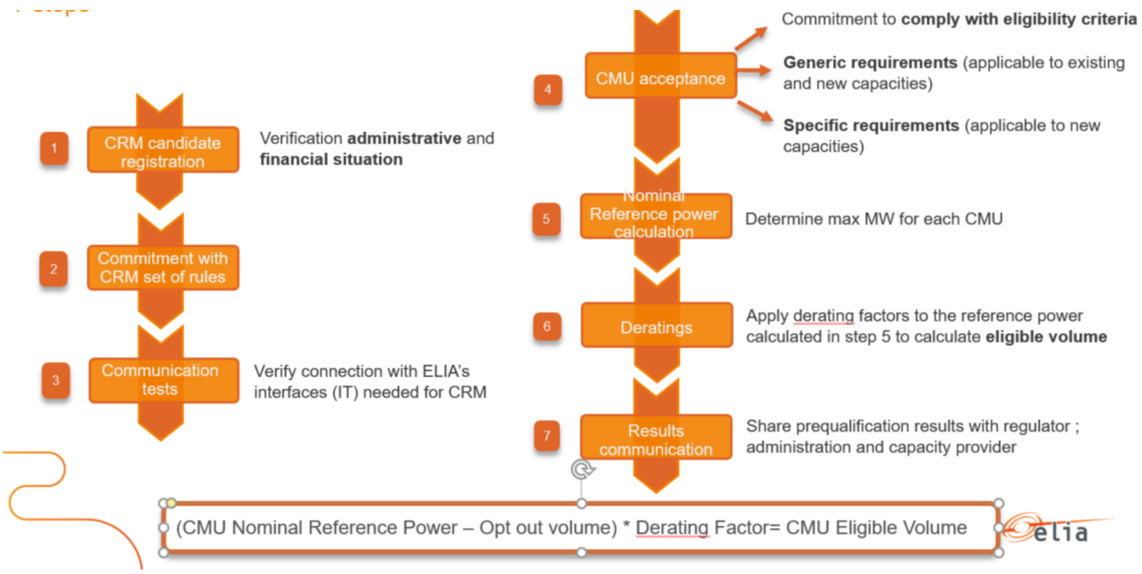
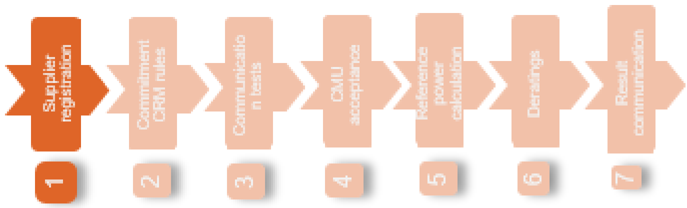



*Figure 4 – The seven steps of the Elia side of the CRM Prequalification Process*

## 3.1 Step 1 – CRM Candidate registration




### 3.1.1 Become a qualified CRM Candidate

As first prequalification step it is common practice for ELIA to verify the administrative and financial situation of each CRM Candidate. Specific qualification forms are available as example on ELIA's website[4]. Of course, a specific "CRM application form" will be written by ELIA and included in the Capacity Contract later on and may differ from these examples.

[4] http://www.elia.be/en/suppliers/purchasing-categories/energy-purchases/Ancillary-services/How-to-candidate-make-offer

### 3.1.2 Bank guarantee

ELIA's best practice is to verify systematically the **financial situation** of each CRM Candidate. One possibility currently used in the balancing processes is via the "Graydon score". However, ELIA observes the limits of the Graydon score when looking at the CRM specificities. Indeed, the CRM mechanism consists in two Auction rounds for each Delivery Period: in Y-4 and in Y-1. This configuration introduces a **significant gaming risk**. Especially in the first round of Auction in Y-4 where a volume offered at low price (with no intention to effectively be there at start of Delivery Period) in Y-4 could lead to the rejection of competitors from the Y-4 selection.

Moreover, the penalties[5] for Service's non-delivery are capped to the contractual value and no remuneration is due before the start of Delivery Period (up to 4 years later).

Given these specificities, ELIA is looking for a way to have a different financial incentive (than the Graydon score) applicable from the moment of Y-4 selection while keeping in mind the need to limit at its maximum the entry barriers to this market.

As preferred solution, ELIA proposes the setup of a bank guarantee **for each selected CMU**, **proportional to the Contracted Capacity** (MW). The CRM Candidate commits to deposit the bank guarantee corresponding to its selected CMU within 60 days after the communication of Auction results and delivers as proof of this commitment an **attestation from a recognized financial institution**. In case no bank guarantee is not provided within these 60 days, the Contractual Counterparty has the right to terminate the Capacity Contract and/ or suspend the Capacity Provider for coming Auctions.

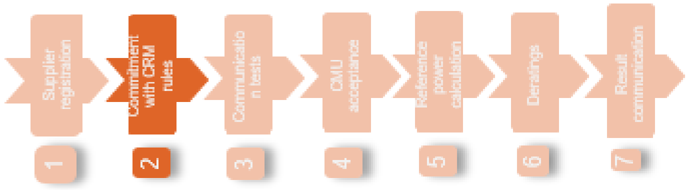
The modalities according to which a Capacity Provider may lose the bank guarantee partially or totally are described in the second part of this document ("Pre-delivery monitoring process").

<u>Important remark:</u>

As already introduced in TF CRM, ELIA welcomes argumented suggestions or possible alternatives to the bank guarantee – provided that it gives similar financial incentive to ELIA as feedback to this public consultation.

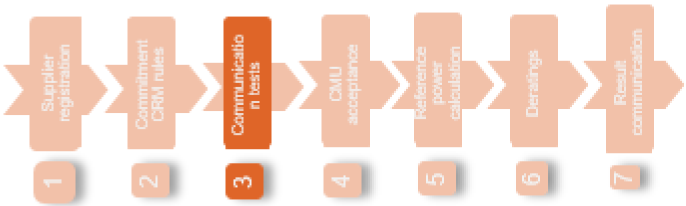
[5] The details on availability controls and related penalties are presented in a specific design note and are therefore not reminded here.

## 3.2 Step 2 – Commitment with CRM set of rules




From the moment a CRM Candidate is registered to ELIA, he confirms its agreement with the whole set of requirements (both related to the Service delivery and the Service verification). It is a precondition to the bid submission in an Auction. Note that the Capacity Contract will be a regulated contract, approved by CREG.

## 3.3 Step 3 – Communication tests




At this stage, ELIA intends to verify the good functioning of its IT interfaces with the Capacity Provider. In this way, the table hereunder illustrates some CRM procedures requiring data exchange in one or both directions (ELIA > Capacity Provider and Capacity Provider > ELIA). As already communicated to market parties during the CRM Task Forces and in order to minimize the interferences with energy market, ELIA will use whenever possible existing data or processes.

| Type of communication | Direction | Level of detail |
|---|---|---|
| **data exchange platform** | Capacity Provider > ELIA | Per Delivery point |
| **Auction tool** | Capacity Provider > ELIA | Per CMU |
| **Prequalification platform** | Capacity Provider > ELIA<br>ELIA > Capacity Provider | Per Delivery point |
| **Availability test signal** | ELIA > Capacity Provider | Per CMU |

Even though some technical details may already be shared with market parties, it is important to remind that the exact procedures and IT technical requirements are not finalized yet. The requirements presented in this document are therefore indicative and subject to changes later on in the process.

**<u>Important remark</u>**: ELIA accepts that a CRM Candidate proves its compliancy with operational processes not required for the introduction of a bid in the Auction during the pre-delivery period (between Auction result communication and start of Delivery Period) to minimize the costs engaged by the CRM Candidate prior confirmation of its Contracted Capacity.

### 3.3.1 Metering data exchange platform and metering requirements

The authenticity of metering data used for settlement purposes is a major concern in each service procured by ELIA. There are currently two processes implemented in balancing services; depending on the kind of metering data exchanged: telemeasures (each 4 seconds) and 15 minutes metering data.

<u>4-second data</u>

As of today and for technical reasons related to the services procured (FCR and aFRR), telemeasures are sent in real time from the Capacity Provider central dispatch to ELIA via a specific secured communication channel . ELIA identifies the following disadvantages that justify not duplicating this requirement to the CRM Service:

a. It **takes time** (around 2 months) to proceed to the installation of this specific communication channel;
b. The **related costs are not insignificant**;
c. It **is not future proof** (physical limitation on number of new channels that can be connected);
d. Such granularity level (4 second) is not required for a proper CRM availability monitoring.

<u>15-minutes data</u>

The second existing process is related to the mFRR service and organizes the data exchange of 15-minute measurements between the Capacity Provider and ELIA. This process was implemented in cooperation with the DSOs and concerned market parties, via a common data exchange platform. Furthermore, specific metering requirements have been established at that time to guarantee the metering data authenticity.

Given the similar metering granularity required for the monitoring of CRM Service, the existing common procedure (and platform) with DSOs and the number of metering devices already compliant with these technical requirements, ELIA **proposes to start from the mFRR data exchange requirements for the CRM Service.**

Obviously, the CRM metering requirement will evolve in parallel to the adaptations foreseen in future evolutions of mFRR product design.

### 3.3.2 Prequalification platform

Unlike the balancing markets - where the number of Delivery Points remains limited so far - ELIA expects to face a much higher number of prequalification requests. This mostly because the CRM Law imposes to each Capacity Holder with production capacity located in Belgian control area (and above a certain threshold yet to be determined) the introduction of a prequalification file. Furthermore, as the Capacity Remuneration Mechanism is a market based one, it offers the opportunity to any Prequalified CRM Candidate to compete in the Auction.

To facilitate the Prequalification Process, ELIA intends to **develop a specific platform** on which each CRM Candidate can easily follow the status of its request and update information whenever required. The access to this platform and the CRM Candidate's possibility to introduce specific prequalification related information is verified at this stage of the procedure.

### 3.3.3 Auction tool

As a conclusion to the Prequalification Process described in this document, the Prequalified CRM Candidate will receive the confirmation on the maximal Eligible Volume for each of its successfully prequalified CMU. This volume corresponds to the multiplication of the CMU's Reference Power by the corresponding Derating factor.

To guarantee the respect of the bidding instructions applicable to the CRM Auction process (and subject to a specific design document) while including the consideration of grid constraints (also subject of the same design document), ELIA will develop a specific Auction platform. During the Prequalification Process, ELIA verifies the CRM Candidate's capacity to connect to this platform and submit a bid compliant with the bidding instructions.

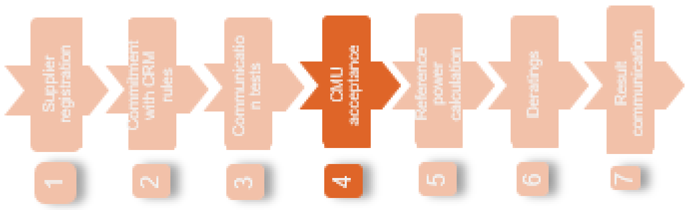
### 3.3.4 Availability test trigger

In parallel to the availability monitoring logic for which a day-ahead nomination price might needed (as described in the separate design note on availability monitoring), another way to verify the correct Service delivery is through a specific trigger requested by ELIA. The detailed modalities around those tests are also described in a specific design note.

During the Prequalification Process, ELIA will therefore verify the possibility to trigger an availability test with a Capacity Provider. This signifies the identification of one or several CMU subject of the test and immediate confirmation of the trigger's good reception from the Capacity Provider (required for the ex-post analysis).

Please note that the exact modalities around this availability test trigger are not known yet and will be shared with market parties later on.

## 3.4 Step 4 – CMU acceptance




At this stage, the CRM Candidate identifies the CMU(s) that he intends to prequalify and delivers the required technical and administrative information detailed in the sections hereunder. Once the verification is over and in case it led to positive results, ELIA will include the proposed CMU into the CRM Candidate portfolio and proceed to the calculation of the related Reference Power following one of the methodologies described in chapter 3.5 below.

ELIA organizes the requirements of this section in three distinct chapters:

a. Compliancy with **Eligibility Criteria**;
b. **Generic requirements** (requirements that apply to both Existing and Additional Capacities);
c. **Specific requirements** only relevant for Additional Capacities;

### 3.4.1 Compliancy with Eligibility Criteria

A Royal Decree (cf. Art. 7undecies §4 of the Electricity Law introduced by art. 6 of the CRM Law) will determine the Eligibility Criteria related to having benefitted from past or ongoing *other* support mechanisms. These rules will determine whether a CMU can participate to the Auction (and therefore be prequalified) or not and focuses on the acceptable interferences with other subsidy mechanisms.

As first verification to determine the possible participation of a CMU to the Prequalification Process, ELIA requires from the CRM Candidate a **firm commitment** of **its compliancy with the related set of rules**. In other words, the CRM Candidate is responsible to determine and confirm to ELIA – based on the Eligibility Criteria's set by such Royal Decree – whether a CMU can participate to the Capacity Remuneration Mechanism.

This commitment is of course auditable by the relevant authorities anytime during or after the Prequalification Process and may trigger specific penalties (not described in this document).

### 3.4.2 Generic requirements

#### 3.4.2.1 Individual or aggregated CMU

The CRM Candidate informs ELIA about the Delivery Points that composes each CMU. Indeed, several possibilities are offered to the Capacity Provider and ELIA must make sure that the following conditions are respected:

1. Any Delivery Point with an Nominal Reference Power lower than the threshold determined by Royal Decree cannot be considered as an individual CMU but may participate as part of an aggregated one;

2. Any Delivery Point subject to the obligation to introduce to ELIA an individual MW schedule (obligation coming from the System Operation Guidelines and already being respected in the energy market) is prohibited to be part of an aggregated CMU (currently, the threshold is 25 MW).

It is also important to remind that there are **no technology related constraints** in the set-up of an aggregated CMU (several technologies can be gathered together as long as the above-mentioned conditions are respected) and that one Delivery Point can only be part of one CMU, in the portfolio of one CRM Candidate.

#### 3.4.2.2 Capacity Contract Duration

As introduced in section 1.2.3 ELIA needs to know whether the CRM Candidate ambitions to ask for an exemption to the standard one year Capacity Contract Duration to the CREG. If it is the case, ELIA will share the results of the Prequalification Process (Eligible Volume) for the related CMUs with the CREG by 1$^{st}$ September at latest.

#### 3.4.2.3 Energy Constrained Assets

As detailed in the specific design note describing derating methodology and principles, several categories are identified depending on – among other things – the technology or the energy constraint.  For each category, specific Derating Factors are calculated.

At this stage of the Prequalification Process, the CRM Candidate identifies to ELIA which category applies to each of his CMU. Based on this information, ELIA will calculate the Eligible Volume (as described in section 3.6 below).

It is important to highlight that the Prequalification Process does not aim at verifying the exactitude of the CRM Candidate derating related declaration as it will be monitored by ELIA thanks to the availability controls. In other words, a CRM Candidate proposing an Energy Constrained Asset (e.g: aggregated CMU) will not be asked to perform a prequalification test for the entire duration of this energy constraint. However, ELIA has the right to verify this requirement during its availability monitoring during the Delivery Period.

### 3.4.2.4 Technical information

The table below gives an overview of most important technical information[6] needed by ELIA because of their use in one of the CRM related processes. It also indicates on which level this information is needed (CMU or Delivery Point) as well as the purpose of this information.

| Technical information | On level of | because |
|---|---|---|
| **Nominal Reference Power (MW)** | Delivery point | Used for the evolution in time of an aggregated CMU (see section 5.4); |
| **P min/ P max (generation) or Unsheddable margin / Max consumption (market response)** | Delivery Point | Used to calculate the Reference Power (see section 3.5) |
| **Carbon emission** | CMU | Used as one of **the tiebreaker rule in the Auction algorithm** (see specific design note on Auction principles for further information). |
| **Nominated Electricity Market Operator (NEMO)** | CMU | Used to calculate the payback obligation (Capacity Provider may select the DA reference price to be used for that calculation for each CMU) |
| **Intermediate price cap** | CMU | Used in the Auction clearing algorithm |
| **EAN – localization** | Delivery Point | Used for the verification of compliancy with rules on possible combination with other Capacity Providers (see section 3.4.2.8);<br>Used in Auction clearing algorithm (grid constraints) |
| **Unique CMU identification** | CMU | Used for trigger of availability test (part of settlement controls) |

### 3.4.2.5 Grid user declaration

Similar to the verification done by ELIA in the balancing services prequalification procedures, a

[6] Please not that this overview is not final yet and may still evolve to consider additional input from the related operational processes (not described yet at moment of redaction of this document)

signed declaration from the grid user (in case the grid user differs from the CRM Candidate) concerned by the offered capacities (in the CMU) – giving the permission to the CRM Candidate to offer the capacity Service to ELIA – is a standard verification in the CRM Prequalification Process.

A specific template adapted to the capacity Service will be proposed in the CRM Capacity Contract in a later stage. Of course, a capacity can only be related to one grid user declaration.

#### 3.4.2.6 DSO – CRM Candidate Agreement

A DSO – CRM Candidate Agreement is an agreement between the CRM Candidate and the DSO allowing him to provide the Service to ELIA with Delivery Points connected to its grid.

Prior to the Prequalification Process with ELIA, the CRM Candidate will deliver the required technical information to the concerned DSO(s) so the specific verifications detailed in this contract can be performed.

ELIA will not consider valid a Delivery Point connected to a DSO grid that has not been verified and confirmed by this DSO.

The details about the technical and administrative requirements gathered in this DSO – CRM Candidate Agreement will be elaborated by the DSOs and are therefore not reminded in this document.

Important remark:

ELIA is currently investigating which additional requirement(s) and related information exchange are relevant in the specific context of a closed distribution system (CDS) and invite market parties to formulate a proposal (in their reaction to this public consultation) to feed in the on-going reflection.

#### 3.4.2.7 Metering / Submetering requirements

As introduced earlier in this document, ELIA proposes to start from the mFRR data exchange requirements as the implemented set of rules is the only one already applicable to both DSO and TSO connected Delivery Points and ensures the data (15 minutes measurements) authenticity.

The exact metering device requirements are described in a specific technical appendix available on ELIA's website[7] and will be verified by the corresponding DSO (in case of DSO-connected

[7] http://www.elia.be/~/media/files/Elia/users-group/Taskforce%20Strat%20Reserve/Winter_2015-2016/General_technical_requirements_submetering.pdf

Delivery Point) or ELIA (in case of TSO-connected Delivery Point).

It is important to remind that from the moment these requirements evolve because of balancing design improvements; the CRM related requirements will follow to keep consistency between energy and capacity markets.

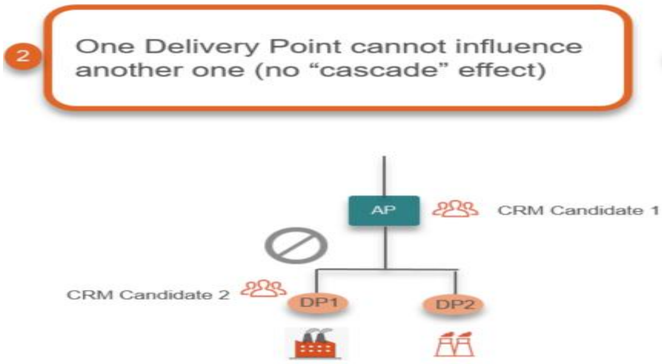
### 3.4.2.8 Combination with other Capacity Providers

Here again, ELIA proposes to follow the three key principles introduced in balancing services to determine the possible competition between CRM Candidates behind an Access Point.

In this way:

1) **There can only be one CRM Candidate per Delivery Point** (an Access Point may be equal to a Delivery Point). The example below gives a practical illustration of that principle, with an Access Point behind which there are two specific capacities: a small production unit (DP2) and an industrial consumption site (DP 1). In the example, the CRM Candidate proposes the Access Point for the prequalification. He is allowed to do so as the Nominal Reference Power of each Delivery Point is lower than the threshold (currently 25 MW).


2) **One Delivery Point cannot influence another one**. In other words, no combination possible between a Service delivery on the Headmeter and a Submeter behind or with two Submeters with hierarchy (one Delivery Point above another one). Indeed, in such configuration the Delivery Point downstream (Delivery Point 1 in the example below) influences the one upstream (Access Point in the example below) and might negatively influence the control of the Service delivery;




3) **More than one CRM Candidate can deliver a Service behind an Access Point as long as these Delivery Points are not influencing each other.**
In the example below, 2 different CRM Candidates can offer the Service as the concerned Delivery Points (DP1 and DP2) are not influencing each other and as no CRM Candidate offers the Service on the Access Point.


### 3.4.3 Specific requirements (Additional Capacities)

On top of the generic requirements listed above, ELIA identifies in this section the need for information specifically related to Additional Capacities (still in project stage and for which no energy can effectively be measured to calculate the Nominal Reference Power at moment of prequalification).

#### 3.4.3.1 Grid connection

Prior to any possible offer in the CRM Auction, capacities not connected yet to the grid must comply with the grid connection process as foreseen in the Federal Grid Code. This procedure gives the confirmation to ELIA that the proposed Delivery Points (in the CRM Prequalification Process) can effectively be connected to the grid before the start of the Delivery Period and details to the CRM Candidate both the technical and financial elements related their connection. This confirmation is formalized via the **signature of a technical agreement** between the grid user and ELIA and **is a pre-requisite** verified at this stage **of the CRM Prequalification Process**. In this way, the technical agreement must at least be valid until the communication of the Auction results (at latest on 31/10 according to CRM law).

The information gathered in the technical agreement will be used by ELIA in the Auction clearing algorithm as input for the determination of grid constraints (as detailed in the specific design note on Auction algorithm).

#### 3.4.3.2 Production permit (if relevant)

According to the CRM law, a Capacity Holder must either deliver a valid production permit for its CMU or provide in his prequalification file every information required for its attribution. ELIA will hence verify the completeness of the prequalification file based on a checklist delivered from the federal administration who is responsible for the production permit delivery and share it with them to obtain their approval on the content of the elements provided.

The verification of the information related to the process for the attribution of the production permit at this stage of the Prequalification Process is of course not a guarantee for the CRM Candidate that he will obtain such permit in the end.

#### 3.4.3.3 Network constraints (Fluxys, DSO)

In parallel to the verification of the possible connection of an Additional Capacity on ELIA's grid (via the connection process described in the Federal Grid Code), ELIA must have the written confirmation that the network infrastructure (electricity and – where relevant – related to primary fuel) needed for the proper functioning of that capacity is effectively foreseen by the CRM Candidate. In this way, ELIA requires signed commitment from the relevant network operator attesting of the possible connection before start of Delivery Period (conditional offer subject to selection of the related capacity in the Auction algorithm is accepted).

This commitment only concerns the guarantee that the Capacity Market Unit can effectively be connected to the required combustible (e.g.: gas for a gas turbine). A valid energy (primary fuel) contract is not required by ELIA as prequalification prerequisite.

#### 3.4.3.4 Construction permit (if relevant)

The current CRM mechanism foresees a period of 4 years between the communication of Y-4 Auction results and the start of the Delivery Period. This period is – in theory – long enough to accomplish both the official procedures to get the required construction permits and to build up and connect a capacity.

ELIA will therefore not require the delivered construction permit as an absolute pre-requisite to the Auction. This would only limit the competition in Y-4 and might negatively influence the mechanism's total cost.

However, ELIA will monitor – from the moment the volumes are allocated consecutive to the Auction – the effective evolution of these projects and apply the mitigation measures described in the pre-delivery monitoring process section of this document (Part II) if delays in the project are observed.

Furthermore, ELIA requires during the prequalification the proof that the spatial plan[8] does not need modifications in order to build the new capacity. Indeed, it does not seem realistic to only request a spatial plan modification once the project is selected in the Auction as this step alone takes between one and two years.

### 3.4.3.5 Terrain

Another administrative verification concerns the field on which the Additional Capacity will be located. The CRM Candidate must – during the prequalification – produce the proof that he has the right to use the field (ownership; agreement with the current owner ;…) for the prequalified project.

### 3.4.3.6 Detailed project planning

In addition to the requirements listed above, ELIA asks - for each Additional Capacity subject to the Prequalification Process - to deliver a detailed project planning that contains at least the following elements:

a. A clear identification of monthly, quarterly and yearly milestones; running from the moment the Auction results are communicated and until the first day of the Delivery Period. In this planning, at least the following milestones must be detailed:

    i. **Process to get the required permits (if relevant);**
    ii. The details of **construction work** in itself (foundations; order of main component ;…)
    iii. The **commissioning phase**; including the organization of physical injection / consumption tests that can be used by ELIA to calculate the Reference Power as described in section 3.5 below;

   For each step, the Capacity Provider identifies **the last possible moment to finalize** it without endangering the project's overall timing.

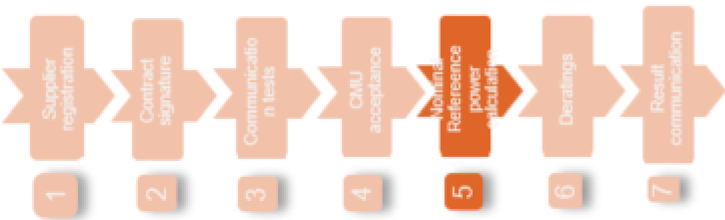
| |
|---|
| Important remark<br><br>As explained in the second part of this document (pre-delivery monitoring process), Additional Capacities exceeding 400 MW have the obligation to deliver the required permits (construction, environmental…) within 24 months (starting from the moment the selection of Y-4 is known). |

[8] As spatial plan, ELIA refers to the cadaster mapping status such as "industrial area, residential area…"

b. The technical information listed in the section 3 above. For the sake of clarity, this includes exact localization of the metering device (to avoid an influence on another meter upstream) as well as the commitment it will respect the standards (already presented in section 3.4.2.7) set by ELIA.

c. A clear identification whether work from third parties (e.g: ELIA, DSOs, Fluxys) is a pre-requisite to the capacity connection to the grid and if so, a detailed planning for these works with yearly, quarterly and monthly milestones and information for each step detailed above. Indeed, the Capacity Provider is responsible for the gathering of the needed information from these third parties so ELIA can perform the required monitoring.

## 3.5 Step 5 – Nominal Reference Power calculation




In this step, ELIA determines the Nominal Reference Power. This volume corresponds to the maximal capacity that can be delivered by the CMU, before consideration of Derating Factors (see section 3.6) and / or any additional correction required by the CRM Candidate (Partial or full opt-Out as detailed in a specific design note).

> <u>Important remark:</u>
>
> In case of a request from the CRM Candidate to reduce its Nominal Reference Power to a lower value (higher or equal to zero), ELIA requires a written signed justification detailing the reasons of that choice.

To determine the Nominal Reference Power, ELIA proposes three different methodologies. As the three reaches the same objective, The CRM Candidate can select his preferred one and confirm it to ELIA at this stage of the process.

### 3.5.1 1st method – use of historical data

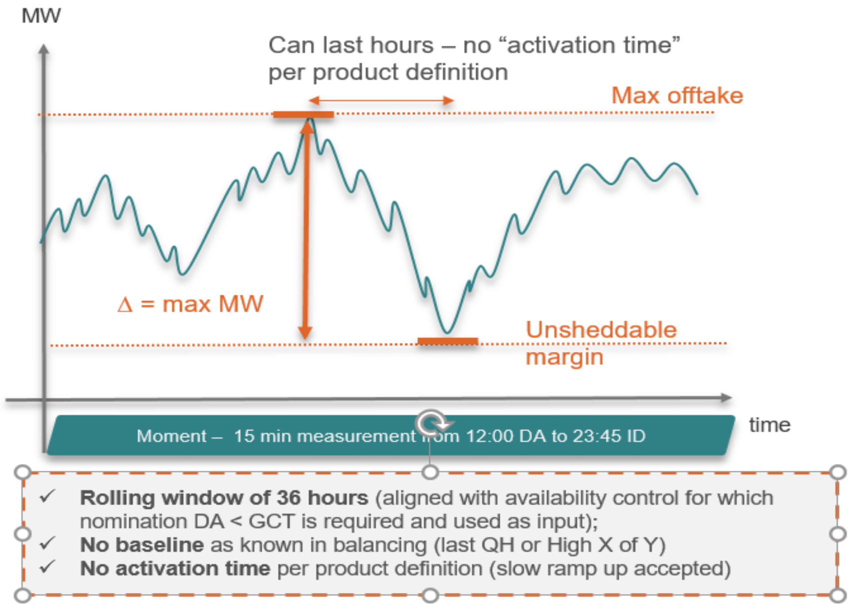
This method only applies to Existing Capacities already connected to the grid and which respect the metering requirements set above (see section 3.4.2.7). In this approach, ELIA analyzes the historical 15 minutes measurement data of each moment **over the last 12 months** to calculate the Nominal Reference Power.

The Nominal Reference Power corresponds to the highest difference observed over a moment.

Indeed, as there are no specific activation time per product definition, the difference must not necessarily correspond to a power deviation between two consecutive quarter hour. A moment starts at 12:00 and ends at 23:45 the following day (36 hours in total).

The graph below illustrates this methodology and makes the distinction between generation and consumption. Indeed, the Nominal Reference Power of a generation unit will often correspond to the difference between the highest injection observed ("Pmax") and 0 (when the unit does not produce) while the Nominal Reference Power of a consumption site will correspond to the difference between the highest consumption (max offtake) and the minimal consumption (Unsheddable Margin) within the considered time window.

**Prequalification – example with method A. use of historical data**




### 3.5.2 2nd method – use of historical balancing results

An alternative methodology to determine the Nominal Reference Power is the consideration of historical balancing results. Indeed, as the requirements (a.o: the activation time) of balancing services are stricter than those set for the capacity product in the CRM, any volume certified and / or proven to be available in those services is de facto prequalified for the CRM.

ELIA considers the following balancing results (**over last 12 months**) valid:

- FCR / aFRR / mFRR prequalification tests;
- FCR availability tests;
- mFRR effective activations;

Of course, in case of aggregated CMU the list of Delivery Points gathered in this CMU must correspond exactly to the list of Delivery Points used in the corresponding balancing service.

### 3.5.3 3rd method – Organize a new prequalification test

Finally, a third possibility to calculate the Nominal Reference Power is via the organization of a specific CRM prequalification test. In this section, ELIA details the modalities of such test.

#### 3.5.3.1 Test organization

The CRM prequalification test is scheduled in advance (not a surprise test) within a time window of 5 days. The Capacity Provider informs ELIA on beforehand and communicates the following information:

- Which Delivery Point(s) are being tested;
- The test volume objective (MW);
- The test profile (activation time; number of quarter hour at full activation ;…); which can last at maximum **36 hours**. This maximal duration is aligned with the duration between an activation test trigger and the effective delivery as verified by ELIA in the availability controls and described in a specific design document.

There is no specific requirement set by ELIA on the minimal activation duration; apart from the fact that it needs to be visualized in the 15 minutes measurements (and therefore last **at least a full quarter-hour**).

#### 3.5.3.2 Test remuneration

The costs related to the organization of a CRM prequalification test are at the CRM Candidate's charge. No remuneration is foreseen by ELIA. Furthermore, no energy compensation is expected from ELIA (in opposite direction to compensate possible imbalance) as the test is foreseen by the CRM Candidate in advance and should be compensated accordingly by him.

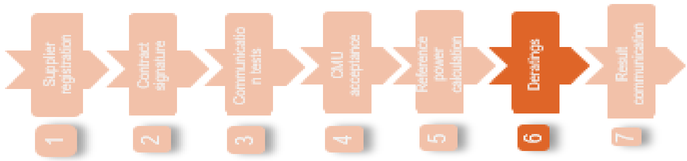
#### 3.5.3.3 Determination of Nominal Reference Power

The logic followed by ELIA to determine the Nominal Reference Power from a test result is the same than the one described in the first methodology above. Indeed, ELIA will look at the 15 min measurement over the entire test period (which can last maximum 36 hours) and calculate the highest power deviation. Note that Elia does not test on particular constraints that would be taken into account via the derating factors (e.g. energy limitation limited to *x* hours).

### 3.5.4 Determination of Nominal Reference Power for Additional Capacities

At the moment of the Prequalification Process, some capacities cannot be physically measured yet (Additional Capacities) as investments and modifications are required. For these CMU, the CRM Candidate will declare (supported by the technical documentation and simulations presented in its prequalification file) the expected Nominal Reference Power. This declared volume will be used by ELIA as input to determine the Eligible Volume and will be specifically monitored in the pre-delivery monitoring period (as described in the second part of this document).

## 3.6 Step 6 – Derating Factors and Opt-out Volumes



As foreseen by the CRM Law, a CRM Candidate may decide not to offer (part of) its prequalified capacity into an Auction towards a Delivery Period, provided that the CRM Candidate notifies the grid operator of such decision. This related volume is called “Opt-Out Volume” and communicated to ELIA at this step of the Prequalification Process.

In this way, ELIA calculates the Reference Power of the related CMU, corresponding to the difference between the Nominal Reference Power and the notified Opt-Out Volume.

As a second step, ELIA applies the adequate Derating Factor on the Reference Power to determine the CMU Eligible Volume. To do so, there are two possibilities:

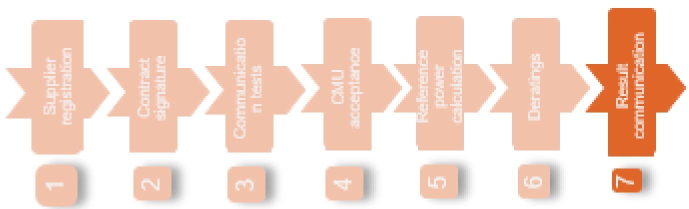
a. By applying the Derating Factor calculated for the CMU’s specific technology (under condition that the CMU consists in one single Delivery Point and that a specific Derating Factor relevant for the technology of this Delivery Point is calculated by ELIA)
b. By applying the Derating Factor corresponding to the declaration of a certain service level agreement (SLA) by the CRM Candidate.

<u>Important remark:</u>

In case of a request from the CRM Candidate to reduce its Nominal Reference Power to a lower value (higher or equal to zero), ELIA requires a written signed justification detailing the reasons of that choice.

The outcome of this calculation corresponds to the Eligible Volume and is equal to the maximal capacity that a CRM Candidate is authorized to offer in the Auction for that CMU.

## 3.7 Step 7 – Result communication to third parties



As final step of ELIA's Prequalification Process, ELIA communicates the Eligible Volume of concerned CMUs to both the CRM Candidate and the CREG. This communication is done at latest on 15/09 for CMU's which are not concerned by a derogation on the standard 1-year Capacity Contract Duration and on 01/09 for other CMUs.

The communicated Eligible Volume of a CMU will be aligned to the granularity level authorized in the bidding instructions (currently 0.1 MW as detailed in the design note on Auction algorithm).

# 4 Fast track prequalification

As introduced earlier in this document, some Capacity Holders have the legal obligation to submit a prequalification file to ELIA from the moment its production unit exceeds a minimal threshold. This obligation is independent from the effective possibility for the Capacity Holder to participate to the CRM mechanism. Indeed, some production units subject to this legal obligation might not respect the Eligibility Criteria.

To facilitate the obligation for Capacity Holders to respect the law and considering the costs of the full Prequalification Process (in time and euros), ELIA proposes a "**fast track**", in which a minimal number of information is filled in by the Capacity Holder.

In the context of a Fast track prequalification process, a Capacity Holder with DSO connected capacity does not need to sign a DSO – CRM Candidate Agreement.

The figure below illustrates the required steps of this fast track, compared to the seven detailed steps of the full Prequalification Process.

ELIA reminds that – consecutive to the fast track – it is **not possible to participate to an Auction nor to the Secondary Market and is considered by ELIA as a "per-default" opt-out.**

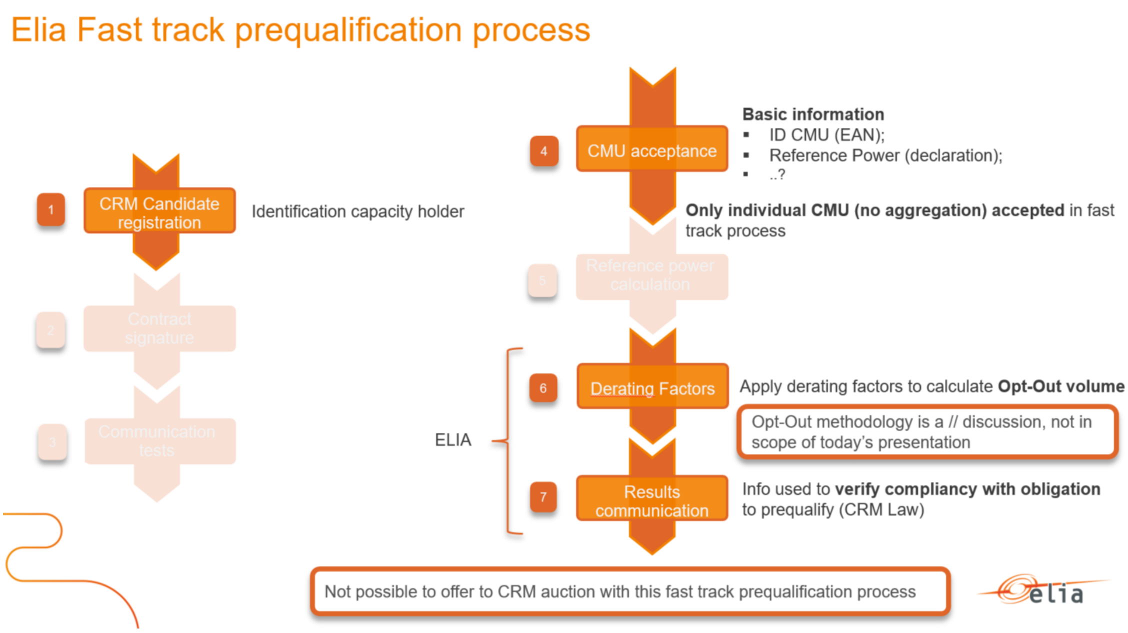



*Figure 5 – Fast track Prequalification Process*

## 4.1 Step 1 – CRM Candidate registration

Unlike the full Prequalification Process where ELIA verifies both the administrative and financial status of each CRM Candidate, the CRM Candidate registration in the fast track process is limited to the **identification of the Capacity Holder**.

## 4.2 Step 2 – CMU acceptance

In this step, ELIA asks the Capacity Holder to **identify its Capacity Market Unit** and declare the corresponding Reference Power. Indeed, ELIA will not calculate it nor verify the entire list of generic requirements set in the full Prequalification Process as the CRM Candidate has no intention (nor rights) to propose this CMU to the following Auction.

ELIA reminds another difference between the fast track process and the full Prequalification Process: **the possibility to have an aggregated CMU makes no sense in the context of a fast track and is therefore forbidden by ELIA.**

These two steps are the only actions required from the CRM Candidate to respect its legal obligation to prequalify. Based on these declared information, ELIA will perform the actions described in step 3 and 4 below.

## 4.3 Step 3 – Derating Factor

Similar to the full Prequalification Process, ELIA calculates the volume corresponding to the CMU contribution to adequacy by multiplying the Reference Power with the related Derating Factor. This volume is called "Fast-track volume" and cannot be confused with the Eligible Volume resulting of a successful prequalification track.

## 4.4 Step 4 – Result communication

To conclude the prequalification fast track, ELIA communicates the information received from the Capacity Holder to the entity (still to be determined) responsible for the follow up of the legal obligation to prequalify and considers the Fast Track volume as default opt-out.

# 5 Evolution of a CMU in time

In this section, ELIA proposes additional clarifications to determine how a prequalified Eligible Volume of one CMU can be reused in the following Auction cycles and which administrative and technical verifications remain valid.

It is important to highlight that the parameters related to a Contracted Capacity remain valid all along the Capacity Contract Duration. The rules proposed below are to be read as for a participation to an Auction related to a later (new) Delivery Period or to a later Auction cycle (e.g: Y-1) for the same Delivery Period.

ELIA identifies three specific situations:

1) There are no other results (from pre-delivery monitoring or from availability controls) that can be used to review the prequalified Eligible Volume;
2) Based on the pre-delivery monitoring results (the modalities and related principles are described exhaustively in the second part of this document), ELIA can adapt the CMU prequalified Eligible Volume;
3) After the first Delivery Period, ELIA can adapt the CMU prequalified Eligible Volume with the results of the availability controls.

In parallel, a Capacity Provider is responsible to notify ELIA in case other parameters have evolved and justify a re-calculation of the initial Eligible Volume related to that CMU.

## 5.1 No results from pre-delivery monitoring process or availability controls

Waiting for the results of the pre-delivery monitoring and availability controls, the only reason to adapt the prequalified Eligible Volume is to **include the yearly updated Derating Factors**. In this way, prior to each Auction, ELIA will automatically consider the latest available Derating Factors to re-run the fifth step of its Prequalification Process.

## 5.2 Evolution of prequalified Eligible Volume to include pre-delivery monitoring results

As detailed in the second part of this document, ELIA will verify – closer to the effective start of the Delivery Period – the Contracted Capacity to make sure the Eligible Volume calculated prior to Y-4 Auction reflects the CMU's technical reality. Indeed, a lot can happen within that time (e.g.: adaptation of a consumption site reducing the flexible capacity).

In this way, ELIA **reduces the Eligible Volume** and related Reference Power from the moment a deviation between the initially Contracted Capacity and the newly observed reaction is measured.

## 5.3 Evolution of prequalified Eligible Volume to include availability monitoring results

From the start of the first Delivery Period, ELIA performs an availability control to verify the effective availability of the Contracted Capacities. (Exact requirements detailed in a specific design note and therefore not reminded here).

ELIA considers the results of both the verification of “AMT moments” and the specific availability test triggered by ELIA as valid input to update the Nominal Reference Power of a CMU. In this way, the average Missing Obligation is calculated for one Delivery Period and corresponding volume is deduced from the initial CMU Eligible Volume **unless** the (minimum) last 3 consecutive tests on that Delivery Period prove the complete respect of the initial Contracted Capacity.

## 5.4 Evolution of an aggregated CMU

In this section, ELIA summarizes the possibilities for a Capacity Provider to add / remove Delivery Points from an already prequalified aggregated CMU.

For each aggregated CMU, ELIA requires (step 4 of its Prequalification Process) technical information on each Delivery Point part of that CMU. Among the gathered information that are useful to determine the principles below: the individual contribution (in MW) and the maximal Capacity Contract Duration awarded by the CREG.

In this way, ELIA accepts that a Capacity Provider adds or removes Delivery Points to an already prequalified aggregated CMU as long as the following conditions are respected:

1) The additional Delivery Point(s) respect the aggregation rules detailed in section 3.4.2.1;
2) The energy constraint declared by the CRM Candidate for that aggregated CMU are not influenced and remain valid;
3) The Capacity Contract Duration of the additional individual Delivery Point is not lower than the Capacity Contract Duration of aggregated CMU;
4) The CO2 emission of the new individual Delivery Point(s) does not exceed the CO2 emission calculated for the aggregated CMU following the rules presented in the Auction algorithm design note;
5) The sum of the Nominal Reference Power (in MW) of the remaining Delivery Points still exceeds the Nominal Reference Power initially calculated for the aggregated CMU.

# Part II – Pre-delivery monitoring

# Introduction

This part of the present design note focuses on another key element of the capacity remuneration mechanism: **the pre-delivery monitoring process**. This specific process starts from the moment a capacity is awarded to a Capacity Provider during an Auction and ends with the start of the Delivery Period. It specifies a set of rules (including a specific financial incentive and penalty mechanism) developed to mitigate **the gaming risk** (hence minimizing mechanism total cost for society), cover the uncertainty inherent to Additional Capacities (e.g.: delay in construction works) while guaranteeing the level playing field.

Indeed, ELIA and some market parties[9] share a common concern on the possible lack of competition in Y-4 Auction. At that time (Y-4), some behaviors might influence the Auction's results and **unfairly exclude other capacities** from the selection. Moreover, one could propose a capacity in Y-4 Auction with the sole purpose to increase the volume to procure in Y-1 Auction (i.o.w. with no intention to effectively deliver the Y-4 Contracted Capacities) and by doing so negatively influence the mechanism's total cost.

The requirements detailed in this part of the document are organized in three specific sections. To start with, ELIA makes the link with the Prequalification Process and highlights the requirements gathered at that moment used during the present pre-delivery monitoring process. In the second section, ELIA presents the key principles of the pre-delivery monitoring process and related incentive mechanism. To conclude with, ELIA illustrates the concrete application of these principles with a set of examples.

[9] Feedback given in answer to an informal consultation on FTR capacity reservation process modification proposal ("FTR v2")

# 6 Monitoring related prequalification requirement

In this section, ELIA explains which prequalification requirement serves as input to the pre-delivery monitoring process.

## 6.1 Bank guarantee

The bank guarantee is a requirement applicable to each Capacity Provider, no matter the status (Existing or Additional Capacity) or the technology of the related capacity. It is **proportional to the Contracted Capacity.**

The bank guarantee is ELIA's proposal **to mitigate the gaming risk** between the auctions (Y-4 and Y-1) and the start of the related Delivery Period. Indeed, the remuneration of the CRM effectively starts with the Delivery Period. Furthermore, the penalties foreseen as part of the availability monitoring during the Delivery Period are capped to the Capacity Remuneration. In such context, a Capacity Provider with no intention to deliver the Service will not be remunerated for the CRM Service but will not face additional penalties while he endangered the security of supply (adequacy issue with a Missing Volume to deal with) and might have negatively influenced the system total cost (in case additional volume is procured in Y-1).

The CRM Candidate therefore commits to deposit its bank guarantee as first step of ELIA's Prequalification Process (step 1 – CRM Candidate registration) and delivers as proof an attestation from a recognized financial institution. The bank guarantee in itself is due within a period of 60 working days starting from the moment the results of the Auction are communicated to market parties (according to the CRM law, at latest on 31/10 of each year during which an Auction is organized).

ELIA observes that the bank guarantee is a common requirement from other CRM mechanisms in other countries as well (e.g: FR, UK, Italy and Poland).

In case a Capacity Provider does not deposit the bank guarantee as initially foreseen, the Contractual Counterparty has the right to terminate the Capacity Contract and / or suspend the Capacity Provider from participation to future Auction cycles.

> Important remark:
>
> As already introduced in TF CRM, ELIA welcomes argumented suggestions (as feedback to this public consultation) of possible alternatives to the bank guarantee – provided that it gives similar financial incentive.

### 6.1.1 Determination of bank guarantee for capacities subject to a similar obligation in connection contract

In parallel to the elaboration of the prequalification and monitoring rules relevant for the Capacity Remuneration Mechanism, market parties (incl. federal administration, CREG and ELIA) are investigating the possibility to adapt the capacity reservation process currently proposed in the Federal Grid Code[10] in order to maximize the competition in a CRM context.

Among the possible improvements, ELIA investigates how to reinforce its connection contract to incentivize the effective project realization and avoid "sleeping capacities[11]". To do so, ELIA identifies two possible incentives: the right to **suspend the allocated capacity** (incl. the termination of the connection contract) as well as possible financial consequences.

Concerning the possible financial consequences to include in the connection contract, market parties proposed to also use the concept of **a bank guarantee** and put forward the following principles:

- 3 to 5 % of the project's total cost;
- Partial reimbursement in function of the project's advancement (if everything goes according to schedule);
- Total reimbursement as of capacity commissioning (in case the initial planning is respected) or in case of "force majeure".

ELIA favors the introduction of the bank guarantee obligation and will include the principle in its next contractual review (subject to a specific public consultation). Its order of magnitude (being a percentage of project total cost as proposed by market parties or a fixed value / MW) will be consistent with the one proposed in the context of CRM mechanism and described further below.

Obviously, ELIA will not ask Capacity Providers subject to the obligation (broader than the CRM) to give a bank guarantee via the connection contract (if approved) to deposit a second one as part of the CRM Contracted Capacity. In such situation, the bank guarantee of the connection contract would be sufficient.

### 6.1.2 Determination of bank guarantee for capacities not subject to a similar obligation in connection contract

For a majority of capacities, no bank guarantee exists yet. However, it is common practice to other CRM mechanism. In this way, based on an EU benchmark and with the objective to provide an amount equivalent to the one suggested by some market parties (up to 5 % of project total cost), ELIA proposes the following formula:

Bank guarantee = 20 000 € / MW contracted.

This amount corresponds to a trade-off between ELIA's objective to minimize entry barrier for

[10] A specific design document has been consulted with market parties and is available on ELIA's website ( )

[11] A Sleeping capacity is a capacity allocated via the signature of the connection contract to a market party but which has never led to its effective connection (no physical injection / consumption)

small market parties and the necessity to dispose of an amount high enough to mitigate possible gaming behaviors between Y-4 Auction and Delivery Period.

Furthermore, the same principles as those put forward as possible connection contract improvement will apply:

- Possibility of partial reimbursement in function of the project's advancement, with the following milestones:
    - 25 % refund with permit delivery;
    - 50 % refund with start of commissioning phase;
    - 25 % remaining refund with start of Delivery Period.
- Full reimbursement in case of "force majeure".

For sake of clarity, the rejection of the required construction and/or environmental permits cannot be considered as "force majeure[12]". To tackle this specific problematic, ELIA proposes concrete measures later on in this document.

## 6.2 Specific requirements for Additional Capacities

Among the prequalification requirements listed in section 3.4.3 above, ELIA will use the detailed planning as central element of its monitoring process. Indeed, as the CRM Candidate details monthly, quarterly and yearly milestones and highlights strict deadlines for its major project phases; ELIA or a third party mandated by ELIA can **closely** follow up the project's status from Y-4 to the Delivery Period.

ELIA identifies the following possibilities as part of a project's monitoring:

- Audit on site to assess the effective project's realization (Inc. participation to project's meetings as external observer);
- Request any relevant documentation (Meeting reports; invoices…);
- Request purchasing orders (e.g: main component);
- Communication with identified third parties to get confirmation on effective advancement of their side;
- …

The following sections detail concrete principles and pre-delivery monitoring requirements as well as the financial consequences (on the bank guarantee and / or the Capacity Contract Duration) in case of deviation with the initial project's planning endangering the possible delivery as of 1st day of the related Delivery Period.

Details on the operational procedures related to the pre-delivery monitoring principles explained above and their concrete application will be detailed in the Capacity Contract later on.

[12] The definition of "force majeure" will be clarified in the Capacity Contract to avoid any misunderstandings

# 7 Pre-delivery monitoring principles

In this section, ELIA details the three principles ruling the pre-delivery monitoring process (section 7.1 to 7.3) while related financial penalties are presented – along with concrete examples – in section 8.

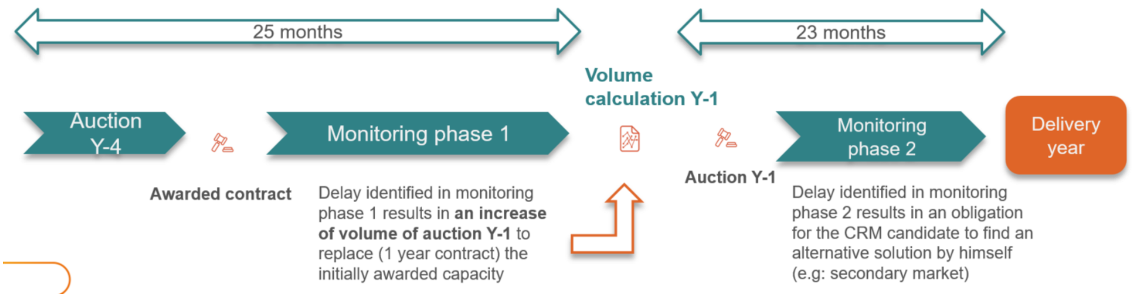
## 7.1 Principle # 1 – the pre-delivery monitoring process is organized in two phases: prior and after Y-1 volume calculation

For each Delivery Period, the Contracted Capacity results from two specific auctions: Y-4 and Y-1. This concretely signifies that ELIA has one single opportunity to compensate a possible difference between initially Contracted Capacity (in Y-4) and effectively observed capacity with an **increase of the volume to procure in Y-1**.

In this way, ELIA determines two specific pre-delivery monitoring periods: pre-delivery monitoring phase 1 (prior to the determination of volume of Y-1 Auction) and pre-delivery monitoring phase 2 (from determination of volume of Y-1 Auction to the start of the Delivery Period).

As illustrated in the figure below, the consequences for the Capacity Provider differ. In case a delay is detected during pre-delivery monitoring phase 1, ELIA has the **possibility** to increase Y-1 volumes while it becomes the responsibility of the Capacity Provider to find an alternative solution for a delay detected later on (in pre-delivery monitoring phase 2).

Of course, a Capacity Provider has still the possibility to find by himself an alternative (e.g: via the Secondary Market[13]) during monitoring phase 1 (and notify ELIA) to avoid the increase of volume in Auction of Y-1 and the related financial consequences for him.




[13] As detailed in the design note on secondary market, its expected entry into force is foreseen for 2024.

Figure 6 – organization of monitoring process in two phases

## 7.2 Principle # 2 – verification of Contracted Capacity

ELIA calculates the Nominal Reference Power used as input for the determination of a CMU Eligible Volume prior to the Y-4 Auction, more than 4 years before the start of the Delivery Period. As a lot can happen within that period, **ELIA wants to make sure** – closer to the start of the Delivery Period – **that the Nominal Reference Power used for the determination of a Capacity Provider Contracted Capacity effectively corresponds to the observed measurements.**

More specifically, **ELIA will verify Existing Capacities at each pre-delivery monitoring phase**. To do so, ELIA uses the 15 min measurement of the related CMU over the concerned pre-delivery monitoring phase.

For Additional Capacities, as their effective presence might not be measured before end of pre-delivery monitoring phase 1, **ELIA can only confirm their effective presence in the market prior to Delivery Period** (in pre-delivery monitoring phase 2).

The example below illustrates the second principle for both Existing and Additional Capacities.

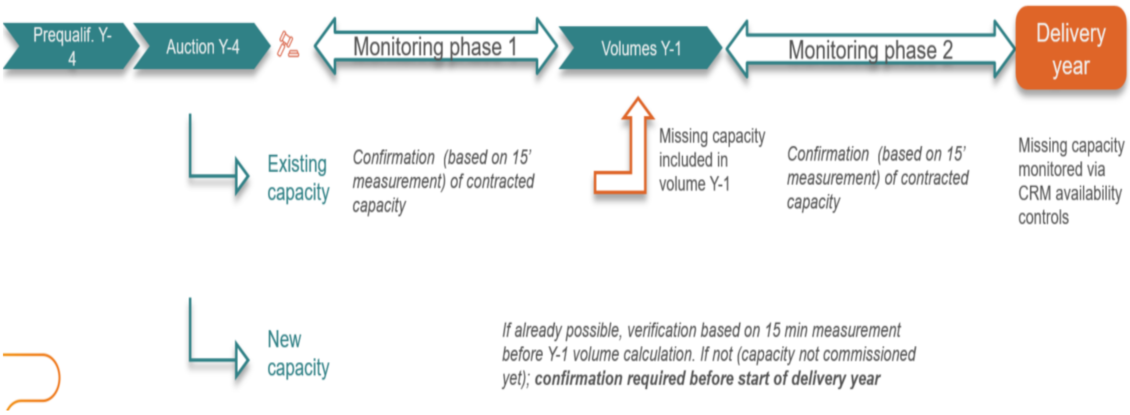



Figure 7 – illustration of second monitoring principle

## 7.3 Principle # 3 – The financial penalty (see section 8) must reflect the Capacity Provider possibility to mitigate the risk and increases in time

ELIA identifies three possibilities to penalize a Capacity Provider that is not able to deliver the Contracted Capacity as foreseen:

a. Via the bank guarantee; with a penalty in % of the bank guarantee and;

b. Via the initial Contracted Capacity, with two possible penalties:
    i. The reduction of the initial Contracted Capacity (volume based penalty) or;
    ii. The reduction of the initial Capacity Contract Duration.

The following other parameters also influence the financial impact for a Capacity Provider:

c. The Capacity Provider's **possibility to mitigate the risk**. In this way, ELIA believes justified to foresee a **specific monitoring and financial regime to cover the risks related to the permitting process** as the Capacity Provider's influence on the construction and / or environmental permit attribution is limited while the impact of an action initiated by a third party (e.g: appeal) is significant.

d. **The moment of detection**: indeed, a risk identified in pre-delivery monitoring phase 2 and close to the effective start of the Delivery Period endangers the adequacy of that Delivery Period while it gives limited possibilities for ELIA to react in an appropriate manner. In this way, the financial consequences for the Capacity Provider should be higher than a risk identified in pre-delivery monitoring phase 1 (where there is the possibility to increase the volume of Y-1 Auction as mitigation measure).

# 8 Concrete examples and associated penalties

Now that the three fundamental pre-delivery monitoring principles are introduced, ELIA foresees in this section specific examples to illustrate the different options and **present their associated penalty regime**. In this way, the following scenarios are investigated:

**Scenario 1**: An Additional Capacity subject to a delay detected in monitoring phase 1. Reason for the delay is the permitting process;

**Scenario 2**: An Additional Capacity subject to a delay detected in monitoring phase 2. Reason for the delay is the permitting process;

**Scenario 3**: An Additional Capacity subject to a delay for any other reason than permitting, detected in monitoring phase 1 or monitoring phase 2

**Scenario 4**: An Existing Capacity for which a Missing Volume is detected in pre-delivery monitoring phase 1 and monitoring phase 2;

## 8.1 Scenario 1

In this scenario, illustrated in the figure below, a Capacity Provider gets a Contracted Capacity of 500 MW in Y-4 Auction on its CMU 1. This CMU benefits from an 8-year Capacity Contract Duration.

The CMU 1 is not connected to the TSO-grid yet. Therefore, the Capacity Provider communicated to ELIA the project's detailed planning and identified key milestones as required in the Prequalification Process.

Concerning the construction and environmental permits, pre-requisite to the effective construction work, the Capacity Provider informed ELIA that it should be received at the latest 18 months after the Y-4 Auction. Otherwise, the effective delivery as of 1$^{st}$ day of the Delivery Period could not be guaranteed anymore.

Following up the evolution of this project in pre-delivery monitoring phase 1, ELIA (or a third party mandated by ELIA) observes that the required permits were not delivered on time, because of an appeal initiated by third parties worried about the project's environmental impact. Furthermore, the Capacity Provider did not notify ELIA about a possible alternative to cover the Missing Volume (e.g: deal made on Secondary Market).

This delay has three consequences:

1) Considering that its detection happens during pre-delivery monitoring phase 1 (hence prior to the calculation of Y-1 volume); **ELIA will increase the Y-1 volume by 500 MW** (as 500 MW cannot be guaranteed anymore by the Capacity Provider of CMU 1).

   As there is still 23 months left before the start of the delivery period; ELIA believes new projects can still be elaborated within that timeframe.

2) Considering that the cause of project's delay is the non-delivery (on time) of the permitting risk, (provided that the Capacity Provider respected the official procedure), ELIA will **delay by 1 year the initial Capacity Contract Duration of CMU 1**: from 2025 – 2033 to 2026 – 2034.

   By doing so, ELIA respects its objective to minimize the total CRM cost for society. Indeed, a delay (without reduction) of the initial Capacity Contract Duration because of permitting process reflects the Capacity Provider possibility to mitigate the risk (limited to the respect of the procedure) and reduces the premium risk he would otherwise foresee by default in its CRM bid to cover the possible related financial loss.

<u>Important remark</u>

The possibility to postpone the start of a Capacity Contract for a specific Contracted Capacity because of delays in the permitting process **must be limited in time**. Indeed, it is not acceptable to see the effective start of a 15-year Capacity Contract Duration granted in CRM first Auction (2021) in 2035.

**ELIA therefore proposes to limit the use of this principle with the following rules:**

**1)** The first delay caused by permitting and detected in monitoring phase 1 results in a delay of the initial Capacity Contract Duration (by one year) and a penalty on the bank guarantee (33 %)

2) The second delay caused by permitting and detected in monitoring phase 1 the following year results in a reduction of the initial Capacity Contract Duration (by one year) and the replacement of the Missing Volume in Y-1 volume determination;

3) The third delay caused by permitting and detected in monitoring phase 1 the third year results in the termination of the Capacity Contract. This does not block the Capacity Provider from a participation in next Auction(s).

The following numerical example is provided to facilitate the understanding of this proposal:

A CMU is contracted for 500 MW / 8 year Capacity Contract Duration (2025 – 2033).

a. First detection happens end 2023 (end of pre-delivery monitoring phase 1 related to Delivery Period 2025) and leads to a delay of the initial Capacity Contract Duration (from 2025-2033 to 2026-2034) in parallel to an additional 500 MW volume in Y-1 Auction related to Delivery Period 2025;
b. Second detection happens a year later, end 2024 (end of pre-delivery monitoring phase 1 related to Delivery Period 2026) and leads to a reduction of the Capacity Contract Duration (from 2026 – 2034 to 2027 – 2034) in parallel to an additional 500 MW volume in Y-1 Auction related to Delivery Period 2026;
c. Third detection happens a year later, end 2025 (end of pre-delivery monitoring phase 1 related to Delivery Period 2027) and leads to the termination of the Capacity Contract and an additional 500 MW volume in Y-1 Auction related to the Delivery Period 2027.

3) To mitigate possible gaming situations (shift volume from Y-4 Auction to Y-1 Auction), ELIA also applies a **financial penalty** which consists in a percentage (33 %) of the bank guarantee deposited for that CMU.

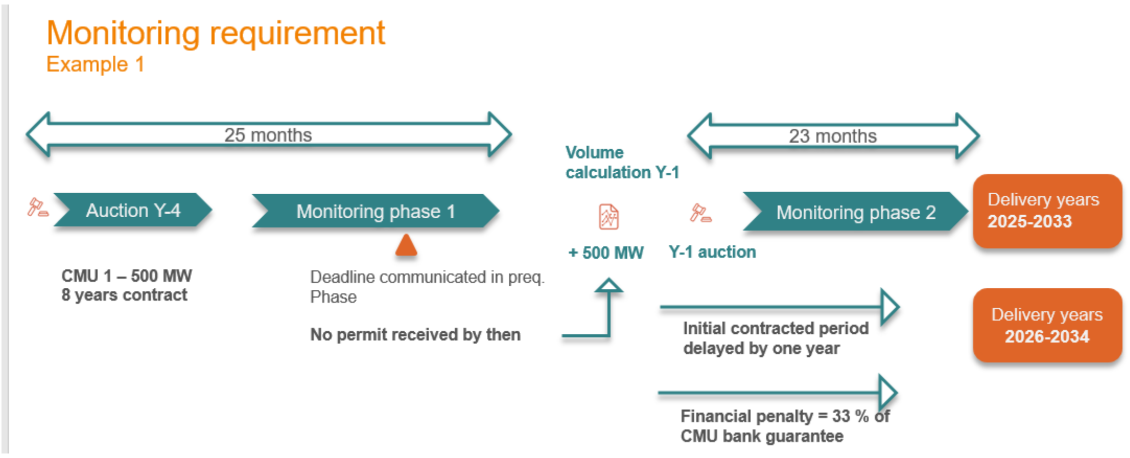



*Figure 8 – Illustration of monitoring principles with a new project confronted to a permitting risk detected in monitoring phase 1*

## 8.2 Scenario 2

In this scenario, illustrated in the figure below, a Capacity Provider gets a Contracted Capacity of 100 MW in Y-4 Auction on its CMU 2. This CMU benefits from a 3-year Capacity Contract Duration.

The CMU 2 is not connected to the TSO-grid yet. Therefore, the Capacity Provider communicated to ELIA the project detailed planning and identified key milestones as required in the Prequalification Process.

Concerning the construction and environmental permits, pre-requisite to the effective start of construction works, the Capacity Provider informed ELIA that he should receive it at latest 18 months before the Delivery Period. Otherwise, the effective delivery as of 1$^{st}$ day of the Delivery Period is not guaranteed anymore.

Following up the evolution of this project in monitoring phase 1, ELIA observes that the required permits are not delivered yet. This is not an issue as such because the Capacity Provider declared as deadline for the permit delivery a moment in monitoring phase 2.

However, **the risk for ELIA differs** as the opportunity to use the Auction of Y-1 to compensate a Missing Volume disappears. In this way, once a Capacity Provider takes the decision to wait the second phase of pre-deliver monitoring to deliver proof of the project's evolution (such as the construction permit), he faces higher financial penalty in case of Missing Volume.

Concretely, ELIA identifies the following consequences:

1) **The initial Capacity Contract Duration** (in the example: 3 year) **is no longer delayed**.

As it starts on 1st delivery day of Delivery Period, the Capacity Provider faces the CRM availability controls as anyone else and is incentivized via the availability penalties to cover the Missing Volume by himself (e.g: via the Secondary Market).

2) In case the Capacity Provider is never able to deliver a significant part of its Contracted Capacity (20 % or more) he will not receive the CRM-related remuneration and will lose its entire bank guarantee (100 %).

As also illustrated in the specific example presented in the section 8.3, the financial consequence in this case does not differ from those due for any Capacity Provider confronted with any other risk than the one related to the permitting process.

Important remark #1

From a certain size (in MW), it seems unrealistic to believe that a project can be entirely implemented in less than two years (permitting, construction, commissioning, tests). Therefore, **ELIA fixes to 400 MW** (threshold determined based on its own expertise in infrastructure projects) the **limit above which a Capacity Provider** has the obligation to show the proof of the permit(s) effective delivery to ELIA within the first pre-delivery monitoring phase.

This threshold is also related to the acceptability of the risk ELIA faces (in terms of adequacy) when confronted to a Missing Volume for a significant volume in monitoring phase 2 (difficult to compensate as no Y-1 Auction already finalized).

Important remark #2

In parallel to the obligation to get the permit delivered before end of first pre-delivery monitoring phase for Additional Capacities above 400 MW, ELIA investigates other possibilities to further increase the certainty on the project's effective delivery within first monitoring phase (e.g: proof of main component's order;…). These specificities will be discussed with market parties in parallel to the consultation of this design note and finalized in the related contractual framework.

## 8.3 Scenario 3

In this scenario, illustrated in the figure below, a Capacity Provider gets a Contracted Capacity of 400 MW in Y-4 Auction on its CMU 3. This CMU benefits from a 3-year Capacity Contract Duration.

The CMU 3 is not connected to the TSO-grid yet. Therefore, the Capacity Provider communicated to ELIA the project's detailed planning and identified key milestones as required in the Prequalification Process.

A first possible detection of Missing Volume (with any other justification than the permitting process) can occur in monitoring phase 1. In this case, ELIA takes the following actions:

1) If an alternative is not found by the Capacity Provider and notified to ELIA in time, the related Missing Volume is added to the Y-1 volume;

2) The Capacity Contract Duration of the concerned CMU (CMU 3) is reduced by a year (from 2025 – 2028 to 2026 – 2028 in the example below) and;

3) A financial penalty based on a percentage of the bank guarantee (33 %) is calculated.

A second possible detection of Missing Volume can occur in monitoring phase 2. In this case, ELIA takes the following actions:

1) The Capacity Contract Duration of the concerned CMU (CMU 3) is not adapted and starts as initially foreseen (in the example below, as from 2025);

2) The Capacity Provider is subject to the Service availability monitoring and related penalties and will therefore have the incentive to find an alternative solution to compensate for the Missing Volume by himself (e.g: via the Secondary Market).

3) In case the Capacity Provider is never able to deliver part or the entirety of its Contracted Capacity (20 % or more), he loses the related bank guarantee (100 %).

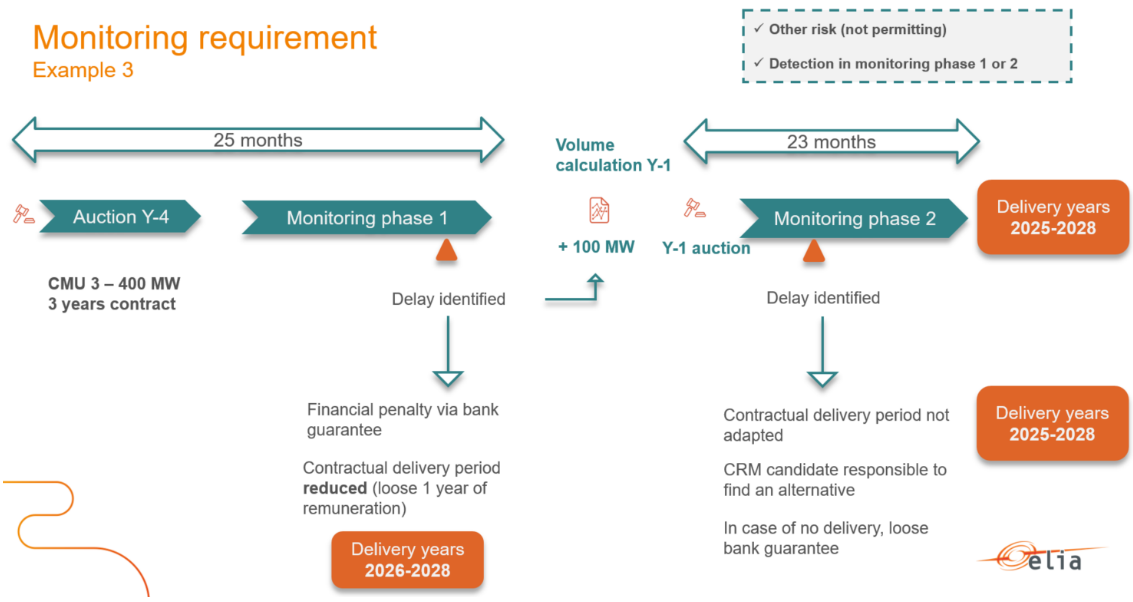



*Figure 9 – Application of monitoring requirement with a concrete example illustrating the consideration of any other risk than permitting in both monitoring phases*

## 8.4 Scenario 4

In this scenario, illustrated in the figure below, a Capacity Provider gets a Contracted Capacity of 20 MW in Y-4 Auction on its CMU 1. This CMU benefits from a 1-year Capacity Contract Duration.

For sake of clarity, the distinction between Existing Capacities and Additional Capacities is proposed.

<u>Existing Capacity</u>

Considering CMU 1 as an Existing Capacity, ELIA will monitor **in both phases** the effective availability of these 20 MW applying the method based on historical measurement described in the Prequalification Process (see section 3.5.1).

If, consecutive to this verification in pre-delivery monitoring phase 1, ELIA observes a deviation with the initial Nominal Reference Power and no alternative has been found by the Capacity Provider (e.g: via the Secondary Market) and notified to ELIA, then:

- ELIA reduces the initial Nominal Reference Power to the effectively observed one. In consequence, ELIA uses this updated value to calculate an updated Eligible Volume for that CMU and adapt the Capacity Provider Contracted Capacity accordingly;

- ELIA add the volume difference to the volume of Y-1 Auction.

If, consecutive to this verification in monitoring phase 2, ELIA observes a deviation with the initial Contracted Capacity, it is **up to the Capacity Provider to find an alternative solution**. Indeed, he is subject to the availability monitoring and related penalties as of 1st day of the delivery period for the **entire initial Contracted Capacity**. (20 MW).

<u>Additional Capacity</u>

Considering CMU 1 as an Additional Capacity, ELIA will only be able to monitor **once** before the start of Delivery Period the effective delivery (as the project might not be realized yet in pre-delivery monitoring phase 1) applying the method based on historical measurement described in the Prequalification Process (see section 3.5.1). Consequences in case of detection of a Missing Volume in such configuration (Additional Capacity and monitoring phase 2) are identical to those listed above for an existing capacity in pre-delivery monitoring phase 2.

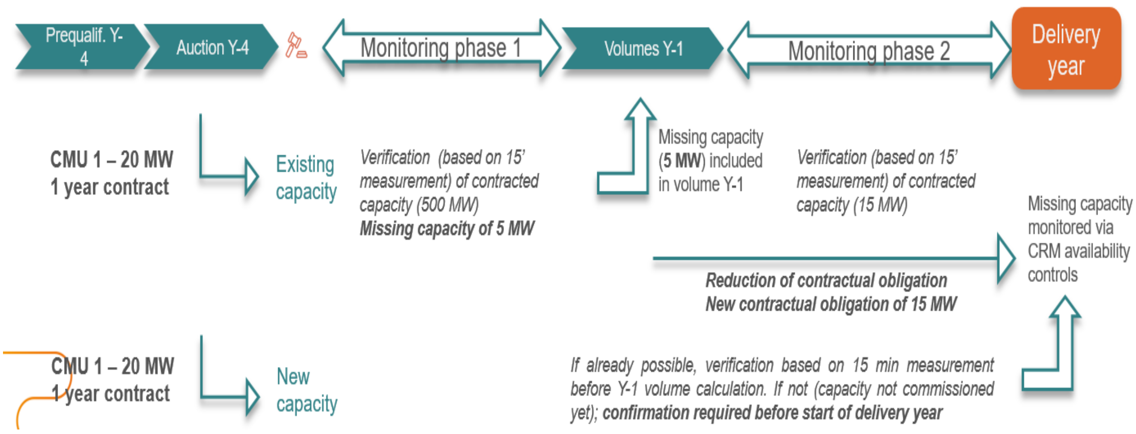
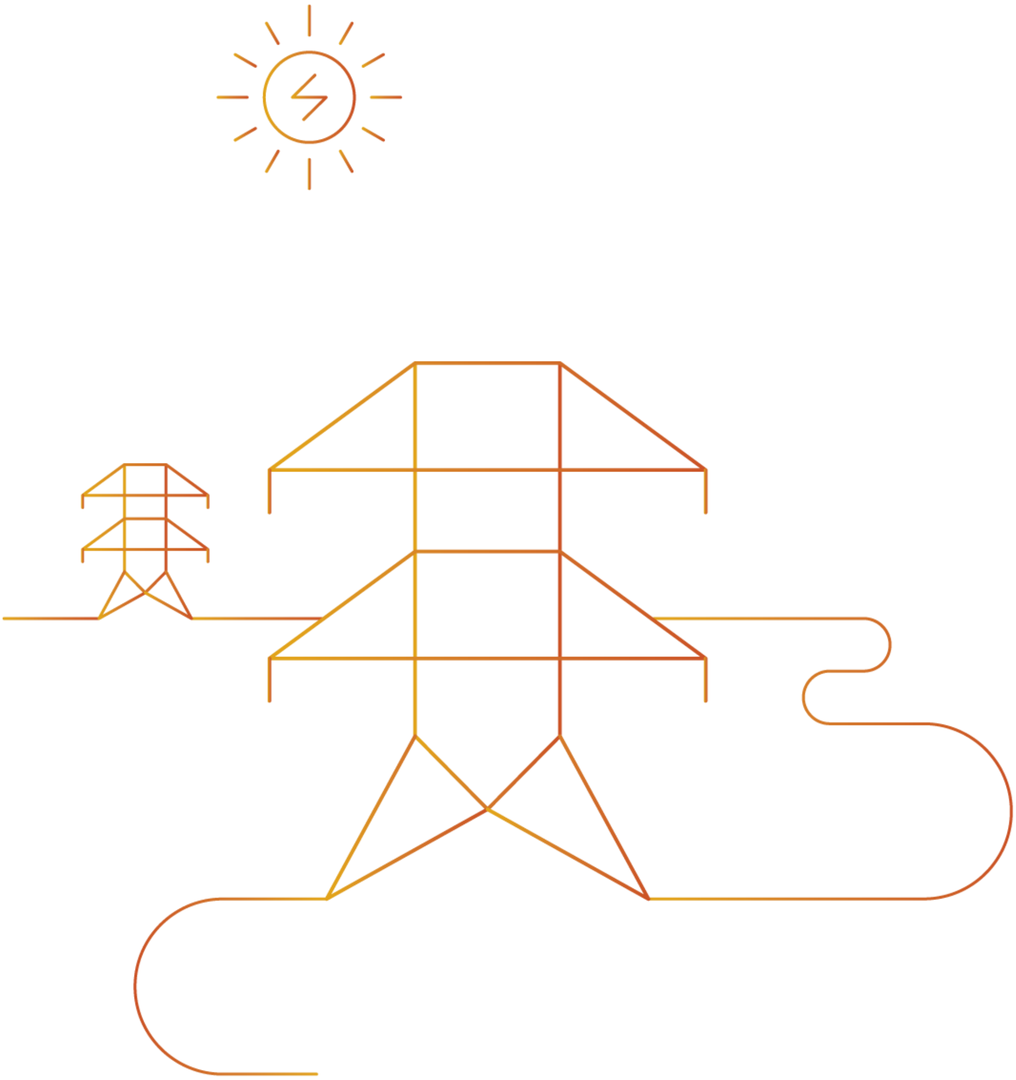



*Figure 10 – illustration of second monitoring principle applied to Existing Capacities and Additional Capacities*



# CRM Design Note: Auction Process

2 October 2019

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# Introduction and context

The purpose of the present design note is to provide all stakeholders with a clear view on the design of the auction algorithm that will apply during the primary CRM Auctions for capacity (hereafter "Auctions"*)*.

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

Grid feasibility constraints that will be incorporated in the auction algorithm design are discussed in the present design note as well. These auction algorithm grid feasibility constraints are not to be confused with the existing grid connection procedures, which remain applicable and aim at assessing the grid feasibility of the individual connection request. The auction algorithm grid feasibility constraints are applied in complement to the above mentioned individual grid feasibility check to ensure that the combination of CMUs is grid feasible.

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

Note that each Auction obviously relies crucially on a supply and Demand Curve. While the supply curve depends on the Prequalified CRM Candidates' Bids, the Demand Curve is set in an administrative way, according to the legal framework as determined by Royal Decree (its design is therefore not elaborated upon in the present design note). Importantly though, the presented rules in this design note on the auction algorithm are generally applicable, irrespective of the shape of the Demand Curve.

In addition to this design note, a single detailed list of definitions will be provided and publically consulted upon. As several concepts are relevant for different design aspects, a centralized approach via a single list is opted for at this stage.

***<u>About the public consultation</u>***

This design note is put for formal public consultation and any remark, comment or suggestion is welcome. It builds further on the discussions and proposals already made in the different TF CRM meetings gathering all relevant stakeholders and in the follow-up committee, the latter consisting of representatives of the CREG and Elia, under the presidency of the FPS Economy.

This public consultation runs in parallel with a public consultation on other design notes. Reactions to this public consultation can be provided to Elia via the specific submission form on Elia's website no later than Wednesday 30 October 2019 at 6pm.

On 13 September 2019 a first set of design notes has already been launched by Elia for public consultation.[1]

Note that, in line with their roles and responsibilities and the foreseen governance in the Electricity Law, also the FPS Economy and the CREG will consult on aspects within their competence according to their procedures.

***Legal framework***

The Law setting up a Capacity Remuneration Mechanism adopted on April 4th 2019[2] (hereafter “CRM Law”), modifying the Electricity law of 29 April 1999 on the organization of the electricity market (hereafter “Electricity law”) defines in Art. 2 an Auction (“veiling/ mise aux enchères”) as (own translation) “the competitive process in which Capacity Holders are offering a price for making available capacity.”

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

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

***Structure of the design note***

In what follows firstly the auction format is presented. Secondly, this design note describes the pricing rule that will apply during the Auctions, determining the Capacity Remuneration Capacity Providers will receive when being selected in the Auction. Thirdly, the bidding requirements define how to make a Bid into the Auction. Fourthly, the section on market clearing begins with explaining the objective function of the clearing algorithm, after which grid feasibility constraints and the tie-breaking rules are discussed. Next, section five describes how Opt-Out Volumes will be treated in the different Auctions. In a sixth and final section, an overview is given of the transparency rules with respect to the information sharing on different CRM aspects.

1 https://www.elia.be/en/public-consultation/20190913_formal-public-consultation-on-the-crm-design-notes-part-i
2 http://www.ejustice.just.fgov.be/eli/wet/2019/04/22/2019012267/staatsblad

# 1 Auction format

**Design Proposal #1:**

Each Bid shall be submitted into the Auction as sealed Bid, meaning that no information about this Bid is shared with other participating bidders. When all Bids have been submitted in the Auction, the auctioneer will clear the market in one single-round, meaning that the bidder cannot update or withdraw his Bid during the clearing process.

The auction format sets the contours of the auction algorithm design and defines how the Auction process takes place. Given the Belgian context with the presence of a few large incumbents, the single-round sealed Bid auction format is considered the most appropriate choice (and not the multi-round descending clock format, cf. infra) in order to ensure a level-playing field among market participants (cf. section 1.2) and limit the potential for market power abuse (cf. section 1.1). Under the single-round sealed Bid format, market participants must submit their Bid(s) without knowing other participants' Bids, after which the market is cleared by the auctioneer in one single round (see illustration in Figure 1 below). The sealed bid auction format is currently also in use in capacity markets in Ireland, in the Eastern USA capacity markets in PJM, MISO and NYISO, in the capacity market in Alberta, Canada. Additionally, as pointed out in section 1.3, complexity and flexibility in the auction clearing are best managed via such single-round sealed bid approach.

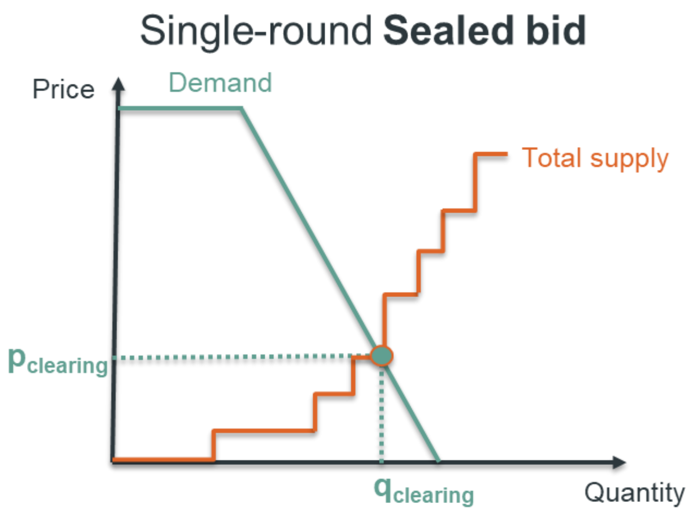


*Figure 1: Single-round sealed bid auction format*

## 1.1 Market power mitigation

The single-round sealed bid auction format is less susceptible to market power abuse in comparison to its main alternative in a CRM context, i.e. the multi-round descending clock auction format. This is especially valid for small and concentrated markets. For instance, in both the New England capacity market in the USA and the Colombian capacity market – applying the descending clock format – market power abuse in the form of capacity withholding has been observed in the past (cf. infra) and has resulted in evolving to a sealed bid format instead.

### 1.1.1 Capacity withholding in a descending clock auction format setting

A descending clock auction market clearing takes place over several sequential rounds, as illustrated in Figure 2 below. In the first round, the market opens at a high price range (e.g. between p0 and p1 as indicated in Figure 2) and bidders are requested to submit their Bids within this price range. If at the end of a round, the offered quantity at the lower price bound (e.g. p1 at the end of round 1) is in excess of the demanded volume, the Auction progresses to the next round with a lower price range. In each round, bidders may withdraw from participating in subsequent Auction rounds. The Auction process finishes when the offered capacity intersects with the Demand Curve and the market clearing price and quantity are set at this intersection.

A conceptual example of strategic capacity withholding is illustrated in Figure 2 below. Suppose that at the end of round 3, the market arrives at the blue point. There is still some excess offer capacity, so the Auction proceeds to round 4. Given that the Demand Curve is perfectly known beforehand to all market participants and the volume of excess capacity is communicated at the end of each round, assume that one bidder realizes its pivotal position. By withholding just enough capacity in round 4, this bidder can push up the price so that the market clears at a price level at or very near to the opening price of round 4 (i.e. the higher price bound), depicted by the red dot on the graph. This way, the pivotal bidder can ensure a high clearing price for all other capacity within its portfolio, situated in the lower part of the merit order.

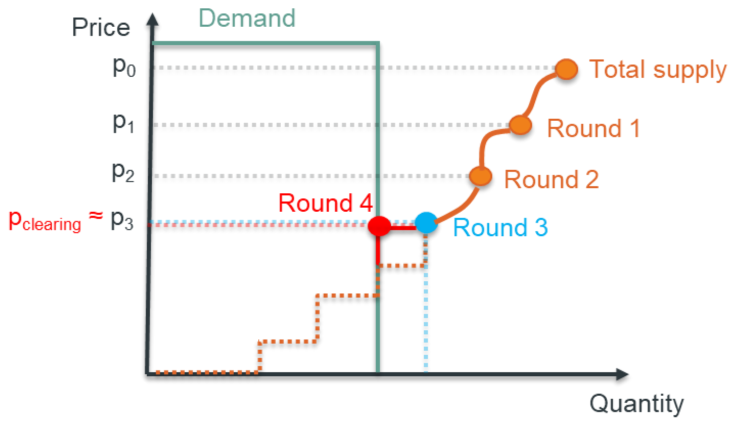


*Figure 2: Capacity withholding in multi-round descending clock auction format*

The threat of capacity withholding and hence price manipulation in the descending clock auction format setting is all the more pronounced when key information is shared (e.g. Demand Curve perfectly known before the Auction and excess capacity transparently communicated at the end of each round) and when a few large bidders dominate the bidding. Larger players obviously have more potential to be pivotal, know more about the offer curve given their larger share in it and are often also better equipped to process any information that would be released between the different rounds (cf. also section 1.2).

A sloped Demand Curve, in contrast to a perfectly inelastic Demand Curve assumed in Figure 2 above for illustrative purposes, reduces the potential for market power abuse somewhat, as strategic bidders would then have to make a trade-off between pushing up the price and a lower accepted volume. The potential for market power abuse can also be mitigated – more effectively – by implementing a restrictive information policy. For example by masking the actual Demand Curve to bidders by adding an artificial tolerance band around the Demand Curve or by only sharing a range of excess supply at the end of each round and not the exact volume. However, reducing the information revealed to the market neutralizes what is in fact a descending clock auction's main advantage, namely to provide price discovery information to the market thereby encouraging participation. Indeed, a descending clock auction with no information reported between rounds is essentially equivalent to a sealed bid auction.

### 1.1.2 Case study 1: Capacity withholding observed in FCM New England

The ISO (Independent System Operator) of New England (NE) has implemented a capacity market referred to as FCM (Forward Capacity Market) and in this respect organizes regular FCAs (Forward Auctions).

In its report titled *2015 Assessment of the ISO New England Electricity Markets*[3], the external market monitor for ISO-NE observed: (underlining by Elia) "In FCA 9, the descending clock auction format would have provided information of strategic value to any bidder that was interested in setting a higher clearing price at the interface. Specifically, at the end of Round 3, participants were informed that the System-wide region had cleared at a price of $9.55/kW-month and that 1,154 MW was still competing at the New York AC Ties interface (equal to 1,054 MW). In this situation, any supplier would know that withdrawing 100 MW would stop the clearing price from falling further. Not surprisingly, 100 MW was withdrawn moments after Round 4 started at a price of $8.00/kW-month, setting a clearing price of $7.97/kW-month".

In the same report, the external market monitor for ISO-NE states: (underlining by Elia) "The descending clock auction format is sometimes touted over sealed bid formats because it provides auction participants with information about the value of a good. However, in the FCA, sellers do not receive any information that may be useful in establishing a competitive offer. Instead, the information learned through the auction

[3] https://www.potomaceconomics.com/wp-content/uploads/2017/02/isone_2015_emm_report.pdf

process is primarily useful in determining when to leave the auction in order to set the highest price and receive the highest capacity revenue possible."

In conclusion, one of the recommendations put forward by the external market monitor in the report is to replace the descending clock auction format with a sealed bid auction format instead in order to eliminate the information provided during the Auction that effectively reduced the competitiveness of the Auction.

### 1.1.3 Case study 2: Capacity withholding observed in reliability market Colombia

In 2006, replacing their original regulated capacity payment mechanism, Colombia introduced a reliability capacity market. Through so-called FEOs (Firm Energy Obligations), this reliability market imposes commitments on electricity generation capacity during critical conditions. These critical conditions correspond mainly with periods of drought, which are the main cause for concern in the Colombian power system that is largely dominated by hydro generation capacity.

In a report titled *Britain's electricity capacity auctions: lessons from Colombia and New England*[4], the authors note that: (underlining by Elia) "The CREG [Colombian Commission for the Regulation of Energy and Gas] has now held two capacity auctions using the descending clock auction format: the first in May 2008 and the second in December 2011. The 2008 auction ended early at the first point at which a large bidder could see that it had become pivotal and able to withdraw one of its offers to set a high capacity price. To avoid this happening again, in 2011 the CREG adopted measures to make this strategy harder by reducing the amount of information on demand and supply revealed to bidders during the auction. This was not sufficient, however, and the auctioneers abandoned the auction after the initial two rounds and effectively held a sealed-bid auction in its place. They subsequently recommended changing the auction format to a combinatorial clock auction followed by a sealed-bid stage to reduce the risk of this being repeated in the future".

### 1.1.4 Reflections for Belgium

The potential for market power abuse in descending clock auctions is clearly demonstrated through the New England and Colombian case studies. While these power systems and the design of their capacity markets differ from the Belgian context in several respects, the fundamentals explaining the potential for market power abuse are equally valid. Particularly in small markets with a presence of one or a few large incumbent market players, the information provided to the market in descending clock auctions poses a clear threat in terms of strategic behavior, potentially resulting in

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[4] https://mpra.ub.uni-muenchen.de/56224/1/MPRA_paper_56224.pdf

windfall profits and unnecessarily inflating the cost of the CRM. Although market power mitigation measures will have to be considered in several other CRM design elements as well, the single-round sealed bid auction format is believed to be an important step towards the avoidance of market power abuse and hence a limitation of the overall CRM cost.

## 1.2 Level-playing field

In the Belgian context with the presence of a few large incumbents, the sealed bid auction format is not deemed inferior to the descending clock auction format in terms of stimulating competition and providing a level-playing field for all. The descending clock auction is indeed sometimes touted over a sealed bid auction for this reason, arguing that the information shared in a descending clock auction provides price discovery information and thereby encourages participation. However, the presence of a few large incumbents (and associated potential for market power abuse) undermines the claimed competition stimulating advantage of a descending clock format in the following ways:

- Firstly, it is expected that in case the descending clock auction format would be applied in the Belgian CRM, a restrictive information policy would have to be implemented in order to reduce the threat of market power abuse, thereby removing the price discovery information argument to stimulate competition.
- Secondly, when bidders of different size compete, the information provided under the descending clock auction format might be of use especially to large incumbents who are better able to take advantage of this information because of their established position and better knowledge of the system in general. This way, new entrants are not stimulated to compete and incumbents are given an additional competitive advantage instead.
- Thirdly, as argued by the external market monitor for ISO-NE (cf. supra), the information provided in the context of capacity market auctions may actually have limited value given costs and/or revenues may be quite specific to every unit individually.

## 1.3 Complexity and flexibility

In addition to the fundamental arguments raised above, sealed bid auctions are also less complex, both from a bidder's and auctioneer's perspective.

Unlike in descending clock auctions, bidders are not tied up for (typically) 2-3 days in which they should act upon the information provided to them. In this sense, a sealed bid auction format presents lower entry barriers for smaller and less established market players.

Also from the auctioneer's perspective, a sealed bid auction is less complex in terms of set up. Moreover, this auction format provides more flexibility in terms of possible pricing rules and dealing with relevant market clearing constraints (cf. infra).

# 2 Pricing rule

**Design Proposal #2:**

The auction algorithm shall apply a pay-as-bid pricing rule in the first two Auctions that will be organized (i.e. Y-4 Auctions in 2021 and 2022) and apply a pay-as-cleared pricing rule in all subsequent Auctions (both Y-4 and Y-1) that will be organized.

Under a pay-as-bid pricing rule, Capacity Providers for each selected Bid receive a Capacity Remuneration equal to the corresponding Bid Price of this Bid.

Under a pay-as-cleared pricing rule, Capacity Providers for each selected Bid receive a Capacity Remuneration equal to the Bid Price of the most expensive Bid selected among all submitted Bids of all Capacity Providers, however limited to maximally the Intermediate Price Cap for each Bid that is subject to the Intermediate Price Cap.

In what follows, the rationale for applying a pay-as-cleared pricing rule in the long-term and the application of a pay-as-bid pricing rule in the initial Auctions is elaborated upon. Furthermore, this section explains why it is proposed to shift from pay-as-bid to pay-as-cleared based on a fixed ex-ante determined schedule.

Note that an Intermediate Price Cap shall apply to some Bids, restricting both the Bid Price and Capacity Remuneration that can be received for these Bids. The topic of Intermediate Price Cap is treated in a separate design note launched mid-September, titled *CRM Design Note: Intermediate Price Cap*.

## 2.1 Pay-as-cleared in the long-term

In the long-term, the pay-as-cleared pricing rule is considered the better choice in order to stimulate competition, provide a transparent price signal and allow Capacity Remunerations to tend to zero. Besides, the pay-as-cleared pricing rule is also the most widespread approach used in capacity mechanisms throughout the world.

The rational bidding behavior under pay-as-cleared is to bid in at true costs, which in a CRM context means at the truly expected level of missing-money. There is no better strategy for bidders: bidding higher would risk not to be selected although the bidder would have actually received a Capacity Remuneration sufficient to cover its missing money, bidding lower risks to be selected while not covering all the missing money.

Unlike under pay-as-bid where the Bid Price determines the possible Capacity Remuneration, under pay-as-cleared all selected bidders receive the market clearing price anyway. So except when a bidder knows he is pivotal and as such is able to influence the market clearing price (which should be avoided by means of adequate market power mitigation measures), he has no incentive to bid in higher than its truly expected level of missing-money.

Because of this rational bidding behavior, the pay-as-cleared pricing rule has the following advantages. Firstly, an efficient selection – i.e. selecting CMUs with lowest missing-money – in the Auction is guaranteed. Secondly, the Auction's clearing price can naturally tend to zero when the missing-money in the market reduces. In contrast, under the pay-as-bid pricing rule, bidders never have a true incentive to bid in at zero. Thirdly, pay-as-cleared pricing provides a more transparent price signal over time towards the market. This information can be particularly valuable to small units and new market players, as it may give them a better idea about current and future expected market conditions, thereby encouraging participation over time. The transparent price signal under pay-as-cleared also facilitates the contractual arrangements small players could have to make with aggregators or other facilitators in the process.[5]

## 2.2 Pay-as-bid in initial Auctions

Given the anticipated Belgian adequacy situation towards 2025 requiring new investments, it is expected that new CMUs will compete with existing CMUs in the initial Y-4 Auctions. Since it is reasonable to expect that new CMUs requiring substantial capex investments are associated with significantly higher levels of missing-money than existing CMUs currently already operating in the market, it makes sense to apply an Intermediate Price Cap, as further elaborated upon in the *CRM Design Note: Intermediate Price Cap*. However, while an Intermediate Price Cap is able to skim an important part of the – in a CRM context – inappropriate inframarginal rents from the CRM Auction, it cannot avoid inframarginal rents entirely. For instance, within the category of CMUs applying for multi-year Capacity Contracts also varying levels of missing-money and hence potential for windfall profits from the CRM Auction could arise when pay-as-cleared would apply to them. Note that in a capacity market context, as argued in the design note on the Intermediate Price Cap, inframarginal rents are to be considered as windfall profits.

Because a certain degree of uncertainty related to the would-be pay-as-cleared clearing price in the first Auctions that are organized in the context of a CRM is unavoidable, it is believed that applying a pay-as-bid pricing rule in the initial Auctions may result in a lower cost of CRM as some market players could act more prudently due to this uncertainty. Stated otherwise, although it is known that the rational bidding behavior under pay-as-bid is to bid in close to the estimated clearing price, i.e. the estimated Bid Price of the most expensive selected Bid, uncertainty might induce lower missing-money participants to bid in lower than the would-be market clearing price under pay-as-cleared. Moreover, market participants might also bid in rather carefully to avoid the risk of not being selected, especially when multi-year Capacity Contracts are at stake, which would be the case for investment-intensive CMUs.

[5] Cf. also mentioned in ODE's position paper "Standpunt over capaciteitsvergoedingen voor bevoorradingszekerheid" (https://www.elia.be/-/media/project/elia/elia-site/users-group/crm-implementation/documents/20190718_ode_standpunt_crm.pdf)

In conclusion, bearing in mind the need for new capacity given the Belgian adequacy context, applying a pay-as-bid pricing rule in the initial capacity Auctions is expected to result in a lower cost of CRM, skimming more CRM-inframarginal rents than would be the case when only an Intermediate Price Cap is implemented. Both within the category of CMUs that is subject to the Intermediate Price Cap and within the category of CMUs that apply for multi-year Capacity Contracts and are thus not subject to the Intermediate Price Cap, a pay-as-bid pricing rule has the potential to further reduce windfall profits.

Note that the CRM as being deployed in Belgium is conceived as a remuneration mechanism complementary to the energy market (incl. ancillary services) to ensure that Capacity Providers are capable to cover their costs including a reasonable and fair rate of return. Being complementary to the energy market implies that the initial sources of revenues should come from the energy market and that only the residual part, i.e. the so-called missing money, is ensured via the CRM. As this missing-money level is specific to each CMU and may therefore be different, it makes sense not to reward all Capacity Providers with the same Capacity Remuneration.

## 2.3 Switch from pay-as-bid towards pay-as-cleared

It makes sense to switch from a pay-as-bid to a pay-as-cleared pricing system after a while and especially to avoid being locked-in for too long in a pay-as-bid pricing system, whose disadvantages come into play particularly when repeated Auctions with a pay-as-bid pricing rule are held. Indeed, recurring pay-as-bid Auctions are expected to result in a "flat" offer curve, as market participants begin to anticipate the reference market clearing price, thereby diluting a transparent price signal.

It is proposed to switch from a pay-as-bid towards a pay-as-cleared pricing rule based on a predetermined schedule. More specifically, it is proposed to apply a pay-as-bid pricing rule for the first two Auctions (i.e. Y-4 Auctions for Delivery Periods starting in November 2025 and November 2026 respectively), after which all following Auctions shall apply a pay-as-cleared pricing rule.

A clear advantage of the fixed schedule approach is its simplicity and upfront transparency towards all market actors. Furthermore, the organization of two initial pay-as-bid Auctions is expected to serve its purpose, namely to avoid as much as possible inappropriate CRM inframarginal rents, which are to be considered as windfall profit in a capacity market context.

# 3 Bidding requirements

All Prequalified CRM Candidates are allowed to submit a Bid into the Auction for their respective CMUs. However, in line with the treatment of Opt-Out Volumes as foreseen in the Electricity Law and discussed later in this design note, Prequalified CRM Candidates are not obligated to submit a Bid, or can submit a Bid for only part of their capacity. This is only possible though when the Prequalified CRM Candidate has notified the grid operator of such opt-out decision prior to the Auction. As a consequence, all prequalified capacity that is not part of an opt-out decision, is obligated to be offered into the Auction.

In what follows, firstly an overview of the general Bid requirements is provided, explaining the high-level rules each Bid should comply with. Next, an additional Bid requirement related to the capacity volume of Bids to be in line with the opt-out rules is presented. Finally, special bidding requirements regarding linked Bids and mutually exclusive Bids are discussed.

## 3.1 General Bid requirements

**Design Proposal #3:**

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

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

at all

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

However, an exception applies for Bids corresponding to CMUs that are covered by a signed technical agreement, for which linked Bids are allowed (cf. infra).[6] Still, one Bid per CMU has to be introduced, but the various Bids corresponding to CMUs covered by the same signed technical agreement may (and should be to comply with all bidding requirements, cf. especially Design Proposal #5) linked.

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

## 3.2 Capacity volume of Bids to respect opt-out rules

**Design Proposal #4:**

For each CMU, the volume of at least one Bid or the maximum selectable volume by the auction algorithm of a combination of Bids related to this CMU (taking into account all bids related to a CMU including linked Bids and mutually exclusive Bids) shall be equal to the Eligible Volume for the corresponding CMU as determined during the Prequalification Process.

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

If bidders would not offer the entire Eligible Volume of a CMU in the Auction though, this

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

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

## 3.3 Linked Bids

**Design Proposal #5:**

Bidding has to respect signed technical agreements, as required during the Prequalification Process. This means that no independent Bid can be made corresponding to a CMU (or a subset of Bids corresponding to CMUs) that is covered by a signed technical agreement if there is no signed technical agreement for this individual CMU (subset of CMUs).

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

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

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

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

## 3.4 Mutual exclusivity of Bids

**Design Proposal #6:**

Prequalified CRM Candidates may submit one or more sets of mutually exclusive Bids.[7] From each set of mutually exclusive Bids, maximally one Bid shall be selected by the auction algorithm.

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

Bids within a set of mutually exclusive Bids may include linked Bids (as defined in Design Proposal #5), which are within a set of mutually exclusive Bids interpreted as a single Bid. Different Bids within a set of mutually exclusive Bids may (although individually required to respect all rules as defined in Design Proposal #3) correspond to different CMUs, also for Bids not corresponding to CMUs covered by a signed technical agreement.

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

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

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

# 4 Auction clearing

**Design Proposal #7:**

The auction algorithm shall clear the Auction by selecting the grid feasible combination of Bids that results in the highest social welfare, taking into account on the Bids received by the Prequalified CRM Candidates and the administratively determined Demand Curve.

In case multiple grid feasible combinations of Bids lead to the same social welfare, the following tie-breaking rules shall apply:

(1) Select the combination of Bids with the lowest weighted average emission factor, calculated as the Bid volume weighted average of the emission factors of all Bids, as determined during the Prequalification Process

(2) In case of remaining equivalence after rule (1), random selection

The objective of the auction clearing is to select the social welfare maximizing combination of Bids, taking into account the administratively determined Demand Curve and all submitted Bids. At the same time though, the selected combination of Bids also has to be grid feasible.

In what follows, firstly the objective function is discussed in more detail, after which an overview is given of the grid feasibility constraints and how they are incorporated into the auction clearing process. Finally, this chapter elaborates on the tie-breaking rules that will apply in case of equivalent economic (social welfare maximizing) and technical (grid feasible) auction outcomes.

## 4.1 Objective: Maximize social welfare

For the sake of clarity, in this section on the objective function, grid feasibility constraints are considered not active and therefore not influencing the auction algorithm. Grid feasibility constraints are discussed later in section 4.2. The objective remains the same with or without grid constraints though, as grid constraints only restrict the set of plausible auction outcomes, i.e. by rejecting certain combinations of Bids which are together not grid feasible.

The objective function of the clearing algorithm shall maximize social welfare, which is equivalent to pursuing the most cost-efficient combination of Bids, taking into account the administratively determined Demand Curve (cf. infra). This objective shall be applicable regardless of the implemented pricing rule, i.e. in both a pay-as-cleared and pay-as-bid mechanism. In the context of a CRM, social welfare (also illustrated in Figure 3 on the left below) is to be interpreted as the sum of

1. Surplus for society from satisfying capacity demand at a price below the willingness-to-pay for capacity, as defined by the Demand Curve (also referred to as “Consumer Surplus”)

2. Surplus for Capacity Providers from the selection of their Bids at a price above the Bid Price (also referred to as “Producer Surplus”)

From Figure 3 (on the left), it can be derived that the social welfare maximizing solution is found by accepting all orange-colored Bids. Indeed, selecting an additional grey Bid would decrease social welfare, as the willingness-to-pay for this additional capacity (defined by the area under the Demand Curve) is clearly lower than the cost of accepting this Bid (defined by the grey block that defines the Bid).

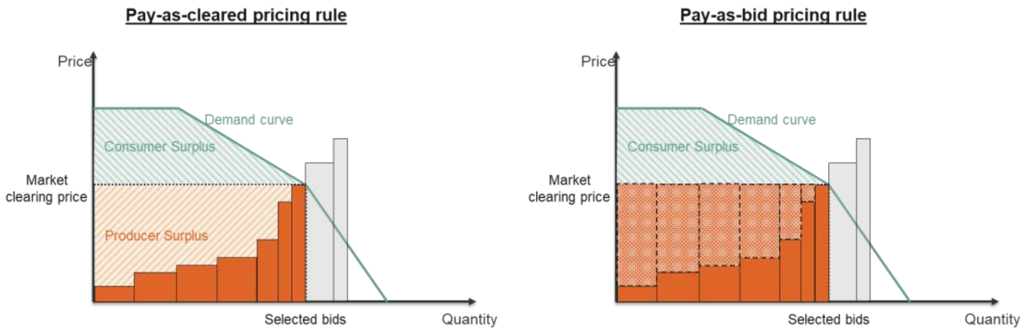


*Figure 3: Market clearing under pay-as-cleared (left) and pay-as-bid (right) with perfect information*

As explained in the design note titled *CRM Design Note: Intermediate Price cap*, there is in fact no rationale for inframarginal rents (i.e. Producer Surplus) to Capacity Providers in a CRM Auction context, which can be regarded as windfall profits. The application of an Intermediate Price Cap serves in particular to avoid as much as possible these windfall profits. However, in a market clearing, and especially when projects with various levels of missing-money compete, some inframarginal rent towards Capacity Providers cannot be avoided. Also a pay-as-bid pricing rule cannot eliminate these inframarginal rents, although under pay-as-bid there is in fact no explicit producer surplus (see Figure 3 on the right). Since bidders are known to have an incentive to Bid in at the expected market clearing price under pay-as-bid, some producer surplus is likely implicitly incorporated in the Bids. For illustrative purposes only, a theoretical illustration of market clearing under a pay-as-bid pricing rule when the market has perfect information, is shown in Figure 3 on the right. From this illustration it can be derived that under pay-as-bid, bidders with perfect information would update the Bid Prices of their Bid to exactly the would-be market clearing price under pay-as-cleared. In the end therefore, the market outcome would be the same.

Note that because of the presence of indivisible Bids, it may happen that the social welfare maximizing solution does not exactly correspond with a point on the Demand Curve (contrary to the illustration in Figure 3). In determining the social welfare maximizing solution therefore, the auction algorithm will always make a trade-off between willingness-to-pay for additional capacity and the cost for additional capacity. Furthermore, in doing so, the entire set of Bids is considered. These principles are illustrated in Figure 4 below (note that also the would-be market clearing price under a pay-as-cleared pricing rule is indicated in the figure):

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

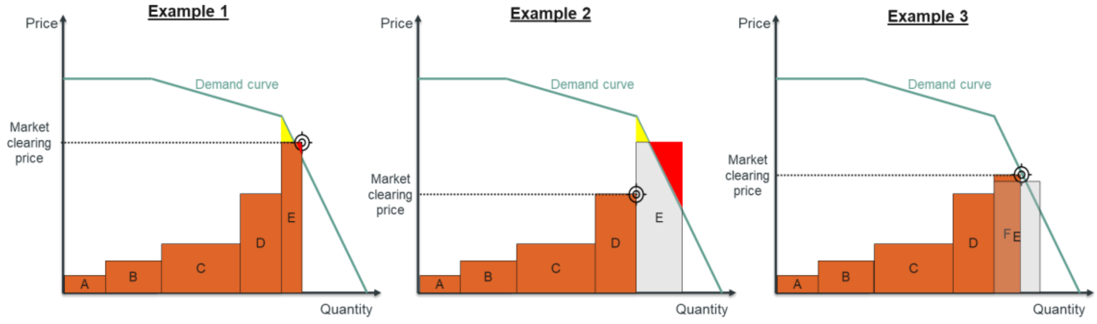


*Figure 4: Dealing with indivisible Bids*

To illustrate more clearly that the social welfare maximization objective does indeed minimize the cost of the CRM Auction, consider the following alternative formulation of the objective function. The social welfare maximization objective can alternatively be formulated as “minimizing the total cost of the CRM Auction”. The total cost of the CRM Auction is to be interpreted as the cost of the Bids that are selected (indicated by the orange-colored Bids in Figure 5 below) and the cost of unserved capacity demand (indicated by the green-colored area in Figure 5 below). Selecting the orange-colored Bids minimizes the total cost. Indeed, accepting an additional grey-colored Bid would increase the total cost, as the cost of accepting this Bid is higher than the cost of unserved demand related to the capacity volume of the Bid.

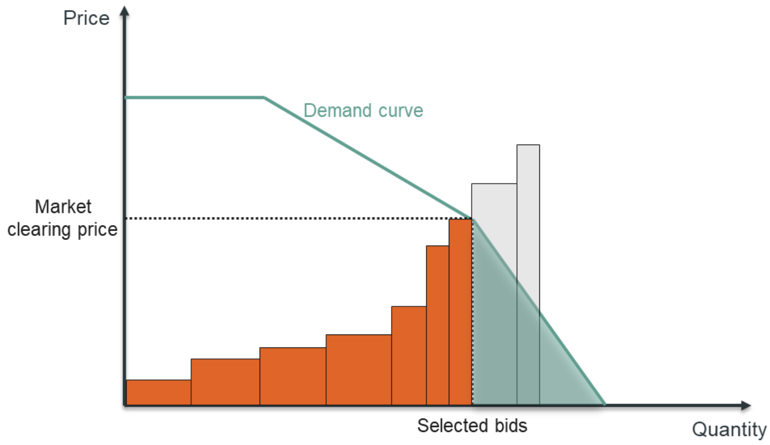


*Figure 5: Alternative formulation of the auction clearing objective in terms of total cost*

Note also that towards finding the highest social welfare combination of Bids, the Capacity Contract Duration for which Bids apply, is not considered. Indeed, the Bids are only judged based on their Bid Price, which has a 1-year granularity (i.e. Bid Price expressed in €/MW/year). The impact of taking into account the Capacity Contract Duration on the cost-efficiency of the CRM Auction outcome is not straightforward and depends on a number of assumptions. For instance, there is no formal data on the future cost of capacity compared to the cost of current contracts, so any welfare-optimizing choice would be based on assumptions regarding the anticipated trend of the cost of capacity. Furthermore, it would not be fair towards Prequalified CRM Candidates to judge on Bids based on the Capacity Contract Duration, which serves in the first place to create a level-playing field among CMUs requiring more/less investments.

## 4.2 Ensuring grid feasibility

### 4.2.1 What are grid constraints and why are they needed for the CRM?

A grid constraint is a limitation on the combination of offers for additional capacity (to be set on the target horizon) originating from one or more technical constraints on the grid, which form the boundaries of the technical solution space, within which the social welfare maximization can take place.

Technical constraints are already taken into account for individual units during the relevant connection processes on a case by case basis. However, in the framework of a market-wide CRM, application of such technical constraints ensures the technical feasibility from a public grid perspective of any CRM Auction outcome, for any specific combination of CMUs. In this document grid constraints refer to the latter application. Such grid constraints could originate from the transmission grid, the distribution grids or other. The principles described in this design note can be applied on all such kinds of grid constraints. The technical feasibility check ensures that it allows, based on the expected grid structure by the commissioning date of the considered CMUs, all operations & market criteria to be respected.

For what concerns the transmission system, Elia is responsible for proposing and realizing investments in the grid, which aim at increasing socio-economic welfare, ensuring a reliable system as well as enabling the national and regional objectives in terms of energy mix and electrical sector evolution; all at an optimal overall cost for society. In practice, these responsibilities translate into a complex multi-objective optimization, resulting intrinsically into some temporary limitations of grid hosting capacity pending the realization of further scheduled grid reinforcements as either planned in the last approved Federal Development Plan 2020-2030 or that might originate from specific client connection requests.

The application of grid constraints in the CRM will be subject to the following:

- Combination of offers:
  The feasibility of single Bids is determined and verified through the Prequalification Process. In this Prequalification Process multiple criteria are verified, which include constraints on the level of the public transmission grid, distribution grid or other; but always on single grid user (project) connection level. Specifically for the transmission grid, amongst other prequalification criteria the existence and validity of a detailed study (EDS) and a positive technical agreement will be verified. An EDS is a specific milestone deliverable from the TSO towards the grid user in the standard grid connection process in order to obtain a capacity reservation, and is a precondition for signing a connection contract, at which point in time the local grid hosting capacity will be finally allocated to the client, as described in the Federal Grid Code.

- Additional capacity:
  Only additional to be built capacity (generation, demand or storage), meaning capacity without or not fully considered in an existing connection contract with intention to participate to a CRM Auction, is considered and potentially subject to grid constraints in the CRM Auction algorithm.
  Opposed to additional capacity, existing capacity is capacity with a valid connection contract at the time the CRM Prequalification Phase takes place (which did not announce decommissioning prior) or capacity that is known to be commissioned outside of the CRM at the moment of gate closure time of CRM Prequalification Phase, which is then taken as a given in the reference grid.
  This existing capacity is considered grid feasible, as it has passed necessary steps in the connection processes in the past, and the relevant owner has the choice whether or not to maintain the existing connection irrespective of the CRM Auction outcome. Within the CRM Auction therefore, these existing allocated capacities are considered to be maintained from a grid perspective, except if the permanent closing of the concerned capacity has been announced officially by the owner before the CRM Auction.

- Technical constraints:
  Constraints that are technical in nature and result from physical limitations. In particular within the framework of CRM, they result from application of grid security rules and/or geographic spacing limitations in/towards substations, as specified in §4.2.3.

- Boundary conditions:
  The grid constraints will have to be calculated based on a certain situation, in which notably the reference grid for the given Delivery Period will be key. For the first CRM Auction in Y-4 for example, the nuclear phase-out law will be taken into account. For the transmission grid, the choice for the final reference grid will principally be based on the planned and approved grid development projects as listed in the Federal development plan (i.e. for the first Auction in 2021 the latest Federal Development Plan 2020-2030).

As detailed in the specific design note related to the prequalification and pre-delivery monitoring processes (section 3.4.3.1), ELIA verifies the compliancy of each capacity with the grid connection process as foreseen in the Federal Grid Code. This procedure gives the confirmation to ELIA that the proposed capacity can effectively be connected to the grid before the start of Delivery Period and details to the CRM Candidate both the technical and financial elements related to the connection. This confirmation, formalized by the signature of a technical agreement between the grid user and ELIA and being a pre-requisite verified in the CRM Prequalification Process is hereafter called “EDS” in this document (sections 4.2.2 – 4.2.7). Depending on outcome of on-going discussions to adapt the current grid connection process in the Federal Grid code, other possibilities to sign a technical agreement with ELIA might be added (e.g: “EDS CRM”).

**Design Proposal #8:**

The grid constraints will only be determined for additional capacity, if any. For all existing connections no grid constraints will be considered in the CRM Auction selection algorithm.

### 4.2.2 When are grid constraints related to the transmission grid needed in the framework of a CRM?

This section describes the interaction with the Federal Grid Code (FGC) for what concerns the connection of additional grid user capacities to the transmission grid. In particular, the state of the Federal Grid Code (whether it remains as is or will be amended) will affect whether or not grid constraints related to the transmission grid might be needed in the framework of a CRM. The requirements from the existing regional grid codes of course also remain valid and need to be respected where applicable; however the latter are not discussed further in this section.

► **Interaction with FGC stipulations**

The current FGC, as adopted on 22nd April 2019, handles connection requests sequentially on a first come, first serve basis. Any technical constraints are hence handled implicitly for each individual EDS and on an ad-hoc basis for additional grid user capacity.

For example, this implies that for 2 separate projects that would be competing for the same limited hosting capacity (e.g. at a given substation) of the grid, the 1st project would get the approved capacity reservation from the TSO, whereas the second project would not be acceptable for the grid on the concerned electrical location. In practice, the 2nd project would then be offered another grid connection (if feasible) or would be offered to wait on the further development of the grid before being able to be accepted due to the fact that the 2nd project has to take into account all already reserved (in casu the 1st project) & existing capacities in the reference grid on the target horizon.

In case the current FGC remains as-is, it is expected that with respect to the transmission grid no additional grid constraints would be required in the CRM framework for new (additional) capacity, as they would be implicitly incorporated in all approved EDS that will be part of the CRM prequalification criteria. This connection process however has some major drawbacks in the framework of the CRM, since it allocates capacity in function of a first come first served order before offering in the CRM Auction, which implies no level playing field for competitors interested in capacity on the same or linked electrical locations, hence potentially limiting CRM market liquidity & competition within the CRM Auction.

Currently, discussions are ongoing within the working group Belgian Grid about evolutions potentially revising the FGC in the light of the expected CRM Auction.[8] The discussions are not conclusive at the time of the consultation on this design note and focus on the necessity to adapt the existing connection process for potential new (additional) capacity that may arrive in bulk in the framework of the CRM to allow for competition. The potential revision aims at avoiding an arbitrary allocation of scarce & limited grid hosting capacity on such first come, first serve basis and instead proposes allocation of grid capacity through the competition organized in the CRM Auction based on a total cost optimization for society. The goal of the potential revision is to increase the level playing field for competitors and ensure a maximum liquidity & competition for the CRM.

Any FGC revision in this respect should ensure the balance with the existing connection process, since the CRM Auctions are non-continuous but rather limited to one Y-4 and one Y-1 Auction per year for a given target Delivery Period. The intended revised FGC therefore needs to specify a certain freeze period, which temporarily blocks capacity

[8] https://www.elia.be/-/media/project/elia/elia-site/users-group/crm-implementation/documents/20190805_federal-grid-code-v2-final-proposal_nl.pdf?la=en

reservation & allocations, in order to ensure a firm solution space for the CRM Auction with clear rules including clarity on the ongoing client connection projects for inclusion or exclusion into/out of the reference grid.

In the case where such a revised FGC would be operational and enforced before the first CRM Auction, grid constraints – as described in this chapter 4.2.3 – are necessary to ensure the grid feasibility of certain EDS combinations for the transmission grid.

► **Application in the CRM auction algorithm**

Only in case certain combinations of projects for additional grid user capacities (for which a detailed connection study (EDS) was executed) are not feasible (for instance: when too many grid users want to connect in the same region), binding grid constraints will be calculated and included in the CRM auction algorithm. In case no restrictions apply, no additional grid constraints will be included – which implies a maximum freedom of selection for the algorithm in such cases.

**Design Proposal #9:**

● The FGC potential revision will determine whether explicit grid constraints will be needed within the CRM-framework or not. In case the current FGC, as adopted in April 2019 remains as-is, all grid constraints will be implicitly applied on each EDS individually.

● Elia will only calculate and apply grid constraints for those cases where the latter are needed (eg. when too many grid users want to connect to the same region), in respect of grid security rules & physical limitations. In all other cases, no further restrictions will apply to give maximum freedom of selection for the CRM auction algorithm.

### 4.2.3 Which drivers cause which types of grid constraints within the framework of the CRM?

Elia proposes to ensure the overall grid feasibility of the CRM outcome based on all relevant technical constraint types that can arise from two distinct sources which objectively limit the available grid hosting capacity on the target horizon. The proposed technical constraints are objective & transparent in order to facilitate auditable results, and could apply to any type of public grid (transmission, distribution or other). The two drivers for grid constraints considered for the limitation of the available grid hosting capacity are:

(1) Grid security

Grid and system operators have to apply certain rules to ensure security of the overall grid.

For the electricity grid, such grid constraints aim to ensure that European & Belgian legislation addressing power system planning and addressing the future power system operation will be respected. This brings forth limitations of maximal acceptable power flows throughout the grid from both a market and grid perspective, minimum and maximum voltages or short-circuit currents ensuring a secure and reliable power system as well as electrical safety.

Concerning the transmission grid, and similar to what is described in the connection procedures following the FGC, the TSO must apply mandatory grid security rules, such as the application of the relevant N-1 (relevant incidents) security criteria in order to ensure compliance with all relevant EU legislation & Network Codes (System Operation Guideline (SOGL), Clean Energy Package (CEP), …) as well as all relevant national legislation (Federal Technical Grid Code (FGC), Belgian Electricity Law, …) in order to assess the acceptability of combinations of certain CRM projects. In particular, the Electricity Law Art. 7undecies §8 stipulates – related to the CRM Market Rules –that the technical restrictions of the grid should be respected and should take into account the connection process as defined in the FGC.

(2) Physical spacing limitations

This limitation refers to the available physical space within available terrains at the relevant substations, which is required for the connection of new power plants or demand/storage units (i.e. additional capacity). These limitations might occur for following cases:

- The connection of new power plants to substations requires the availability of sufficient dedicated connection bays (and potentially other elements such as transformers), which in their turn require the necessary physical space to place the necessary equipment, which needs to ensure secure operation as well. Owning sufficiently large terrains and acquiring the necessary permits in due time before the start of the CRM Delivery Period is therefore required.
- In case the same connection path (from the power unit to the substation) is required for 2 (or more) separate projects, their combination might be not feasible due to spacing limitations in or towards the relevant substation.

Application of the 2 drivers for grid constraints, result in a multitude of technical constraints that could occur. For didactic & illustration purposes, the 3 most probable technical constraint clusters are listed & explained in more detail below.

(1) Power flow limitations to avoid overloads on grid elements (typically lines, cables & transformers for the electrical system) and to keep the voltage/power quality /stability within limits. Power flow limitations result from the apparent power [MVA] that is to be transported in an N-1 secure fashion throughout the grid, from the direct connection of a power plant in conjunction with other relevant internal & cross-border market flows.
(2) Short circuit power (SCP) limitations that arise in relevant materials or structures of the considered substation(s), from the directly connected generation/storage or demand project considered in conjunction with other relevant sources for SCP that are present in the reference grid. The FGC sets specific limitations on the SCP contribution of power units (usually expressed in short-circuit current contribution or Isc in [kA]) and also requires the TSO to ensure in general a safe exploitation of the grid in such short-circuit conditions.

(3) Spacing limitations, that limit the acceptable number of connection bays (and potentially other relevant elements such as transformers) within or connections towards the considered substations that inherently limit the grid hosting capacity on individual substations of the reference grid on the target horizon.

**Illustrations of some technical constraint types**

**1) Power flow limitations**

In the examples (Figure 6 and Figure 7) below, we show a theoretic case where on individual basis, both EDS 1 (P = 600MW) and EDS 2 (P = 900MW) are acceptable from a power flow point of view, since no overloads are created in N nor N-1 situations. For simplicity reasons, no other internal flows nor market flows are assumed to be transported through the depicted lines.

However, if both EDS 1 and 2 are combined, this would in fact cause an overload on line 1 or 2 in case of incident on the other line (N-1), since the transport capacity of the other line is limited and not sufficient to withstand the active power flow. In such a case, EDS 1 and 2 together are not acceptable from grid hosting capacity point of view and a binding grid constraint should be calculated to avoid the CRM-Auction having access to such EDS combination. Figure 6 illustrates a case for limited hosting capacity solely on substation A and Figure 7 illustrates a case for limited hosting capacity on the combination of substations A and B.

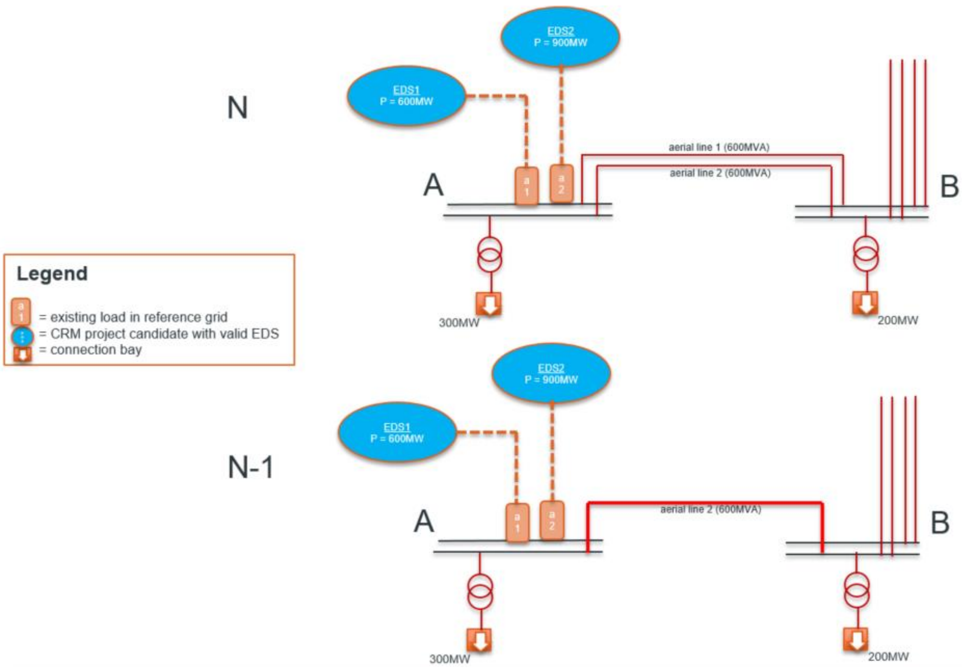


*Figure 6: Power flow limitation illustration (substation A)*

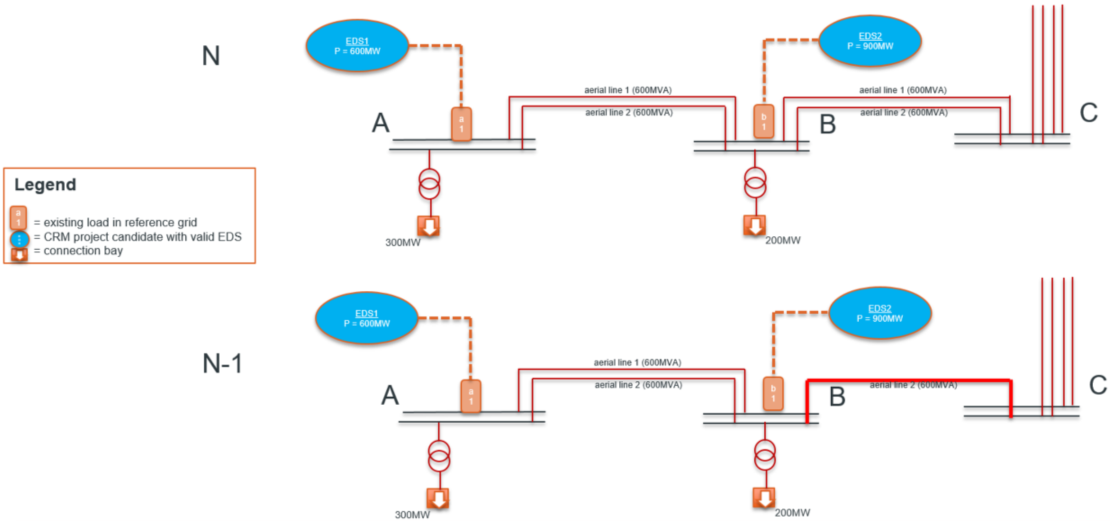


*Figure 7: Power flow limitation illustration (substation A + B)*

### 2) Short-circuit current limitations

In the example (Figure 8) shown below, we show a theoretic case where the substation material & structures can only withstand a maximum short-circuit current Isc of 63 kA and where in the initial situation (prior to new connections) the existing maximum short-circuit current is 55kA for substation A – which is assumed to be caused by the existing generator and short-circuit current contributions from other generations via the lines shown.

For both EDS 1, with an assumed maximum active power of 900MW and individual short-circuit current contribution of 5,5kA, as well as for EDS 2, with an assumed maximum active power of 600MW and a short-circuit current contribution of 3,6 kA, the short-circuit current limitations of substation A are respected and hence both EDS are acceptable on individual level.

However, in the case of the combination of EDS 1 and EDS 2, the maximum short-circuit level would become 64,1kA – which is not acceptable considering the limit of 63kA that applies. In such a situation, EDS 1 and 2 together are not acceptable and a grid constraint should be introduced to avoid the CRM Auction having access to such EDS combination.

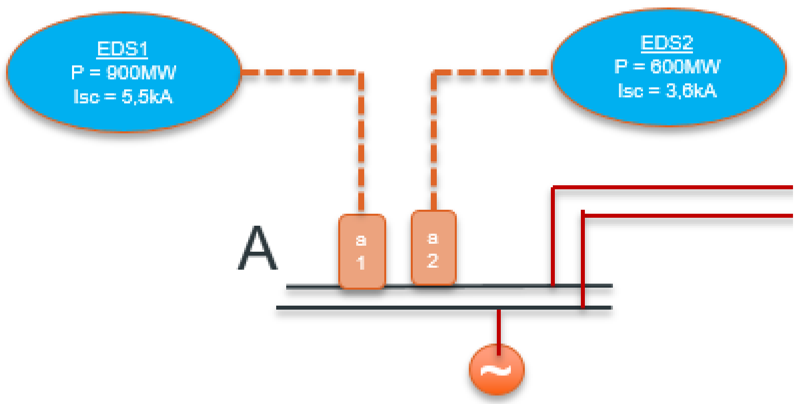


*Figure 8: Short-circuit current limitation illustration*

**3) Spacing limitations**

In the example (Figure 9) shown below, we show a theoretic case where due to spacing limitations in substation A, only 1 connection bay is available for connection of a new power plant (or demand/storage unit), and where it is impossible to extend the substation in order to construct additional bays. Indeed, on individual level both EDS 1 and EDS 2 are acceptable since they only require 1 connection bay to connect their individual power plants, however when they are combined this results in an infeasible situation due to the limitation in number of available connection bays. In this case, the limitation will require a grid constraint in order to avoid such infeasible case where both EDS are combined.

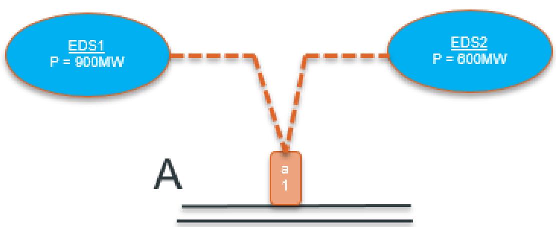


*Figure 9: Spacing limitation illustration*

**External constraints on EDS combinations**

In section 4.2.3 the focus is laid on constraints originating from within the electrical transmission grid. Other external constraints on certain combinations of CRM projects for additional capacity could be needed, this is subject to further analysis. In any case, as explained in §4.2.1, the methodology for determining grid constraints based on acceptable EDS combinations allows for the potential inclusion of such external constraints, if needed.

**Design Proposal #10:**

● Elia will consider 2 drivers (grid/system security & physical limitations) for verification of any technical constraints that might result out of these 2 drivers and which potentially translate in the need to apply grid constraints within the CRM auction selection algorithm. These resulting grid constraints are therefore objective & transparent to facilitate the auditability of the CRM auction.

● External constraints (originating outside of the transmission grid) on combinations of CRM-projects for additional capacity could be facilitated by the proposed methodology.

### 4.2.4 Interaction CRM bidding and EDS requirements

In order to verify the grid feasibility for additional capacity as described in 4.2.3 to determine and apply the resulting grid constraints in the CRM auction algorithm, Elia needs a direct one-on-one link between the relevant technical and financial information presented in the related EDS and the individual CRM Bids, in order to ensure respect of the FGC and the Electricity Law Art. 7undecies §8, so that in the end for each Bid:

- Elia knows the detailed technical information from the related EDS, so that the grid constraints can effectively be calculated & subsequently applied in the CRM auction algorithm;
- The CRM candidate has the adequate financial information that will allow him to prepare his bid.

It should suffice to indicate in each CRM Bid the link to the respective individual EDS & technical information – for instance via a unique identification number – in order not to duplicate the information already present in the content of the respective EDS, which also avoids potential inconsistencies.

In order to be eligible for submitting a CRM Bid – apart from other prequalification rules – this unique one-to-one link needs to be specified during the bidding process (between GOT and GCT) in addition to having obtained such a valid EDS prior to the start of the grid constraints calculation (after publication of Auction rules and around start of the freeze period). The indivisible volume, for each EDS, that can be submitted in the CRM Auction will be fully known in advance, to facilitate the accurate calculation of the grid constraints and to ensure the grid connection proposed in an EDS is always adequate from a technical point of view & connection cost perspective).

In order to build the grid constraints, in essence Elia will use following technical information which is contained in each EDS:

► The maximum active power in [MW] and apparent power in [MVA] of the power plant (or storage or demand unit), based on the concerned underlying power units (potential different CMUs) and how these are linked to the relevant bays for each relevant substation(s) to ensure verification of the technical constraints (§4.2.3). The maximum active power & apparent power (not derated power) of the power plant (or storage/demand unit), which will be offered in CRM with link to an individual EDS will be considered indivisible for determination of the grid constraints.

- The short-circuit power (SCP) contribution in [MVA/MW] for each power unit on the relevant bay of the relevant substation(s) in order to calculate the short circuit current (Isc) limitations (if any). This Isc contribution in [kA], can be compared to the existing and expected short-circuit current levels to verify if sufficient margin remains available to accept the combination of CRM projects.
- The relevant connection type and trajectory (part B) assumed i.e. the connection between the site of client (part C) and the relevant bays of the concerned substation(s) of the Elia grid (part A) for each power unit in order to calculate the spacing limitations (if any) in or towards the relevant substation(s).

In order to successfully participate in a CRM Auction, for additional capacity as specified under §4.2.1, an applicant must:

- Respect the requirements as specified in the design note on prequalification a.o. §3.4.3.1 (passing prequalification & having a valid EDS);
- Indicate for each CRM-Bid, between Gate Opening Time & Gate Closing Time, the link to the individual EDS & CMU(s) , in order to for Elia to be able to apply the calculated grid constraints in the CRM auction algorithm

**Design Proposal #11:**

● Calculation of the grid constraints requires the final list of valid EDS to be known to Elia after the publication of Auction rules and latest prior to GOT.

● Participation to CRM Auction for additional capacity, requires market actors / grid users to:

– respect the requirements as specified in the design note on prequalification – a.o. §3.4.3.1 (passing prequalification & having a valid EDS)

– indicate for each CRM-Bid the link to the individual EDS & resp. CMU(s) – in order for Elia to apply the grid constraints to the proper CRM Bids within the CRM Auction selection algorithm

### 4.2.5 Methodology for calculating CRM grid constraints for the transmission grid

The section below will describe the methodology to calculate the CRM grid constraints that Elia will apply for the transmission grid. The first part will describe the theoretic methodology, after which in the second part a concrete illustration is included for a theoretic case. In terms of concrete application for the CRM-auction, 2 options exist which will be described further below.

**<u>Methodology Description</u>**

**Step 0)**

Elia proposes to calculate the grid constraints considering all relevant EDS combination sets for additional capacity in the CRM-framework, based on the relevant <u>reference grid</u> & <u>market scenario</u> for the relevant CRM-Auction, together with some specific sensitivities if relevant.

► <u>The reference grid</u> for the CRM Auction will be based on the most recent status of the projects included in the latest approved & relevant Development and Investment Plans and includes the planned projects with expected commissioning date before the start of the Delivery Period. For the first Auction, the hypothesis on (snapshot of) the reference grid will be finally determined in summer 2021 for the first CRM Y-4 Auction – somewhere between the publication of Auction rules (15 may 2021) and CRM Gate Opening Time – and ideally at the start of the freeze period in 2021 to leave sufficient time for calculation of the grid constraints. This ensures that the latest most accurate information is used. In practice, the reference grid will be based on:

- existing network & existing users;
- scheduled reinforcements – based on latest information & status of projects included in both federal & regional development plans – that are expected to be commissioned before the start of the CRM Delivery Period;
- any potential connections of generation/demand/storage that are or will have been realized with the validity of their grid user capacities allocated before the start of the CRM Delivery Period and including those projects (outside of CRM) that have obtained the right to connect to the grid at a fixed moment in the future, with the validity of their grid user capacities reserved, in line with FGC connection process stipulations;
- excluding generation/demand or storage capacity that has given a definitive closure notification prior to the CRM Prequalification Phase.

► <u>The market scenario</u> proposal used here shall be consistent with the one determined to calibrate the volume to be procured through the CRM auction as defined in the Royal Decree meant in Art. 7undecies §2 of the Electricity Law.

It is proposed to use an EDS combinatorial approach allowing to limit the search space and calculation time, since all valid EDS in the CRM-framework must be known prior to the CRM gate opening time (GOT) which avoids the extremely complex exercise of an exhaustive hosting capacity calculation on all combinations of substations. The proposed methodology makes sense in light of the limited time available to determine the grid constraints.

**Step 1)** The final list of individually valid EDS for additional capacity for grid users in the CRM framework will be known to Elia somewhere between the start of the freeze period (after publication of Auction rules) and the gate opening time (GOT) of the relevant CRM Auction. Only the relevant valid EDS which are accepted within the CRM framework via the CRM Prequalification Process and which respect the above mentioned timings will be considered in calculating and building the relevant grid constraints based on the relevant reference grid & market scenario as defined in step 0.

**Step 2)** An EDS combination matrix will be set up by Elia, that explicitly enumerates all possible options – hence $2^n – 1$ combinations with n = # individual valid EDS.

**Step 3)** The assessment of each EDS combination is performed by Elia, based on the technical constraint types that can result from the application of the 2 drivers as specified in §4.2.3, which ultimately result in acceptance (OK) or non-acceptance (NOK) from a grid feasibility point of view. The specific technical constraint for a NOK will be logged (e.g. overload of line xx, unacceptable level of short-circuit current on substation yy, connection bay limitation on substation zz, etc.) in order to ensure auditability of the grid constraints which will serve as input for the CRM auction algorithm. A report can be set up with all relevant (non-redundant) information for communication to the regulator.

**Step 4)** Elia maps the outcome of the binary OK/NOK assessments on individual & combined substation level and translates the information to active power limitations, only where and if relevant, in order to anonymize the individual EDS information & their combinatory acceptance. This anonymization step taken by Elia intends to avoid market collusion for CRM bidding, limits the redundant information and intends to improve the auditability & transparency of the grid feasibility assessment results.

In essence, the mapping process allows for a translation of discrete binary feasibility assessment of any EDS combination to an overarching continuous constraint in terms of active power on individual & combined substation level, which when applied in the CRM auction algorithm, ensures that no infeasible combinations can be selected. This substation mapping approach gives a set of binding grid constraints for application in the CRM auction algorithm. The final set of binding grid constraints can be further limited, by removing potential redundant information and only keeping the relevant ones. This action further reduces complexity as well as the number of individual constraint that the CRM Auction selection algorithm will have to handle together, thus reducing overall pre-solver execution time and increasing auditability during and after the clearing.

**Step 5)** The CRM Auction selection algorithm uses the final list of feasible EDS combinations or the final list of binding grid constraints in order to determine the social welfare maximizing solution.

Step 4 is only feasible if it is possible to effectively translate all technical constraints to an anonymized hosting capacity at substation level (in terms of MW's) which is not 100% clear at the time of writing of the design note, therefore in terms of application and communication regarding the grid constraints, in principle 2 options exist:

- ► Option 1: the methodology is applied until step 3 with the result report available for the regulator;
- ► Option 2: the methodology is applied until step 4 where the anonymized results are available for the market parties.

Both options can serve application of the grid constraints in the CRM Auction selection algorithm, where in option 1 all discrete constraints will exhaustively be added and in option 2 only the set of binding grid constraints on substation level are added. Both options should yield the same constraint information and clearing result.

Based on the above, Elia proposes option 1, also since the CRM bidding volumes & prices should not be affected by the grid constraint information. Indeed, since all individual EDS for additional capacity will be known prior to gate opening time and since a unique one-to-one link should exist between an EDS and CRM bidding volumes, there is no strict necessity for the market actors to know the grid constraint information prior to the bidding process. In terms of transparency & auditability, option 1 suffices. Publication of option 1 results also to the market parties – containing detailed information on which EDS combinations are possible between the same or different market actors – is not proposed to avoid market collusion within the CRM bidding, which in low liquidity cases could cause potential price inflation of CRM-bids.

**Design Proposal #12:**

● The reference grid needs to be determined latest before GOT and not before the publication of the Auction Rules, in order to apply the most accurate assumptions at that point in time. The reference grid will be based on the latest approved development and investment plans.

● The market scenario will be aligned with the one determined to calibrate the volume to be procured through the CRM as defined in the Royal Decree meant in Art. 7undecies §2 of the Electricity Law.

● The methodology for determination of grid constraints will follow the described stepwise approach and the results of step 3 will be communicated to the regulator.

**Methodology illustration**

The Figure 10 below shows a theoretic setup of a reference grid, including some existing generation and offtake. In Figure 11 below, there are 5 potential EDS candidates for inclusion into this reference grid in the CRM framework. Some combinations of EDS will be allowed and some are not acceptable, as will be illustrated – following the step-wise approach as specified in the methodology description before. A summary of the full methodology application is given in the end of this section in Figure 15.

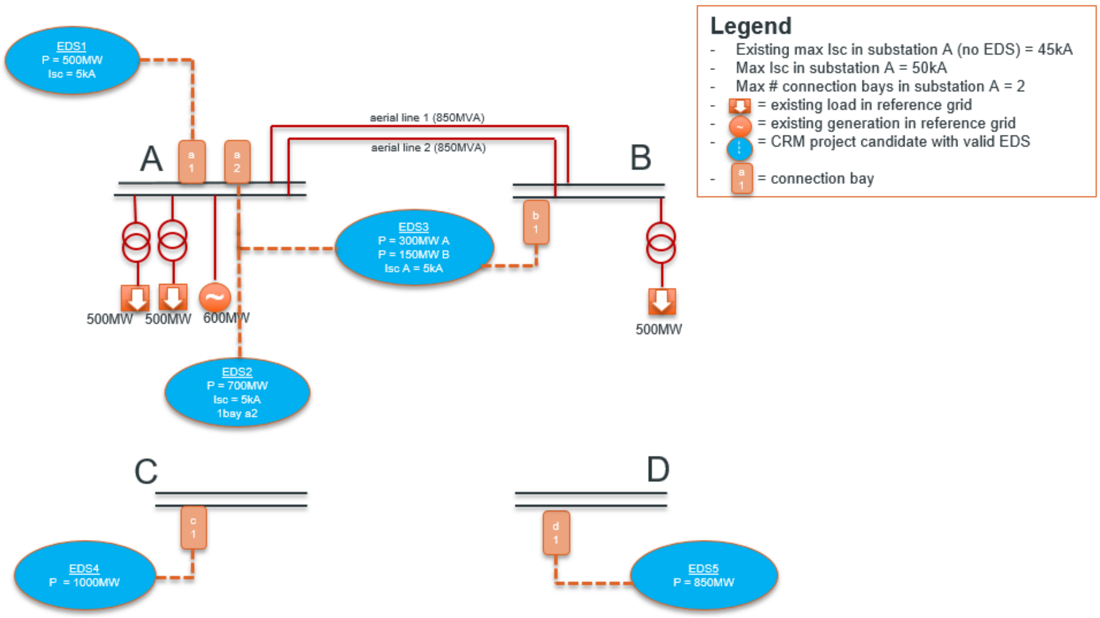


*Figure 10: Example grid setup for methodology illustration*

| EDS | Pmax @substation | PQ status |
|---|---|---|
| EDS 1 | 500MW @A | OK |
| EDS 2 | 700MW @A | OK |
| EDS 3 | 300MW @A + 150MW @ B | OK |
| EDS 4 | 1000MW @C | OK |
| EDS 5 | 850MW @D | NOK |

*Figure 11: Example EDS list for methodology illustration*

**Step 0-1)**

- EDS 5 – with envisioned connection at substation D on bay d1 for a Pmax of 850MW, is assumed to not have passed the CRM prequalification, due to non-respect of one of the criteria, for instance not feasible before the required go-live date of the CRM Delivery Period. This EDS will hence not be considered further in the calculation of grid constraints.

**Step 2)**

- Explicit enumeration of all options in an EDS combination matrix only considers EDS 1 – 4 – which results in 15 potential combinations.

| EDS<br>EDS combo ID | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| 1 | 1 | 0 | 0 | 0 |
| 2 | 1 | 1 | 0 | 0 |
| 3 | 1 | 0 | 1 | 0 |
| 4 | 1 | 1 | 1 | 0 |
| 5 | 0 | 1 | 0 | 0 |
| 6 | 0 | 1 | 1 | 0 |
| 7 | 0 | 0 | 1 | 0 |
| 8 | 1 | 0 | 0 | 1 |
| 9 | 1 | 1 | 0 | 1 |
| 10 | 1 | 0 | 1 | 1 |
| 11 | 1 | 1 | 1 | 1 |
| 12 | 0 | 1 | 0 | 1 |
| 13 | 0 | 1 | 1 | 1 |
| 14 | 0 | 0 | 1 | 1 |
| 15 | 0 | 0 | 0 | 1 |

*Figure 12: EDS combination matrix (full)*

- EDS 4 – with envisioned connection at substation C on bay c1 for a Pmax of 1000MW, is assumed for the remaining illustration not to influence the set of EDS (1, 2, 3) due to a long electrical distance between those projects. To reflect this assumption, no direct connections are illustrated in Figure 10 between substations A, B and C. We will hence only focus on the remaining cross impacts within the set of EDS (1, 2, 3) for the illustration.

**Step 3)**

| EDS<br>EDS combo ID | 1 | 2 | 3 | OK or NOK<br>For grid | Reason for NOK |
|---|---|---|---|---|---|
| 1 | 1 | 0 | 0 | OK | |
| 2 | 1 | 1 | 0 | OK | |
| 3 | 1 | 0 | 1 | OK | |
| 4 | 1 | 1 | 1 | NOK | Flux: overload line 1/2<br>SCP: overload @ substation A<br>Bay limitation @substation A<br>Same connection offered |
| 5 | 0 | 1 | 0 | OK | |
| 6 | 0 | 1 | 1 | NOK | Same connection offered |
| 7 | 0 | 0 | 1 | OK | |

*Figure 13: EDS combination matrix for relevant subset EDS 1-3*

- Within the set of EDS (1, 2, 3):
  - Individually, they all pass the technical criteria resulting from application of the 2 drivers, as defined in §4.2.3, in addition to having passed the CRM-prequalification step. EDS-sets (1, 2) and (1, 3) are also combinable, hence also do not create specific grid constraints.
  - EDS-set (2, 3) is not combinable, violation detected:
    - Same connection path B offered, which is detected not combinable for this illustration.

- ► EDS-set (1, 2, 3) is not combinable, violations detected:
  - Max 2 bays @substation A
  - Max short circuit circuit (Isc) @substation A = 50kA
  - Max power flow on lines 1 and 2 (in case of incident on one of both lines)
  - Same connection path B offered, which is detected not combinable for this illustration

The information, as shown in Figure 13 in column "reason for NOK", can be summarized in a report with all relevant information for communication towards the regulator – to serve a potential audit process.

**Step 4)**

Elia maps for all combination IDs the binary assessment (OK/NOK) towards hosting capacity levels on individual & combinations of all relevant substations in terms of active power, in this case for substations A and B. Based on this process, the following 4 binding grid constraints result for the example:

- MW (A) + MW (B) <= 1200MW
- MW (A) < 1500MW
- MW (B) <= 150MW
- 1000MW (A) + 150MW (B) = NOK

| | SUBSTATION LEVEL | |
|---|---|---|
| Feasibility | A [MW] | B [MW] |
| OK | 500 | 0 |
| OK | 1200 | 0 |
| OK | 800 | 150 |
| NOK | 1500 | 150 |
| OK | 700 | 0 |
| NOK | 1000 | 150 |
| OK | 300 | 150 |

*Figure 14: EDS combination matrix mapping to active power on substation level*

Elia further removes redundant grid constraints in order to derive the leanest set of constraints that are binding. In this case, only MW(A) + MW(B) <= 1200MW and 1000MW(A) + 150MW (B) = NOK are applicable. Note that, the specific spacing constraint of not accepting 1000MW on A together with 150MW on B is only related to this specific EDS combination, due to violation of same connection path. This can therefore not be translated into a continuous constraint based on a MW limitation.

**Step 5)**

This binding grid constraints (MW(A) + MW(B) <= 1200MW and 1000MW (A) + 150MW (B) = NOK) are added to the CRM Auction selection algorithm to ensure that the infeasible combinations will not be selected.

### Summary of the CRM grid constraint calculation methodology

Figure 15 below illustrates a schematic overview of the different steps 1 to 5

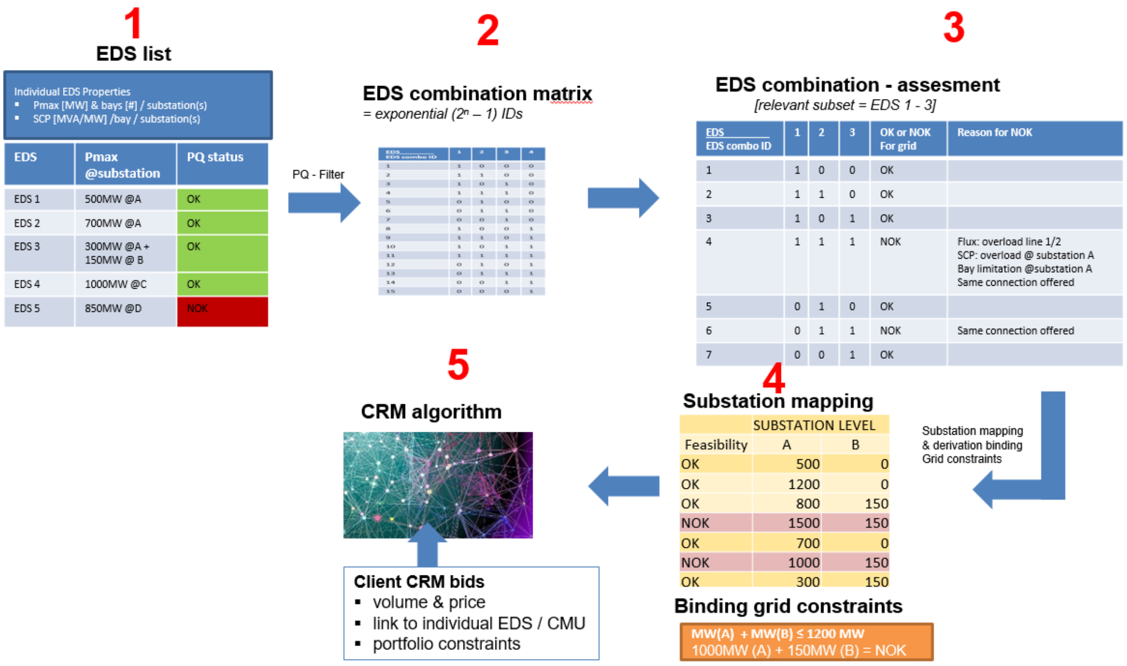


*Figure 15: Summary of methodology for CRM grid constraint calculation*

## 4.2.6 Implications on CRM Auction selection outcome

Application of the grid constraints will result in the possibility of paradoxically rejected Bids, meaning no simple merit order selection can be applied based on unity pricing of the CRM Bids. Indeed, application of grid constraints could result in a selection that minimizes total cost for society, with some unselected Bids with unity prices cheaper than the marginal selected Bid, due to the non-acceptance of their coexistence with the other EDS-Bids in the set to ensure grid feasibility.

## 4.2.7 Timing of CRM grid constraints calculation

Elia proposes to determine any required grid constraints for application in the CRM clearing algorithm "ex-ante" (prior to CRM clearing). This allows to ensure auditability of the CRM-Auction. In order to do so, Elia must know the final list of valid EDS for participation in the CRM (for additional capacity as mentioned in §4.2.1) prior to gate opening time – with some sufficient margin in order to allow for the (potentially significant) calculation time.

A potential fallback solution would be to apply the concept of grid constraints only during the CRM clearing (i.e. after GCT). In such a case, the same 2 drivers for grid constraints will be applied to verify whether any technical constraints exist for the combination of certain CRM-projects, but only on the cost-optimal solution as selected in the CRM Auction selection algorithm. This fallback solution can be considered an 'ex-post' approach, which potentially could require some iterative steps in order to arrive to the final CRM-optimal solution that respects all constraints – but which will equally yield the overall cost-optimal selection as with the ex-ante approach. When comparing the ex-ante approach to the ex-post approach, it is clear that the ex-post approach is less transparent & auditable (potentially an issue, considering the legal timing restriction of 1 month maximum between the GCT & the required communication of the CRM Auction results, as specified in CRM law), however still yields the overall cost optimal solution but with much more limited calculation complexity. Elia focusses only on the development of the ex-ante approach.

**Design Proposal #13:**

The grid constraints shall be determined ex-ante, prior to the start of the CRM bidding process i.e. before GOT.

## 4.3 Tie-breaking rules

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

1. Select the combination of Bids leading to the lowest carbon emissions
2. In case of still equivalence after rule 1, random selection

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

# 5 Treatment of Opt-Out Volume

**Design proposal #14:**

● In line with the Electricity Law Art. 7undecies §6, a CRM Candidate may decide not to offer (part of) its prequalified capacity into an Auction towards a Delivery Period, provided that the CRM Candidate notifies the grid operator of such decision (i.e. the "opt-out notification") at the latest by the end of the Prequalification Process related to this Auction. The capacity subject to an opt-out notification is hereafter referred to as "Opt-Out Volume".

● A CRM Candidate who submits an opt-out notification is required to indicate to the grid operator if the Opt-Out Volume is associated with a definitive or temporary notification for closure or a structural reduction of capacity, as referred to in Art. 4bis of the Electricity Law.

● A CRM Candidate who submits an opt-out notification towards a Y-1 Auction for Opt-Out Volume that is not associated with a definitive or temporary notification for closure or a structural capacity reduction, is required to indicate to the grid operator in its opt-out notification if the Opt-Out Volume will be contributing to adequacy (category 'IN') or not (category 'OUT'). When indicating that the Opt-Out Volume will not be contributing to adequacy (category 'OUT'), a signed motivation letter is required to support this claim.

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

The opt-out notification allows Capacity Holders that are obligated to prequalify, or have been prequalified in the past, to refrain from offering capacity in an upcoming CRM Auction, while at the same time also informing the grid operator of the capacity that will not be offered in the upcoming CRM Auction.[9]

Various reasons are possible for a CRM Candidate to (partially) opt-out of a CRM Auction, such as a notified temporary or definitive closure, extensive maintenance plans during the Delivery Period to which the Auction relates, an alternative view on the technical derating for its installation, the estimation that not participating in the CRM could prove more profitable, etc.

[9] In line with the Electricity Law Article 7undecies §4, eligible production Capacity Holders are obligated to prequalify. Note that the fast track prequalification, as further discussed and detailed in the design note *CRM Design Note: Prequalification & Pre-delivery Monitoring,* by default leads to an opt-out.

Depending on the reason for opt-out, an opt-out notification might have different implications, first of all related to the CRM Required Volume that may or may not have to be reduced with the Opt-Out Volume. Secondly, also towards Secondary Market participation there may be consequences of an opt-out notification, in terms of whether or not the Opt-Out Volume is still entitled to participate. In general, Secondary Market participation should be allowed to a maximum extent possible to ensure liquidity, while obviously avoiding double counting of capacity – meaning that capacity that is already counted upon to contribute to adequacy should not at the same time be allowed to participate in the Secondary Market as well.

***Legal framework***

The Electricity Law Art. 7undecies §6 determines the right for each CRM Candidate to decide not to offer (part of) its capacity into the Auction, provided that the CRM Candidate notifies the grid operator of this decision prior to the Auction. Furthermore, this same article states that the grid operator will treat this Opt-Out Volume according to the Market Rules.

In what follows, an overview is given on the treatment of Opt-Out Volumes. A differentiation is made between opt-out supported by definitive closure notification, opt-out supported by temporary closure notification and opt-out without closure notification. The treatment of capacity having followed the fast track Prequalification Process - and is therefore by default considered as opt-out - is discussed separately. The chapter concludes with other considerations and practical implementations regarding Opt-Out Volumes.

A global overview of the treatment of the different categories of Opt-Out Volumes towards Y-4 and Y-1 Auctions, in terms of impact on the volume requirement and Secondary Market participation, is given in Figure 16 below. The following sections zoom in on this overview and provide examples when deemed useful.

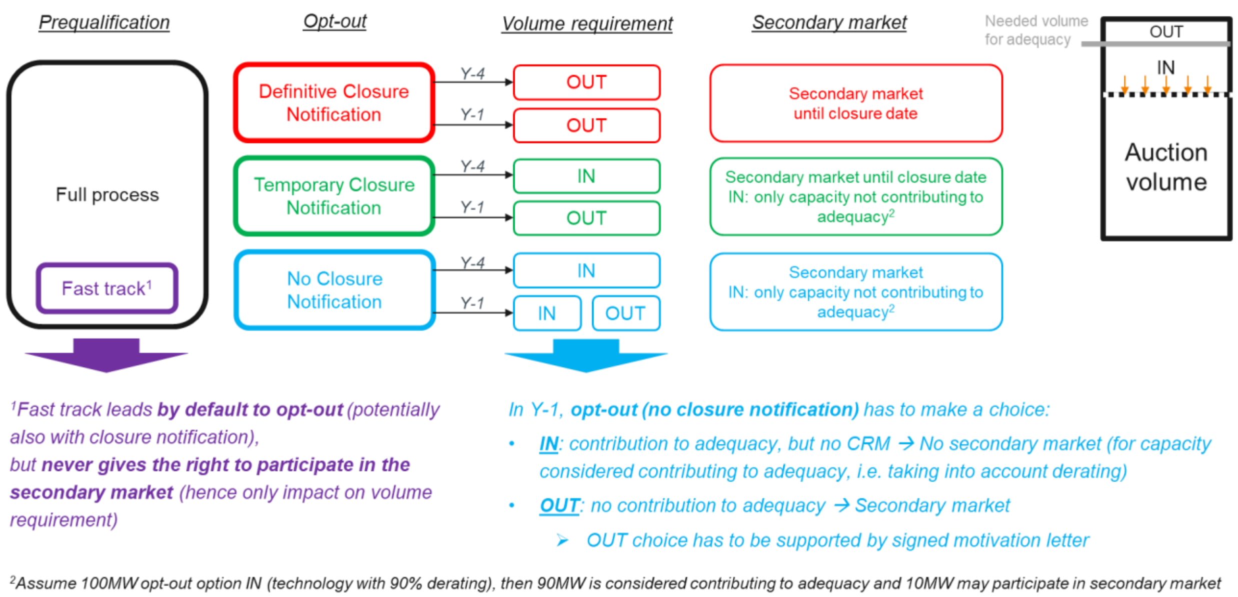


*Figure 16: Treatment of Opt-Out Volumes towards Y-4 and Y-1 Auction*

## 5.1 Opt-out supported by definitive closure notification

**Design proposal #15:**

● The CRM Required Volume for a Y-4 Auction is not reduced by Opt-Out Volume that is associated with a definitive notification for closure or a structural reduction of capacity as referred to in Art. 4bis of the Electricity Law.

● The CRM Required Volume for a Y-1 Auction is not reduced by Opt-Out Volume that is associated with a definitive notification for closure or a structural reduction of capacity as referred to in Art. 4bis of the Electricity Law.

● Opt-Out Volume that is associated with a definitive notification for closure or a structural reduction of capacity as referred to in Art. 4bis of the Electricity Law, is allowed to participate in the Secondary Market for the Delivery Period to which the Opt-out notification relates, but only until the definitive closure or structural capacity reduction date as included in the notification as referred to in Art. 4bis of the Electricity Law.

Opt-Out Volume supported by a definitive closure (or structural capacity reduction) notification in line with Art. 4bis of the Electricity Law is treated as firm both towards the Y-4 and Y-1 Auction. In other words, this category of Opt-Out Volume is considered not contributing to adequacy in the relevant Delivery Period (OUT).

Therefore, the CRM Required Volume both towards Y-4 and Y-1 will not be corrected with the Opt-Out Volume with a definitive closure notification, meaning that other capacity is to be contracted instead.

Secondary Market participation in the relevant Delivery Period is possible if relevant and only until the definitive closure date.

## 5.2 Opt-out supported by temporary closure notification

**Design proposal #16:**

● The CRM Required Volume for a Y-4 Auction is reduced by a share of the Opt-Out Volume that is associated with a temporary notification for closure or a structural reduction of capacity as referred to in Art. 4bis of the Electricity Law, equal to the Opt-Out Volume multiplied by the applicable Derating Factor.

● The CRM Required Volume for a Y-1 Auction is *not* reduced by Opt-Out Volume that is associated with a temporary notification for closure or a structural reduction of capacity as referred to in Art. 4bis of the Electricity Law.

● Opt-Out Volume that is associated with a temporary notification for closure or a structural reduction of capacity as referred to in Art. 4bis of the Electricity Law and limited to the share of Opt-Out Volume that has not resulted in a reduction of the CRM Required Volume, is allowed to participate in the Secondary Market for the Delivery Period to which the Opt-out notification relates, until the temporary closure or structural capacity reduction date as included in the notification.

Opt-Out Volume supported by a temporary closure (or structural capacity reduction) notification in line with Art. 4bis of the Electricity Law is only treated as firm towards the Y-1 Auction (OUT). Towards the Y-4 Auction, this category of Opt-Out Volume will still be considered contributing to adequacy as a temporary closure could still be revoked, e.g. when market conditions change or for other reasons (IN). By considering a temporary closure notification firm only towards the Y-1 Auction, potential abuse of the temporary closure notification and consequently overprocurement of capacity is avoided. Besides, since there is still a Y-1 Auction for the relevant Delivery Period, the Y-4 Auction is not yet the final call for the system to close its adequacy position.

An example to illustrate the treatment of Opt-Out Volume supported by a temporary closure notification towards respectively the Y-4 and Y-1 Auction is provided in Figure 17 below.

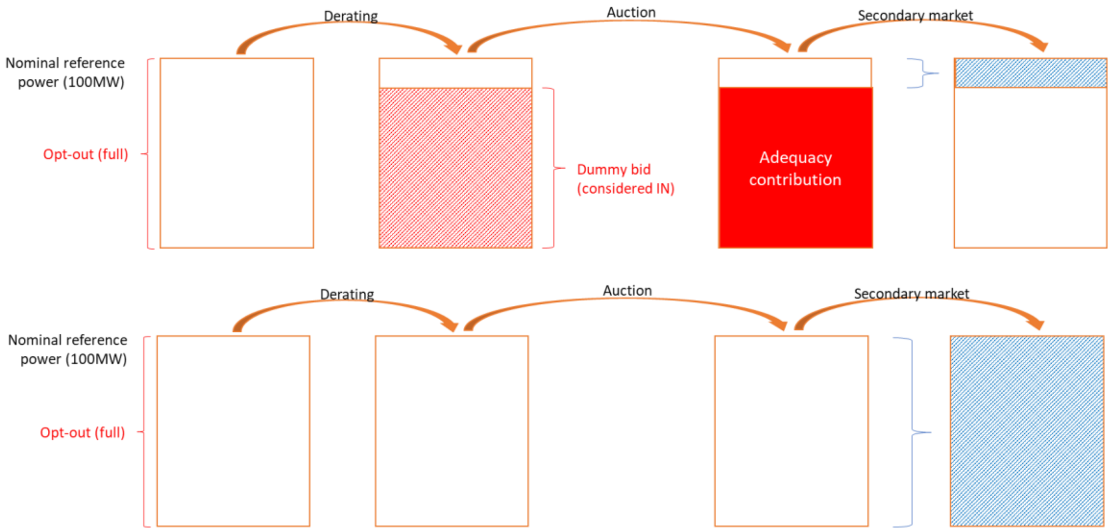


*Figure 17: Full opt-out of CMU of 100MW supported by temporary closure notification towards Y-4 Auction (top) and Y-1 Auction (bottom)*

As illustrated in Figure 17 (top), a dummy Bid will be inserted into the Y-4 Auction related to the Opt-Out Volume with a temporary closure notification. However, the same Opt-Out Volume with a reconfirmed temporary closure notification will not lead to a dummy Bid into the Y-1 Auction (Figure 17, bottom). In other words, towards the Y-1 Auction, a temporary closure notification is considered firm and the capacity is considered not contributing to adequacy, meaning that other capacity is to be contracted instead.

Secondary Market participation in the relevant Delivery Period is possible if relevant and only until the definitive closure date. As Opt-Out Volume supported by a temporary closure notification is still considered contributing to adequacy towards the Y-4 Auction, at this moment only the capacity not considered contributing to adequacy can participate in the Secondary Market (see blue rectangle on the right in Figure 17 (top)).

## 5.3 Opt-out without closure notification

**Design proposal #17:**

● The CRM Required Volume for a Y-4 Auction is reduced by a share of the Opt-Out Volume that is not associated with a temporary or definitive notification for closure or a structural reduction of capacity as referred to in Art. 4bis of the Electricity Law, equal to the Opt-Out Volume multiplied by the applicable Derating Factor.

● The CRM Required Volume for a Y-1 Auction is reduced by a share of the Opt-Out Volume (category 'IN') that is not associated with a temporary or definitive notification for closure or a structural reduction of capacity as referred to in Art. 4bis of the Electricity Law, equal to the Opt-Out Volume multiplied by the applicable Derating Factor.

● The CRM Required Volume for a Y-1 Auction is *not* reduced by Opt-Out Volume (category 'OUT') that is not associated with a temporary or definitive notification for closure or a structural reduction of capacity as referred to in Art. 4bis of the Electricity Law.

● Opt-Out Volume that is not associated with a temporary or definitive notification for closure or a structural reduction of capacity as referred to in Art. 4bis of the Electricity Law and limited to the share of Opt-Out Volume that has not resulted in a reduction of the CRM Required Volume, is allowed to participate in the Secondary Market for the Delivery Period to which the Opt-out notification relates.

Opt-Out Volume without closure notification is always considered as contributing to adequacy towards the Y-4 Auction (IN). This way, overprocurement of capacity is avoided and there is not yet a risk of an adequacy gap, as there will still be a Y-1 Auction for the relevant Delivery Period.

In contrast, towards the Y-1 Auction, this category of Opt-Out Volume has to make an explicit choice:

1. IN: Indication that the Opt-Out Volume will contribute to adequacy, but will not participate to the CRM
2. OUT: Indication that Opt-Out Volume will not contribute to adequacy. Such OUT-choice has to be supported by a signed motivation letter explaining why capacity will not be contributing to adequacy.

An example to illustrate the treatment of Opt-Out Volume without closure notification towards the Y-4 and Y-1 Auction (in the latter, an OUT choice has been made) is provided in Figure 18 below.

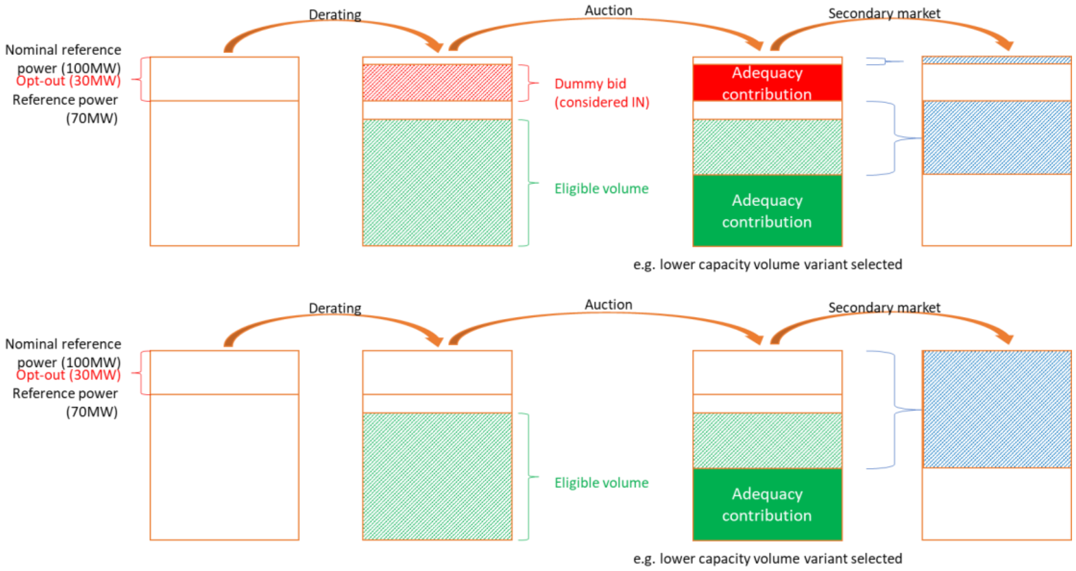


*Figure 18: 100MW CMU with 30MW opt-out without notification towards Y-4 Auction (top) and Y-1 Auction with choice OUT (bottom)*

As illustrated in Figure 18 (top), a dummy Bid will always be inserted into the Y-4 Auction related to the Opt-Out Volume with a temporary closure notification. The same Opt-Out Volume will only lead to a dummy Bid when option IN has been chosen, but not when option OUT has been chosen and motivated. Figure 18 (bottom) assumes such OUT choice towards the Y-1 Auction. This means that for the Opt-Out Volume without notification (option OUT), in the Y-1 Auction, other capacity is to be contracted instead.

In general, as illustrated in Figure 18, Secondary Market participation is allowed for all capacity that has not been considered contributing to adequacy. Note that, regarding the Opt-Out Volume without notification that is considered contributing to adequacy (towards Y-4 Auction or option IN towards Y-1 Auction), still the capacity on top of the derated Opt-Out Volume is allowed to participate in the Secondary Market.

## 5.4 Prequalification fast track

**Design proposal #18:**

A CRM Candidate that goes through the fast track Prequalification Process is automatically considered as submitting an opt-out notification and therefore has to comply with all above requirement related to such opt-out notification.

Capacity that goes through the fast track Prequalification Process – as further discussed and detailed in the design note *CRM Design Note: Prequalification & Pre-delivery Monitoring* – instead of the full Prequalification Process is by default considered as Opt-Out Volume.

Opt-Out Volume resulting from fast track prequalification, can still be classified into each of the three opt-out categories as discussed above: opt-out supported by definitive closure notification, opt-out supported by temporary closure notification or opt-out without closure notification. The same rules apply for Opt-Out Volume resulting from fast track prequalification with respect to the volume requirement. Note that without closure notification, a choice between 'IN' and 'OUT' (of which IN is the default choice as OUT has to be motivated) towards the Y-1 Auction is also required for capacity that has gone through the fast track Prequalification Process.

Consequences in terms of Secondary Market participation are different though, since a fast track prequalification never gives the right to participate in the Secondary Market. Indeed, capacity going through the fast track Prequalification Process is not duly prequalified. A full process prequalification is a prerequisite for being able to participate in the Secondary Market (and also the primary CRM Auction by the way).

## 5.5 Other considerations and practical implementations

**Design proposal #19:**

● An Opt-out notification regarding the Y-4 Auction towards a Delivery Period has no implications for the opt-out possibilities regarding the Y-1 Auction towards the same Delivery Period, meaning that the Opt-out notification may be changed.

● A reduction of the CRM Required Volume, if applicable, is done by means of a dummy Bid that is artificially introduced by the auctioneer. Such dummy Bid corresponds with a Bid at 0 €/MW/year, is not linked to a Capacity Provider and does not result in any contractual obligations.

● A Capacity Holder who does not submit a prequalification file, despite a legal obligation to do so as defined in the Electricity Law Art. 7undecies §4, is considered as submitting an Opt-out notification and always considered contributing to adequacy (category 'IN')

A Y-4 opt-out decision has no implications for Y-1 opt-out possibilities. This principle is based on the idea that conditions may change over time, and as such also choice to opt-out or not.

An opt-out notification during the Prequalification Process will be made related to the Nominal Reference Power level. Volume corrections, if required, will take into account a derated capacity volume to reflect the adequacy contributing volume. To this end, the predefined Derating Factor depending on the technology of the CMU will be applied. A partial opt-out will be derated by the same Derating Factor as a full opt-out.

For the sake of simplicity, an CRM Required Volume correction will always be done during the Auction process, by means of a dummy offer curve Bid (increase offer) instead of through a Demand Curve shift (reduce demand). In the end, both options lead to the same outcome. The dummy Bid will be an artificial Bid foreseen by the auctioneer (not implying any action of the CRM Candidate that has opted out) for the derated Opt-Out Volume to be corrected for, introduced by the auctioneer at 0 €/MW/year, not linked to a Prequalified CRM Candidate and not resulting in any contractual obligations.

The Electricity Law Art. 7undecies §4 requires all eligible production Capacity Holders to prequalify. In case this Capacity Holder does not enter a prequalification file, despite an obligation to do so and regardless of other legal implications this may have, its capacity will be considered as Opt-Out Volume and always assumed contributing to adequacy (category 'IN').

# 6 Validation of auction results and transparency

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

## 6.1 Validation of auction results

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

The precise implementation of the result validation process will be elaborated during the development phase of also other necessary tools and processes in the context of the CRM.

## 6.2 Transparency on Auction results

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

In what follows, the information that will be shared on the Auction results is further detailed into the following categories: information on the Auction clearing price, on the offered and selected capacity, and on the Opt-Out Volume. A schematic overview only for illustrative purposes on the Auction result categories of information that will be provided is given in Figure 19 below.

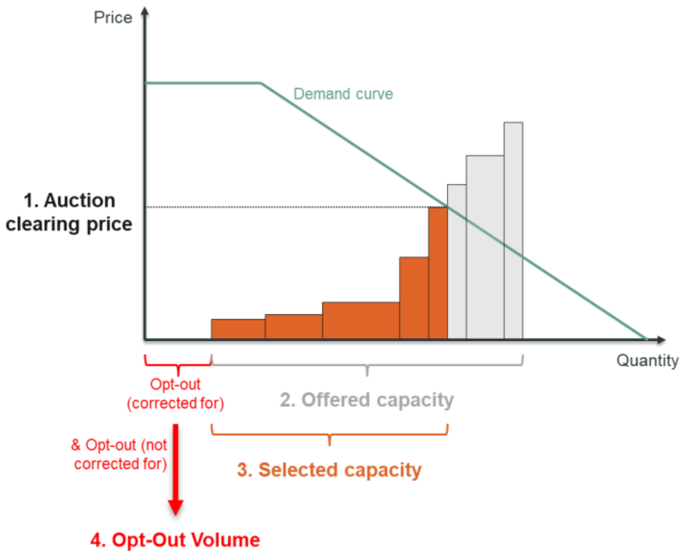


*Figure 19: Overview of Auction result information categories*

### 6.2.1 Auction clearing price

- The **Auction clearing price**, *in €/MW/year*. In case of pay-as-bid, the price of the most expensive selected Bid will be shared, as an approximation of the would-be Auction clearing price under pay-as-cleared.
- The **cross-border clearing prices**, *in €/MW/year per participating neighboring country*, determined as the most expensive selected Bid in each country. → This element provides information on the competitiveness of foreign capacity compared to Belgian capacity participating in the Belgian CRM.

### 6.2.2 Offered & selected capacity

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

Information on capacity volumes[10]:

- Capacity per Capacity **Contract Duration**, *in #MW with 1-year contract, #MW with 2-year contract, etc.*
- Capacity per **technology** according to the derating categories, *in #MW DSR (per SLA), #MW CCGT, etc.*
- Capacity per **country**, *in #MW in Belgium, #MW in France, etc.*

[10] Capacity volumes will be reported as derated capacities, unless stated otherwise.

- Capacity **TSO-connected vs. DSO-connected**, _in #MW TSO-connected and #MW DSO-connected_

On Bids into the Auction:

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

Specifically related to the monitoring process following up on new capacity being developed towards the Delivery Period and hence relevant for selected capacity only, a reporting will be done on the **evolution of selected capacity that requires monitoring** towards the Delivery Period, _in #MW monitored and #MW drop-out/delayed, etc. on a yearly basis_.

### 6.2.3 Opt-Out Volume

Specifically regarding Opt-Out Volume, information on capacity volumes will be shared, categorized into:

- Opt-Out Volume supported by **definitive closure (or structural capacity reduction) notification**, _in #MW_
- Opt-Out Volume supported by **temporary closure (or structural capacity reduction) notification**, _in #MW_
- Opt-Out Volume **without closure notification**, _in #MW contributing to adequacy and #MW not contributing to adequacy_

The above capacities will be reported in non-derated form, in line with how Opt-Out Volume is notified to the grid operator during the Prequalification Process. However, next to the above described information, the **total Opt-Out Volume assumed contributing to adequacy**, _in #MW (derated)_ will also be provided as this volume will impact the volume to be procured in the Auction (i.e. dummy bids).

Note that although no aggregated information is shared to all stakeholders at the end of the Prequalification Process, the information on offered capacity related to the Auction (Section 6.2.2) together with the information on Opt-Out Volume (Section 6.2.3) does give a full overview of the results of the Prequalification Process.

## 6.3 Transparency towards the start of the Delivery Period

Prior to the start of a Delivery Period, Elia will publish a report with aggregated information of the Contracted Capacities for that Delivery Period thereby indicating, amongst others, the remaining Capacity Contract Duration of different Contracted Capacities, the applicable Strike Price levels and the level of capacity corresponding to each Strike Price level. Such report should provide all market parties with the necessary (aggregated) information, allowing them, for instance, to be better informed on the link between the CRM and the energy market during the concerned Delivery Period.

The details of this reporting will be further developed towards the start of the first Delivery Period.

# CRM Design Note: Payback Obligation

2/10/2019

# Table of contents

# 1 Introduction & context

## 1.1 Context and Goal of the Design Note

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

In addition to this design note, a single detailed list of definitions will be provided and publically consulted upon. As several concepts are relevant for different design options, a centralized approach via a single list is opted for.

***About the public consultation***

This design note is put for formal public consultation and any remark, comment or suggestion is welcome. It builds further on the discussions and proposals already made in the different TF CRM meetings gathering all relevant stakeholders and in the follow-up committee, the latter consisting of representatives of the CREG and Elia, under the presidency of the FPS Economy.

This public consultation runs in parallel with a public consultation on other design notes. Reactions to this public consultation can be provided to Elia via the specific submission form on Elia's website no later than **Wednesday 30 October 2019 at 6pm**.

On 13 September 2019 a first set of design notes has already been launched by Elia for public consultation.[1]

Note that, in line with their roles and responsibilities and the foreseen governance in the Electricity Law, also the FPS Economy and the CREG will consult on aspects within their competence according to their procedures.

***Legal Framework***

The Law setting up a Capacity Remuneration Mechanism, adopted on April 4th 2019[2] (hereafter "CRM Law"), modifying the Electricity law of 29 April 1999 on the organization of the electricity market (hereafter "Electricity law") introduces the concept of a Reliability Option implying a Payback Obligation when the Reference Price exceeds the Strike Price.

In Art. 2 the following elements are defined:

- The Reliability Option ("Option de fiabilité / betrouwbaarheidsopties") is defined as (own translation): the mechanism for which the Capacity Provider has to re-imburse the positive difference between the Reference Price and the Strike Price
- The Reference Price ("prix de reference / referentie prijs") is defined as (own

[1] https://www.elia.be/en/public-consultation/20190913_formal-public-consultation-on-the-crm-design-notes-part-i
[2] http://www.ejustice.just.fgov.be/eli/wet/2019/04/22/2019012267/staatsblad

translation): “the price reflecting the price that should be obtained by the Capacity Providers on the market”.

- The Strike Price (“prix d’exercice / uitoefenprijs”) is defined as (own translation): ”the predefined price that determines the threshold above which the Capacity Provider has to pay-back difference with the Reference Price”.

In Art. 7undecies, §2 the CRM law further foresees the governance framework for the determination of the Strike Price and the Reference Price, foreseeing a vast consultation procedure of market actors, the FPS Economy and the regulator, prior to determining on the one hand the methodology for the determination of the proposal of this parameter (scope of this design note) and on the other hand the yearly calibration (based on the methodology in this design note, translated into a Royal Decree) and decision of this parameter.

## 1.2 Structure of the design note

The purpose of this design note is to address the methodology to define and calibrate the Strike Price & Reference Price in the Payback Obligation in order to reach a clear common understanding of the choices made and to determine the according rules.

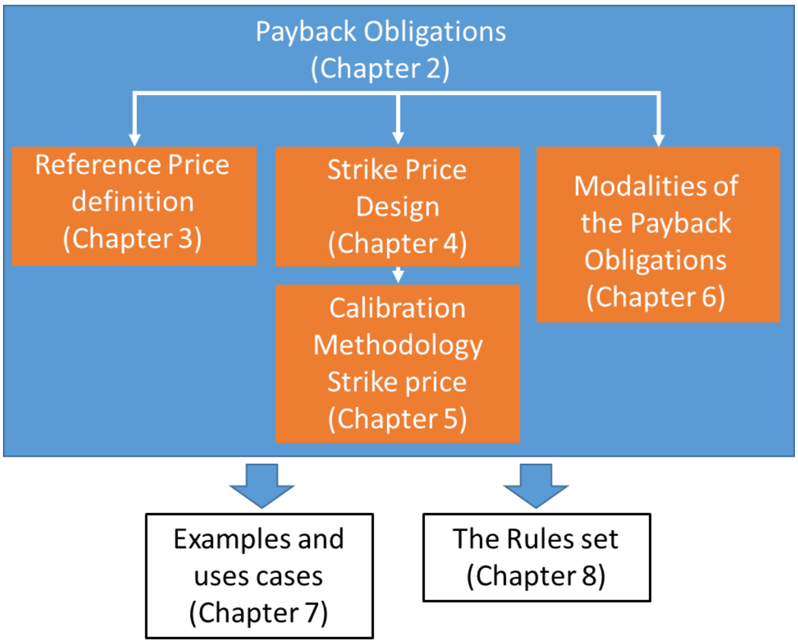


*Figure 1: Structure of the Design Note*

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

Chapter 3, based on the information developed in chapter 2, will explain the proposal for determining the Reference Price.

Chapter 4 will describe the proposal for determining the fundamental design of Strike Price. This is further supported directly in Chapter 5 by the methodology for the Strike Price calibration.

Finally, Chapter 6 aims to discuss other relevant complementary modalities related to the Payback Obligation.

Use Cases and examples that help the comprehension of the Payback Obligation concept are described in Chapter 7.

A summary of the design proposals finalizes the document in Chapter 8.

## 1.3 Concept of Reliability Option & Payback Obligation

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

*In a Reliability Option, the Capacity Provider receives a Capacity Remuneration from the CRM mechanism but 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).*

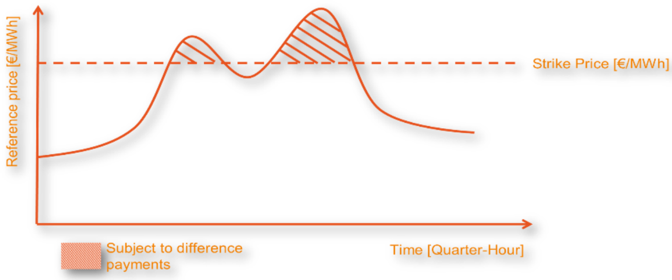


*Figure 2: Payback Obligation trigger concept*

In principle, such approach has typically two advantages for society.

Firstly, it contributes to the avoidance of windfall profits**.** As the Capacity Provider already receives a Capacity Remuneration on top of its 'normal' energy market revenues which – together - should cover all its costs, extreme energy prices would provide him with an extra, double remuneration insofar these revenues have not been accounted for when determining his offer price in the CRM. This would constitute a windfall profit.

Secondly, it strengthens the availability incentive. As the Capacity Providers are obliged to payback when the reference energy price exceeds the Strike Price and those moments will be strongly correlated with moments of (near-) scarcity, there is an extra incentive for Capacity Providers to be available for the system at such moments. 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 the Belgian CRM Framework and under the light of the Clean Energy Package and other European energy guidelines, the definition of the Payback Obligation is considered as a design element where several objectives and important considerations come together, amongst other: technology neutrality and openness, limitation of the overall CRM cost, windfall profit avoidance, respect of the Reliability option principle, limiting energy market interference, overall complexity avoidance and feasibility.

The strengthening of the availability incentive objective function has been considered as an upside of the Payback Obligation definition. Although in the proposed Belgian CRM design the availability incentive of the Reliability Option is recognized, other availability requirements are foreseen as well to make sure that the whole contracted capacity has sufficient incentives to deliver on its obligation and to ensure adequacy at system level.

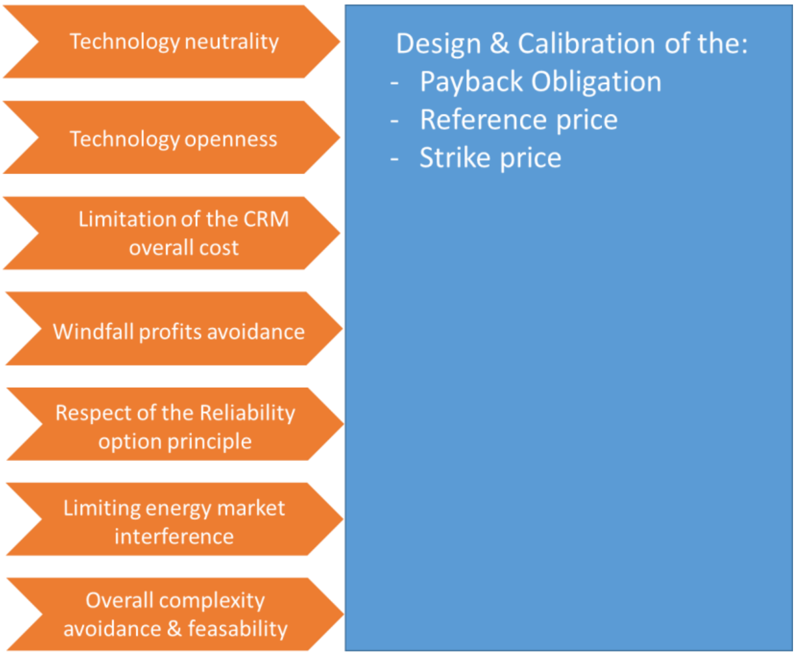


*Figure 3: Design & calibration of the Payback Obligation elements deals with several objectives and considerations*

It is fundamental to understand that each decision to re-inforce one element of the multi-objectives and considerations may influence on:

- Other objectives and considerations related to the Payback Obligation
- Impact on consistency with other CRM design elements

The design and the calibration therefore inevitably implies a trade-off, a compromise between the objectives and considerations. This element must be kept in mind at all stages of the proposal.

The objectives and considerations mentioned above are further detailed in Paragraph 1.3.

### 1.3.1 Technology neutrality

In the overall CRM design, the Payback Obligation and the definition of its parameters are driven by the consideration of technology neutrality at all steps. Technology neutrality should ensure a level playing field between technologies and aims at creating a homogeneous CRM design and product requirements. The importance of technology neutrality has also been demonstrated throughout the approval processes of earlier CRMs in Europe.

The rules are to be designed in order to make sure that all realistically potential technologies are able to participate in the CRM while taking into account their actual contribution to the Belgian adequacy (cf. Derating Factor rules presented in the Design Note 1).

One more concrete consequence to bear in mind is that technology neutrality should also imply the facilitation of the participation of aggregators to the CRM. Any differentiating based on technologies should not prevent aggregators from realistically participating (i.e. with a real chance to actually win a contract). As their added value typically lies in combining across multiple technologies, e.g. (smaller scale) generation, storage & DSR units, the rules should keep this in mind from the start.

### 1.3.2 Technology openness

The Clean Energy Package and other European guidelines consider technology openness as a main requirement for the design of the Market rules & methodologies. For instance, the Clean Energy Package in Art 22 §1 of the Energy Regulation states explicitly that capacity mechanism shall "[...] *be open to participation of all resources that are capable of providing the required technical performance, including energy storage and demand side management* [...]".

As long as a contribution to the Belgian Adequacy is ensured, the developed methodologies and rules have to ensure that there is no creation of undue entry barriers to the CRM.

It is to be avoided that the CRM design and also the Payback Obligation would create undue barriers for entry. Especially in the Strike Price design, the level of the Strike Price – if not well calibrated and not well embedded within a larger design – could risk to constitute such a barrier for entry. For instance, too low Strike Price levels not complemented with other design features (e.g. stop loss limits, cf. infra) may prevent the participation in the CRM from capacity characterized by higher short run marginal costs. Also the case of an aggregator possibly combining multiple technologies should not be confronted with unnecessary constraints, e.g. the number of different Strike Prices could impact this (cf. infra).

### 1.3.3 Limitation of the CRM overall cost

The Electricity Law clearly states that an important factor of the CRM is to limit its overall cost (cf. Art.7undecies, §1). In this respect it is crucial to not only address design elements individually, but also considering them within the bigger picture of the entire CRM. It could be that giving in (slightly) at one place in the CRM design could leverage more positively in terms of cost management elsewhere. In this context, allowing more technologies to participate to the CRM, by avoiding undue entry barriers, allows to increase the amount of participants and foster greater competition. Greater competition in the capacity auction by means of more technologies can only have a downward pressure on the overall CRM cost. In the context of the Payback Obligation, it is important to bear in mind that the impact design choices have on the potential for demand response to participate and create competition for (more conventional) generation technologies. A desired volume and price effect in the primary auction is to be traded off with for instance the impact on potential windfall profits resulting from Strike Price choices (cf. next section 1.3.4).

### 1.3.4 Windfall profits avoidance

In the energy market, the so-called “infra-marginal rent” of the participating asset is the difference between its market revenue and its marginal cost. Windfall profit (or a double remuneration) would arise when such inframarginal rents would reach levels that are not counted upon initially when investing in the capacity.

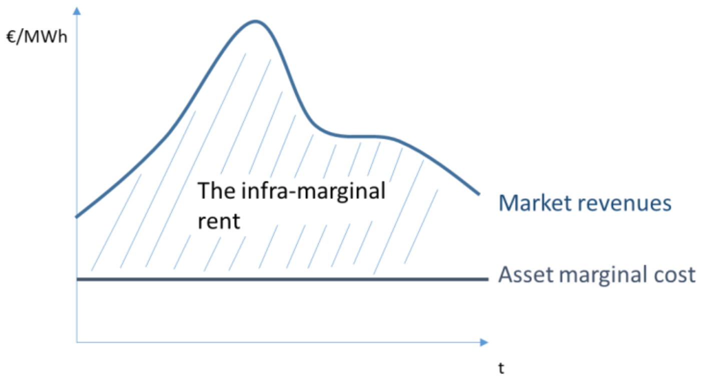


*Figure 4: Infra-Marginal rent concept*

This risk of windfall profits could exist in the CRM when the Capacity Provider receives a Capacity Remuneration from the CRM to complement its 'normal' energy market revenues. Together it should cover all its costs (incl. a fair remuneration for the investors). However, all extra unusual inframarginal rents originating from higher energy prices, that were not foreseen in the business case and hence not taken into account as market revenues in the CRM bid price, would provide an extra, double remuneration. This would constitute a windfall profit.

The windfall profit is thus the difference between the market revenues (or inframarginal rents) and a certain threshold defining the revenues that were taken into account in its Bid Price as revenue. Of course, such thresholds could vary from technology to technology and from investor to investor, for instance depending on his views on the future market outcomes as well as his risk appetite.

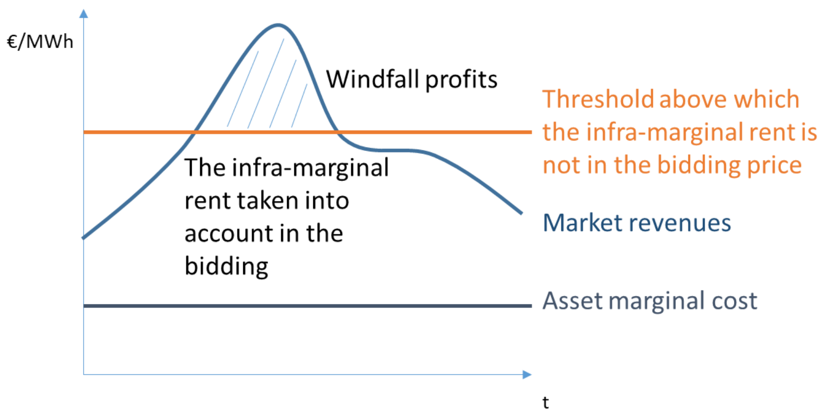


*Figure 5: Windfall profit definition*

The goal of the Payback Obligation requires thus a Strike Price and a Reference Price defined in order to limit as much as possible such windfall profits, not the least in case of 'extreme' energy market revenues.

### 1.3.5 Respect of the Reliability Option principle

The CRM law made the choice of a centralized Capacity Remuneration mechanism with a Reliability Option principle. This means that it should be sufficiently realistic that the Payback Obligation could occur. Otherwise, the principle put forward by the legislator remains hollow and without effect. Obviously, it is crucial to calibrate this prudently, in order not to overthrow the overall mechanism. This principle could easily be interpreted too strictly as well, particularly when taken together with the windfall profit avoidance, in such a way that a Payback Obligation would apply frequently, e.g. several times a year. Lower Strike Prices could achieve this. However, if the idea had been to capture *all* windfall profit perfectly and to have frequent paybacks, other mechanisms could have been more promising in the first place (e.g. based on contracts for differences). A more sensitive interpretation to the Payback Obligation in the context of this mechanism could lie in the avoidance of extremes, for instance the Payback Obligation should kick-in particularly at more extraordinary moments, e.g. when higher energy price levels (which could still be (far) below the price cap) occur. In this way the Payback Obligation provides a real protection to society and respects the overall principle.

### 1.3.6 Limiting energy market interference

The Design of the CRM rules (including the Payback Obligation aspects) should not hamper the good functioning of the energy market. A particular element is allowing a good assessment of energy market participants of the impact of Payback Obligation (and particularly Strike Price choices) on the price formation in the energy market. The more complex the Strike Price design would be, the more difficult the dynamics towards the energy market functioning could be, eventually even hampering its good functioning. From this perspective simplicity is to be preferred.

### 1.3.7 Overall complexity & feasibility

Feasible methodologies based on accurate logics that could be managed by all is key for the CRM. A manageable complexity of the CRM system is desirable in order to increase competition and limit the cost of the CRM, both in the development phase and in the risk aversion to uncertainty modelling within the CRM Bid Prices by the participants. Overly complex mechanisms, particularly in Strike Price design and calibration, risk in going beyond the effects. The more assumptions and choices needed, the more likely it is to make wrong choices. Also, the more complex the mechanism becomes, the less manageable it is. In this respect, feasibility also links to the overall market design in place. The Belgian energy market design is for instance characterized by portfolio bidding and comes with a specific degree of information sharing. Choices in, for instance, Strike Price design should bear in mind the available information on the Belgian market when for instance pursuing a calibration. For instance, by lack of a unit-based approach in the energy market (like for instance the case in more pool-based market organizations) there is also less information available on actual earnings and profits for individual assets, technologies and/or market players.

# 2 Overall Payback Obligation design

In this chapter, the proposed overall 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 according to which energy market revenues earned above a pre-defined threshold, the Strike Price, that will be applied to all CMUs of the CRM at all moments of their delivery period, will be reimbursed to society.

This calculation will occur for all participating technology types without distinction assuming that they all have access to the energy market respecting therefore the principles of technology neutrality and openness within the CRM design.

Finally, this Payback Obligation calculation will apply to all participating CMU's of a Capacity Provider for a defined operational period & obligated capacity. As presented in 1.3., a **positive** delta between the Reference Price and the Strike Price has to be applied on a CMU obligated capacity, at each moment of the delivery period, under pre-defined modalities. The modalities and possible exemptions related to the volume used for the calculation will be further detailed in Chapter 6. The amount that should be reimbursed is calculated **ex-post** in euro (€) by use of those modalities and when comparing the relevant Reference Strike & Strike Price.

The objectives and considerations of the Payback Obligation described in Paragraph 1.3 will be assessed carefully when developing the proposals for each constituting element, in particular: the Reference Price (chapter 3), Strike Price (chapter 4 & 5) and modalities of application (chapter 6).

## 2.2 The Payback Obligation formula

Obviously the application of the concept of Reliability Option on the Obligated Capacity becomes trickier when considering other elements of the CRM such as the various auctions and the secondary market.

The Payback Obligation formula is applicable for each individual participating CMU of a Capacity Provider. However, within a CMU, a distinction has to be made between its different obligations. 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.

Of course, each of these auctions or transactions' obligations is likely to have a different *Payback Obligated Capacity (CMU, t, Transaction Id).* This will be described in Chapter 6.

Finally, these different CMU Obligations may also have been contracted at different moments in time potentially corresponding to different Strike Prices: *Strike Price (CMU, at Transaction*

*Date).* This aspect will be covered in Chapter 4.

As a conclusion, the overall generic formula for a CMU Payback Obligation can be described as the sum of its Payback Obligations (being the positive delta between the common Reference Price and its Strike Price linked to each CMU Obligation transaction date) multiplied by the Obligated Capacity linked to the same transaction obligations.

**Design Proposal #1: The Payback Obligation Formula**

The Payback Obligation formula for a given CMU obligation is:

For all t hours where the CMU is under a Transaction Capacity,

*Payback Obligations (CMU, t) =*

*Sum on all Transactions of the CMU:*

*max[0; Reference Price (t) – Strike price (CMU, at Transaction Date)] * Payback Obligated Capacity(CMU, t, Transaction Id) [in €]*

The Reference Price formula is defined in Chapter 3 whereas Chapter 4 describes in detail the Strike Price (CMU, at Transaction Date). Calibration modalities are covered in Chapter 5.

The *Payback Obligated Capacity (CMU, t, Transaction Id)* is further defined in Chapter 6.

# 3 Reference Price design

The Reference Price should represent the most relevant energy market price signal (€/MWh) of the overall Belgian energy market revenue 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 define the amount of the Payback.

In this chapter, the rationale behind the choice of the Reference Price will be presented in details.

## 3.1 Reference market choice

Several aspects are described below in order to assess and finally propose the most suitable Reference Price in the Belgian CRM design:

### 3.1.1 A standardized, market-wide Reference Price is preferred in the Belgian context

In the Italian and Irish Reliability Options mechanisms, an individualization of the Reference Price by each contractor has been settled based on Day-Ahead Market (DAM), Intraday Market (IDM) and Balancing Market.

It is very unlikely to reach such individualized Reference Price per Unit in the current functioning of the 'Self-dispatching' on the DAM/IDM on a portfolio basis in Belgium as the level of information available in Belgium is not as high as in the above-mentioned countries. Indeed, there are no individualized offer curves in both DAM and IDM markets and a lot of trading happens within portfolios or over the counter, and it is hard to change it without affecting the good functioning of the energy market.

In this context, the complexity of the calibration of such individualized Reference Prices per CMU or even per technology would have led to arbitrary definitions of parameters creating niches for some technologies & assets compared to others. It would have then made the technology openness & neutrality criteria impossible to fulfill, next to impacting very significantly the functioning of the energy market itself.

Therefore, a standardized, market wide reference appears to be the simplest, most transparent, equal and "energy market"-compatible solution given the current Belgian Self-dispatching on the DAM/IDM markets.

### 3.1.2 The Day-Ahead Market is considered as most suitable standardized, market-wide reference in the Belgian context

To determine which market is deemed most suitable for observing the Reference Price, different market segments have been considered: Forward market, Day-Ahead market, Intraday Market and the Balancing Market.

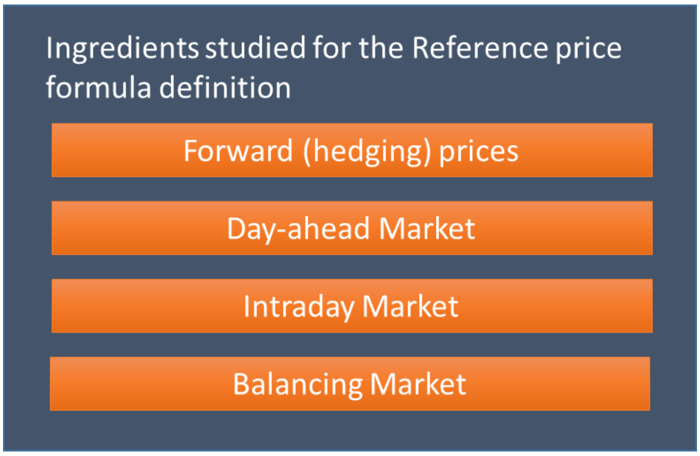


*Figure 6: Considered market segments for the Reference Price definition*

**Forward (hedging) prices**

The main issue with the forward prices inclusion in the Reference Price calculation to be used in a CRM lies in its granularity. forward prices are not closely enough linked to adequacy issues, there is for instance no hourly granularity on a day per day basis. Clearly, it also does not represent a sufficiently close signal to potential 'near scarcity' moments in the energy market (which is rather a matter of a few hours on a few days), even the shorter term available forward products still are not capable to actually distinguish between specific moments that are suffering from adequacy concerns from others.

Indeed, forward prices are driven by averages for certain delivery periods: the inclusion of these prices in a Reference Price formula might drastically lower the Reference Price. The dilution effect of these 'near-scarcity' events due to the 'average' of the forward price delivery period is too extreme to truly consider the inclusion of forward prices as (part of) the Reference Price

Also, the Forward market in Belgium is much less transparent and its liquidity is rather limited, compared to other market segments. Its accessibility, the bid-ask spreads identified and the quasi non-existence of peak prices indicate its limited potential as true reference market for the purpose of the Payback Obligation.

Nevertheless, one could wonder whether the hedging on Forward markets of the Capacity Providers would justify an exemption to the Payback Obligation. The question raised would be whether Capacity Providers run the risk of a Payback Obligation despite a potential absence of revenues earned in case of (near) scarcity (due to an absence on the market during these moments). In other words, should Capacity Providers payback when triggered by high spot prices whereas they had not captured high revenues in the first place (because of the hedging/forward volumes already sold at typically lower price levels than a Strike Price based on spot price levels)?

Whereas hedging on Forward markets is an inherent part of the functioning of the overall energy market, the choice to hedge (or not) in the end boils down to an individual market actor's choice driven by a risk management internal policy and for which no standard procedure applicable to all Capacity Providers exists. It is, for instance, very likely that some technologies such as demand response are far less active on Forward markets than others.

Uniformly applying exemptions would not be correct and applying it at individual level, i.e. at CMU-level, is not compatible with functioning and available transparency on the Forward market, which is not organized at CMU-level.

The question on whether such exemption on forward hedged volumes should apply raises a more fundamental question on forward price formation and whether particularly the "Forward backwardation principle" applies in this market in Belgium. As far as Elia can tell, the literature on the Energy markets was inconclusive on this topic and remains open whether forward prices do or do not include a sufficient and correctly calibrated premium to reflect (expected) high spot prices. For example, (Bessembinder and Lemmon, 2002) takes several assumptions on the functioning of the electricity market and states that the forward price is a linear formula of Expectancy, Variance and Skewness of spot prices. In practice, the model is insufficient as it relies on its own assumptions to assess the relation between both spot and forward prices. Other literature articles like (Boterrud 2009), (Lucia and Torro 2008) and others contributed to show that 'the Bessembinder and Lemmon realization' was not persistently observed. 'The Bessembinder and Lemmon realization' has been tested and is therefore not sufficiently validated by the empirical literature to be proven to be applied in the Belgian energy market context.

In conclusion, for the above reasons such exemption related to forward hedged volumes is not deemed appropriate in the context of the Payback Obligation in the Belgian CRM.

**Day-Ahead Market (DAM)**

The daily published hourly DAM prices provide a very interesting option to be considered as Reference Price in the case of a CRM. Indeed, the Day-Ahead market encompasses relevant drivers for adequacy. The main advantages for considering the Day-Ahead Market as Reference Price market are:

- The DAM represents the most relevant market signal related to adequacy issues 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. All program changes after the daily matching are rather considered as adjustments and managed via the market and ancillary services. Any structural, i.e. adequacy issues, to be expected are already identified at that time or should ultimately be revealed through the DAM.
- The previous element is further reinforced as after the Day-ahead matching, in the Belgian system, all BRPs have to present balanced portfolios (nomination DA at 3 PM) and at that unique moment, the entire market is considered as settled. This is a unique opportunity in the product timeline and it shows that the market is accessible to all desirable market parties.
- The DAM has a strong price signaling function and represents the strongest, most liquid spot market in Belgium. It is by far considered as the most accurate, liquid and transparent market in the Belgian electricity landscape with a traded volume estimated at 25-30% of the Total Load in Belgium. This figure must be considered as high given that the Belgian transactions in the Day-Ahead Market are portfolio based, meaning that only position nettings of the market actors appear. Indeed, it is not mandatory to trade the gross production and gross consumption positions apart. Most of the Belgian contracts nowadays

refer to this price signal as a reference for transaction settlements. Due to its fair and liquid price, almost all other products available in the Market are benchmarking their revenue expectations with the DAM for their asset volume allocation in their operational strategy.

- The Day-Ahead Market, due to its timing position in the spot markets, allows all technologies (e.g. also 'slow capacity') to react upon. Indeed, the adequacy goal is not a matter of speed or quick ramping like for flexibility. The use of the Day-Ahead Market as Reference Price ensures that some 'slower' technologies that are nevertheless reliable and useful assets for adequacy (e.g. slower generation units requiring a few hours to start-up or industrial demand processes requiring sufficient notification time to react) can also participate to the CRM. This contributes to the technology openness of the CRM.

Also in Elia's recent Adequacy & flexibility study for Belgium 2020-2030 study of June 2019, it is mentioned in page 7 that *"An electricity system is 'adequate' if there is sufficient capacity to meet the relevant needs (via generation, imports, storage, demand-side management and so on). Flexibility relates to the ability to cope with fluctuations between production and consumption due to the increasing volatility of generation"*. In the CRM design phase, it has been considered that all DAM relatively high prices are reflecting adequacy issues as it provides for the best summary of all system conditions (available generation portfolio, import contribution, impact of temperature on load, etc.). In contrast, short-term balancing prices reflect in the first place flexibility need. Not every flexibility problem is also an adequacy problem (e.g. high balancing prices on a summer day are possible, but are not likely to be the consequence of an adequacy issue).

For all the above reasons, the DAM is considered an appropriate reference market for the Payback Obligation in the Belgian CRM.

**Intraday Market (IDM)**

The possible inclusion of IDM has been considered. Its lack of liquidity undermines however the reference value of the market. Also the continuous pricing method (clearly limits the reference value as it is not straightforward to determine what precisely would be the Reference Price that could be used in a standardized manner. It currently doesn't represent or add an extra signal of adequacy compared to the Day-ahead Market.

Rather acting as an adjustment market, adequacy issues ought already to be identified in the day-ahead stage.

Also, the technology neutrality and level-playing field principle could suffer from the shorter lead times in Intraday compared to for instance Day-Ahead, e.g; up to only few hours in advance of their expected adequacy participation. Indeed, it is not possible for all technologies (e.g. slower generation capacity as well as industrial demand response with slower lead times) to react upon. In conclusion, it thus creates a bias towards a subset of faster assets and technologies while the adequacy need does not require it.

**Balancing market**

In the Belgian landscape, the Balancing prices are representing in the first place a flexibility signal rather than an adequacy signal. Indeed, most of the peak prices appearing in the balancing timeframe are related to the need to cover for a flexibility issue at moments where there is as such no any adequacy concern. Basing the Reference Price in an adequacy-oriented CRM on the Balancing price could result in many ‘false positive’ signals.

As argued on Intraday, a fortiori it is also impossible for all technologies to react upon Balancing prices within the same time frame and therefore it creates a competitive advantage for a subset of assets while the adequacy need does not require such short lead-time. This clearly could also affect the overall cost of the mechanism, as limiting to flexible technologies only may come at higher costs than allowing a larger set of (also slower ) technologies to participate.

### 3.1.3 Other Reference Price aspects

A number of other dimensions related to the Reference Price have been considered.

- **Ex-ante or ex-post Reference Price**

In the case of an ex-ante Reference Price, the coefficients of a Reference Price formula and its corresponding values are disclosed before the delivery period. This decreases the Market parties’ risks and would have, a priori, a virtuous impact on the CRM Cost.

In the case of an ex-post Reference Price, the coefficients of a Reference Price formula and its corresponding values are only revealed after the delivery period. This increases the market parties’ uncertainty and ends up priced in the Auction bid price as it creates an extra possible exposure for market parties.

An ex-ante approach is favored as this would be facilitating the market parties’ participation because of its simplicity and the lower risk exposure attached to it. Lowering risks in such way also contributes to lowering the overall cost of the mechanism.

Opting for the Day-ahead Market as (single) reference market follows this preference for an ex-ante solution.

- **Single or multiple Reference Price**

Multiple Strike Prices definition is the existence of a categorization of the Strike Price. This means that a Strike Price will be inherent to a feature of a participating CMU. The most common Multiple Strike Price differentiation element is the technology. In that case, it requires to assign a technology to each CMU. Being assimilated to a technology will automatically defines the Strike Price that will be applied to the CMU for its Payback Obligation calculation.

The question related to a single or multiple Reference Price is a key question when considering technology neutrality and complexity. Having multiple Reference Prices drawn on the different technologies present in the market would have led to a non-technology neutral situation as no unique solution would have been applicable to all technologies.

Besides, the calibration of these multiple Reference Prices would have an influence on the various technologies targeted by these prices. Any inaccuracy on the calibration could create a potential distortion of the capacity market by advantaging/dis-advantaging a technology in respect to the others. Furthermore, it would have potentially had an influence on Payback Obligation as well as it is calculated by differentiating the Reference and the Strike Prices.

### 3.1.4 Conclusion

For all reasons explained above, the proposal is to work with a strong, accessible, reliable and liquid market, ex ante Standardized Reference Price i.e. **the Day-Ahead Market price.**

**Design Proposal #2: Reference Price definition**

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

## 3.2 Choice of the specific Day Ahead NEMO

The Belgian Day-Ahead energy market allows for more than one power exchange (NEMO) to operate and provide a Day-Ahead Market price. Already today this multiple NEMO setting is a reality with both EPEX and Nordpoolspot being active.

For the CRM design and particularly the determination of the Reference Price, this is to be taken into account.

Given that in the energy market, all market actors are free to choose their NEMO Reference Price this should be followed in the Reference Price as well, i.e. leaving the choice to the Capacity Provider or Prequalified CRM Participant to select for each CMU the NEMO best fitting its own functioning on the energy market reference.

- EPEX Day-Ahead spot Belgium[3]

It is the most liquid exchange market related to the Day-Ahead transactions. Its gate closes at 11.30 am and its matching occurs daily around 12pm for delivery products of the day after. The current granularity is hourly.

- NordPool Day-Ahead spot Belgium[4]

It has been recently launched in Belgium and a matching occurring at 2.30 pm UK time. Its granularity is by half hour.

- Reference Price Day-Ahead Belgium (publication by ELIA)

It represents a publication of the Belgian zone Day-Ahead prices

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

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[3] https://www.belpex.be/market-results/the-market-today/dashboard/

[4] https://www.nordpoolgroup.com/

**Design Proposal #3: CMU choice of NEMO for its Reference Price**

A CRM participating 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)

Any contracted CMU can during the delivery period notify a modification of the NEMO choice for the Reference Price to Elia (and the Contractual Counterparty) up to 5 working days prior to a new calendar month of delivery, with the change being effective as from the 1st day of the next month.

In case of missing or conflicting data on its NEMO choice related to a specific CMU, the Reference Price Day-Ahead Belgium (publication by ELIA) will be used as fallback value.

For example, if no matching occurred on the delivery period dd/mm/20xx hh:mm on the EPEX spot Day-Ahead, then the ELIA Reference Price Day-Ahead published for the same delivery period will be applied.

**Design Proposal #4: modification of the Day-Ahead Reference Price & missing data**

The Capacity Provider has the possibility for each CMU to notify a modification of its earlier NEMO choice for the Belgian Day-Ahead Market Reference Price of a CMU up to 5 working days prior to a new month of delivery.

The change will be effective as from the 1st calendar day of the next month. In case of missing or conflicting data related to a specific CMU' NEMO choice, the Reference Price Day-Ahead Belgium (publication by ELIA) will be used as fall-back value. The Reference Price Day-Ahead Belgium is determined as the 'Belgian Bidding Zone Day-Ahead Reference Price'. The valid and binding price for the Belgian bidding zone is the single Day-Ahead coupling price ("Belgian SDAC Price") which is calculated by the Market Coupling Operator (MCO) function jointly performed by all Nominated Electricity Market Operators (NEMOs), and is published on the ENTSO-E Transparency Platform and on the websites of the Belgian NEMOs. (https://www.elia.be/fr/donnees-de-reseau/transport/prix-de-reference-day-ahead)

# 4 Strike Price design

## 4.1 Decision & Choice: storyline

As the Reference Price, the Strike Price definition is fundamental for the Payback Obligation and has a crucial impact on the assessment of the different objectives and considerations.

The design of the Strike Price encompasses several dimensions which together should bring an adequate trade-off related to the objectives and considerations.

○ **A single Strike Price is preferred over a multiple Strike Price(s)**

The number of Strike Prices applied for the Payback Obligation is obviously a crucial design element. Different options exist and have been studied and discussed with the stakeholders in the Task Force CRM preceding the launch of the public consultation on this note. In addition, two short surveys were organized among the stakeholders to gather early feedback allowing to better develop the current proposal.

Next to the existing practice in other European countries with Reliability Options, the use of a single Strike Price brings a number of advantages:

- In terms of level playing field and technology neutrality, it ensures a more homogeneous product with similar requirements laid upon every contracted capacity in the CRM.
- A single Strike Price is inherently less complex, both in assessing and appreciating the overall CRM design as well as for its (annual) calibration.
- The impact of a Single Strike Price towards the proper functioning of the energy market is more limited. For the energy market, it is relevant to understand how capacities active in the market are impacted by Payback Obligations and at which price levels those obligations become active.

Especially the first advantage related to the level playing field and homogenous product requirement is fundamental. Multiple Strike Prices (i.e. two or more) would typically rely on a differentiation based on technology starting from the hypothesis that different technologies have different cost structures and revenue expectations. For instance, short-run marginal costs of generation technologies are typically deemed lower than for demand response technologies and the energy price level as from which inframarginal rents in the energy market would no longer serve as necessary revenue but rather be considered as a so-called windfall profit could differ greatly.

Notwithstanding that it looks appealing at first glance to differentiate between Strike Price levels on a technology basis, particularly when dealing with the objective to avoid windfall profits and keeping costs low, a closer analysis reveals that this is not straightforward and that the perceived advantages are not necessarily correct:

- There exist many technologies, each with its own cost structures. This is true for various generation technologies (peakers versus based load, different fuel types, varying efficiency levels, varying ages of installations, etc). This is applicable for Demand Side Response and Storage as well. The activation price for demand response is typically distributed over a very large price range (going from a few hundred euros up to – theoretically – the Value of Lost Load). In order to correctly differentiate between technologies, a large set of (sub)-technologies should be distinguished. This raises at least questions on the complexity and feasibility of such approach. A reduction to for instance two groups (e.g. generation versus demand response) would be oversimplifying reality and overthrowing the goal of differentiating in the first place.

- If the Strike Price level was differentiated across technologies, this would clearly be with the intention to "manage" the revenues of such technologies. If the choice was to differentiate, in the CRM design, the product in such way to "correct" between technologies, wouldn't it be crucial to apply this principle more generally? In other words, shouldn't we have also considered differentiating the allowed revenue in the capacity auction of the CRM (e.g. via technology differentiated price caps), as capex levels and missing money levels are also not similar across technologies? This clearly goes beyond the purpose of the CRM and Reliability Option concepts as it would imply a full revenue regulation of the whole capacity participating in the CRM, rather than considering the CRM as a technology-neutral complement to the energy market.
- Finally, differentiating between Strike Price levels would create difficulties for aggregated portfolios to participate. As aggregators create added value by bringing together different technologies (e.g. complement small-scale generation with demand response and/or Storage), it would require either very arbitrary rules on how to assess the Strike Price of such aggregated, differentiated portfolio or it would result in obliging aggregators to compose portfolios within the same (sub)technology (e.g. aggregate Storage with Storage, metallurgy demand response with metallurgy demand response, small-scale CHP with small-scale CHP, etc.). This would hamper the added value and participation of aggregated portfolios in the CRM.

For the above reasons, a single Strike Price is preferred over multiple (two or more) Strike Prices.

- **The level of the Strike Price requires a careful trade-off**

The level of the single Strike Price is essential to respect a number of objectives and considerations of the Payback Obligation, but like with other design aspects, it unfortunately also implies a trade-off to be made.

Firstly, having a relatively low Strike Price compared to Spot Reference Price expectations better ensures that windfall profits could be avoided, particularly by technologies with lower short-run marginal costs. This argument of course only holds to the extent that inframarginal rents above the Strike Price would not normally be accounted for when determining the offer price in the CRM auction. If put too low, a low Strike Price could even risk in augmenting the cost of the capacity auction.

Secondly, a relatively high Strike Price scores well in terms of making the mechanism sufficiently technology open, particularly towards technologies with higher short-run marginal costs. They otherwise bear the risk of having a Payback Obligation while not being dispatched by the energy market in the first place. Although a higher Strike Price may avoid such effects to some extent, other measures (such as a Stop-Loss limit on the Payback Obligation) help mitigating this risk (cf. infra).

The trade-off between lower and higher Strike Prices is more subtle that simply preventing from windfall profits versus being more open towards some technologies. An important indirect effect is that thanks to a higher Strike Price, more technologies can be facilitated, this has the chance to create more competitive pressure in the CRM auction and thereby impact the capacity mix obtained and lower the overall cost of the CRM. Notwithstanding its relevance, a too narrow focus on the Strike Price oriented on windfall profit avoidance could backfire when zooming out and looking at the broader picture.

In conclusion, the Strike Price should be sufficiently high to ensure a realistic chance for all technologies to participate in the CRM. This is particularly relevant with respect to high SRMC technologies, not less for demand response. However, the Strike Price should not be excessive in order to respect the spirit of the CRM law, i.e. ensuring a Reliability Option with a Payback Obligation and to limit any windfall profits of lower SRMC-technologies, to the extent that not all inframarginal rents from the energy market are not accounted for in setting the CRM offer prices.

Chapter 5 will proposes a concrete calibration methodology bearing in mind the above conclusions.

The **Transparency** offered by a single and market-wide Strike Price towards the Energy market actors creates fairness and enhances competition in **a level playing field** and market-wide mechanism delivering a solution to the society SoS-issues. In the European energy context and the existing CRM, the same type of Strike Price has been settled in the Irish mechanism with a Strike Price level of 500€/MWh.

For the sake of clarity, all assets having a higher activation cost than the single Strike Price valuation are of course allowed to participate to the mechanism.

The **Simplicity & feasibility** of a single Strike Price development and follow-up is evident. Its simplicity will enhance competition with the participation of new type of technologies and market participants having the opportunity to acquire the required modelling for their auction bids.

As mentioned in Paragraph 1.3., the proposed Design is a trade-off of the multi-objectives function of the Payback Obligation. The choice of the Strike Price with all involved Stakeholders in the Tasks Forces was not straightforward as they have different interests.

For all these reasons, the Strike Price proposal is:

**Design Proposal #5: One Single Strike price choice**

One Single Strike Price will be applied to all Transactions of the CMUs at the same Transaction Date.

## 4.2 Strike price in time

Following Art. 7undecies §2 of the CRM Law, the determination of the Strike Price parameters will be decided by Ministerial Decree each year no later than 31/03 of that year. This means that the Strike Price could evolve over time and that contracts concluded as the result of one Auction do not necessarily include the same Strike Price as for contracts concluded following another Auction. In any case, prior to each Auction, the Strike Price applicable for the contracts that will be concluded following that Auction will be known upfront, allowing participants to duly factor in this information in their bids without further risks on the Strike Price level applicable on them.

It is proposed that the last published Strike Price will also be applicable for traded obligations in the Secondary market when calculating the due amount of the Payback Obligation. The timestamp of transaction notification will settle which Strike Price will be applicable: in the case of a Secondary Market transaction, the latest published Calibrated Strike Price will be used for the CMU taking over and delivering on the Obligation, this independently from the Initial Strike Price of the initial CMU selling its obligation. This element is further detailed in the design note dealing with Secondary Market arrangements.

Because of such Secondary Market deals, but even more due to multiyear contracts concluded from earlier Auctions and because of Y-4 and Y-1 auctions targeting the same delivery year do not necessarily rely on the same Strike Price, it is likely that in a given Delivery Period, several Strike Prices are active. Nevertheless, the Strike Price of an obligation is related to an Auction or to Secondary Market transactions for which the Strike Price was properly settled and known. The definition of the Single Strike Price remains valid for the entire period of delivery of the elected CMUs bid.

**Design Proposal #6: Update of the Strike Price**

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

For contracts covering more than one Delivery Period, the Strike Price is not updated during the lifetime of the contract.

The last published Strike Price will also be applicable for Transactions in the Secondary market when calculating the due amount of the Payback Obligation. The timestamp of transaction notification as known by Elia will settle the Strike Price of a CMU Secondary Market transaction.

One Single Strike Price will be applied to all Transactions of the CMUs at the same Transaction Date:

*Strike Price (CMU, t, Transaction Id) = Calibrated Strike Price (Transaction Date) [€/MWh]*

Where *Calibrated Strike price (Transaction Date)* represents the value of the Strike price actualization at the Transaction Date. The methodology & calculation of the Strike price calibration will be defined in Chapter 5 – Strike price calibration.

The yearly Strike Price calibration result will be described in Chapter 5 Calibration of Strike Price. As a Specific CMU may trade different obligations for the same Delivery Period at different moments, it is important to distinguish the related Strike Prices per obligation in the Payback Obligation calculation.

This leads to a principle of a Single Strike Price associated to a CMU elected bid for an Auction result period. In case of a transfer of obligation via the Secondary Market, the latest published Strike Price at notification for the related delivery year will be applied to the new 'Obligated' Party.

**Example 1: Primary Auction**

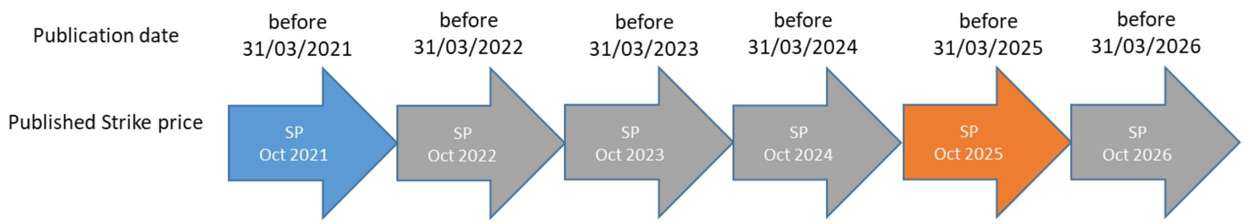



*Figure 7: Strike Price update considered for an Auction*

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)

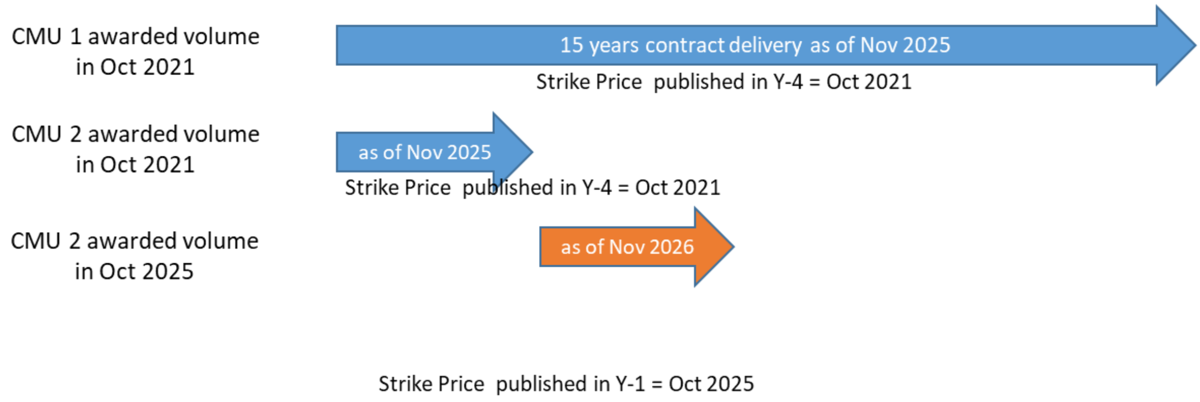



*Figure 8: Example 1: different Strike Prices for the same Delivery Period*

- ⇨ CMU1 will be guaranteed on the same Strike Price for the Delivery Period [Nov 2025 – Oct 2039]
- ⇨ 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]

**Example 2: Secondary Market transactions based on Example 1**

In August 2025, a Secondary Market Transaction occurs : CMU 1 releases part of its obligation to CMU2 for the period of Nov 2026 until Oct 2028 included.

The Strike Price has been updated before March 31st 2025 ➔ before Oct 2025.

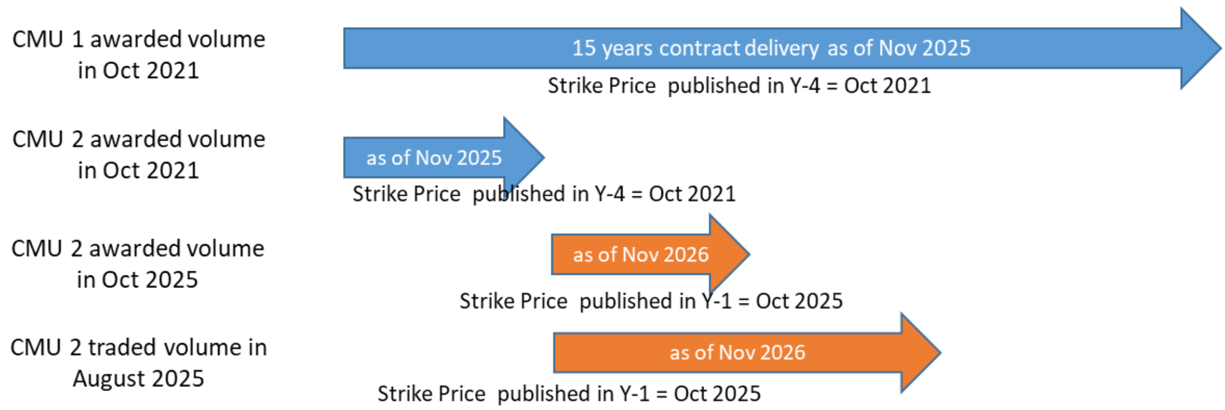



*Figure 9: Example 2: different Strike Prices for the same delivery period*

- ⇨ For the considered Transaction Period, CMU 1 keeps on Strike Price published before Oct 2021 for its remaining volume

- ⇨ CMU 2 has two obligations with the same Strike Price for the Delivery Period Nov 2025 – Oct 2026

⇨ If CMU 2 is awarded in Y-1 auction Nov 2026 of capacities for Nov 2027-Oct 2028, the Strike Price will be different for the same period than the one applied for its Secondary Market transaction (of August 2025).

It is then possible to summarize the Strike Price of a specific CMU valid for a specific obligation (selected or traded at a specific date).

# 5 Calibration methodology of the Strike Price

As mentioned in the Chapter 4, the Strike Price will be calibrated yearly and determined via Ministerial Decree no later than March 31st prior to the Y-4 and Y-1 Auctions. It is the purpose of the current chapter 5 to define the methodologies for the calibration of the Strike Price in line with the design principles already described in the previous chapter.

## 5.1 Considerations and objectives of the Payback Obligation

As previously presented in paragraph 1.3., the Payback Obligation and the Strike Price should take into account considerations and objectives of the CRM. These include technology neutrality and openness, limitation of the CRM overall cost, windfall profits avoidance, insurance of a functioning reliability option principle and keeping the complexity of the CRM under control. These considerations and objectives remain essential when calibrating the Strike Price level.

As pointed out in the previous chapter, particularly technology openness and windfall profit avoidance are directly impacted by the Strike Price level, but the other objectives and considerations should not be overlooked as they could be indirectly impacted.

## 5.2 Calibration methodology

When developing a methodology, it is deemed important that the outcome of the methodology can be considered objective, tailored to the situation and its calculation is transparent.

Therefore, the proposed calibration methodology relies on observable, measurable and tangible data from the Belgian Day-Ahead Markets. Note that looking at the Belgian DAM is overall coherent with other design aspects such as the choice of the Reference Price, the functioning of the Availability Monitoring Mechanism, etc. In general, the reasons justifying the choice of the Belgian DAM for those aspects remain valid here.

The hourly DAM market offer and demand curves are transparent and are fair signals of the sensitivity to price of capacity present in the Belgian energy market. Although prices have not necessarily often reached high (or extreme) levels, those curves reflect real market behaviors and correspond to actual prices market parties of various technologies are willing to pay/accept in return for energy.

In a nutshell, the proposed methodology boils to the following:

> The Strike Price should be set at a price level within a pre-specified range, that ensures that a reasonable volume of capacity was offered in DAM, would be selected in the DAM prior to reaching the Strike Price level. To assess this price level, a rolling window of historical DAM curves will be used, complemented where needed with further considerations on the market.

More concretely, this methodology aims to collect historical hourly offer and demand curves of all Belgian DAM Markets (i.e. EPEX Spot and Nordpoolspot) and to use these data to construct an aggregated curve indicating the DAM participation (expressed as volume) as function of the price level.

Before using such data, relevant pre-filtering is done to be consistent with and focus on adequacy relevant moments. Therefore, and in line with earlier practice for assessing market response volumes, only weekly peak hours during the Winter period are used. More specifically this concerns: Months November to March, hours [8:00 to 20:00[, weekdays only. At least the so-called aggregated curves provided by the NEMOs shall be used. It will be further investigated how also the volumes in more complex bid types can be incorporated or estimated in the approach depicted below.

In a 1st step, all demand and offers curves of the Belgian Day-Ahead Markets must be collected (this includes their prices and their volumes). A first filter is then applied, for timing matters, by considering only the last 3 Winter periods in the calculation. Limiting to only recent periods allows to factor in market evolutions, such as the emergence of market response or other technologies. By using three Winters rather than only one outlier, effects are smoothened as DAM participation levels may be subject to exogenous effects (e.g. general economic situation or alike). Next to filtering to the relevant dataset (cf. above), all prices of the offer and demand curves below 0 €/MWh and at the market price cap are excluded of the datasets as they are not considered as market prices reacting to adequacy matters, these are considered as inelastic. The simple blocks, linked blocks, exclusive groups or loop blocks are not considered. In other words, it is reasonable to assume that these volumes would have (been) offered/asked at a higher price cap (at any price) if it had been needed/possible. This for instance due to BRPs needing to complete their portfolio balance.

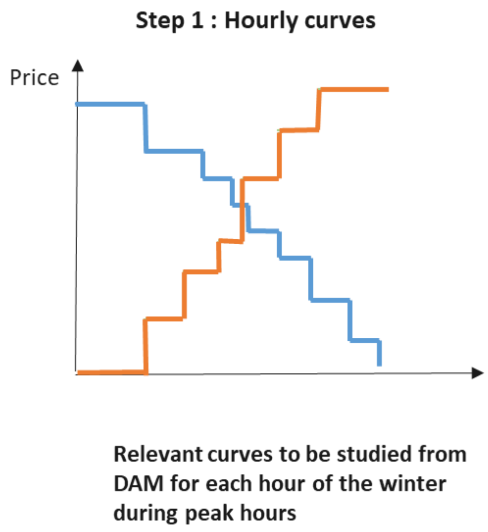



*Figure 10: Concept of elastic hourly demand and offer curves*

As the Belgian Day-Ahead Markets offer and demand curves are built by netting the market parties portfolio positions, both have to be considered at the same level of price sensitivity. It is not possible to distinguish, from the demand and offer curves, the volumes related to production assets or demand assets that could be participating in the CRM. As a consequence, it is necessary to sum up their contribution.

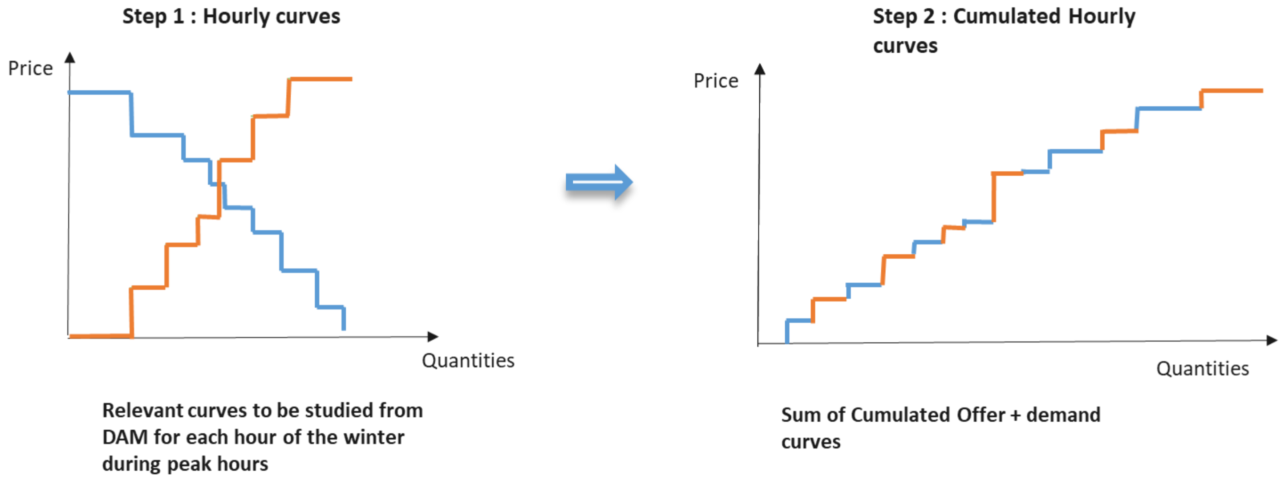



*Figure 11: From the elastic hourly demand and offer curves to a Day-Ahead Market cumulative price sensitivity curve*

In a second step, all orders are sorted according to their price levels. This provides an hourly cumulative curve.

In a third step, an average cumulative curve for a Winter period is determined. A simple average from the sum of all demand and offer curves of all Belgian Day-Ahead markets leads to a result of a quantity reacting to prices for a considered Winter weekly peak period. From this cumulated curve, the Winter hourly average total quantity reacting to price in Belgium can be deducted. It is the maximal value of the Simple Average of the Sum of Cumulated offer + demand curve of all Belgian Day-Ahead markets (see green dot on the Fig. 12).

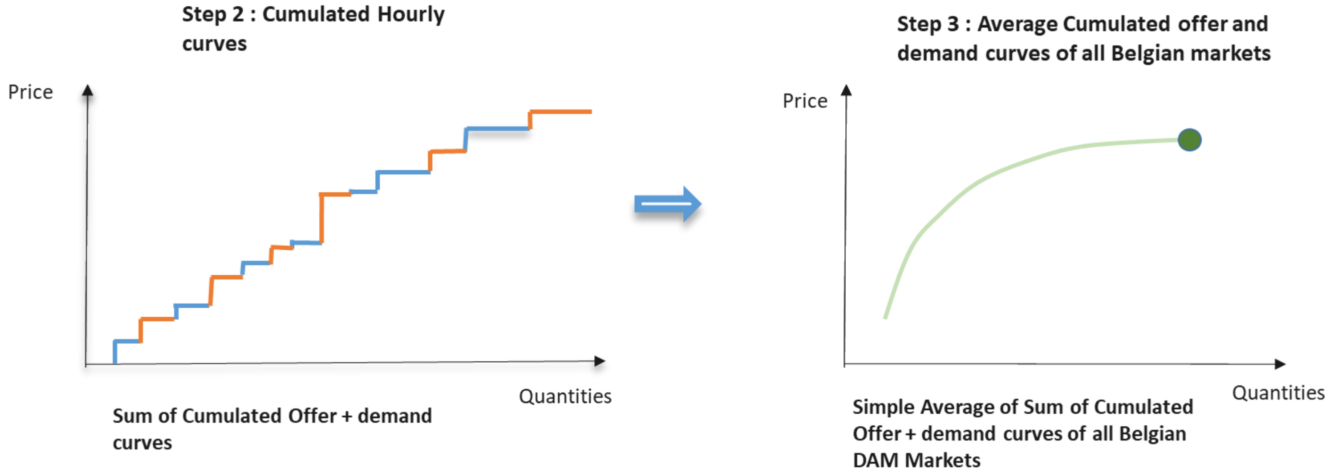



*Figure 12: Winter weekly peak hours aggregation of Day ahead Market cumulative price sensitivity curve*

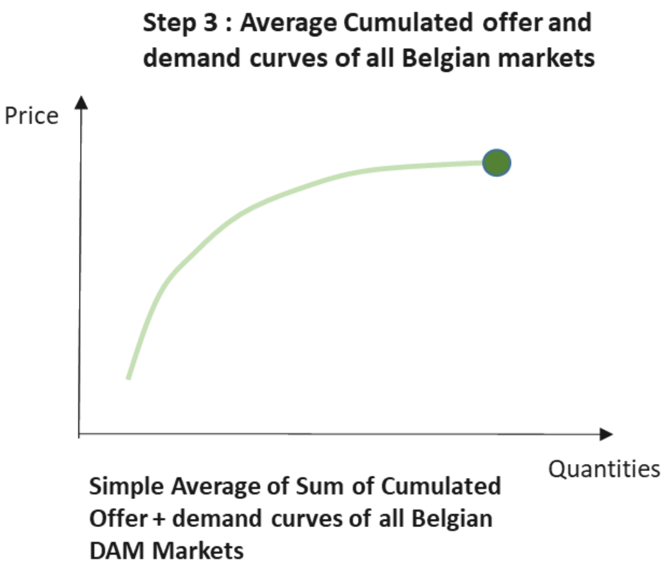



*Figure 13: Determination of the Maximal quantity of a Winter weekly peak hours cumulative price sensitivity curve*

In step 4, the quantities of the dataset of the Winter (by looking at them cumulatively) are divided by the Maximal volume of the Simple average of Sum of cumulated offer and demand curves. This gives a common percentage of the offer and demand reacting to a market price.

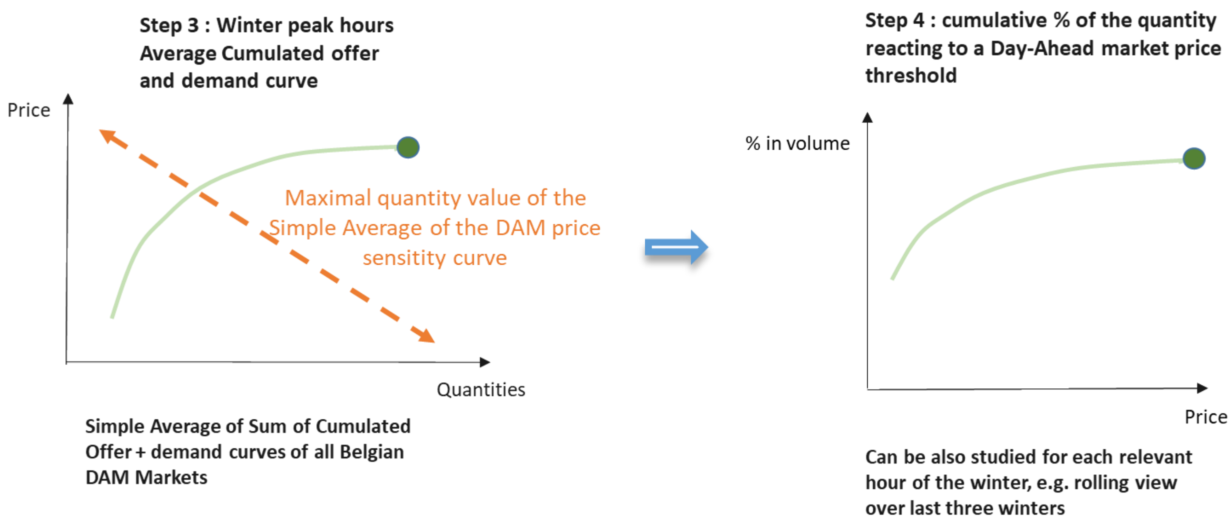



*Figure 14: Normalization of the Winter weekly peak hours cumulative price sensitivity curve*

Having repeated this for each considered Winter in step 5, the weighted average (Maximal volume based (see Fig. 14)) of the three last Winter's curves is deducted in step 6. From this latter curve, the DAM participation rate (% in volume) at various price levels can be observed.

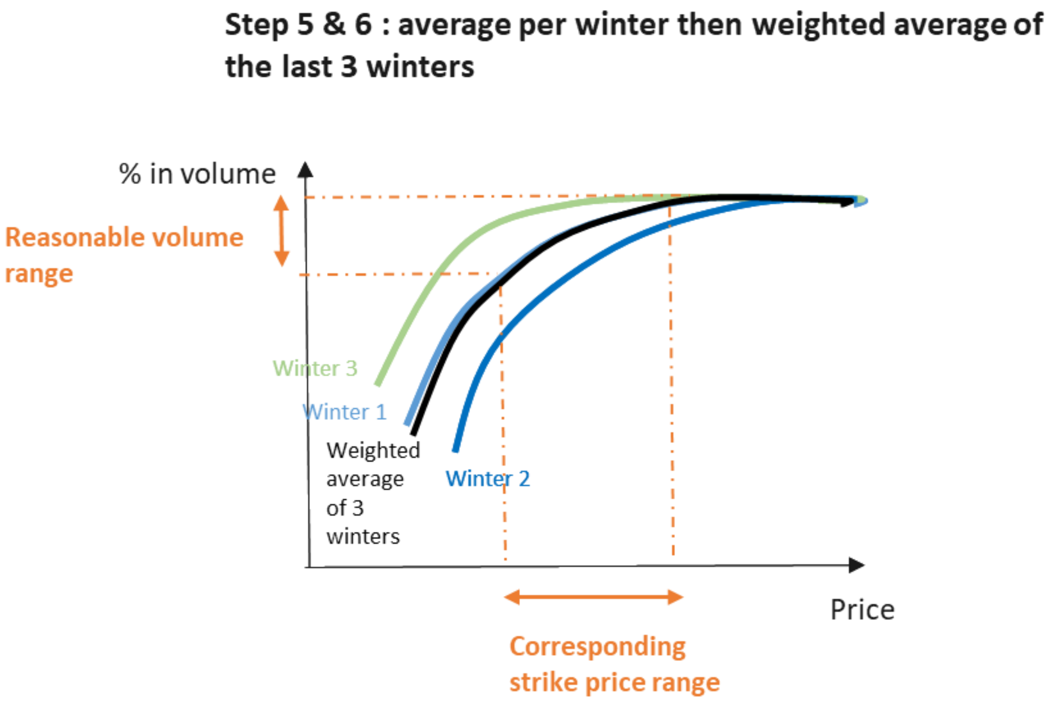



*Figure 15: Weighted Average (Maximal volume based) of the last three Winters weekly peak hours cumulative price sensitivity curve*

To finally calibrate the Strike Price at a certain level, a "% in volume" is to be chosen at which a Strike Price level corresponds. It is proposed that the methodology (to be set in a Royal Decree) specifies a range of such percentages, thereby already limiting the Strike Price levels that could result, but still leaving the necessary margin to interpret the curve (e.g. in terms of inflection point, flat areas where changing the Strike Price level hardly impacts the volume accommodated, etc.) and to take into account other relevant aspects.

It is to be noted that by such approach two important objectives and considerations can be covered in a quantitative and objective manner. The % in volume of DAM participation is a clear indicator of the technology openness of the Strike Price level choice. The higher the percentage chosen, the higher the volume that is facilitated. On the other hand, the resulting price levels are indicative to the risk of windfall profits, the lower the price level, the smaller the risk of windfall profits.

For example the exercise has been done on the last 4 Winters average and is giving the following results:

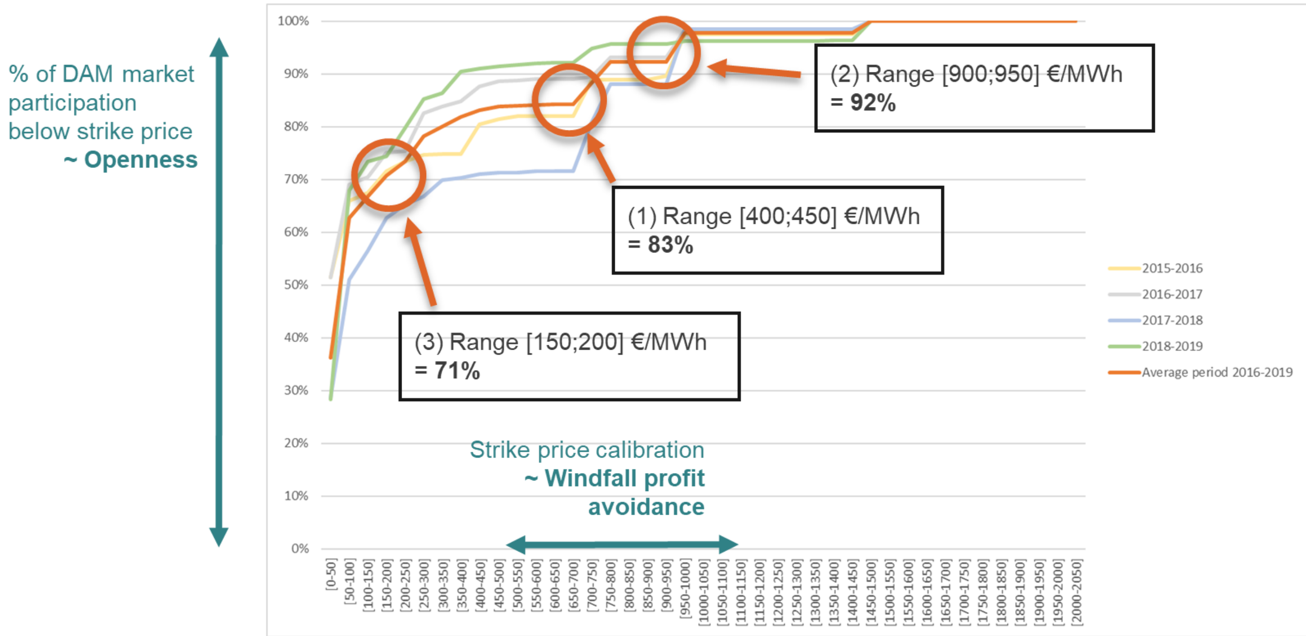



*Figure 16: Example of Calibration curve of the last 4 Winters and Average*

The Strike Price Calibration and its methodology are now relying on the % range of quantities defined as reasonable volume below the Strike Price.

It is proposed is to apply a range of percentage range between [70; 90] % in order to calibrate the yearly update of the Strike Price. The definition of this % range as going from 70% to 90% is based on the observed shapes of the average calibration curve observed for the last 3 years for Winter weekly peak hours: whether the curve is reaching a flat area ("plateau") at the lower/upper bound of the cumulated % level and whether the inflection points are sufficiently "within range". The 70% is, a fortiori, a floor under which the inframarginal rent is decreasing severely as the windfall profit possibility while at the same time the technology openness is limited.

At the opposite, the 90% is creating a cap above which it is implying that the windfall profits are appearing in disproportionate growth while at the same time technology is openness is reaching a major potential of new participating assets.

In the rolling process, the percentage within the range that will define the Strike Price level will be yearly carefully assessed and proposed to the Minister following a study on the shape of the average calibration curve observed (applied to the 3 previous Winters, for weekly peak hours) e.g. whether the curve is reaching a plateau at the lower/upper bound of the cumulated % level. This will be evaluated taking into account clear and observable market evolutions possibly having an impact on prices & market actors' reactions while at the same time having a willingness to stabilize the Strike Price over time.

For all these elements,

**Design Proposal #7: Calibration of the Strike Price**

Within the One single Strike Price applicable to all Transactions of the CMU's at the same Transaction Date, a *Calibrated Strike Price (obligation transaction date)* is required:

Once a year and before March 31st:

Considering the construction of a *calibration curve* equal to the Weighted average of the last previous 3 Winters (November 1st to March 31st) of the sum of all the weekly peak hours (weekdays from [8:00 to 20:00[) gathering the elastic part of the cumulative hourly offer and demand curves of all Day-Ahead Belgian Market exchanges (which are taken as couple of prices €/MWh and cumulative quantities in MW) modelled by the following formula:

$$= \begin{matrix} \mathit{Weighted\ Average} \\ \mathit{on\ 3\ last\ Winters\ of} \end{matrix} \sum_{i=1}^{\substack{\mathit{All\ Winter} \\ \mathit{Peak\ hours}}} \sum_{j=1}^{\substack{\mathit{All\ Belgian} \\ \mathit{DA\ Markets}}} \begin{matrix} \mathit{Elastic\ Part\ of\ demand\ curve}\ (i,j) \\ + \\ \mathit{Elastic\ Part\ of\ offer\ curve}\ (i,j) \end{matrix} \Bigg/ \begin{matrix} \mathit{Number} \\ \mathit{of\ peaks} \\ \mathit{hours\ of} \\ \mathit{Winter} \end{matrix}$$

The Elastic part of the cumulative hourly demand and offer curves is including all registered orders except the simple blocks, linked blocks, exclusive groups or loop blocks, and the ones below or equal to a price of zero and the ones at market Price Cap.

The volume part of the constructed curve will be normalized for the quantities part leading to a curve representing a % range of quantities with their corresponding prices in €/MWh.

The weighted average on the last three Winters will be volume based using the Winter Maximal volume of the Simple average of Sum of cumulative offer and cumulative demand curves.

A Calibrated Strike Price (in €/MWh) will be selected for the next publication date on the calibration curve which will represent a % range of cumulated volume of reaction within a range of [70;90]%

The selected Strike Price level and % within the predefined range shall take into account:

 The shape of the average calibration curve observed (applied to the 3 previous Winters, for weekly peak hours): whether the curve is reaching a plateau at the lower/upper bound of the cumulated % level

 Market evolutions possibly having an impact on prices & market actors' reactions

 The stability of the Strike Price over time

The *Calibrated Strike Price* will be settled for all Transactions of the Primary Market selected and Secondary Market traded at a transaction date above or equal to its publication date and before the next *Calibrated Strike Price* publication date.

➔*Calibrated Strike Price (at Transaction date) = Calibrated Strike Price (at publication date)*

# 6 Modalities of Payback Obligation

The main ingredients of the Payback Obligation, i.e. the Reference and Strike Price, have been described in the precedent Chapters. It is, however, key to complete the Payback Obligation with the necessary modalities of application of this Calibrated Strike Price, such as 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. Nevertheless, it is reasonable to take into account a number of corrections to this general principle.

In the Payback Obligation part of the formula introduced in chapter 2, it is crucial to clearly determine the *Payback Obligated volume(CMU, t, Transaction Id)*:

*max[0; Reference Price (t) – Strike Price (CMU, at Obligation id transaction date)] * Payback Obligated Volume (CMU, t, Transaction Id)*

This chapter defines this concept further (6.1) and introduces three particular elements:

- The Availability Ratio (t) (6.2)
- The Load Following Ratio (t) (6.3)
- Application of the Payback Obligation on CMUs with an Energy-Constrained service level (6.4)
- Stop-Loss limit on the Payback Obligation (6.5)

## 6.1 Payback Obligated volume of an obligation

The *Payback Obligated Capacity (CMU, t, Transaction Id)* is the total of hourly capacity in MW on which the Payback obligation will be applied. It will be of course related to the Transaction Capacity of the CMU but should also include all types of exemption.

As each obligation of the CMU hasn't been contracted in the same Market (Primary or Secondary) and hasn't been contracted at the same moment with the same Payback Obligation parameter (Strike Price), it is important to differentiate the calculation and to introduce the *Transaction Id* which is representing the identification of a CMU Obligation linked to a specific Transaction. This Transaction Id is related to a Transaction.

In the paragraphs 6.2. and 6.3., the two ratios of Availability and Load following will be defined. These ratios will correct the Payback Obligated Capacity (CMU, t, Transaction Id) and may decrease the Payback Obligation.

**Design Proposal #8: Payback Obligated volume definition**

Payback Obligated Capacity (CMU, t, Transaction Id) = Transaction Capacity (CMU, t, Transaction Id) * Availability Ratio (CMU, t) * Load Following Ratio (t)

## 6.2 Availability Ratio

The Payback Obligation targets the re-imbursement to society of any earned revenues above a pre-defined Strike Price. To the extent it is reasonable to assume that for such a moment the revenues have not been earned in the first place (and thereby no unreasonably high inframarginal rents would have been earned), it is also reasonable not to require a payback during those moments. Otherwise, this would unnecessarily increase risks that would be priced in the bids in the Auction, thereby risking to increase the overall cost of the mechanism.

Therefore, it is proposed that all planned and unplanned unavailabilities (e.g. planned maintenance, forced outages,…) as also considered according to the Product Availability & Monitoring design, are exempted of the Payback Obligation calculation to the extent of their unavailability. Note that this only concerns unavailabilities that have been duly communicated to Elia.

As explained above, such exemption allows a better risk management by the Capacity Provider, while at the same time it does not dilute the incentives for Capacity Providers to be available. As moments with the Reference Price exceeding the Strike Price are in principle also moments during which other availability obligations apply (with penalties), there is an incentive to continue to deliver on the service.

This is summarized in the Availability ratio (t) on which the Payback Obligation is due.

**Design Proposal #9: Availability Ratio definition**

For a CMU the Availability Ratio (t) equals:

MIN[1; [Available Capacity (CMU, t)) / Obligated Capacity (CMU, t)]

This value is always lying between 0 and 1.

## 6.3 Load Following Ratio

The CRM will be dimensioned in such a way that Belgian adequacy needs can be met. In a very simplified manner the CRM could be considered as being dimensioned to cover for the Belgian Reference Peak Load. This means that the sum of contracted capacities should equal the Reference Peak Load.[5]

Of course, (near-)scarcity moments and moments where the Strike Price exceeding the Reference Price can occur at moments during which the Total Load is lower than the Reference Peak Load for which the system has been dimensioned. As the CRM targets availability rather than delivery of energy, it is logical that at such moment not all contracted capacities are dispatched via the energy market. For instance, if the CRM is dimensioned for

[5] Obviously, such simplified view ignores several elements such as opt-out volumes, corrections for non-eligible volumes. Also it by no means intends to capture the subtleties related to the determination of the actual volume to be procured, i.e.. by means of a demand curve.

a Reference Peak Load of 14 GW and the moment that a Payback Obligation would be applicable, the Total Load is only 12 GW, it is reasonable to assume that 2 GW of the contracted capacities won't be delivering energy in the energy market (but are nevertheless available to do so).

Therefore, a ratio with a maximal value of 1 will be applied in the Payback Obligation formula. This ensures that the Payback Obligation is proportionate to the actual Total Load level whereas the Belgian Load Following Ratio (t) is defined as the Total Load at t moment divided by the dimensioning Reference Peak Load level for that Delivery Period. In the above example the ratio (t) would equal 12 GW/14 GW = 0,8571.

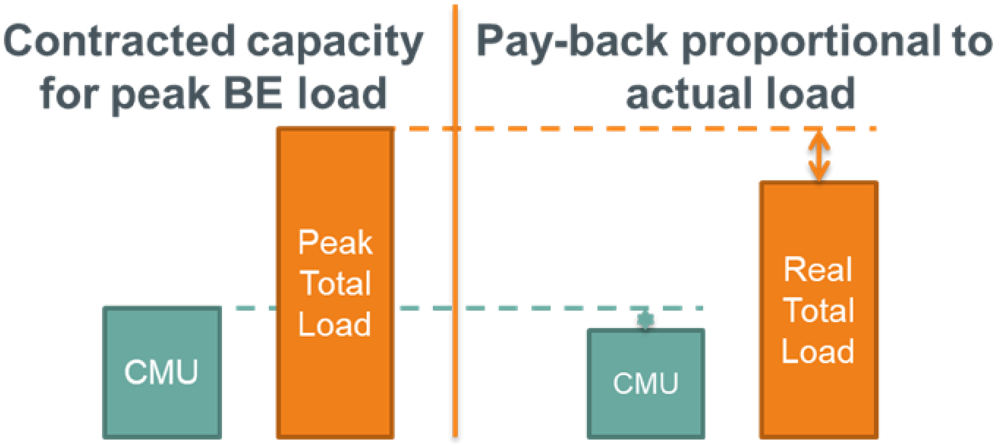



*Figure 17: Load Following ratio applied in the Payback Obligation formula*

**Design Proposal #10: Load Following Ratio definition**

For all CMUs the Load Following Ratio (t) equals:

min [1; [Total Load (t) / Reference Peak Load (t)]]

This value is always lying between 0 and 1.

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

In the Prequalification phase, it is possible for the Capacity Provider or Prequalified CRM Candidate of Energy Constrained Asset or aggregate to select a SLA (Service Level Agreement), implying that its participation to adequacy is limited in to a predefined set of consecutive hours in the day.

As the Energy Constrained CMUs are allowed to trade and take over extra obligations in the Secondary Market outside of their SLA hours (see Design Note 7 Secondary Market), it is required to impose the Payback Obligation on these hours and their Transaction Capacities.

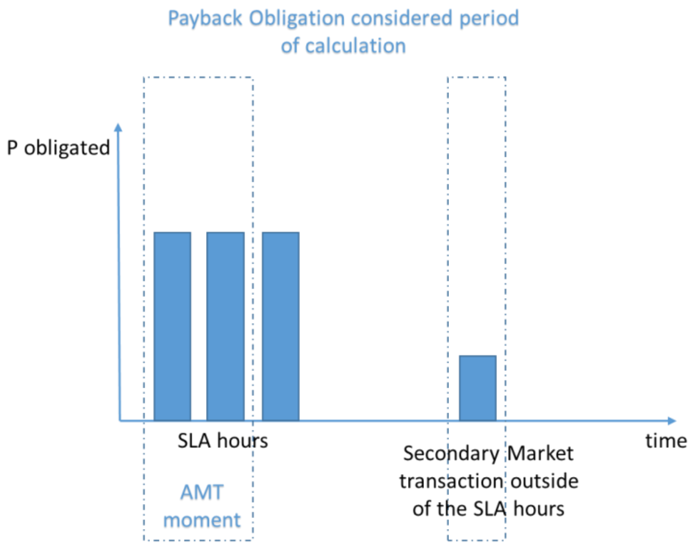



*Figure 17: Energy Constrained considered period for Payback Obligation calculation*

As the Payback Obligation is calculated on the Transaction Capacities, an exemption outside of the committed SLA should occur for the Energy Constrained CMU.

As described in the De-rating factors Design Note and the Availability Requirements and Penalties Design Note, the considered hours regarding the SLA are known and the Payback Obligation will be applied on those.

It is a reasonable assumption that the Strike Price level will be above the P AMT which will define the AMT moments. Therefore, in case of Day Ahead market prices above the Strike Price level, those moments will be considered as AMT moments. The main objective of this exemption is to select the hours of application of the formula during an AMT moment for the assets under a SLA.

**Design Proposal #11: Payment exemption outside of the SLA hours and extra hourly Transaction Periods for the Energy Constrained CMU**

The Payback Obligation is due at any period of the Transaction for which the AMT moments are considered for Penalties according to the CMU SLA for the Energy Constrained CMU. It is also due for any other period of its extra Secondary Market hourly Transactions (during the SLA hours and non-SLA hours).

## 6.5 Stop-Loss limit on the Payback Obligation

The Payback Obligation has obviously a very clear interaction with the energy market and – as discussed when designing and calibrating the Strike Price (cf. chapters 4 & 5) – the Strike Price level takes into account the technology openness of the mechanism. Without further measures, lower Strike Price levels create risks to technologies with higher short-run marginal costs. If their short-run marginal cost is above the Strike Price, they may be subject to a Payback Obligation while they have not yet been called upon by the energy market.

As the above risk would be unlimited without further measures and therefore difficult to achieve a reasonable price when bidding in the Auction, a stop-loss limit is considered appropriate to limit this risk to the contractual value. This contributes to the reflection on the trade-off when setting the Strike Price and considering technology openness as with such stop-loss limit all technologies can effectively assess the risk and price it.

Note that creating such stop-loss limit on the Payback Obligation is also from a broader market design perspective desirable. Without such stop-loss limit, contracted capacities would remain liable to a Payback Obligation if at very low CRM remuneration levels. This could become problematic when considering to phase-out the CRM when adequacy concerns have sufficiently faded away. Indeed, when the energy(-only) market provides sufficient returns, incl. at moments where prices would exceed the Strike Price, the CRM should not become a roadblock for capacities to earn their revenues via the energy market. A stop-loss limit prevents that too many energy market revenues would have to be reimbursed, thereby unnecessarily inflating bid prices in the CRM Auction and thereby making it more difficult to abandon the CRM one day. Stated otherwise, such stop-loss limit on the Payback Obligation more easily allows the CRM Auction to tend to zero €/MW as capacity remuneration.

Therefore, it is proposed to create a Stop-Loss mechanism equivalent to the contractual value of the CMU as a maximum. This will be calculated based on the CRM annual contractual value (i.e. per Delivery Period, starting in November) and will be totally independent from the Stop-Loss related to Penalties of the Availability Requirement and Penalties Design Note. Only the Obligation of a Contracted Capacities (from the Primary Market) could apply for the Stop-Loss. This means that the transactions of the Obligated Capacity of a CMU coming from the Secondary Market are not taken into account in the Stop-Loss calculation and their payments are duly expected even once the Stop-Loss limit has been reached. The rationale comes from the non-implication of the CRM contractual counterparty in the Secondary Market transaction payment and price. As the initial Capacity Provider releasing its obligation continues to be paid, if there is a willingness of Stop-Loss from the Capacity Provider taking over the obligation, it may be part of the bilateral (or exchange) agreement.

**Design Proposal #12: Payback Obligation Stop-loss on Primary Market obligation**

A Stop-Loss mechanism applies on the Payback Obligations regarding a Delivery Period of a CMU Contracted Capacities (solely from the Primary Market). It cannot exceed the contract value for that Delivery Period.

# 7 Examples and uses cases

The objective of the section is to describe examples that help the comprehension of the Payback Obligation concept.

The examples are driven by the present Design Scope related to Strike & Reference Price comprehension as a goal and could/will not replace the future contract details.

### 7.1.1 Example 1: Classical existing Production asset 400MW CCGT

In the Prequalification process, the Capacity Provider of an existing CCGT asset of 400MW, selected several parameters where one of them is the spot Day-Ahead Reference Price. EPEX spot Day-ahead has been selected.

A De-Rating Factor of 0,9 is granted, giving an Obligated capacity of 360MW.

The Prequalification occurred successfully on the Capacity Provider with its existing CCGT asset of 400MW.

The Capacity Provider hasn't 'Opted-Out' its capacity of the CRM mechanism and submits a bid in the Y-4 Auction of Oct 2021 for [November 2025 – October 2026] delivery period.

Under the bidding & Auction rules, the CCGT de-rated volume of 360MW is selected and awarded a contract.

The 360MW obligation is linked to a Strike Price of 500€/MWh.

In September 2025, in the Secondary Market, the CCGT 400MW CMU is taking over 20MW of obligation of another asset for the period November and December 2025. The latest published Strike Price at the time of the transaction notification to ELIA and Contractual counterparty was 525€/MWh.

In December 2025, for the delivery period of November 2025, the Payback Obligation is calculated according to the following :

During the month of November 2025, only 2 hours [19:00-20:00] of 29/11/2025 were having an EPEX spot Day-Ahead price above one of the both threshold with respectively

[825 and 721]€/MWh

The Load Following Ratio is considered at 0,97 for both hours and the asset availability at 100%.

The settlement of Payback Obligation is then:

- 0 € for all hours of November except for the 2 hours mentioned above
- For H19:00:
    - Primary Auction Y-4:

      = max(0;(825€/MWh-500€/MWh)*360MWh* 1 * 0,97)

= 113,49k€

- Secondary Market trade:
  = max(0;(825€/MWh-52500€/MWh)*20MWh* 1 * 0,97)
  = 5,82k€
- For H20:00:
  - Primary Auction Y-4:

    = max(0;(721€/MWh-500€/MWh)*360MWh obligated* 1 * 0,97)

    = 77,1372k€

  - Secondary Market trade:
    = max(0;(721€/MWh-525€/MWh)*20MWh obligated * 1 * 0,97)
    = 3,8024k€

The monthly November 2025 total Payback Obligation that will be billed to the Capacity Provider is 200,25k€.

### 7.1.2 Example 2: Demand-Side management 10MW with 423€/MWh activation cost

In the Prequalification process, the Capacity Provider of 10 MW DSR process, selected several parameters where one of them is the spot Day-Ahead Reference Price. EPEX spot Day-ahead has been selected.

A De-Rating Factor of 0,4 is granted as the option 'no limit of duration' SLA category of DSR is chosen by the Capacity Provider, giving an Obligated Capacity of 4MW.

The Prequalification occurred successfully on the Capacity Provider asset.

The Capacity Provider proposed a bid for the Y-1 Auction of Oct 2024 for [November 2025 – October 2026] delivery period.

Under the bidding & Auction rules, the DSR de-rated volume of 4MW is selected and awarded a contract.

The 4MW Transaction is linked with a Strike Price of 525€/MWh.

In September 2025, in the Secondary Market, the DSR Capacity Provider is releasing 1MW of its obligation to another asset for the period December 2025. The latest published Strike Price at the time of the transaction notification to ELIA and Contractual counterparty was 500€/MWh.

In January 2026, for the delivery period of December 2025, the Payback Obligation is calculated according to the following:

During the month of December 2025, only the 1 hour [19:00] of 14/12/2025 was having an EPEX spot Day-Ahead price above one of the both threshold with 923€/MWh.

The Load Following Ratio is considered at 0,94 for both hours and the asset availability at 100%.

The settlement of Payback Obligation is then:

- 0 € for all hours of December except for 1 hour

- For H19:00:
  - Primary Auction Y-1:

    = max(0;(923€/MWh-525€/MWh)*3MWh obligated * 1 * 0,94)

    = 1122,36€

This is the Monthly December 2025 total Payback Obligation that will be billed to the Capacity Provider.

### 7.1.3 Example 3: Aggregate of capacities delivering a SLA of 2h and 5MW

In the Prequalification process, the Capacity Provider of a set of assets for an installed capacity of 25MW, selected several parameters where one of them is the spot Day-Ahead Reference Price. EPEX spot Day-ahead has been selected.

A SLA of 2 hours is chosen and the related De-Rating Factor of 0,2 is granted as the Capacity Provider has chosen its DSR category, giving Obligated Capacity of 25MW (according the Availability Monitoring & Penalties).

The Prequalification occurred successfully on the CMU pool of assets.

The Capacity Provider is now able to insert a bid in the Y-1 Auction of Oct 2024 for [November 2025 – October 2026] delivery period.

Under the bidding & Auction rules, the pool volume of 5MW is selected and awarded a contract.

The 15MW obligation is linked with a Strike Price of 525€/MWh.

In February 2026, for the delivery period of January 2026, the Payback Obligation is calculated according to the following :

During the month of January 2026, only 3 hours [18:00-20:00] of 17/01/2026 were having an EPEX spot Day-Ahead price above one of the both threshold with respectively

[950;872;861]€/MWh

Only the first 2 hours are considered according the AMT moments definitions of the Availability Monitoring & Penalties.

The Load Following Ratio is considered at 0,95 for both hours and the asset availability at 100%.

The settlement of Payback Obligation is then:

- 0 € for all hours of January except on the 3 hours
- For H18:00:
  - Primary Auction Y-1:

    = max(0;(950€/MWh-525€/MWh)*25MWh obligated * 1 * 0,95)

    = 10 093,75€

- For H19:00:
  - Primary Auction Y-1:

= max(0;(872€/MWh-525€/MWh)*25MWh obligated * 1 * 0,95)

= 8 241,25€

- For H20:00:
  - Primary Auction Y-1:

  = 0

Monthly January 2026 total Payback Obligation that will be billed to Capacity Provider is 18 335€.

# 8 The Rules Set

**Design Proposal #1: The Payback Obligation Formula**

The Payback Obligation formula for a given CMU obligation is:

For all t hours where the CMU is under a Transaction Capacity,

*Payback Obligations (CMU, t) =*

*Sum on all Transactions of the CMU:*

*max[0; Reference Price (t) – Strike price (CMU, at Transaction Date)] * Payback Obligated Capacity(CMU, t, Transaction Id) [in €]*

**Design Proposal #2: Reference Price definition**

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

**Design Proposal #3: CMU choice of NEMO for its Reference Price**

A CRM participating 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)

**Design Proposal #4: modification of the Day-Ahead Reference Price & missing data**

The Capacity Provider has the possibility for each CMU to notify a modification of its earlier NEMO choice for the Belgian Day-Ahead Market Reference Price of a CMU up to 5 working days prior to a new month of delivery.

The change will be effective as from the 1st calendar day of the next month. In case of missing or conflicting data related to a specific CMU' NEMO choice, the Reference Price Day-Ahead Belgium (publication by ELIA) will be used as fall-back value. The Reference Price Day-Ahead Belgium is determined as the 'Belgian Bidding Zone Day-Ahead Reference Price'. The valid and binding price for the Belgian bidding zone is the single Day-Ahead coupling price ("Belgian SDAC Price") which is calculated by the Market Coupling Operator (MCO) function jointly performed by all Nominated Electricity Market Operators (NEMOs), and is published on the ENTSO-E Transparency Platform and on the websites of the Belgian NEMOs. (https://www.elia.be/fr/donnees-de-reseau/transport/prix-de-reference-day-ahead)

**Design Proposal #5: One Single Strike price choice**

One Single Strike Price will be applied to all Transactions of the CMUs at the same

Transaction Date.

**Design Proposal #6: Update of the Strike Price**

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

For contracts covering more than one Delivery Period, the Strike Price is not updated during the lifetime of the contract.

The last published Strike Price will also be applicable for Transactions in the Secondary market when calculating the due amount of the Payback Obligation. The timestamp of transaction notification as known by Elia will settle the Strike Price of a CMU Secondary Market transaction.

One Single Strike Price will be applied to all Transactions of the CMUs at the same Transaction Date:

*Strike Price (CMU, t, Transaction Id) = Calibrated Strike Price (Transaction Date) [€/MWh]*

**Design Proposal #7: Calibration of the Strike Price**

Within the One single Strike Price applicable to all Transactions of the CMUs at the same Transaction Date, a *Calibrated Strike Price (obligation transaction date)* is required:

Once a year and before March 31st:

Considering the construction of a *calibration curve* equal to the Weighted average of the last previous 3 Winters (November 1st to March 31st) of the sum of all the weekly peak hours (weekdays from [8:00 to 20:00[) gathering the elastic part of the cumulative hourly offer and demand curves of all Day-Ahead Belgian Market exchanges (which are taken as couple of prices €/MWh and cumulative quantities in MW) modelled by the following formula:

$$= \begin{matrix} WeightedAverage \\ on\ 3\ last\ Winters\ of \end{matrix} \sum_{i=1}^{\substack{All\ Winter \\ Peak\ hours}} \sum_{j=1}^{\substack{All\ Belgian \\ DA\ Markets}} \begin{matrix} Elastic\ Part\ of\ demand\ curve\ (i,j) \\ + \\ Elastic\ Part\ of\ offer\ curve\ (i,j) \end{matrix} \Bigg/ \begin{matrix} Number \\ of\ peaks \\ hours\ of \\ Winter \end{matrix}$$

The Elastic part of the cumulative hourly demand and offer curves is including all registered orders except the simple blocks, linked blocks, exclusive groups or loop blocks, and the ones below or equal to a price of zero and the ones at market price cap.

The volume part of the constructed curve will be normalized for the quantities part leading to a curve representing a % range of quantities with their corresponding prices in €/MWh.

The weighted average on the last three Winters will be volume based using the Winter Maximal volume of the Simple average of Sum of cumulative offer and cumulative demand curves.

A Calibrated Strike Price (in €/MWh) will be selected for the next publication date on the calibration curve which will represent a % range of cumulated volume of reaction within a range of [70;90]%

The selected Strike Price level and % within the predefined range shall take into account:

 The shape of the average calibration curve observed (applied to the 3 previous Winters, for weekly peak hours): whether the curve is reaching a plateau at the lower/upper bound of the cumulated % level

 Market evolutions possibly having an impact on prices & market actors' reactions

 The stability of the Strike Price over time

The *Calibrated Strike Price* will be settled for all Transactions of the Primary Market selected and Secondary Market traded at a transaction date above or equal to its publication date and before the next *Calibrated Strike Price* publication date.

**Design Proposal #8: Payback Obligated volume definition**

Payback Obligated Capacity (CMU, t, Transaction Id) = Transaction Capacity (CMU, t, Transaction Id) * Availability Ratio (CMU, t) * Load Following Ratio (t)

**Design Proposal #9: Availability Ratio definition**

For a CMU the Availability Ratio (t) equals:

MIN[1; [Available Capacity (CMU, t)) / Obligated Capacity (CMU, t)]

This value is always lying between 0 and 1.

**Design Proposal #10: Load Following Ratio definition**

For all CMUs the Load Following Ratio (t) equals:

min [1; [Total Load (t) / Reference Peak Load (t)]]

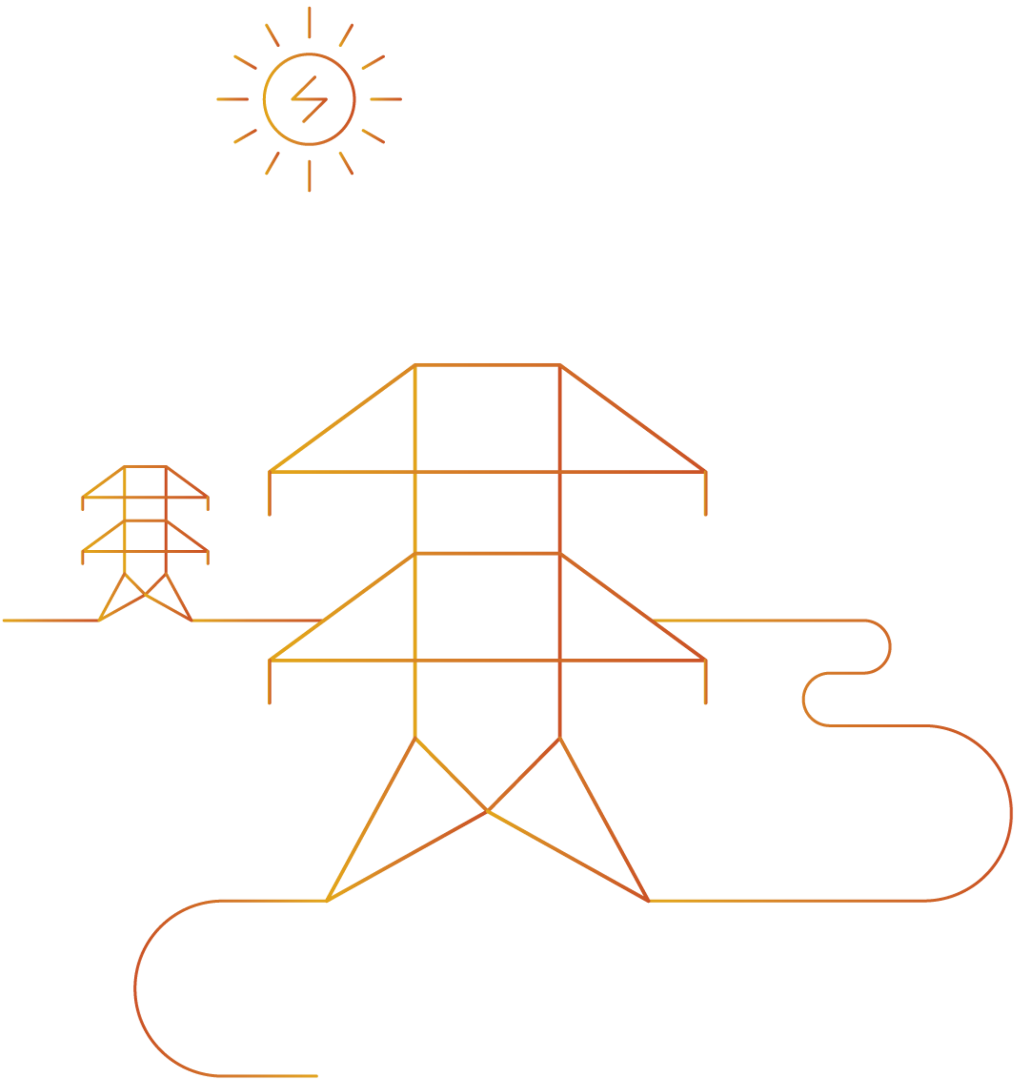
This value is always lying between 0 and 1.

**Design Proposal #11: Payment exemption outside of the SLA hours and extra hourly Transaction Periods for the Energy Constrained CMU**

The Payback Obligation is due at any period of the Transaction for which the AMT moments are considered for Penalties according to the CMU SLA for the Energy Constrained CMU. It is also due for any other period of its extra Secondary Market hourly Transactions (during the SLA hours and non-SLA hours).

**Design Proposal #12: Payback Obligation Stop-loss on Primary Market obligation**

A Stop-Loss mechanism applies on the Payback Obligations regarding a Delivery Period of a CMU Contracted Capacities (solely from the Primary Market). It cannot exceed the contract value for that Delivery Period.



# CRM Design Note: Availability Obligations and Penalties

13/09/2019

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# 1 Introduction

## 1.1 Context and goal of the present design note

The goal of this present note is to further clarify and receive any useful feedback from market parties on the latest CRM design proposal for Availability Obligations and Penalties.

ABOUT THE PUBLIC CONSULTATION

This design note is put for formal public consultation and any remark, comment or suggestion is welcomed. It builds further on the discussions and proposals already made in the different TF CRM meetings gathering all relevant stakeholders and in the follow-up committee, the latter consisting of representatives of the CREG and Elia, under the presidency of the FPS Economy.

This public consultation runs in parallel with a public consultation on other design notes. Reactions to this public consultation can be provided to Elia via the specific submission form on Elia's website no later than **Friday 11 October 2019 at 6 pm**.

Early October also a second set of design notes will be launched by Elia for public consultation.

Note that, in line with their roles and responsibilities and the foreseen governance in the Electricity Law, also the FPS Economy and the CREG will consult on aspects within their competence according to their procedures.

## 1.2 Scope and structure of the present design notes

LEGAL FRAMEWORK

This design note serves to explain the design concepts proposed for the Belgian CRM concerning Availability Obligations and Penalties aspects. Article 7undecies §8 of the Belgian Electricity Law[1] states the following on this aspect (own translation from the law):

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1 http://www.ejustice.just.fgov.be/cgi_loi/change_lg.pl?language=nl&la=N&table_name=wet&cn=2019042221

*"After consultation of the grid users, the transmission system operator submits the market rules of the capacity remuneration mechanism for approval to the Regulator…*

*The market rules of the Capacity Remuneration Mechanism entail in particular:*

*…*

*3° the obligations for the availability obligations for capacity providers, and the penalties for violation of the obligations;*

*…"*

Furthermore, §7 in this section of the law reads:

*"…During the entire period of delivery of capacity, the transmission system operator will verify the availability of the contracted capacity, in accordance with the market rules of the capacity remuneration mechanism intended in paragraph 8."*

This means that the law appoints to Elia the task of proposing the CRM Market Rules – to be approved by CREG – and also the execution of the availability verification during the Delivery Period. Given these responsibilities and in preparation of the first iteration of this design cycle, Elia leaves the current design note on Availability Obligations and Penalties up for consultation by the market.

The details for Availability Obligations will be mainly governed by the CRM Market Rules and further described in the Capacity Contract. Article 7undecies §8 also gives a framework for this contract:

*"After the auction, the Capacity Providers will close a Capacity Contract with the Contractual Counterparty appointed according to article 7 quaterdecies. The Capacity Contract describes the obligations of the Capacity Provider, in particular the availability obligation…*

*…The Capacity Contract is in accordance with the market rules of the Capacity Remuneration Mechanism intended in paragraph 8. The standard Capacity Contracts are approved by the Regulator, upon proposal of the Contractual Counterparty, where appropriate drafted in cooperation with the Transmission System Operator, and published on the website of the Contractual Counterparty."*

AVAILABILITY OBLIGATIONS AND PENALTIES IN THE BROADER FRAMEWORK

Figure 1 illustrates this provision in the broader legal framework, where Availability Obligations and Penalties are marked by an orange box.

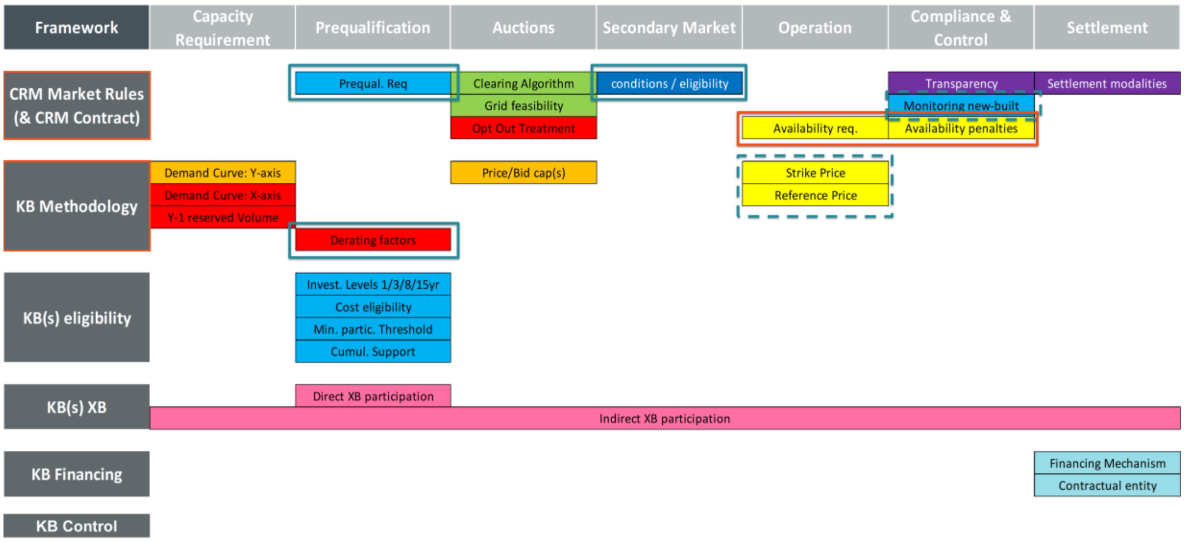



*Figure 1: CRM legislative framework*

This topic of the Availability Obligations and penalties interacts with other elements of the CRM design. In particular the topics Derating Factors, Secondary Market and Prequalification Requirements – indicated by the green boxes in Figure 1 – link strongly with Availability Obligations and Penalties, and will be referred to throughout the text.

It is also part of the larger view of the "Capacity Product", i.e. the functioning of a Capacity Market Unit (CMU) once it has been contracted in a CRM. Availability Obligations and Penalties need to play a specific role and function in the Capacity Product that fits together with the other elements that compose the CRM design.

Section 2 defines this role as guaranteeing adequacy during the Delivery Period, particularly in the interaction between Availability Obligations and Penalties, Monitoring new-built (henceforth referred to as "Pre-Delivery Period Monitoring") and Strike and Reference Price (indicated by the green dotted boxes in Figure 1). The design of the latter two are however out of scope for this design note and are treated in separate notes ("Strike & Reference Price" & "Monitoring").

Section 2 defines objectives the Capacity Product should respect, which are in line with the objectives of the Capacity Remuneration Mechanism and the Market Rules as defined in the Belgian Electricity Law[1]. It will conclude on two things:

1. Adequacy, cost-efficiency and no market interference are the prime objectives for the Capacity Product.
2. The Availability Obligations explained in this note as the prime driver of adequacy during the Delivery Period, contrary to the pay-back obligation (capturing windfall profits during the Delivery Period) and Pre-Delivery Period Monitoring (applying before the Delivery Period).

DESIGN OF AVAILABILITY OBLIGATIONS AND PENALTIES

Knowing that the main function of the Availability Obligations and Penalties is guaranteeing adequacy during the Delivery Period, the design is constructed to achieve this objective.

Section 3 develops the Availability Obligations mechanism further. It selects a trigger-based mechanism using the Day-Ahead Market Price as a reference and most appropriate to achieve the Capacity Product objectives. This leads to the definition of AMT Hours and AMT Moments that can be monitored. It will then define a method for all participating CMU's to assess a difference between Obligated and Available Capacity at relevant moments for Monitoring of availability. In case the Availability Monitoring leads to insufficient proof of capacity to deliver energy when needed (i.e. Proven Availability) for certain CMU's, they are prone to Availability Tests.

An availability penalty applies to a positive difference between Obligated and Available Capacity not covered in the Secondary Market. This is referred to as "Missing Capacity" Section 4 presents the proposed method for calculating this penalty. Next to a proportional formula to this difference, it foresees modalities for the escalation of penalties.

# 2 Definition of the capacity product

The Capacity Product is defined as the complete set of rules and regulations that drive the behavior and performance of contracted capacity in the CRM. It thus entails the functioning of Capacity Market Units in the Capacity Remuneration Mechanism after contracting. Different forms of rules and regulations determine this:

- The Clean Energy Package
- the Belgian Electricity Law[1]
- the various Royal Decrees concerning the CRM (see Figure 1)
- the Market Rules (see Figure 1)
- The Capacity Contract

In essence, they need to provide the right signals and incentives to achieve the desired objectives from the Capacity Product. Article 7undecies of the Belgian Electricity Law[1] provides a basis for these objectives (own translation):

- § 3. *"The level of security of supply to be achieved predetermined before the CRM shall correspond with the demand curve…"*
- §1: *"…The CRM shall be designed so that the cost is as low as possible"*

This means that the overall objective of the CRM for Belgium is to ensure a level of Security of Supply at the lowest cost possible. Both "Adequacy" and "Cost-Efficiency" are therefore considered as the first two primary objectives for the Capacity Product.

A third primary objective of the Belgian CRM is "No Market Interference". This follows from the Clean Energy Package, which imposes that capacity mechanisms ensure among others:

- Technology neutrality of the mechanism
- Level playing field for all participants
- Limit the market distortions caused by a CRM

Figure 2 summarizes the three principal objectives of the capacity product.

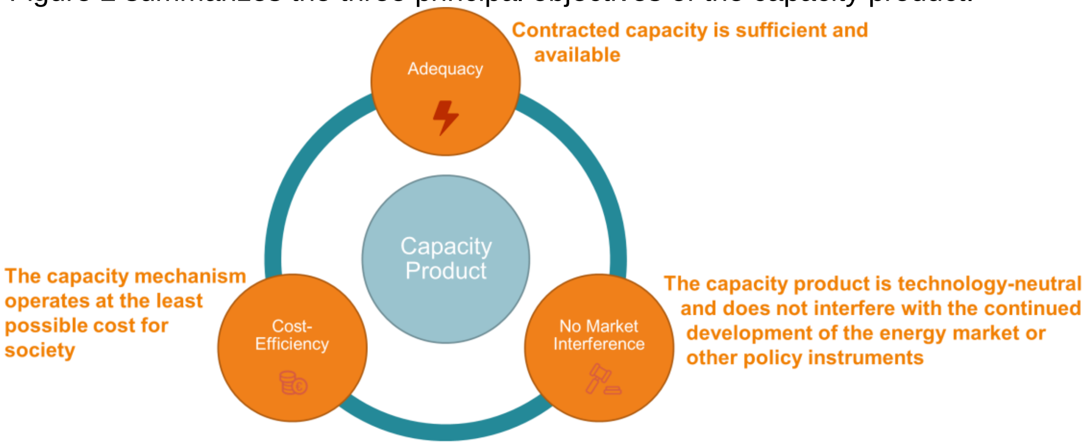



*Figure 2: Principal Capacity Product objectives.*

Before treating the Availability Obligations and Penalties design, it is useful to define their role in the bigger picture of the capacity product. It is important to keep in mind that they only come into play after selection of a CMU in the auction and signature of the Capacity Contract. However, the interaction with other design elements applying at that point are also of importance. Particularly, the "Pre-Delivery Period Monitoring", "Strike Price" and "Reference Price" have also their characteristics/boundaries and also serve objectives. They will thus also influence the aforementioned functioning of the Capacity Market Units. The boundaries and objectives of each of these elements thus warrant a clear definition.

In this light, the design considers Availability Obligations as the **prime driver for adequacy during the Delivery Period**, by ensuring the availability of CMU's at adequacy-relevant moments. Figure 3 gives a summary of the relationship between Availability Obligations and Penalties, Pre-Delivery Period Monitoring and the Payback Obligation.

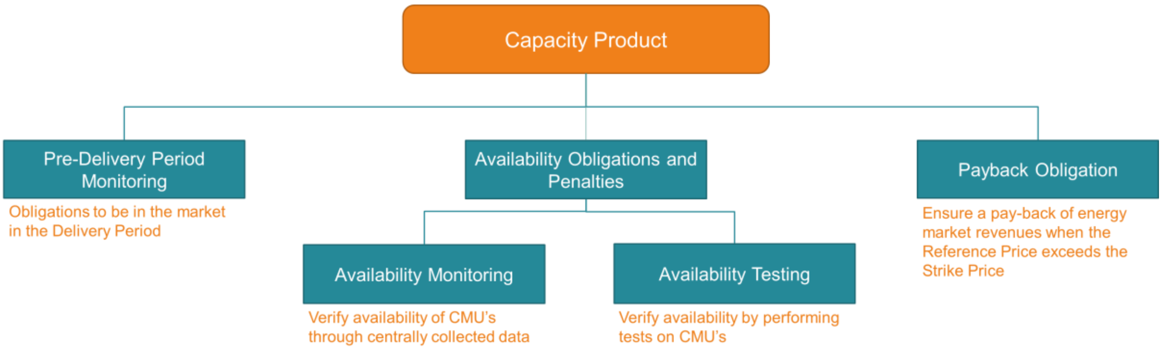



*Figure 3: Summary of the different obligations of the Capacity Product*

The Pre-Delivery Period Monitoring serves to ensure entry into market of the CMU's that were contracted in the Capacity Auction. It takes place in the period starting from signature of the Capacity Contract right up until the Delivery Period. From this point onwards, the Availability Obligations and Penalties will take over.

The remainder of this design note will treat the cases where a CMU has successfully entered into the market according to the process set out in the Pre-Delivery Period Monitoring. Availability Obligations and Penalties apply in the subsequent Delivery Period. The timeline in Figure 4 illustrates this.


*Figure 4: Timeframe for application of Pre-Delivery Period Monitoring vs Availability Obligations*

Contrary to the Pre-Delivery Period Monitoring, the payback obligation characterized by the Strike and Reference Price applies in the Delivery Period. The design note on Strike and Reference Price will contain the details of the proposed implementation of the Payback Obligation in the Belgian CRM. In general, Availability Obligations and the Payback Obligation are complementary to each other.

Availability Obligations and Penalties is split further into "Availability Monitoring" and "Availability Testing". Section 3 explains these concepts and their application.

# 3 Availability Obligations

Section 2 concluded that the Availability Obligations are the key for ensuring the availability of CMU's. This relates in particular to one of the main objectives of the Capacity Product: Adequacy. Every contracted CMU in the auction contributes to the achievement of the reliability standard, meaning that Elia should be able to verify the availability of each one. Given that the CMU's could number in the hundreds or thousands, monitoring of their availability through centrally collected data seems most appropriate.

These data can come from various sources and should be sufficient to reliably assess availability. Given that another main objective is Cost-Efficiency, the following principle should apply to the data sourcing:

> Use data collected through other market mechanisms as much as possible and limit the amount of additional data requirements imposed by the capacity remuneration mechanism.

**DISCLAIMER:** this principle will be applied as far as other constraints, such as legal considerations, accountability for the data and operational feasibility, permit its application. The used data sources presented in this note should be treated as indicative. The CRM design could still ask for specific data if any of the presented sources are no longer deemed plausible.

Several the Availability Monitoring mechanism design will be further detailed in this section. Firstly, paragraph 3.1 discusses the identification of the moments during which Elia will check availability. These moments should be relevant for adequacy.

In addition to the moments of monitoring, the mechanism needs to define the required level of availability. This will lead to the definition of **Obligated Capacity** in Paragraph 3.2.

The monitoring mechanism is necessary to establish the **Available Capacity** at every moment of monitoring, based on the centrally collected data. It is apparent from the functioning of other mechanisms that the available data will differ depending on unit size and technology. This will result in the definition of **CMU Types** determining the monitoring method, explained in Paragraph 3.3.

As a last resort, the Market Rules will foresee **Availability Testing** where the monitoring mechanism is insufficient. The objective of testing is to create equal degrees of monitoring and required proof of availability for all CMUs. Paragraph 3.4 proposes a basis for the modalities of testing.

## 3.1 Availability Monitoring Mechanism

As stated previously, the moments of monitoring have to be relevant for adequacy. In this respect, a CMU that is available all year except for when the system is in real need of this capacity has a limited contribution to adequacy as opposed to capacity that is unavailable for most of the year, but available every time the system requires their capacity. In order to reflect actual contribution towards adequacy, the monitoring should thus happen during adequacy-relevant moments. An objective manner to identify these moments is necessary. This will further be referred to as the **Availability Monitoring Trigger (AMT)**. Moments identified by this trigger are defined as **AMT Moments**.

**Design Proposal #1:**

Elia can perform Availability Monitoring subsequent to an Availability Monitoring Trigger (AMT). Elia can assess the Available Capacity on all CRM-contracted capacity during the AMT Moments identified by an AMT.

Paragraph 3.1.1 discusses the appropriate choice of trigger type for the Belgian Market. This will be a uniform trigger for all CRM-contracted capacity to be monitored on availability, in order to ensure adequacy at system level. It will conclude on a trigger based on the electricity Market Price, for it allows the best all capacities to contribute at the same adequacy relevant moments for the system.

Subsequently, Paragraph 3.1.2 proposes the day-ahead market price for the Availability Monitoring Trigger. The price level for the trigger will be referred to as the **Availability Monitoring Trigger Price, AMT Price** or $\mathbf{p_{AMT}}$.

Finally, Paragraph 3.1.3 sets the basis for the calibration of **the AMT Price.**

### 3.1.1 Choice of trigger type

In a market environment like the electricity market, scarcity moments are strongly correlated with electricity **market price**, as this price is driven by the merit order of capacity offering to the system. The higher the market price, the less margin typically remains between production and demand and the more the system approaches complete exhaustion of these resources (i.e. scarcity). Stated otherwise, a market price could be a good and reliable summary of the state of the system in terms of adequacy.

A market price has the extra advantage that it is a market-wide signal, for which transparent information exists available to all market parties. It also implicitly takes into account the import capabilities, as foreign offers integrate in the same merit order via the single day-ahead market coupling mechanism. Since Belgium is effectively reliant on import and import capabilities make up a significant share in meeting the peak load, this effect is especially impacting.

**Design Proposal #2:**

The Availability Monitoring Trigger shall be based on electricity market price.

A summary of the functioning of the Availability Monitoring Trigger is given in Figure 5.

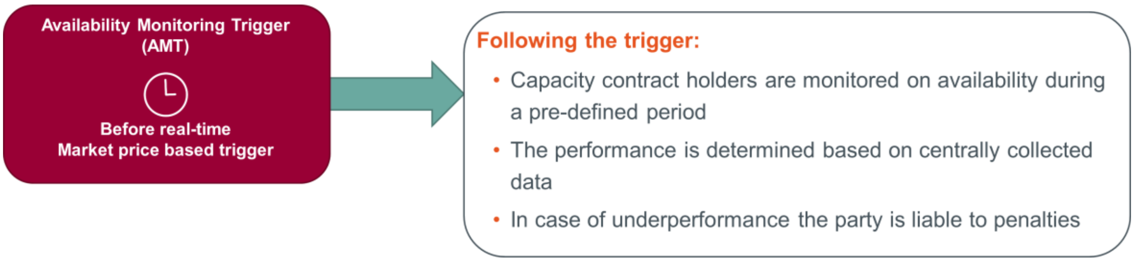



*Figure 5: Illustration of the Availability Monitoring Trigger*

The following paragraph will determine the appropriate market price trigger.

### 3.1.2 Choice of Market Price Trigger

The Market Price should be a continuous and visible price signal for the Belgian market, so that there is one reference for all involved actors (Capacity Providers, Elia, Contractual Counterparty,…). More importantly, a high price value in this reference should be relevant for adequacy. In particular it should reflect structural adequacy problems, as these are envisaged to be covered by the CRM.

To this end, the **Belgian Day-Ahead price** fits all criteria:

- Its transparency is attested by e.g. the numerous contract applications where it is used as a reference for transaction settlements.
- It is relevant for structural adequacy, since at the moment of DAM closure, BRP portfolio's need to be settled. Sufficient capacity in the market should be able to settle the portfolio's in day-ahead. Uncertainties after this point are managed via Intraday transactions, Balancing and Ancillary Services. This is more the territory of flexibility, which is not the overall goal of the CRM.
- Its accessibility to market players is attested by its liquidity compared to other markets with transparent information (25-30% of the total load in Belgium).
- In addition, the interval between selling and delivery allows for participation of technologies with slow ramping and start-up constraints. Considering structural adequacy, these types of technologies definitely contributing as well. The CRM design should also accommodate these technologies, which could include slower starting generation units, but also industrial processes that could deliver demand response when timely informed.

Contrary to the Day-Ahead price, the Intra-Day price signal has been showing less liquidity so far and by its nature is not a reference for technologies reacting slower to its timeframe. The latter is even more applicable for the real-time balancing price, which requires close-to-real-time reaction. Furthermore, many price spikes in the balancing price are due to flexibility (sometimes temporary) issues and not adequacy. The Adequacy and Flexibility study[2] published by Elia contains more information on how the two subjects are considered separately.

By using the Day-Ahead price as a reference, the design obtains a transparent, accessible and technology-inclusive signal for adequacy-relevant moments. To clarify: this does not limit the choice of Capacity Holders to participate in any of the other existing markets. It only serves to indicate that the capacity should be available in any market at occurrences of a high Day-Ahead market price. Section 3.3 contains more information on how this applies.

Day-ahead trades are made through NEMO's, via their dedicated platform. Decoupling of the NEMO from the market could lead to the unavailability of a correct Day-Ahead price. In this case, the AMT trigger should not apply.

**Design Proposal #4:**

When a NEMO composing (part of) the reference Day-Ahead price is decoupled from the Day-Ahead Market (e.g. due to IT problems), this must not lead to the triggering of an AMT.

A sufficient, yet simple and transparent rule for triggering Availability Monitoring would be if the **Day-Ahead price exceeds a certain level**. Since price levels depend largely on the capacity in the market – which can vary from one Delivery Period to another – a **yearly calibration** of this level seems appropriate. This calibration will be subject to the method described in the Market Rules and further clarified in the next paragraph.

The price level causing the AMT will be the system-wide indicator, applicable to all contracted CMU's. This price level will be further referred to as the **AMT Price** or $\mathbf{p_{AMT}}$.

As a consequence of choosing the Day-Ahead price as a trigger, the Availability Monitoring applies on an hourly basis. Every hour causing an AMT – i.e. for which the Day-Ahead price exceeds the AMT Price – is referred to as an **AMT Hour**. A string of consecutive AMT Hours make up an **AMT Moment**.

[2] http://www.elia.be/~/media/files/Elia/publications-2/studies/20190628_ELIA_Adequacy_and_flexibility_study_EN.pdf

**Design Proposal #5:**

An Availability Monitoring Trigger occurs when the Day-Ahead Market Price exceeds the AMT Price.

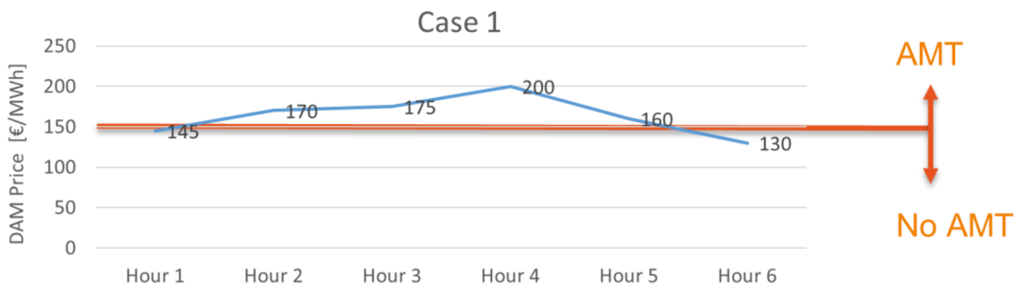
The AMT Price will be calibrated yearly and defined in the Market Rules

Every hour where the Availability Monitoring Trigger occurs is an AMT Hour. A string of consecutive AMT Hours makes up an AMT Moment.

At any AMT moment, Elia can assess the availability for each AMT Hour composing the AMT Moment.

Figure 6 illustrates this with two example cases, both with an AMT Price of 150 €/MWh. In Case 1 the Day-Ahead price supercedes 150 €/MWh during the block of hours 2 through 5, i.e. consecutively above 150 €/MWh. This interval consists of one single AMT Moment. Each of the consecutive hours 2-3-4-5 are AMT Hours. Hours 1 and 6 are not AMT Hours and are thus not considered for Availability Monitoring, as the price is below 150 €/MWh.

In Case 2 there are two AMT Moments as there are two separate strings with AMT hour(s): hours 2-3 (2 AMT Hours) and hour 5 (1 AMT Hour). Elia will not apply monitoring during hours 1, 4 and 6 in this case.



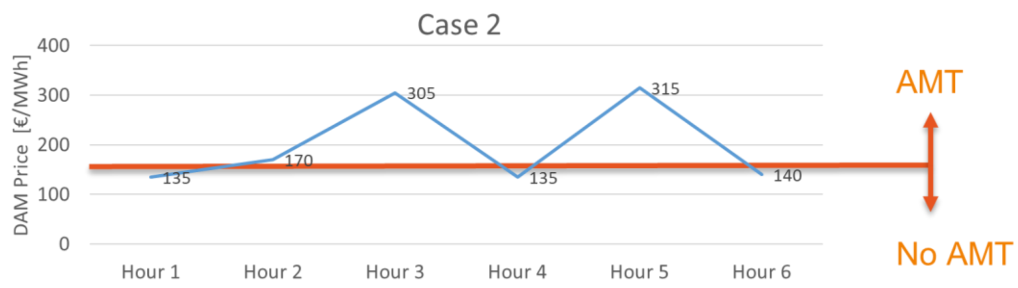




*Figure 6: Example cases of AMT Hours and Moments for $p_{AMT}$ = 150 €/MWh*

The next Paragraph discusses the method for calibration of the AMT Price.

### 3.1.3 Calibration of the Availability Monitoring Trigger Price

This paragraph aims to describe a method for a yearly calibration of the AMT Price, i.e. a single Day-Ahead electricity price level above which Availability Monitoring will take place. The objective is threefold:

- The trigger should correspond to adequacy-relevant moments
- The trigger should occur sufficiently during the Delivery Period to have clear incentive to be available
- The trigger should be transparent during the Delivery Period

The current design proposal aims to achieve these objectives by taking the steps shown in Figure 7:


*Figure 7: steps in the yearly calibration of the AMT Price*

Each step is now explained in more detail.

**Step 1**: **establishing price-duration curves for the considered Delivery Period**

Determining statistically likely, but adequacy relevant price levels requires price occurrences for the Delivery Period. This is best shown in monotonic price-duration curves (see Figure 8). The moment for establishing these curves and nature of the curves are key to a qualitative calibration. Both will be discussed separately. The moments most relevant to adequacy are at high end of the curve when the highest prices occur.

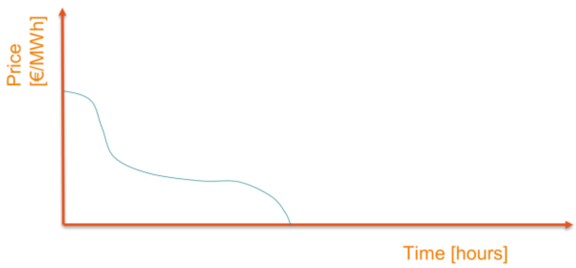



*Figure 8: Illustration of a price-duration curve*

<u>Moment of calibration:</u>

In order to retain a transparent AMT during any Delivery Period, it is best to determine the value of AMT Price upfront. The absence of an ex-ante transparent signal would result in increased uncertainty for Capacity Providers and – as a result – also increased cost of CRM (which is contrary to the cost-efficiency objective). Additionally, any financial incentives for corrective behavior stemming from the Contractual Counterparty (e.g.: availability penalties) would come long after the occurrence of the AMT Moments. This results in slow market feedback, to the detriment of the adequacy objective. This then excludes determining the AMT Price based on a price duration curve using the real DAM price values observed during the Delivery Period itself, as they are only known ex-post.

It is therefore proposed that the calibration should be based on the information used in the preparation of the Y-1 auction and also take into account the results of the Y-1 (and earlier Y-4) auction for the relevant Delivery Period. This yields the most recent view on capacity resources for a Delivery Period. This is in the advantage of both sufficient monitoring hours and risk perception from market actors due to possible variation of the real AMT hours. In addition, there is no strong need for market parties to know the value of the AMT Price before the Capacity Auction in Y-4 as long as they can have a view on the expected amount of AMT hours. A calibration close to the Delivery Period is desirable. Figure 9 shows a simple timeline.

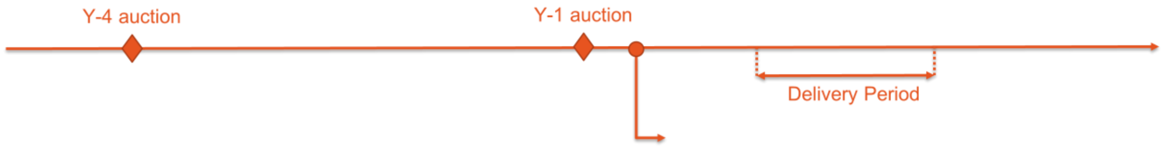



*Figure 9: illustration of timeline for calibration*

Nature of the price duration curves used for calibration of the AMT Price

Finally, the calibration method should assess multiple statistically relevant cases for which the price-duration curve will have different values. To this respect, the design proposes the inclusion of the following cases stemming from probabilistic calculations:

- **Expected:** a median outlook on the anticipated price-duration curve throughout the Delivery Period
- **Mild year**: anticipated price-duration curve should the underlying drivers cause relatively low prices throughout the Delivery Period (e.g.: mild winter), e.g. via a $P_{10}$ curve
- **Worst case**: anticipated price duration curve should the underlying drivers cause significantly higher prices throughout the Delivery Period (e.g.: harsh winter/high unavailability), e.g. via a $P_{90}$ curve

This allows to take into account exceptional cases driven by climate factors and unavailability of capacity. Figure 10 shows an example of all price-duration curves.

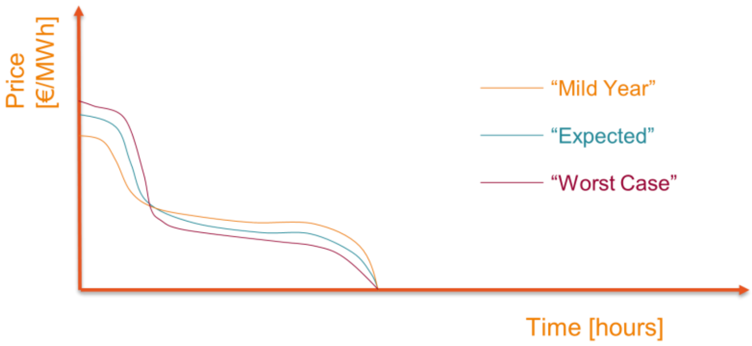



*Figure 10: Illustration of different Price-Duration curves to be determined*

To achieve these estimations, Elia proposes to use price-duration values resulting from probabilistic market modeling used for the calibration of other CRM parameters (e.g. derating, intermediate price cap,…). In doing so, the estimation is sure to be in line with other considerations. The resulting price-duration curve can now be used for calibration in step two.

**Step 2: identifying the "Expected" price level**

This price level should correspond to statistically likely, adequacy relevant (i.e. above normal values of the market price) occurrences. A subset of the highest prices estimated by the "Expected" price-duration curve established in Step 1 should include these occurrences. The lowest price observed in this subset is then equal to the AMT Price.  Figure 11 shows an example of determining the AMT Price based on an estimated price-duration curve.

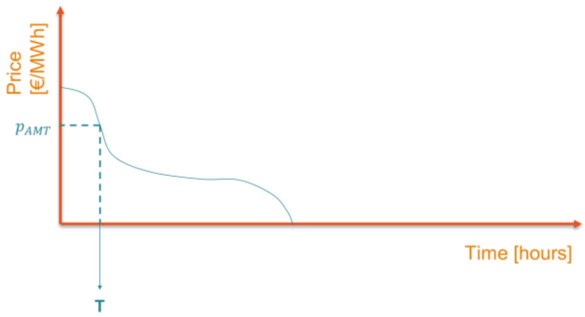



*Figure 11: Example of calibrating* $p_{AMT}$ using a price-duration curve for the Delivery Period

The choice then comes down to determining a number of hours *T* comprising the likely and adequacy relevant occurrences. This balanced value for *T* is beneficial as too much of a bias in one direction could undermine the initial objectives:

- **Downwards:** too little AMT hours could result in too little credible threat for market parties to make themselves available. This is to the detriment of the adequacy objective.
- **Upwards:** this could lead to excessive availability demand (especially regarding planned maintenance). This is to the detriment of the cost-effectiveness objective.

This period should be specified in the Market Rules for the capacity market mechanism and will be a relatively stable parameter from year to year.

Elia proposes a value of ***T = 100 hours***. Such amount allows for a sufficient set of hours to verify the actual availability, it also allows to ensure availability during a reasonable level of hours. If for instance on a tight day a morning peak would last 2 hours and an evening peak 3 hours, this would correspond to about 20 days during which during peak hours availability could be monitored. Obviously, by relying on a price signal (i.e. the preferred choice for the AMT) a much finer assessment of actual adequacy relevancy can be obtained compared to a very simple morning/evening peak approach.

Table 1 gives the historical 100 hour price level for 2015-2018 of the BELPEX/EPEX Day-Ahead spot prices, showing that this level can differ considerably from year to year.

*Table 1: Historical BELPEX/EPEX Day-Ahead price levels surpassed during 100 hours*

| Year | Day-Ahead price level only surpassed during 100 hours |
|---|---|
| **2015** | 82,53 €/MWh |
| **2016** | 104,94 €/MWh |
| **2017** | 121,3 €/MWh |
| **2018** | 120.1 €/MWh |

Figure 12 shows the price-duration curves for the same years. It shows that below 100 hours of duration, the variation in prices becomes significantly higher, whereas for longer durations the curve shows little variation (i.e. a more flat part of the curve). This illustrates that – historically – 100 hours indeed reflects exceptional events.

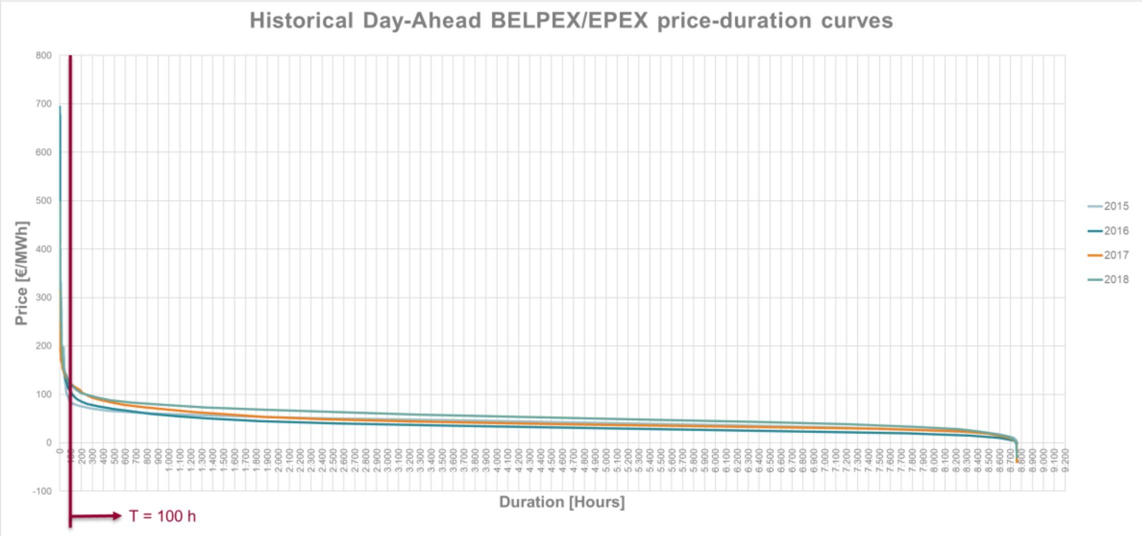



*Figure 12: Historical BELPEX/EPEX price-duration curves*

When looking at the Expected price duration curve for the Delivery Period, the price corresponding to T=100h is defined as the AMT Price (as Figure 11 illustrates).

**Step 3: covering exceptional cases**

Step 2 established a(n initial) value for the AMT Price. The methodology should now verify if this value is robust against exceptional cases when considering intra-Delivery-Year variations. This can be done by comparing the “Expected” price duration curve with those for the “Mild year” and “Worst case”. The following two elements are proposed:

1. **Mild year:** identify if the duration corresponding to $p_{AMT}$ is larger than a pre-defined value “**T-**“. If not, $p_{AMT}$ becomes the price corresponding to T- in the Mild year price-duration curve. The value of T- will be fixed in the Market Rules. Elia proposes a value of **20 hours** for T-.
2. **Worst case:** the maximum amount of AMT hours that could be monitored during a delivery are capped at the duration corresponding to $p_{AMT}$. This cap is defined as “**T+**”.

Figure 13 illustrates the ensemble of calibrating $p_{AMT}$ and T+, using T and T-. This is the last step in calibration the AMT price before publication.

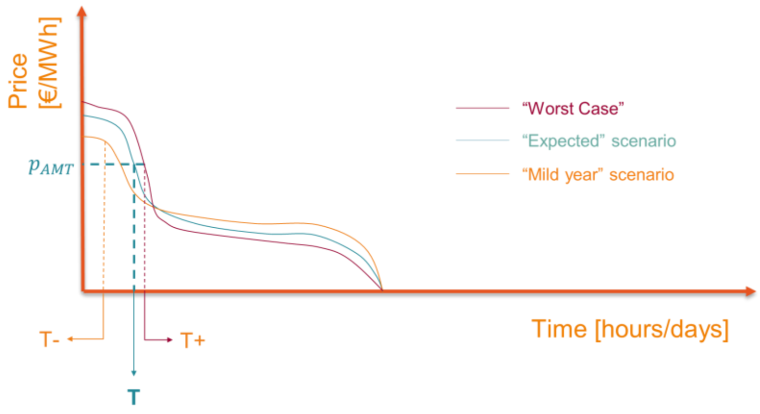



*Figure 13: Conceptual illustration for callibrating $p_{AMT}$ and T+ using T and T-*

### Step 4: publication

Publication of the AMT Price will be after the Y-1 auction. This is a direct consequence of the calibration timing discussed in step 1 of the process. Additionally, it ensures level playing field Y-4 and Y-1 auction, as neither have AMT Price information before bidding in the Capacity Auction. The candidates for the Y-1 auction should not need this information either, for the same reasons as Y-4 candidates (explained in Step 1). Figure 14 a simple timeline.

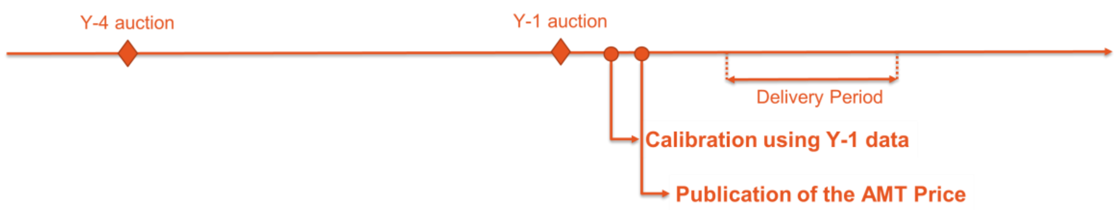



*Figure 14: timing of publication of the AMT Price*

The Design Proposal below lists the full process.

**Design Proposal #6:**

The AMT price will be ex-ante determined in the year preceding the Delivery Period, based on “Expected”, “Mild year” and “Worst case” cases. The cases shall be based on a scenario consistent with the one(s) determined to calibrate the volume to be procured through the CRM as defined in the Royal Decree methodology meant in Art. 7undecies §2 of the Electricity Law.

The first value of the AMT Price shall be the price corresponding to a duration of “T” hours in the “Expected” scenario price-duration curve. The Market Rules will specify the period “T”, currently proposed at 100 hours.

It shall be verified if this value for the AMT price results in a predicted duration that is larger than a pre-defined minimal duration “T-“ in the “Mild Year” scenario. If this is not the case, AMT Price should instead be set to the price value corresponding to a duration of “T-“ in the price-duration curve of the “Mild Year” scenario. The Capacity Market Rules will define the value for “T-“, currently proposed at 100 hours.

A cap will apply on the effective number of monitoring hours during the Delivery Period. Even if there are more AMT hours during the Delivery Period, Availability Monitoring for those hours will no longer be penalized. It is determined as the duration predicted for the AMT price in the predicted price-duration curve for the “Worst case” scenario. This value is denoted as “T+”.

Publication of the AMT Price value and T+ occurs after the closure of the Y-1 auction. Once published these parameters are fixed for the concerning Delivery Period.

This finalizes how to establish the single trigger that will result in the monitoring of capacity availability contracted in the CRM framework. The next step is to define which amount of capacity is required at AMT moments for all types of contracted capacity. This definition needs to be consistent with the way it is taken into account in adequacy modeling, considering the technical aspects of different capacity types, and it should be non-discriminatory.

## 3.2 Obligated Capacity

The goal of this paragraph is to define the capacity required at AMT moments from each CMU. Therefore, it will define the rules to establish the “Obligated Capacity” or “$P_{obligated}$” for each CMU and each AMT Hour. The CMU has to make the Obligated Capacity available at every AMT Hour separately in order to ensure adequacy. Paragraph 3.2.1 explains the motivation and application of this principle further.

Generic rules to define the Obligated Capacity apply to all CMUs. In order to ensure the contracted adequacy, the obligation needs to be consistent with how the adequacy model takes the CMUs into account, i.e.: how the derating is determined (more information on this in the Derating Factors design note). For this, there is a difference between non-energy constrained and energy constrained CMU’s, further explained in paragraphs 3.2.2 and 3.2.3 respectively.

The Monitoring Mechanism will then compare this with the measured Available Capacity to assess any volume that is liable to an Availability Penalty in paragraphs 3.3 and section 4.

### 3.2.1 Ensuring hour-by-hour adequacy

A system is adequate when the capacity in the system is able to cover the load at any time in line with the reliability standard. This is why the Capacity Auction procures a derated volume covering peak demand up until a reliability standard. Therefore, to be adequate, the market should be able to rely on this volume of capacity at all adequacy-relevant moments.

The Availability Monitoring mechanism serves as a verification that the procured capacity could indeed respond to a market signal in day-ahead, in order to meet the demand. This means that every CMU should make at least their Eligible Volume (see 3.2.2) or the Reference Power according to their SLA (see 3.2.3) available to the market. Moreover, they should do so at every AMT hour, as insufficient capacity at one AMT hour could cause an adequacy issue. Figure 15 illustrates this principle. The volume required to be available for a specific AMT Hour is referred to as the Obligated Capacity.

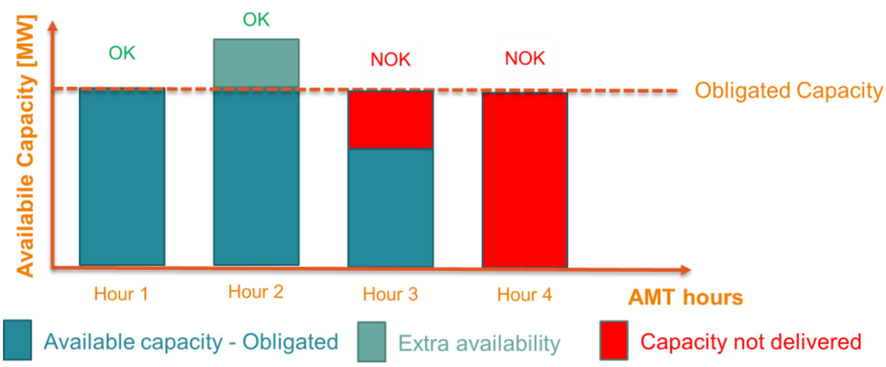



*Figure 15: Conceptual illustration of Obligated Capacity for each AMT hour (i.e. for non-energy-constrained CMU's*

It is important to note that the AMT Hours are the moments for which the capacity was contracted in the first place. Any unavailability during these hours detracts from the contracted service. For this reason, Availability Monitoring will apply regardless of Forced or Planned Outages. The obligation will also not be Load-Following, since the check is on availability of capacity, not delivery of energy.

Paragraph 3.3 defines the rules for measuring Available Capacity in the Availability Monitoring Mechanism. In case of Missing Capacity – i.e. a positive difference between Obligated and Available Capacity not covered in the Secondary Market – a penalty could apply, as section 4 describes. To avoid such a penalty, the CMU could instead source the missing capacity on the Secondary Market of the CRM. Oppositely, "Hour 2" in Figure 15 illustrates that a CMU could also be available beyond their Obligated Capacity during AMT Hours. In this case, the excess capacity can be sold on the Secondary Market. More information on these types of exchanges can be found in the Secondary Market design note.

At a system level, this creates an incentive to maximize available capacity during AMT Hours. Therefore, this design principle incentivizes system adequacy at all AMT hours.

**Design Proposal #7:**

CMU's have to provide their Obligated Capacity at every AMT hour. The Obligated Capacity is not influenced by Forced or Planned Outages.

### 3.2.2 Obligated Capacity for non-energy constrained CMUs

For these CMU types, the duration of the AMT moment (i.e. the number of AMT hours) does not cause unavailability. This is why a uniform Obligated Capacity for every AMT hour should not affect the expected expenses and revenues.

The derating of non-energy constrained CMU's is based on statistical drivers, such as forced outage rates and – for e.g. renewable sources – climate conditions. The adequacy model counts on these units to deliver make at least the Eligible Volume available.

**Design Proposal #8:**

For non-energy constrained CMUs, the Obligated Capacity is at every AMT hour equal to the Eligible Volume as established in the Prequalification phase preceding the Capacity Auction.

In practice, these units will be available at full capacity at some AMT moments and significantly less or not at all at others. Using the principles of Secondary Market trading as explained above, the CMU's should be able to deliver at least the Eligible Volume on average.

### 3.2.3 Obligated Capacity for energy constrained CMU's

If a CMU is energy constrained (e.g. a battery or an industrial process which can only be stopped for a limited time), it knows beforehand that at AMT Moments lasting longer than its energy constraint, it will have expenses on covering the Missing Capacity (i.e. penalty or replacement capacity). This is not compensated by benefits of availability in the other AMT Moments, exactly because they will be shorter. A CMU like this would then incorporate the expected expenses for a uniform Obligated Capacity at all AMT Moments in the CRM bid, inflating the overall cost. This is contrary to the cost-efficiency objective.

Additionally, the adequacy model does not impose such a uniform profile for energy constrained CMU's. It determines their contribution **according to their Service Level (SLA)** comprising the energy constraint. This leads to a categorization of derating Table 2 shows.

*Table 2: SLA's for Energy Constrained CMU's as defined in the derating design*

| "Aggregation category" | Duration | Limits |
|---|---|---|
| **SLA #1** | 1h | 1 activation / day |
| **SLA #2** | 2h | |
| **SLA #3** | 3h | |
| **SLA #4** | 4h | |
| **SLA #5** | 8h | |
| **SLA #6** | No Limit | |

In order to be adequate, it is sufficient that these CMU types make their capacity available, as long as their energy is not depleted. However, at such moments, the system requires the Reference Power, not the Eligible one. Figure 16 illustrates this principle for a 50 MW Reference Power limited to two hours delivery.

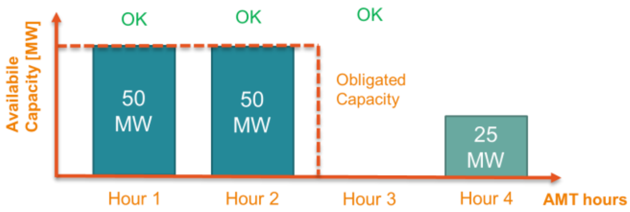



*Figure 16 Numerical Example of Energy Constrained Obligated Capacity*

If the Capacity Provider offers an SLA that matches the physical limit of the assets behind the CMU, they should not be able to offer any capacity to the Secondary Market.

However, if a CMU does deliver beyond its SLA (e.g. Hour 4 in Figure 16), it is in excess to what was contracted for the CRM and can be offered (ex post) to the Secondary Market.

This is especially advantageous when Capacity Providers see reasons beyond the Energy Constraint to be unavailable. Because these types of products are typically very diverse (e.g. demand response, aggregates…), an individual assessment by the capacity provider of the capacity before SLA derating is advantageous to be able to strike the higher-mentioned balance between costs (i.e. penalties) of not respecting the SLA-determined availability and revenues (from both Primary and Secondary Market). This is why the design allows a Capacity Provider to declare – to an extent – their own Reference Power during Prequalification (see dedicated design note for rules).

**Design Proposal #9:**

For energy constrained CMU's, the Obligated Capacity is equal to the Reference Power, as determined during the Prequalification phase, for all AMT hours in one day until energy constraint of the SLA has been met by energy delivery of the assets comprising the CMU. After that, the Obligated Capacity will be equal to 0 MW for any other AMT Hour occurring in the same day.

## 3.3 Available Capacity and CMU Types in the Capacity Market

The Availability Monitoring mechanism has to define how the Available Capacity can be assessed at each AMT Hour and for every category of CMU. Paragraph 3.3.1 specifies the rules for this, respecting the previously determined cost-efficiency principle that it should use data channels from existing market mechanisms as much as possible. The disclaimer at the beginning of this chapter still applies to this principle.

In this segmentation, some categories of CMU's will only truly deliver at prices that could exceed the AMT Price. To take this into account the Declared Market Price (DMP) is introduced. This means that the proof of this Available Capacity's capability to deliver the corresponding energy will be limited to certain price occurrences. This is where Proven Availability becomes relevant. Paragraph 3.3.2 elaborates on both principles.

Finally, CMU's contracted in Ancillary Services by Elia are considered available for the contracted period unless proven otherwise via the availability checks foreseen in the context of the ancillary services. More clarifications on this link between mechanisms is explained in paragraph 3.3.3.

### 3.3.1 Rules for evaluating Available Capacity for each CMU Type

A first indicator of availability already in place today is the data coming through outage planning agents on the maximum available capacity of units. This is today the case for the CIPU contract typically applicable for units above 25 MW installed capacity, which are obliged to send a full schedule (including nominations of production). These obligations for these units will persist in the future.

In the future, this will be extended in the framework put forward by the System Operator Guidelines (SOGL)[3]. Therein, the obligations for the Outage Planning Agent to communicate asset availability and obligations for assets to have an assigned Outage Planning Agent are set out. Elia facilitates the implementation of this framework on a Belgian level, in close collaboration with the stakeholders[4]. The current design proposal obliges availability data on generation/storage starting from Type B (currently set as > 1MW installed capacity) as defined following the Network Code dealing with Requirements for Generators and Demand Facilities directly connected to Elia's grid.

***Remark:*** *please take note that this framework is still under construction and – whereas the proposal in this Design Notes outlines principles based on the latest information – this could still be adapted in function of the final result, as also denoted in the disclaimer at the top of this section.*

The Availability Monitoring will take the information received through Outage Planning Agents where available. The Outage Planning Agent can communicate three availability statuses. The link between the rated "Available Capacity" in the CRM is given in Table 3.

*Table 3: Relation of Availability Status vs Available Capacity*

| Availability Status | Available Capacity |
|---|---|
| **"Available"** | $P_{max, Available}$[5] |
| **"Unavailable"** | 0 MW |
| **"Testing"** | 0 MW |

[3] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2017.220.01.0001.01.ENG&toc=OJ:L:2017:220:TOC
[4] As part of a larger project commonly referred to as ICAROS (Integrated Coordination of Assets for Redispatching and Operational Security)
[5] Any communicated restrictions on the production capacity, as determined in the SOGL, will be taken into account

CMU's not having any outage planning obligations, should communicate planned unavailability until D-1 before the Day-Ahead market. This is similar to assets with outage planning obligations under the SOGL and falling under the "Alternative Outage Coordination Calendar" in the current proposal put forward by Elia. Any future evolutions of these rules could apply on the CRM as well.

**Design Proposal #10:**

Available Capacity is primarily determined on the data received via the Outage Planning Agent, according to Table 3. CMU's without outage communication obligations should notify Elia of any planned capacity restrictions before D-1 before Day-Ahead at the latest.

Specifically for Demand Side Response products and aggregations, the capacity to reduce consumption is important. This is why Available Capacity at any AMT Hour for a demand product (prior communicated outages as mentioned above notwithstanding) will be a comparison of the consumption with an Unshedable Margin (UM), established during the Prequalification Phase. This does not give the CMU an incentive to consume, as the modalities defined in 3.3.2 allow them to indicate when they will reduce consumption (i.e. dispatch themselves based on market signals).

**Design Proposal #11:**

Available Capacity at any AMT Hour for demand side response and aggregation will be a comparison of the measured consumption with an Unsheddable Margin (UM), established during the Prequalification Phase.

Additionally to a declaration of availability, the capability of delivering energy when required by the market needs to be demonstrated. For units with a full scheduling obligation (i.e. CIPU units today, as defined by the Belgian adaptation of the SOGL in the future) the consistency with the nominated $P_{max}$ is apparent from the usage of that margin today in e.g. the balancing mechanism.

**Design Proposal #12:**

The availability of CMU's with a full schedule including $P_{max}$ nominations will have an Available Capacity at each AMT Hour of $P_{max}$ nominated, notwithstanding capacity reserved in Ancillary Services.

On the other hand, energy of smaller-scale generation/storage – without full schedule – and demand management assets is much less visible via the typical market mechanisms. Whereas the CRM should not impose the delivery of energy, it should ask for proof of delivery when market conditions are favorable for the market actor. This should be a question of sufficiently high market price. Therefore, the Availability Monitoring takes the Outage Planning Data (and consumption for DSR) as a reference except for AMT Hours where the Day-Ahead electricity price surpasses a level declared by the Capacity Provider as favorable. This Day-Ahead price level will further be referred to as the **"Declared Market Price"** or the **"DMP"**. Paragraph 3.3.2 explains the modalities for communicating such DMP.

At these AMT hours, the CMU is expected to deliver energy at its Reference Power. The Monitoring Mechanism will verify if the output of the unit indeed matches the Obligated Capacity for those hours (see 3.2). For generation or storage with direct metering this is simply the output at the meter, or "$P_{measured}$". For DSR or delivery at a delivery point with net offtake, this is a comparison of the measured consumption ("$P_{measured}$") with a baseline.

A priori, the baselining method will be consistent with the rules under development in the Transfer of Energy framework thereby ensuring compatibility of CRM arrangements with the energy market functioning (subject to the disclaimer in the beginning of this section).

The establishing of a metered output requires metering in the first place. The Availability Monitoring Mechanism will require quarter-hourly measurements at the Delivery Point(s) for the contracted service. An hourly value is subsequently determined – to create an equivalent granularity as the Day-Ahead reference market – as the average metered output.

**Design Proposal #13:**

CMU's without a full schedule and obligations on production margin are required to prove their capability of delivering the Obligated Capacity when market conditions are such that they would deliver energy into the market. To this end, they are obligated to communicate a Day-Ahead price above which their full capacity will be used, i.e. delivering energy. This is the CMU's DMP. The DMP must be communicated before Day-Ahead market closure. For AMT hours where the Day-Ahead price is higher than the DMP, the Available Capacity will be equal to the measured output.

Figure 17 shows a numerical example for an AMT Price of 150 €/MWh and a CMU with the following characteristics:

- 2 hours energy constraint
- Reference Power = 10 MW
- DMP = 200 €/MWh

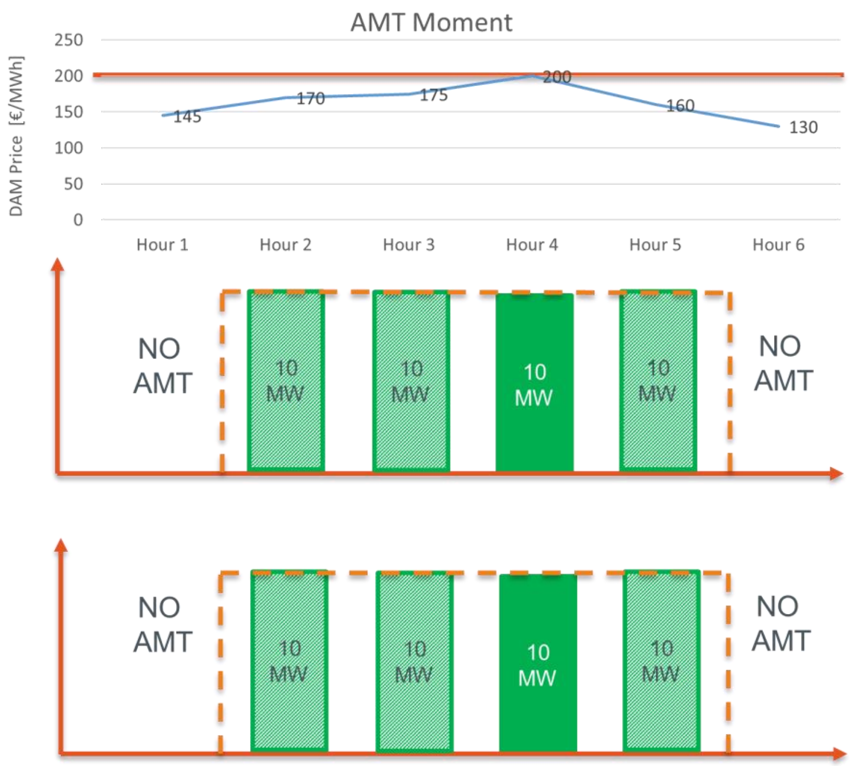



*Figure 17: Numerical example for the DMP mechanism*

The example CMU will have to be available for all AMT Hours (hours 2-5). It has however indicated that it will not deliver energy until the price surpasses 200 €/MWh. During hours 2 and 3 it will be considered available without delivering energy. During hour 4, however, the price is sufficiently high and a dispatched power of 10 MW should be observed. At hour 5, the price drops below the DMP again. The unit will no longer deliver energy, but is still considered available without delivering energy as the energy constraint has not yet been met.

Paragraph 3.3.2 ties this way of measuring Available Capacity to Proven Availability. Lastly, Capacity reserved in Ancillary Services is considered available. Paragraph 3.3.3 elaborates the modalities for indicating capacity as reserved in ancillary services. Table 4 summarizes the rules for establishing Available Capacity as described above.

*Table 4: overview of determination of Available Capacity for all CMU Types*

| CMU Type | Not Reserved in AS: Above DMP | Not Reserved in AS: Below DMP | Reserved in AS |
|---|---|---|---|
| **Generation/storage with full schedule** | $P_{available} = P_{max,Nominated}$ | | $P_{Available} = P_{Reserved,AS}$ |
| **Generation/Storage without full schedule** | $P_{available} = P_{Measured}$ | See Table 3 | |
| **Aggregation/DSR** | $P_{available} = P_{baseline} - P_{Measured}$ | $P_{available} = P_{measured} - UM$ OR See Table 3 | |

### 3.3.2 Declared Market Price and Proven Availability

CMU's could have a singular Day-Ahead electricity market price for which they are willing to deliver their energy, which is constant over the entire year. For such CMU's, a singular fixed DMP is easiest. On the other hand, this price could vary due to e.g. seasonal fuel cost, opportunity costs… calling for a more dynamic DMP.

Given that both products have their merit and it is in the interest of performing correct monitoring to have the most representative information, both options should be allowed. In any case, the DMP should be disclosed before closure of the DA market to avoid gaming (e.g. no later than D-1 at 11h30).

**Design Proposal #14:**

For each CMU obligated to communicate a DMP, the Capacity Provider must fix a singular value for the DMP in their contract. The Capacity Provider can update the DMP by communicating a new price to Elia. This DMP cannot apply on AMT hours for which the Day-Ahead market has already closed at the time of communication. For these AMT hours, the last known value before market closure will be used.

A Day-Ahead DMP is a minimum requirement, as it is consistent with the reasoning presented in 3.1.1. When the Available Capacity during AMT hours where the DAM price surpasses a CMU's DMP is consistent with the Obligated Capacity for those AMT hours, the CMU exhibits "Proven Availability".

The distinction between "Proven" and "Unproven Availability" can be applied to the example in Figure 17 : the CMU is considered "Proven Available" during hour 4 (solid fill) and "Unproven Available" during hours 2, 3 and 5 (pattern fill).

CMU's with the least "Proven Availability" are most likely to be tested, as explained in 3.4. This ensures that a Capacity Provider has the incentive to correctly declare DMP for a CMU:

- A DMP which is **too low** could require the CMU to react to a day-ahead price for which it would be turning a loss in the Energy Market
- A DMP which is **too high** could be so exceptional that the CMU has almost no Proven Availability and is the top priority to be tested.

In case the CMU would be able to react to Balancing price signals as well, for which the prices can be higher, it could also indicate prices for these markets. Consistent Available Capacity evaluations during AMT Hours where Balancing prices exceed declared levels also contribute to the considered "Proven Availability". However, as the Balancing markets are not accessible to all assets contributing to adequacy, these should be considered optional. To clarify: this changes nothing to the market-wide Availability Monitoring Trigger, which is still based solely on the Day-Ahead market.

**Design Proposal #15:**

CMU's can optionally communicate Balancing prices above which they would be willing to deliver the energy behind the CMU's capacity. Elia can take this into account in the CMU's considered Proven Available Capacity when establishing priority for testing.

Lastly, the obligated DMP should be the price for which the full Obligated Capacity is activated. For a CMU comprising of multiple assets (e.g. aggregates), each with different costs, the true price and volume could be stepped. In addition to the obligated DMP, the CMU should be able to submit multiple volume-price pairs in increasing order. Figure 18 shows an example of this stepped response to a Day-Ahead price.

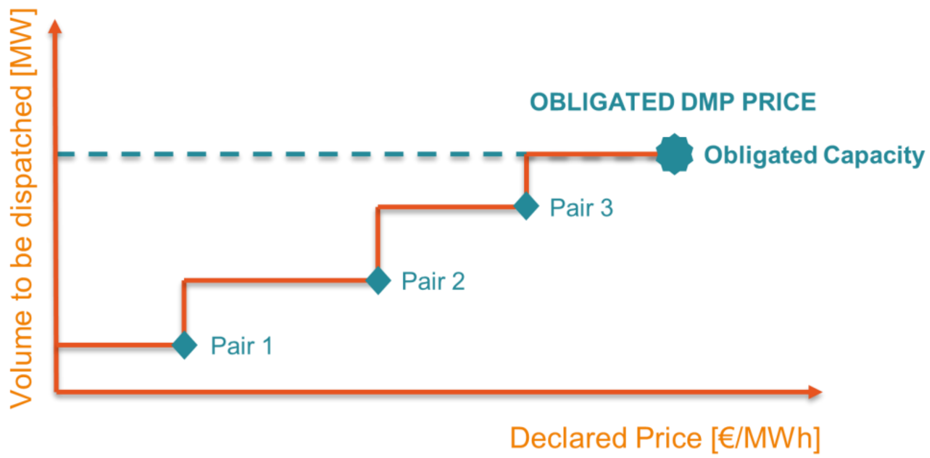



*Figure 18: Illustration of multiple price-volume pairs for DMP*

**Design Proposal #16:**

Capacity Provider can optionally communicate multiple additional DAM/Balancing price-dispatched volume pairs for a CMU, according to their real dispatching strategy which Elia will take into account when establishing Available Capacity and Proven Available Capacity.

### 3.3.3 Availability for units reserved in Ancillary Services

Capacity reserved in the Ancillary Services is considered available in the context for the CRM for the period during which it is contracted as Ancillary Service, unless the availability checks in the Ancillary Services reveal otherwise.

For the Ancillary Services bidding, Elia receives from the Balancing Service Provider (BSP) an offered volume and the Delivery Points at which that volume will be provided. It is not specified at the bidding stage how this volume is partitioned over the different Delivery Points. Furthermore, the bidder of the flexibility at a Delivery Point could be a different entity from the Capacity Provider. On the other hand, Elia disposes of the following information:

- **From the Capacity Provider:**
  - Delivery Point(s) for each CMU
  - Obligated Capacity per CMU
- **From the Balancing Service Provider:**
  - Ex post activated volume per Delivery Point

If the reserved bid consists of (a) Delivery Point(s) associated with one single CMU, the AS reserved volume will be added to its Available Capacity at every AMT Hour. In this case, Elia can directly associate the reserved volume with the CMU.

This is not the case if a Delivery Point associated to a CMU is successfully reserved in the Ancillary Services as part of a larger pool, consisting of multiple CMU's or non-CRM delivery points. Elia will then take note of the activated volume for Ancillary Services ex-post when determining Available Capacity during an AMT Hour. It will be equal to the sum over the delivery points of:

- The Available Capacity as determined in Table 4
- The activated volumes in the framework of Ancillary Services

As is the case for $P_{measured}$, the latter will be based on the average of the metered output over the AMT Hour.

This is numerically illustrated in

Table 5 for a “DSR/Aggregation” CMU with three delivery points – DP1, DP2 and DP3 – respectively with 3, 3 and 4 MW Obligated Capacity for the considered AMT Hour. It considers all possibilities concerning AS activation and height of DAM price compared to DMP.

*Table 5: numerical illustration of Ancillary Services Available Capacity for a DSR/aggregation CMU*

| | Day-Ahead Price < DMP | Day-Ahead Price > DMP |
|---|---|---|
| **AS activation of 2 MW in DP 3** | DP 1 and 2 retain a margin of 3 MW compared to UM<br>DP 3 retains margin of 2 MW compared to UM | DP 1 and 2 consume 3 MW lower compared to baseline<br>DP 3 consumes 4 MW lower compared to baseline |
| **No AS Activation in DP 3** | DP 1 and 2 retain a margin of 3 MW compared to UM<br>DP 3 retains margin of 2 MW compared to UM | DP 1 and 2 consume 3 MW lower compared to baseline<br>DP 3 consumes 4 MW lower compared to baseline |

This method is used to assess Available Capacity for any monitored AMT Hour within the AS-contracted period.

**Design Proposal #17:**

If a CMU is reserved in an Ancillary Services bid consisting only of (a) Delivery Point(s) associated with the CMU in the Capacity Contract, the reserved volume will be added to its Available Capacity for any AMT Hour, taking into account the AS activated volume when measuring the output, for the AS-contracted period, unless the tests applying in the Ancillary Services mechanism demonstrate a lack of capacity. A Missing Capacity will be established according to the results of such tests.

When (a) Delivery Point(s) associated with a CMU is successfully reserved in the Ancillary Services in one bid associated with Delivery Points not associated to the CMU, the volume of any Ancillary Services activation in the concerned Delivery Point(s) is added to its Available Capacity, on top of the method for determining Available Capacity for the CMU type.

Of course, the AS activation volume could be zero, in which case the full Obligated Capacity must be met with Available Capacity according to the evaluation defined in Table 4.

## 3.4 Rules for Availability Testing

Paragraph 3.3.2 illustrates the importance of Proven Available Capacity. Regarding cost-efficiency, it is most effective to determine Available Capacity as much as possible through the rules set out in 3.3. Nevertheless, as these generally applicable rules for monitoring could still cause limited visibility on certain CMU’s, provisions for Availability Testing as a last resort are necessary. Elia reserves the right to test any contracted CMU up to three times successfully during the winter period and once successfully during the summer.

Testing implies a delivery of energy up to the Reference Power, as defined in the Capacity Contract. This is done according to the same modalities for determining the Reference Power during Prequalification. Elia reserves the right to demand a test for the contracted SLA duration (see 3.2.3) up to one time successfully per Delivery Period. This means that delivery of the Reference Power must be maintained for the duration indicated in the SLA. Any other tests will only require a delivery of the Reference Power during one quarter-hour.

The test should be announced at Day-Ahead Market closure at the latest, because the Capacity Product is designed to respond at least to a day-ahead signal. In the absence of any other ramping/start-up requirements, a later announcement would not match the product definition. The nature of the test remains a “surprise test”. The design regarding Availability Testing is presented in the design proposal below. Availability tests are at the expense of the Capacity Provider.

**Design Proposal #19:**

Elia reserves the right to test any contracted CMU up to three (3) times successfully during the winter period (1 November – 31 March) and one (1) time successfully outside of the winter period during the Delivery Period. Included therein, Elia reserves the right to test the duration of the registered SLA one (1) time successfully during the Delivery Period.

To initiate a test, Elia communicates a timeframe during which delivery of the full capacity is due, by closure of the Day-Ahead Market at the latest. The procedure for the test itself will be the same as the test performed during the Prequalification stage to determine the Reference Power. A failure of the test will result in a penalty as defined in section 4.1 as if the Obligated Capacity is the Reference Power and the Available Capacity is the Measured Power.

Any potential costs incurred by the Capacity Provider as a result of such a test will be borne by the Capacity Provider.

The selection of units to be tested is a result of an internal selection procedure from Elia that will not be disclosed in order not to loose on its surprise effect. It is however clear that Elia shall give priority to the following cases:

- CMU’s with previously failed tests
- CMU’s with limited “Proven Availability” during the Delivery Period
- CMU’s exhibiting illogical behavior (i.e. potential gaming on DMP, structural short-term coverage on the Secondary Market,…)
- CMU’s consistently failing to deliver (in Availability Monitoring or preceding Availability Tests)

# 4 Availability Penalties

Section 3 established the rules for determining Obligated and Available Capacity. Any positive difference between $P_{obligated}$ and $P_{Available}$ which is not covered in the Secondary Market is liable to a penalty. $\Delta$ in Figure 19 illustrates this volume for an AMT Hour. This is referred to as "Missing Capacity". As explained in paragraph 3.2.1, a Capacity Provider's requirement to cover their Obligated Capacity should be met at any AMT hour.

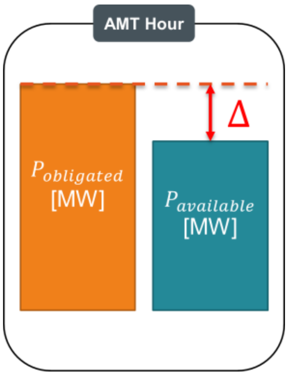



*Figure 19: Volume exposed to an Availability Penalty*

The penalty exists to create a sufficient incentive for CMUs to cover exposed volumes via the Secondary Market and drive system adequacy as described in Paragraph 3.2.1. A first step to achieve this would be a proportional penalty to the Missing Capacity. Paragraph 4.1 establishes a formula for such a penalty.

Consistently underperforming CMUs undermine the adequacy of the system. To discourage this kind of behavior further, an escalation procedure should be foreseen going beyond the proportional penalties. Paragraph 4.2 describes this.

Finally, the penalties applied for testing require a specific set of rules, as they are often the result of preceding limited visibility or illogical behavior. Paragraph 4.2 sets out these rules.

## 4.1 Proportional penalty

The Proportional Penalty should scale with two elements:

1. The positive difference between Obligated and Available Capacity
2. The value of the contract

This latter value should be divided over a certain subset of hours considered representative for the global availability performance. This period will be defined in the Market Rules and is referred to as the "Unavailability Period" or "UP". The Unavailability Period should reflect the minimum number of AMT Hours that will be effectively monitored for availabiltiy and for which – if warranted – a penalty is issued by Elia. This is consistent with the fact that the Obligated Capacity should be respected for every AMT hour. The renewed formula then becomes:

Finally, a penalty factor should apply. This factor is key in establishing sufficient incentive to be available. The formula then becomes:

$$Penalty\ [€] = \frac{(1+X) * \left(P_{obligated} - P_{available}\right)}{UP} * yearly\ contract\ value$$

With "X" as the Penalty Factor. As for the value, CMUs that have planned their unavailability and communicated this according to the specifications in paragraph 3.3.1 will be liable to a lower penalty factor (i.e. X = 0) when planned outside the winter period. Any outage planned during the winter period is likely to put adequacy more at risk, considering the adequacy drivers in Belgium. This is why only Announced Unavailability outside of the winter period receives a lower penalty factor than Unannounced Unavailability. Table 6 further specifies this feature.

*Table 6: Penalty factor for Announced vs Unannounced unavailability*

| | Announced unavailability<br>01/04/20xx – 31/10/20xx | Unannounced unavailability<br>01/11/20xx-1 – 31/10/20xx | Announced unavailability<br>01/11/20xx – 31/03/20xx |
|---|---|---|---|
| **X** | 0 | 1 | 1 |

Since this is a proportional penalty, the design proposes a yearly penalty cap (stop-loss limit) at the yearly contract value. Reaching the cap does not relinquish the Availability Obligation for the CMU, nor does it imply the escalation procedure discussed in paragraph 4.2. The Design Proposal below summarizes the proposal for the proportional penalty.

**Design Proposal #18:**

Elia can perform an availability monitoring on any AMT Hour during the Delivery Period. It should, to that end, define estimated minimal number of effectively monitored hours for the Delivery Period denoted as the "Unavailability Period" or "UP". The value for UP should be disclosed with the market in the Capacity Market Rules.

The selection criteria for AMT Hours during which availability will be monitored will not be disclosed to the market, thereby ensuring the full incentive effect on remaining available at all AMT Hours.

UP is in no way a limitation on the number of AMT hours during which Availability can be monitored by Elia. The latter is capped at T+.

For any AMT Hour Elia can issue a penalty to a Capacity Provider for a CMU not meeting its Obligated Capacity (after taking into account exchanges via the Secondary Market) as follows:

$$Penalty\ [€] = \frac{(1+X) * (P_{obligated} - P_{available})}{UP} * yearly\ contract\ value$$

The value of the penalty factor "X" will be 1, with the exception of Announced Unavailability outside of the winter period (1 April until 31 October), where it will be 0.

The total yearly charged amount for the proportional penalty shall not exceed the yearly contract value for the concerned CMU.

## 4.2 Escalation of penalties

Aside from the proportional penalty, which is the main incentive for system adequacy as in 3.2.1, extra provisions for consistently underperforming units encourages contracts that reflect true performance of the CMU. To this end, two provisions are envisaged.

Firstly, a consistently underperforming asset should be liable to have remunerated volume revised. The proposed criteria for this are the following:

**Design Proposal #20:**

Elia reserves the right for a downward revision of the monthly capacity remuneration of a CMU proportional to observed Missing Capacity in case of Missing Capacity (i.e. not covered by the Secondary Market) exceeding each time 20% of the Obligated Capacity at three (3) separate AMT Moments (i.e. three (3) non-consecutive AMT Hours) or three (3) failed Availability Tests. This does not diminish the Obligated Capacity demanded at each AMT Hour or Availability Test once this measure is applied.

The original remunerated amount can be reinstated if the CMU exhibits Proven Availability of at least the Obligated Capacity during three (3) AMT Moments or Availability Tests, without taking into account obligations traded on the secondary market.

The Capacity Provider has the right to request and schedule Availability Tests in order to obtain this criterion.

Secondly, severe offence regarding the Availability Obligations could lead to further contractual impact. This would be the case when a CMU incurs the first penalty escalation and fails to reinstate the original remunerated amount for two subsequent Delivery Periods. In that case, the contract will permanently be revised downwards and terminated by the start of the Delivery Period covered by the first subsequent Y-1 Auction.

**Design Proposal #21:**

Elia reserves the right to instate downward revision of the monthly capacity remuneration of a CMU proportional to observed Missing Capacity and terminate the contract by the start of the Delivery Period covered by the first upcoming Y-1 Capacity Auction, if during two subsequent Delivery Period the Capacity Holder as incurred for the CMU a penalty under the form of a downwards revision of monthly remuneration without reinstating the initially remunerated volume.

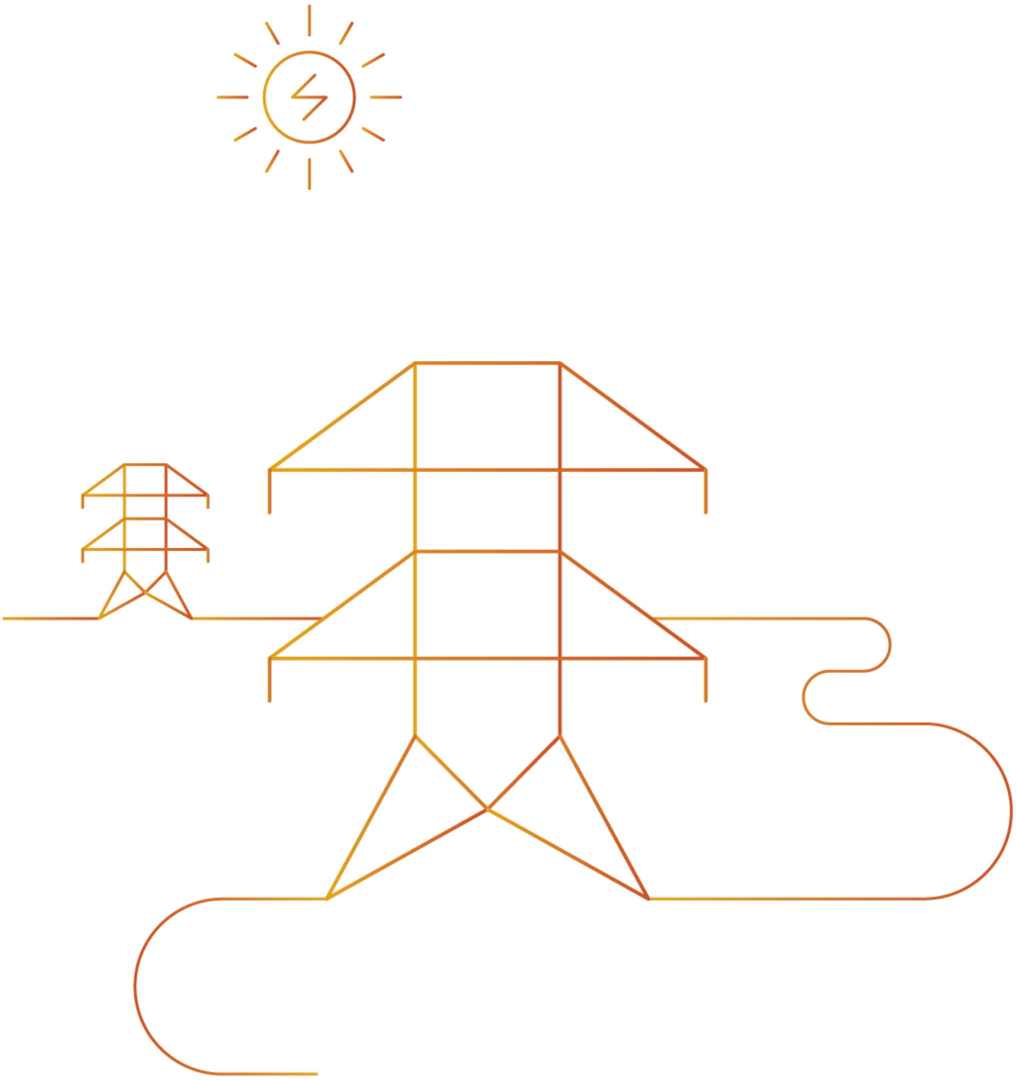
# 5 Conclusion

The whole of the presented rules and modalities presented in this design note aim to incentivize the desired behavior of any Capacity Provider for its CMUs in the CRM during the Delivery Period and in particular with the objective of maintaining system adequacy.

This behavior can be summarized on a CMU level by the following elements:

- Submitting information reflecting real expected performance in the Delivery Period
- Maximizing availability of capacity for every AMT Hour
- Covering any potential Missing Capacity in the Secondary Market
- Giving accurate and complete information during the Delivery Period for e.g. DMP, planned unavailability,…
- Deliver proof of the capability to deliver energy when it would be required in the Electricity Market

A Capacity Provider conforming itself with this behavior is expected to perform well under the design of the presented mechanism.



# CRM Design Note: Secondary Market

2/10/2019

# Table of contents

# 1 Introduction

## 1.1 Context and Goal of the design note

The purpose of the present design note is to provide all stakeholders with a clear view concerning the Market Rules related to the details on design & process of the organization of the Secondary Market in the context of the Belgian Capacity Remuneration Mechanism.

In addition to this design note, a single detailed list of definitions will be provided and publically consulted upon. As several concepts are relevant for different design aspects, a centralized approach via a single list is opted for.

***About the public consultation***

This design note is put for formal public consultation and any remark, comment or suggestion is welcome. It builds further on the discussions and proposals already made in the different TF CRM meetings gathering all relevant stakeholders and in the follow-up committee, the latter consisting of representatives of the CREG and Elia, under the presidency of the FPS Economy.

This public consultation runs in parallel with a public consultation on other design notes. Reactions to this public consultation can be provided to Elia via the specific submission form on Elia's website **no later than Wednesday 30 October 2019 at 6pm.**

On 13 September 2019, a first set of design notes has already been launched by Elia for public consultation.[1]

Note that, in line with their roles and responsibilities and the foreseen governance in the Electricity Law, also the FPS Economy and the CREG will consult on aspects within their competence according to their procedures.

***Legal Framework***

The Law setting up a Capacity Remuneration Mechanism, adopted on April 4th 2019[2] (hereafter "CRM Law"), modifying the Electricity law of 29 April 1999 on the organization of the electricity market (hereafter "Electricity law") introduces the concept of a Secondary Market.

In Art. 7undecies §8 the following elements are defined (own translation):

- The functioning rules of the Capacity Remuneration Mechanism containing

[1] https://www.elia.be/en/public-consultation/20190913_formal-public-consultation-on-the-crm-design-notes-part-i

[2] http://www.ejustice.just.fgov.be/eli/wet/2019/04/22/2019012267/staatsblad

especially […]

- […] at the latest one year before the first delivery period, the organization mechanism of the Secondary Market.

## 1.2 Structure of the design note

One of the main objectives of the design note is to address the driving principles underlying the proposed design choices for the Secondary Market in order to reach a clear understanding of the general contours of the Secondary Market choices proposed, this will be handled by Chapter 2.1.

A focus on the desig of the Secondary Market will be expressed in Chapter 2.2.

Further, the note details in Chapter 2.3. the Transactions requirements regarding the Secondary Market product guidelines and specifics.

Details on the volumes that can be offered in the Secondary Market will be itemized in Chapter 2.4.

In the end, Chapter 2.5. provides information about the implementation of the solution in time.

## 1.3 Concept of a Secondary Market in a CRM

Market access to the CRM in a Primary Market will occur via the Y-4 and Y-1 Auctions. These Auctions will contract capacities for a specific period in time (i.e. a number of consecutive Delivery Periods). The purpose of a Secondary Market is to give comfort to the contract capacities to be able to transfer their CMU obligations to another CMU at an agreed price in order to allow them to manage their risks better. By doing so, a good functioning Secondary Market can contribute to decrease the overall CRM cost.

Under conditions and eligibility criteria as the full Prequalification Process of participating CMUs, the use of a Secondary Market is to be considered as an operational way to manage and optimize the CMU's availability/unavailability and its obligations, thereby ensuring system adequacy at all times.

In general, the Secondary Market is composed of (at least):

- Buyers of an Obligation (i.e. taking over the obligation)
    - And their prequalified CMU's capacities able to buy/acquire CRM obligations
- Sellers of an Obligation (i.e. releasing their obligations)
    - And their prequalified CMU's capacities able to sell their CRM obligations

Based on their bilateral agreement on terms and conditions, Transactions may occur for a certain time period (ranging from 1 hour up to days, weeks...) and for a certain price agreed bilaterally. The Transaction Capacity transferred is expressed in the standard unit of MW.

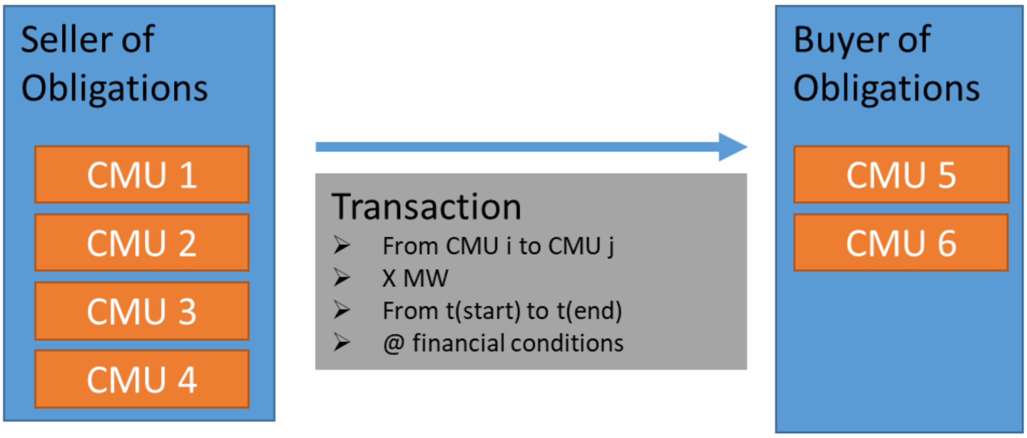



*Figure 1: CRM Secondary Market Transaction principle*

In the organization of the Belgian CRM, a table containing all the project topics to be developed has been settled.

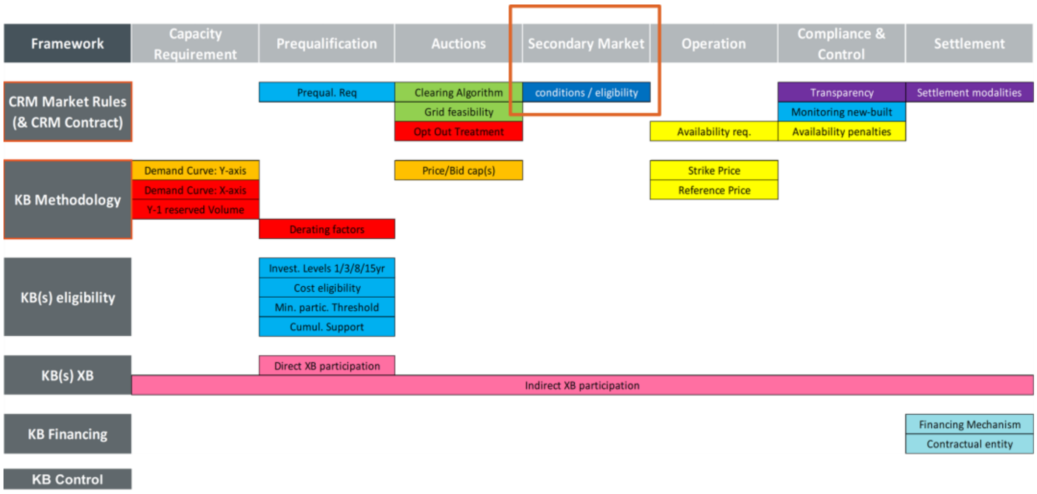



*Figure 2: CRM legislative framework*

The Secondary Market is defined as a specific market design element under the Market Rules (& Capacity Contract) framework as mentioned in Figure 2. The topic has strong links with most of the other topics, notably: Prequalification Process, Derating Factors, pre-delivery monitoring, opt-out treatment, Availability Monitoring Mechanism, Penalties and Payback Obligation. These links will explicitly be mentioned in the document.

In the Belgian CRM framework and under the light of the Clean Energy Package and other European energy guidelines, the definition of the Secondary Market is considered as a design element where several objectives and important considerations come together, among others: technology openness, limitation of the overall CRM cost via liquidity, and overall complexity avoidance and feasibility. These objectives and considerations are further discussed in the next paragraphs.

The rules are to be designed in order to make sure that all realistically potential technologies are able to participate in the CRM while taking into account their actual contribution to the Belgian adequacy (cf. Derating Factor rules presented in the Design Note 1).

### 1.3.1 Technology openness

The Clean Energy Package and other European guidelines consider technology openness as a main requirement for the design of the Market Rules & methodologies. For instance, the Clean Energy Package in Art 22 §1 of the Energy Regulation states explicitly that capacity mechanism shall "[...] be open to participation of all resources that are capable of providing the required technical performance, including energy storage and demand side management [...]".

As long as a contribution to the Belgian adequacy is ensured, the developed methodologies and rules have to ensure that there is no creation of undue entry barriers to the CRM.

It is to be avoided that the CRM design and also the Secondary Market would create undue barriers for entry. Especially in the details of the Secondary Market and if not well embedded within a larger design – it could risk to constitute such a barrier for entry. For instance, the Energy Constrained CMU's and their specific SLA may prevent the participation in the CRM if the proposed granularity (hourly, daily…) of Transactions on the Secondary Market in terms of period covered by the Transaction is not fitting their technical extra capabilities. As for the Auctions, the Secondary Market should facilitate the participation of all types of technologies.

### 1.3.2 Limitation of the overall CRM cost by fostering liquidity

The Electricity Law mentions that the CRM should be designed as such to limit its overall cost (cf. Art.7undecies, §1). It is therefore essential to find an overall CRM design solution reaching both a global minimal CRM overall cost, rather than targeting local optimums of parts of the design. In this respect, it is crucial to not only address design elements individually, but also considering them within the bigger picture of the entire CRM. It could be that giving in (slightly) at one place in the CRM design could leverage more positively in terms of cost management elsewhere.

With respect to the Secondary Market, a number of aspects could contribute to this cost objective, e.g. avoiding undue (Secondary) Market entry barriers could increase the amount of participants, thereby improve liquidity on the Secondary Market, which in turn allows participants to the Auctions to better (and less costly) manage their risk which should be reflected in lower bid prices and, ultimately, reduce the overall CRM cost.

One of the Secondary Market roles is a need for an asset selected in the Primary Market to find a risk mitigation in case of unavailability. By doing so, the Primary Market actors calculating their bids will count on a fall-back option in case of undesirable capacity unavailability. In the same way, a design hampering the development of a liquid Secondary Market will create risk premiums in the Primary Market. Stated otherwise, the goal is well to avoid the existence of risk premiums in the Auction bids related to a lack of natural back-door before the penalties are applied.

Regarding this risks decrease, the design of the Secondary Market explicitly endorses the logic of a Secondary Market as fall-back of the Primary Markets obligations, before the Penalties settlement. This means that any Contracted Capacity could resort to the Secondary Market to meet its obligations. For a system perspective, adequacy remains guaranteed in this way, hence there is no need to be overly restrictive or penalizing if market actors are managing their risks in such way. Of course, a precondition remains that all CMU's participating in the Secondary Market are also duly prequalified.

Liquidity is a key enabler to keep overall CRM costs under check. The more liquid the Secondary Market will be, the more confident the market participants will be to find a way to trade (part) of their obligations in order to manage the risks related to their contractual obligations.

Therefore, the proposed design will focus to open the Secondary Market participation to all CMUs to the extent their prequalification and Eligibility Criteria are respected. (cf. 2.3.).

For example, by authorizing in the Secondary Market newly prequalified CMUs that haven't participated yet in the Auction for a specific Transaction Period, they could provide extra liquidity in the Secondary Market and nevertheless create value for the Belgian adequacy.

The liquidity of a Secondary Market is an attention point that has been highlighted from the beginning of the design. The Secondary Market access and related aspects on the eligibility of volumes has been approached according to a philosophy of 'All contracted CMU's not capable to deliver on their obligations, i.e. suffering from Missing Capacity, should be facilitated to be able to find as much as possible alternative CMU's to (temporarily) take over their obligations and avoid unnecessary Penalties.'

Obviously, fostering liquidity is a difficult exercise in a way that the overall capacity need covered by the Auctions should be designed in order to avoid the over-dimensioning of the Belgian system. In a context of adequacy concerns (i.e. a context justifying a CRM in the first place), liquidity in a Secondary Market could be under pressure as generally there tends to be little to no overcapacity available in the system, particularly at adequacy relevant moments.

As a consequence, in order to improve the liquidity of the Secondary Market, it has been opted for opening as much as possible the Secondary Market. In particular four types of sources of capacity for the Secondary Market are identified:

- Extra Available Capacity of the contracted CMU's in the Primary Market for the same Delivery Period (i.e. the volume equivalent to (1-Derating Factor) x Reference Power)
- Prequalified CMU's having participated in the Primary Market Auctions, but that were not selected and contracted (as they were not in-the-money)
- Newly prequalified capacities that haven't participated in the Primary Market
- Opt-out Volumes that have not yet been accounted for in the Auction volume (i.e.

for which no dummy bid hasn't been introduced in the Auctions for the considered Delivery Period). Note that other Opt-out Volumes cannot be accommodated in the Secondary Market as this would imply a potential double-counting of the same capacity (i.e. first by lowering the volume procured via the Primary Market Auction and secondly via allowing it take obligations in the Secondary Market).

The exercise continues with the common CRM ambition to decrease the CRM cost and to avoid all types of double counting of the capacities: implicitly in the demand while at the same time in the Primary / Secondary Market offer curve. This will be done using the Prequalification Process as a source for the volume of capacities need in Y-1 and Y-4 Auctions.

Finally, Elia has a role to facilitate the Secondary Market. Therefore and in addition to the above principles, in the proposals described throughout this note, it has always been taken into account to provide solutions that would allow power exchanges, brokers, … or other facilitating entities to join the system and facilitate further the liquidity on the Secondary Market.

### 1.3.3 Overall complexity avoidance & feasibility

Feasible methodologies based on accurate logics that could be managed by all is key for the CRM. A manageable complexity of the CRM system is desirable in order to increase competition and limit the cost of the CRM, both in the development phase and in the risk aversion to uncertainty modelling within the Bid Prices by the participants. Overly complex mechanisms, it is also the case for Secondary Market design. Also, the more complex the mechanism becomes, the less manageable it is. In this respect, feasibility also links to the overall market design in place.

It appears clear that the feasibility of the design of the Secondary Market with a Title Transfer Facility should allow the integration of third parties facilitating liquidity (e.g. power exchanges, brokers, bulletin boards,…) with acceptable levels of complexity. This is further covered under the technical constraints mentioned in the Chapter 2.2.

# 2 Secondary Market design

## 2.1 General contours of the Secondary Market: a Title Transfer Facility

As expressed in the introduction, the Secondary Market design concerns the development of an obligation title transfer from one CMU to another CMU in order to manage its risks and make optimal use of the real Available Capacity of the CMU. The design of the Secondary Market should not interfere with the Auctions but should offer solutions to the CMU Availability Obligations, Penalties and Payback Obligation enhancing competition and decreasing the overall CRM cost.

Two entities or levels have to be considered in the design, the Capacity Provider (or Prequalified CRM Candidate) and the CMU. As the Capacity Provider or Prequalified CRM Candidate may trade with multiple CMU's, and knowing the overall CRM design parameters of the Primary Market, the design proposal should continue to meet the objectives and considerations previously presented in 1.3 (technology openness, limitation of the overall CRM cost by fostering liquidity and overall complexity avoidance and feasibility) while at the same time avoid any "gaming" effects. Note that, in any case, all the CMU's picking up obligations – including via the Secondary Market - have to be fully prequalified.

For Contracted Capacity resulting from winning in an Auction, several possibilities regarding the organization of a transfer of obligation exist:

- The first possibility is a transfer of obligation from a CMU to another CMU for which the obligation and all or part the Availability Obligations, Penalties and Payback Obligation are settled on the Capacity Providers (Buyer of an Obligation). Elia (and the CRM contractual counterparty) should recognize the transfer as duly performed and the CMU releasing its obligation and its Capacity Providers are not held liable anymore to their initial obligation. In this case, all Capacity Remuneration for the transferred obligation would also be transferred as well as Availability Obligations, Penalties and Payback Obligation towards the Capacity Provider taking over the obligation.
- The second possibility is identical to the first one, except that the (initial) Capacity Provider remains remunerated for its Contracted Capacity following the Primary Market Auction outcome. This implies that he has to negotiate bilaterally (or through an exchange) a price with the Capacity Provider taking over the obligation. All other obligations are transferred to the CMU's and its Capacity Providers taking over the obligation. Although seemingly less complex, the first possibility may create an issue regarding transparency as the transfer of remuneration necessarily implies revealing details of the individual remunerations which are not market-wide known. This could be blocking the emergence of potential anonymous exchanges because the offer and demand prices will have to cope with each of the primary Capacity Remuneration

transfers. This is particularly relevant in a pay-as-bid context of the Primary Market Auctions, but even in a pay-as-cleared context over time there may be differentiated capacity remunerations due to the existence of multi-year contracts that have not all cleared in the same Auction.
On top, in the energy and ancillary services markets in Belgium, the transfer of obligation is currently designed in an obligation release for the Capacity Provider selling its obligation and with a free (i.e. bilaterally negotiated) transfer price between both market parties. This second possibility builds on this principle.

- A third possibility is a transfer of the obligation monitoring on another CMU where the initial Capacity Provider remains responsible for the Availability Obligations, Penalties and the Payback Obligation and their settlement towards Elia and/or the Contractual Counterparty. Such design is not a full transfer of the obligation as the initial party remains liable after the transfer of obligation. In other words, the CMU taking over the obligation is considered as a subcontractor of the initial Capacity Provider, i.e. the one having a Primary Market Capacity Remuneration. For the sake of clarity, regarding the obligation transfer, no contractual liability exists with the Capacity Provider of the CMU taking over the obligation towards the overall system, i.e. Contractual Counterparty, it remains fully on the initial Capacity Provider of the CMU which has been granted a Capacity Contract in the Primary Market with its remuneration and its obligations. A question may raise to which extent such design helps in providing sufficient credibility of a Secondary Market and contributes to sufficiently mitigating risks and thereby providing sufficient comfort to participants in the Primary Market Auction to actually lower their bids? The remaining liability of the initial Capacity Provider is likely to be priced in.

An important concern related to the third possibility is the mandatory requirement of a permanent link between the CMU taking over the obligation and the initial Capacity Provider releasing its obligation. This is likely to hamper the liquidity on the Secondary Market and may in theory only work if the transfers stop after an iteration. In the following example, the limits of the third possibility are illustrated.

At first, two transfers of 5 MW (Party A to Party B) and 1 MW (Party C to Party B) occur:

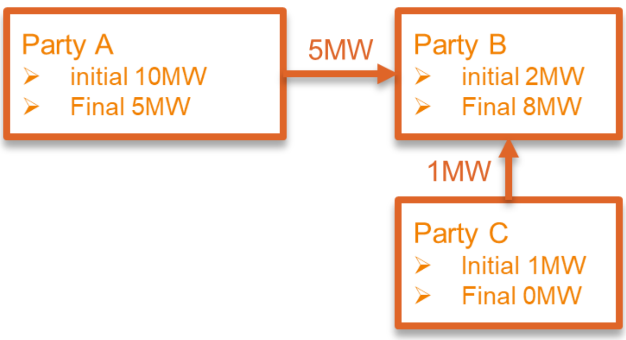



*Figure 3: Example of issue on the third possibility of a transfer of obligation (1)*

Followed by Party B further transferring part of its obligation to Parties D and E:

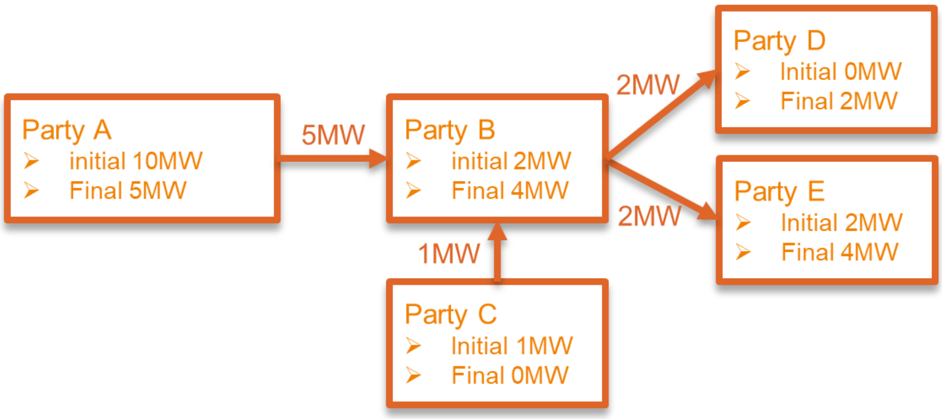



*Figure 4: Example of issue on the third possibility of a transfer of obligation (2)*

And finally, suppose that Party D has taken over obligations from another party F, but Party D turns out not fully delivering on its obligations:

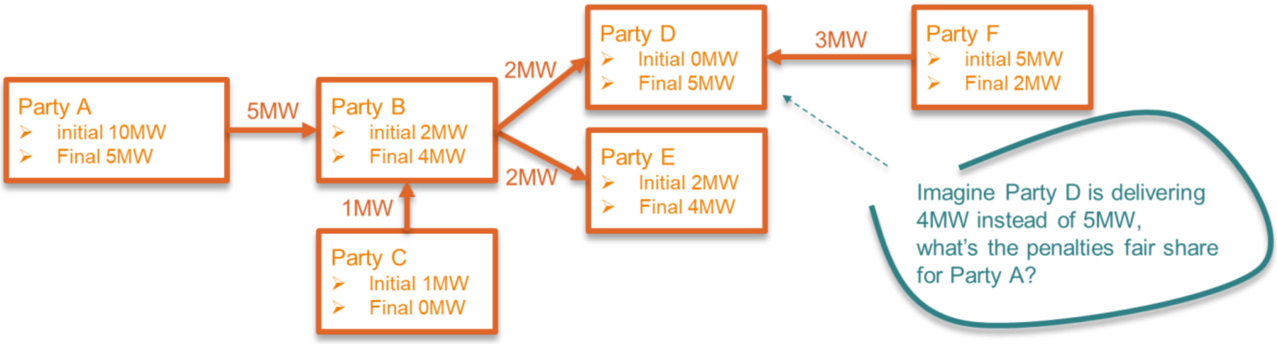



*Figure 5: Example of issue on the third possibility of a transfer of obligation (3)*

Firstly, it is uncertain which CMUs have to be considered as the final CMU's delivering the 5MW obligation of Party A. In case of sub-delivery of D, it is not clear which share of Party D is considered to be delivered for Party A. It would require arbitrary (proportional or other) rules determining this. This could create extra risks to Party A, for instance related to the financial status of Party D. Although Party D was prequalified, in such a constellation with remaining liabilities for Party A, this Party A may want to put its own requirements in terms of financial indicators (e.g. creditworthiness) of any counterparty. Perhaps Party B meets these criteria, but how could Party A manages this towards further deals with Parties E and D, whereas it nevertheless creates financial risks for Party A?

It requires clearly in any case that Party A is (made) aware of the Transactions from Party B to Parties C and D.

A second consequent issue is the clear impossibility to organize anonymous exchanges in regards to the continuous link between the CMU (like Party B) taking over the obligation and the initial Capacity Provider (like Party A) releasing its obligation.

Summarizing, it would at least require two consequences hampering the good market functioning, the application of a pro-rata rule or equivalent of the Penalties and Payback

Obligation, and the credit exposure at such financial flows of the exchange towards the contracting party.

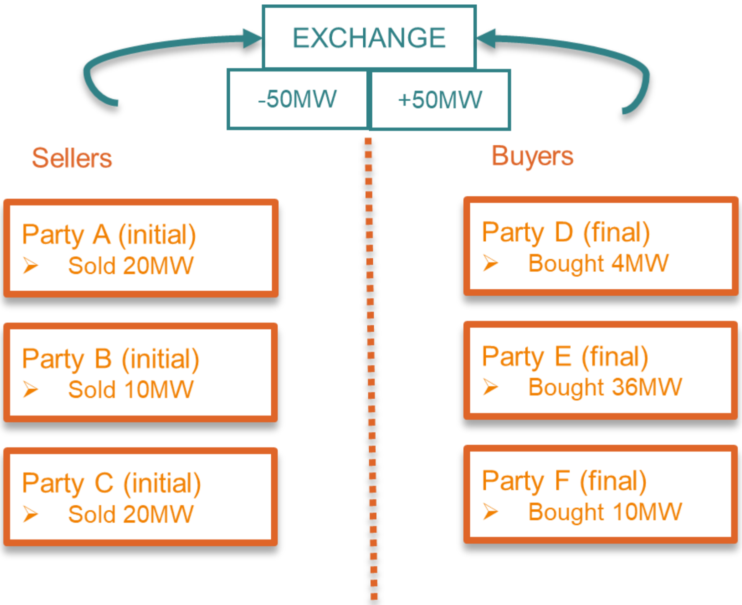



*Figure 6: Example of issue on the third possibility of a transfer of obligation in an Exchange*

In regards to the considerations and objectives of a Secondary Market exposed in Chapter 1.3, a trade-off has to be made as a compromise of such objectives. A feasible and liquid Secondary Market, accessible to all with standardized obligation transfer modalities is further proposed. In terms of the possibilities listed above, Elia proposes possibility 2 (i.e. full transfer of obligations, but the Capacity Remuneration from the Auctions remains towards the initial Capacity Provider).

## 2.2 Design of the Secondary Market

Chapter 2.2. elaborates further on the proposal of a Secondary Market in line with the second possibility of obligation transfer (i.e. full transfer of obligations, but the Capacity Remuneration from the Auctions remains with the initial Capacity Provider).

The main rationale for this decision has been exposed in Chapter 2.1: it gives sufficient comfort to Capacity Providers to find the most liquid and accessible to all possible technologies solution, allowing the facilitation of a power exchange, broker, bulletin board, ... This allows a better risk management and therefore a possible decrease of the CRM overall cost as the Penalties could be decreased by such transfer to another reliable CMU.

Whereas the Primary Market is based on an Auction with single clearing, settling the bids selection at certain moment in time for future Delivery Period(s), the Secondary Market is a continuous market letting market participants trade under the present Design Note conditions.

As mentioned in section 2.2., it appears mandatory that the Secondary Market is composed at least of Buyers of an Obligation (taking over the obligation with their prequalified CMU's able to buy/acquire obligations) and of Sellers of an Obligation (releasing their obligations with their prequalified CMU's able to sell their CRM obligations). Based on their bilateral agreement on terms and conditions, Transactions on certain period and for a certain price / value may occur. The obligation transfer is expressed in standard unit of MW with a granularity of Obligated Capacity of 0.1MW as the Primary Market.

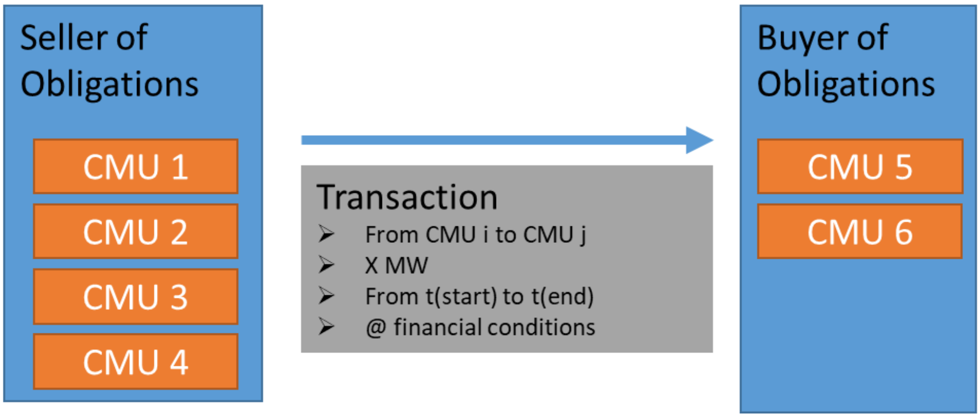



*Figure 7: CRM Secondary Market Transaction principle*

In the **Step 1 of a Transaction**, both parties (in the figure called Market Party A and Market Party B), are negotiating together (directly, or facilitated by a broker or by an exchange platform) prior to the notification of their agreed Transaction. This step is not in the scope of the Secondary Market rules but is of course a pre-requisite for its functioning.

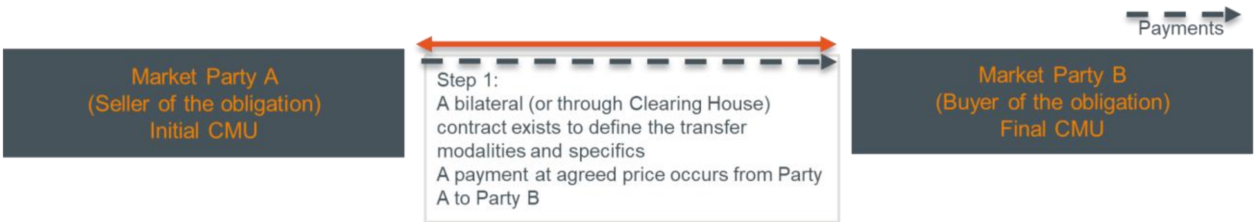



*Figure 8: First Step: CRM Secondary Market Transaction*

**Step 2 of a Transaction** is to notify a Transaction with its relevant parameters. In order to validate the Transaction, it has to be notified to ELIA (and the Contractual Counterparty) to ensure that the necessary Availability Obligation, Penalties and Payback Obligation will be correctly handled and settled. To be notified all criteria's according to 2.3. and 2.4. have to be met by both parties jointly communicating information about the CMU's obligations transfer. The following details are to be communicated to ELIA and the Contractual Counterparty.

- The prequalified CMU releasing its obligation
- The Capacity Provider of the CMU releasing its obligation
- The prequalified CMU taking over the obligation

- The Capacity Provider or the Prequalified CRM Candidate of the CMU taking over the obligation
- The Transaction Capacity transferred in MW
- The Transaction Period (i.e. time period covered by the transfer)

The Transaction Date will be determined and logged as the notification timing. The notification of the Transaction will be based on elements that will be crosschecked with the contractual capabilities of both counterparties and the CMU's capabilities to ensure the obligation, e.g. to what extent the Buyer of an Obligation has sufficient prequalified volume not yet contracted on the considered CMU to take over an obligation (cf. 2.4.).

For the case of an exchange implying Transactions from one to many CMU's or from many CMU's to many CMU's for the same Transaction Period, a split of the obligation transfer has to be organized by the exchange so that ELIA and the Contractual Counterparty are notified of multiple Transactions and can validate and confirm to each of the CMU the impact on its Availability Obligations, Penalties and Payback Obligations.

For the sake of clarity, the price of the Transaction Capacity or other elements of the Transaction are not to be notified to ELIA and the Contractual Counterparty as there is no impact on the CRM mechanism cost and has no further use to the system.

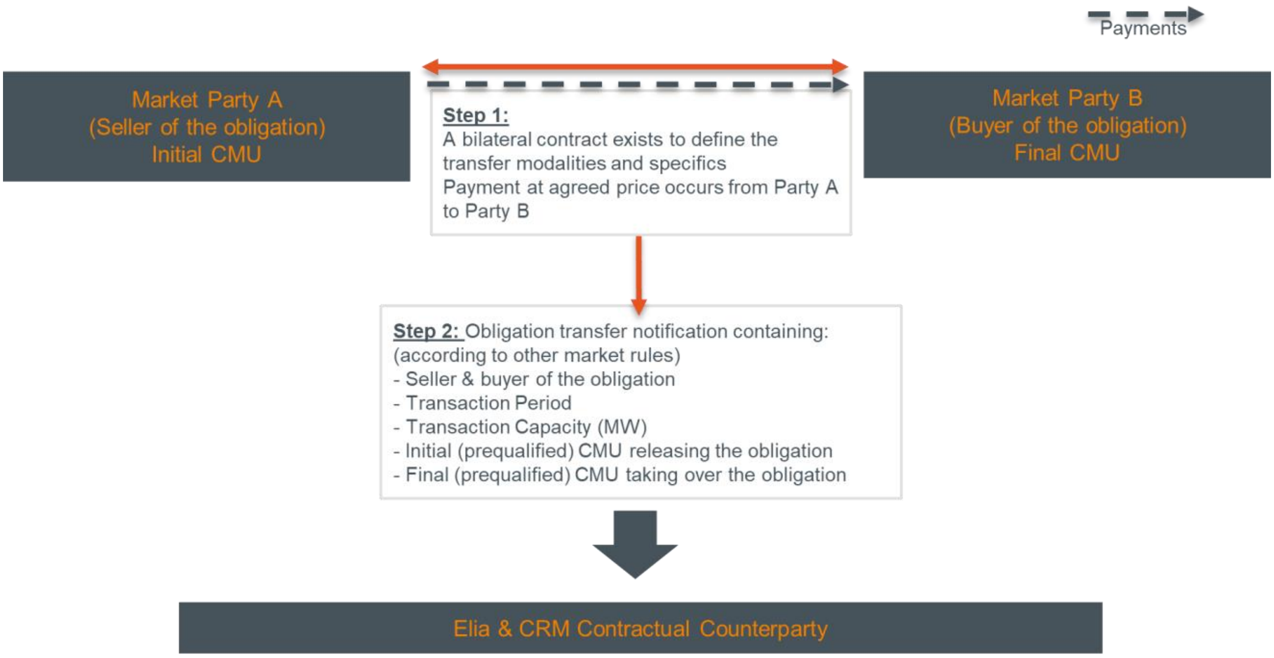



*Figure 9: Second Step: Transaction notification*

ELIA and the Contractual Counterparty will acknowledge the reception of the Transaction details and performs several checks according to 2.3. and 2.4. on the Transaction.

After a successful validation of a Transaction, a confirmation will be sent to the Seller of the Obligation that will be released of the Availability Obligations, Penalties and the Payback Obligations related to the Transaction Capacity for the Transaction Period. A confirmation will be sent to the Buyer of the Obligation that will take over the Transaction Capacity regarding the Availability Obligations, Penalties and the Payback Obligations for the Transaction Period.

In **Step 3 of a Transaction**, as the initial CMU (Seller of an Obligation) has been released from its Transaction Capacity, it is not liable anymore for the Transaction Capacity on Availability Obligations, Penalties and Payback Obligations.

Nevertheless, this initial party (as Seller of an Obligation) will still receive the Capacity Remunerations based on the Capacity Contract it has signed with the Contractual Counterparty, so that the Capacity Remuneration resulting from the Auction remains unchanged.

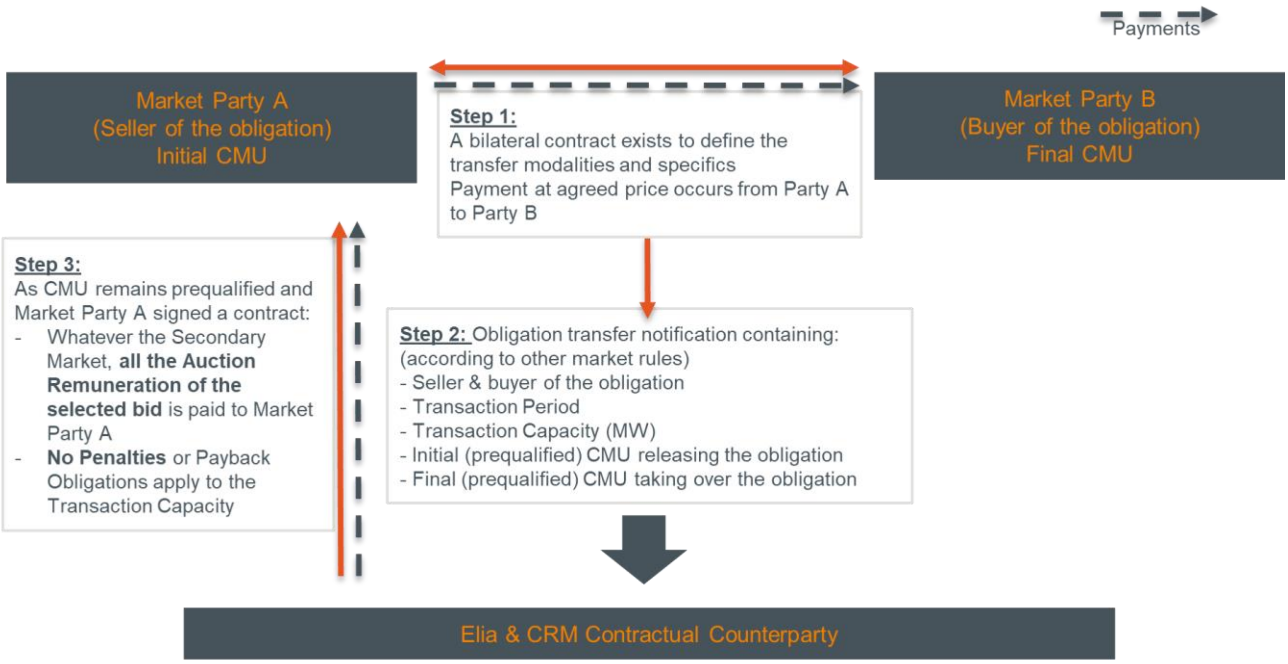



*Figure 10: Third Step: Transaction notification*

In **Step 4 of a Transaction**, all the obligations that have been transferred will be monitored on the CMU taking over the obligation. The CMU, which has taken over the obligation has to deliver the Transaction Capacity on top of any previous obligations on this CMU for the same period and will be liable to Availability Obligations, Penalties and the Payback Obligations.

However, the CMU taking over the obligation is never remunerated by the Contractual Counterparty for the obligations he has taken over, his remuneration is supposed to be part of the bilateral Transaction concluded in Step 1 of the Transaction.

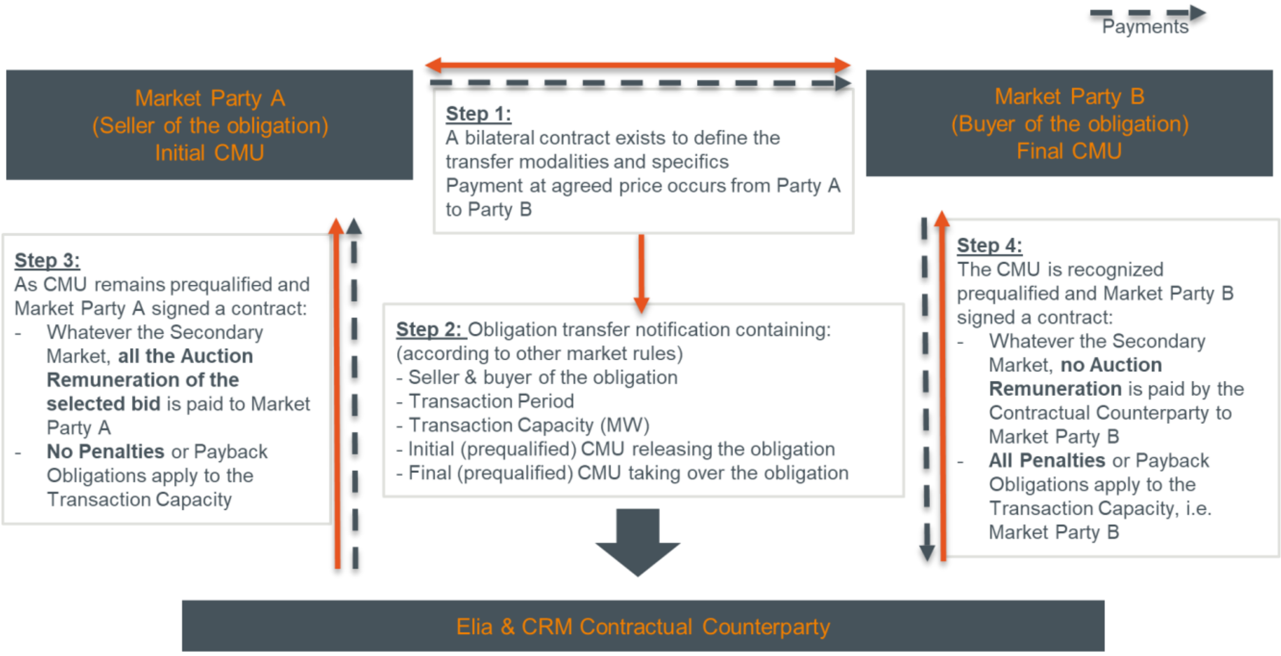



*Figure 11: Value chain of a transfer notification*

The solution fitting such steps approach is a Title Transfer Facility. All transfers of Transaction Capacity are arranged between Capacity Providers or Prequalified CRM Candidates creating Transactions to be communicated to Elia and the Contractual Counterparty. The Title Transfer Facility will be designed in order to also facilitate the third parties development of market interfaces (bulletin board, OTC brokers platform, exchanges clearing platform, …). Indeed, it is the purpose to offer a Secondary Market solution that is market-wide and open to all future development of Transaction types in order to maximise liquidity.

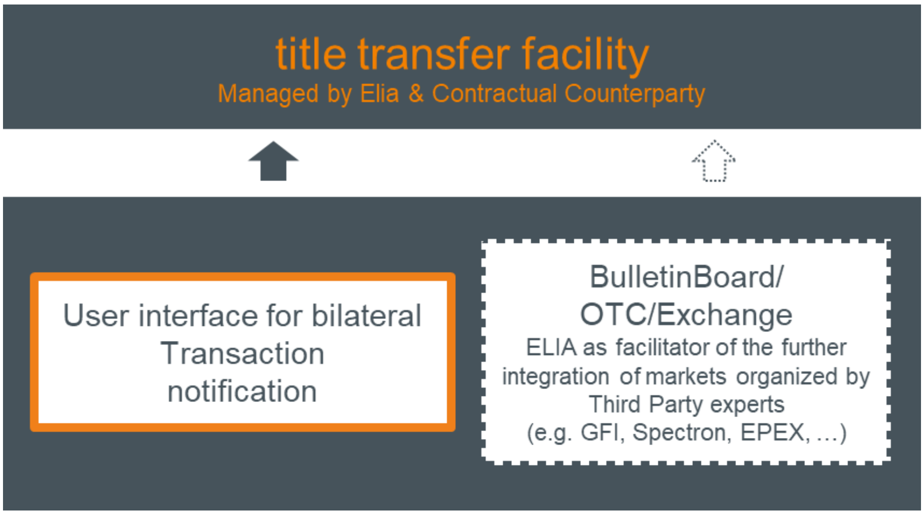



*Figure 12: Title Transfer Facility principle*

**Design Proposal #1: Secondary Market definition**

The Secondary Market is **a Title Transfer Facility** mechanism. Its purpose is to manage all transfers of obligation on a Transaction, which are arranged between Capacity Providers and Prequalified CRM Candidates creating Transactions communicated to and validated by Elia & Contractual Counterparty.

The Contractual Counterparty & Elia will receive from both Capacity Providers and Prequalified CRM Participant Candidates, the Transaction notification, will acknowledge the reception and confirm, in case of compliance, the transfer of Availability Obligations, Penalties and the Payback Obligation from the Seller of an Obligation to the Buyer of an Obligation for the Transaction Period.

All Capacity Remuneration remains to the Seller of an Obligation.

## 2.3 Secondary Market Transactions requirements

This section aims to describe the mandatory requirements of the elements of a successful Secondary Market Transaction notification.

### 2.3.1 Contractual requirement

The participants and their CMUs need to have signed a Capacity Contract in order to participate in the Secondary Market. This ensures that, from a system perspective, any capacity picking up an obligation is confronted with the same rights and obligations.

**Design Proposal #2: Contractual Requirement of Secondary Market**

All potential participants to the Secondary Market have to sign a Capacity Contract with the Contractual Counterparty prior to any Transaction in the Secondary Market and its notification to ELIA or the Contractual Counterparty.

Once all contractual documents are signed, Capacity Providers or CRM Prequalified Candidates can start to trade and notify Transactions on the Secondary Market.

### 2.3.2 Prequalification of the participating CMU's

The prequalification of both CMU's is a pre-requisite to the notification of the Transaction to ELIA and the Contractual Counterparty. This will be ensured via the need of a successful prequalification by Elia. This ensures towards the overall system and adequacy that only capacities actually capable of delivering on the required Service could participate in the Secondary Market.

It is therefore obvious that nor un-prequalified CMU's, neither any CMU's going through 'Fast-Track' Prequalification Process are eligible for the Secondary Market.

All Transactions notified to ELIA and the Contractual Counterparty with un-prequalified CMU's will be rejected.

**Design Proposal #3: Prequalification requirement of the CMU**

All participating CMU's to the Secondary Market have to be successfully prequalified under the Prequalification Process. Nor un-prequalified CMU's, neither any CMU's going through 'Fast-Track' Prequalification Process are eligible for the Secondary Market.

### 2.3.3 Transaction type

As mentioned in 2.2., the Title Transfer Facility is designed in order to allow and facilitate all Transactions types among others:

- OTC
- Exchanges
- Bulletin board
- …

For the sake of clarity, the Secondary Market part of the CRM will facilitate the integration of such third party developments in the context of the Secondary Market but Elia will not develop them. It goes beyond Elia's role to organize such activities.

### 2.3.4 Volume of the Transactions

Chapter 2.4. will treat the eligible Secondary Market capacities and the quantities of capacities allowed for a Transaction. In any case, for each Transaction on the Secondary Market the volume shall be notified.

### 2.3.5 Notification timing

As the obligation transfer has no impact on adequacy, it is foreseen to accept the notification ex-post up to 5 working days after AMT Moment. Allowing such ex-post Transactions also help in fostering liquidity and overall optimizing the cost of the system by avoiding unnecessary Penalties (i.e. limiting the amount of Penalties to the volume that was really unavailable to match adequacy needs).

A notification prior to an AMT identification related to a Transaction Period is considered as "ex-ante" and is to be distinguished from a notification "ex-post", notified after an AMT identification related to a Transaction Period, the AMT identification is the Day-Ahead Market prices publication (according to Availability Obligations & Penalties Design Note). Despite the fact that both are facilitated in the proposed Secondary Market mechanism, ex-post Transactions are possible up to 5 working days after start of the Transaction Period. If the timestamp of the Transaction is later than 5 working days after its delivery start date and time, the Transaction will be rejected.

**Design Proposal #4: Ex-ante and ex-post notification**

An ex-ante Transaction is considered as notified before the AMT identification related to a Transaction Period, where the AMT identification is the Day-Ahead Market prices publication.

By opposition, an ex-post Transaction is considered as notified after the AMT identification related to a Transaction Period, where the AMT identification is the Day-Ahead Market prices publication.

Ex-post Transactions are authorized up to 5 working days after the start of the Transaction Period, considered as an AMT Hour.

### 2.3.6 Transaction Period

For the Transactions management and in order to apply all the other requirements, it implies that Transactions have to follow specific timing granularities. By a market-wide approach, daily and hourly granularities are very important to offer sufficient levers for the market participants to find the most suitable Secondary Market product. This will generate an optimal treatment of the portfolio(s)'s synergies and increase the overall Secondary Market liquidity. This is particularly the case for the Energy Constrained CMU having a SLA with a limited amount of hours. Those Aggregates or Energy Constrained assets could find in the extra hours (non-SLA) a remuneration.

It means that a Transaction either covers a set of consecutive days, either it covers a set of consecutive hours, but not a combination of both.

For example:


*Figure 13: Secondary Market Transaction granularity in terms of period covered by the Transaction*

**Design Proposal #5: Transaction period**

All Transactions have to be with a granularity in terms of period covered by the Transaction of:

Either, multiple of days according to the Belgian definition of time (GMT+1) where days start at 00:00 and finish at 00:00 not included of the day after.

Either, multiple consecutive hours in a day according to the Belgian definition of time (GMT+1).

On top, for obvious reasons, it appears clear that no Transactions are eligible for a period in time not covered by a Contracted Capacity. This will be part of the Transactions notification validity check.

### 2.3.7 Notification content

As mentioned in paragraph 2.2, the necessary notification information towards the Title Transfer Facility is common to all Transactions types' solutions (OTC, bulletin board, exchanges, …). .

**Design Proposal #6: Transaction notification dataset**

Transaction subset of information required:

1-The prequalified CMU releasing its obligation (Prequalification ID)

2-The Capacity Provider of the CMU releasing its obligation (CRM ID) considered as the Seller of an Obligation

3-The prequalified CMU taking over the obligation (Prequalification ID)

4-The Capacity Provider or Prequalified CRM Candidate of the CMU taking over the obligation (CRM ID) considered as the Buyer of an Obligation

5-The Transaction Capacity that is transferred in MW

6-The Transaction Period (From date/time to date/time)

A time stamp of the Transaction Date/time will be taken as the official notification time on the Contractual Counterparty / ELIA user interface for the Secondary Market.

The Transaction Date of the Transaction is used for further purposes, such as related to the identification of the applicable Strike Price and the ex-post Transaction Date validity.

At notification, ELIA and the Contractual Counterparty ensure the feasibility of the Transaction (e.g. via automatic data entry checks or other kind of validation) followed by a notification acknowledgment and notification confirmation. The feasibility checks are in particular:

- The period of the transfer of obligations (Transaction Period)
- The volume to be transferred (Transaction Capacity)
    - Based on the 2.4. Eligible Volumes
    - The previous registered Transactions included in the Obligated Capacity
- The Strike Price levels at the timestamp of the notification
- The contractual status of the Capacity Providers or Prequalified CRM Candidates
- …

The explanation of any notification rejection will be consistent with the Chapter 2 described design proposals.

If multiple requests for the same CMU's / owners are sent to ELIA / Contractual Counterparty, they will be ordered by notification time stamp for the treatment and the above described checks will occur one by one.

### 2.3.8 Notification of an hourly transfer on non-SLA hours of Energy constrained CMUs

In the prequalification phase, it is necessary for the Prequalified CRM Candidate of Energy Constrained CMU to select a SLA, implying that its participation to adequacy is limited in to a predefined set of consecutive hours in the day. This is mainly done to cover for any energy constraints of the concerned CMU. The Availability Requirements & Penalties design note allows the Capacity Provider to deliver its SLA at its discretion within the AMT Hours of the day.

As the Energy Constrained CMU's are allowed to trade and take over extra obligations in the Secondary Market outside of their SLA hours, all Transactions leading to precise hours notification (Transactions granularity in terms of period covered by the Transaction lower than days) and related to an Energy Constrained CMU, can only be notified under the ex-post notification process.

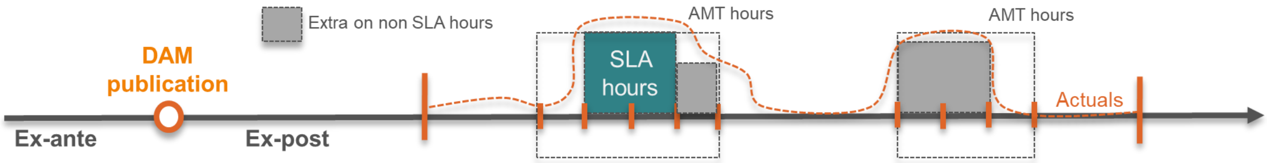



*Figure 14: mandatory ex-post notification for non-SLA Hourly Transaction*

The proposal is to allow Transactions on hours out of the SLA hours (the non-SLA hours), by imposing a Notification in ex-post, it ensures that the SLA hours related to the Energy Constrained CMU are duly identified by the Capacity Provider and doing so that he may capture opportunities to be present at the other available AMT Hours of the day, creating value for the adequacy (grey blocks in Fig. 8). Such value could be traded in the Secondary Market and the Capacity Provider will be accountable for such volumes in the Availability Obligation, Penalties and Payback Obligation. By acting ex-post, it gives leverage for the Capacity Provider to fine-tune its Transaction Capacity in order to avoid any Penalties on the transferred Transaction Capacity. Therefore, the Proven feature of the Energy Constrained CMU is essential as the Availability Obligation, Penalties and Payback Obligation will be settled on its actuals, presence in the Energy Market.

This restriction to an ex post notification process for Energy Constrained CMU, is justified as it could be uncertain for the Contractual Counterparty whether extra hours have been traded with actual real availability. At the same time for the Capacity Provider, the provisional capacity out of its SLA hours is harder to define and to commit in ex-ante, and much easier in ex-post.

In the Fig. 8 here above an example of a 2 hours of SLA Energy Constrained CMU is given for which the SLA hours are duly identified according to its Availability Obligations and Penalties. Following its actual CMU capability on the AMT hours, the grey zones on the Fig. 8 are eligible for an ex-post Secondary Market Transaction and as the Availability Obligations and Penalties will be settled on its presence in the energy market, it will not be penalized for those hours. E.g. it gives room for DSR assets within a participating CMU to capture energy market opportunities out of their SLA hours if their features allows it, while at the same time capture an extra revenue via the Secondary Market.

By performing so, having a certainty on their Proven Availability in the energy market, no transfer of Penalties is expected. Such expectation should increase the related traded volume in the Secondary Market, leading to a liquidity improvement and a CRM overall cost decrease.

For those reasons,

**Design Proposal #7: Hourly Transaction on non-SLA hours notification**

All hourly Transactions transferring an obligation to an Energy Constrained CMU on its non-SLA hours can only be notified in ex-post. The Transaction Capacity on those hours is to be based on Proven Availability.

## 2.3.9 Transactions technical possibilities

As mentioned above, apart from the notification process, no Transactions platforms are foreseen in the Secondary Market development phase.

The Transactions have to comply with the 2.3. Requirements for their notifications and for the rest the modalities are not defined. It could either be traded among others by:

- Voice and contract
- OTC with brokers
- Exchanges platform
- Bulletin board
- …

The result should be the same towards Elia and the Contractual Counterparty at the notification under the condition that the subset of information is compliant with sections 2.3. and 2.4 requirements.

Further practical arrangements (communication channel and process) will be described in the Capacity Contract.

## 2.3.10 Strike price associated to a Secondary Market Transaction

The Strike Price that applies on the CMU taking over an obligation for its Payback Obligation (cf. Design Note Strike & Reference price) will be the latest Calibrated Strike Price applicable at the Transaction Date of the Transaction towards the Contractual Counterparty and ELIA.

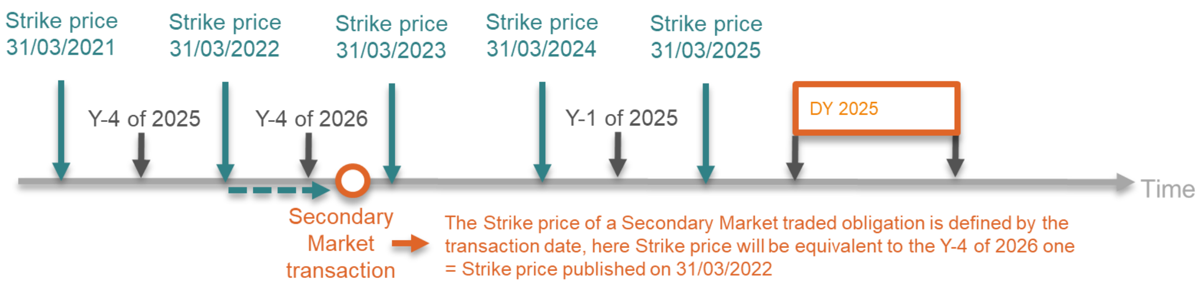



*Figure 15: Strike price associated to a Secondary Market obligation transfer*

Under the light of section 1.3. considerations and objectives, determining the Strike Price in this manner facilitates feasibility and, more importantly, allows the uniformity at a moment in time of the Secondary Market conditions so that all technologies may pretend to acquire it at the same market conditions. Being aware that this requires a trade-off with parties potentially being able to 'optimize' to some extent Payback Obligations via Secondary Market Transactions, it is proposed to foster liquidity in the first place. The proposed solution indeed avoids imposing an "inherited" Strike Price from earlier deals and thereby requiring a full tracking of all deals to the initially Contracted Capacity, and thereby potentially requiring revealing individual, market-sensitive information.

Also, in case of third parties facilitating Secondary Market liquidity, they should have had incorporated such additional complexity by constructing product involving multiple dimensions (i.e. Transaction Capacity, Transaction price (e.g. bilateral or by an Exchange) & Strike Price) for the same Transaction Period.

**Design Proposal #8: Strike price of Secondary Market Transaction**

The last published Strike Price will be applicable for Transactions in the Secondary Market when calculating the due amount of the Payback Obligation. The timestamp (Transaction Date) of Transaction notification as known by Elia will settle the Strike Price of a CMU for a Secondary Market Transaction.

### 2.3.11 Penalties in case of unavailability following a Secondary Market Transaction

For a Contracted Capacity, the Penalty is proportional to the Capacity Remuneration value. Doing so, everyone is proportionally subject to a similar Penalty, or stated otherwise, everyone has reached its Stop-Loss limit after the same number of 'failures'.

For the Secondary Market Transactions impacting the Obligated Capacity, as there is no Capacity Remuneration, there is no contractual value, hence a proportional penalty is not possible.

For the Penalties calculation on any Missing Capacity up to the Contracted Capacity, a Penalty applies as defined in the Availability Obligations and Penalties design note. On any additional Missing Capacity (Missing Capacity above the Contracted Capacity) or in case there is no Contracted Capacity for the Delivery Period, the "yearly contract value" (€/MW/year) will be substituted with a market-wide value.

Taking the assumption that no information related to the level of the Penalty of the Seller of Obligation CMU is to be shared with other Capacity Providers, this requires – at least for the Transaction Capacities resulting from a Secondary Market Transaction that a standardized Penalty is defined.

Multiple references are possible to determine the Penalty related to a Secondary Market Transaction amongst others: the maximal price used as Penalty for the Contracted Capacity for the Delivery Period; or the weighted average (volume based) price used for the Penalty of the Contracted Capacity for the Delivery Period; …

If the Penalty level in the Secondary Market Transaction was lower than the one the Capacity Provider has to pay, he would have an incentive "to trade away" his obligation. Such reasoning alone results in taking the highest Penalty from the Primary Market as then no one has an incentive to "trade away".

However, if the Penalty level in the Secondary Market Transaction was higher than the one the Capacity Provider normally has to pay, he would perceive the Secondary Market as costly because the Transaction Capacity proposed will be priced with a risk of a (higher) Penalty. This may influence the bidding behavior in the Primary Auction as the cost of relying on the Secondary Market rises which would be reflected in his Bid Price. Furthermore, he may also have an incentive to first accumulate Penalties at his lower

Primary Market Penalty level and only go to Secondary Market when ‘escalation’ measures start applying (cf. Availability Obligations and Penalties Design Note).

The above mentioned issue regarding a treatment difference for the Penalty is particularly relevant for ex ante Transactions on the Secondary Market, for ex post Transactions this is not an issue as the risk of Penalty does not exist (it is expected from Capacity Providers to create ex-post Transactions related to an Obligated Capacity for which you have an availability certainty at the AMT moments).

It is proposed as a trade-off that the Penalties on a CMU related to Transactions Capacities of the Secondary Market will refer to a calculation using a market-wide parameter expressed in €/MW/year, defined as the Average Capacity Remuneration for the Delivery Period and equals to the sum of all Capacity Remuneration for the Delivery Period divided by the sum of the Contracted Capacities for the same Delivery Period. Meaning that all Penalties related to the Missing Capacity above the Contracted Capacity will be settled on the same Average Capacity Remuneration price on the Delivery Period.

It is assumed that a split in a CMU Obligated Capacity partly participating in Primary Market and partly in Secondary Market regarding its Penalties calculation will occur, from the one hand, the Contracted Capacity and their intrinsic level of Penalty related to the Capacity Remuneration and from the other hand, the Transaction Capacity its Penalty market reference, considered as weighted average (volume based) of the CRM Contracted Capacities for the delivery period.

**Design Proposal #9: Penalties for the Secondary Market Transactions**

For the CMU Penalties calculation, on any Missing Capacity up to the Contracted Capacity, a Penalty applies as defined in the Availability Obligations and Penalties design note. On any additional Missing Capacity (the Missing Capacity above the Contracted Capacity) or in case there is no Contracted Capacity for the Delivery Period, the yearly contract value will be substituted with a market-wide value.

The Penalties on a CMU related to Transactions Capacities of the Secondary Market will refer to a calculation using a market-wide parameter expressed in €/MW/year, defined as the Average Capacity Remuneration for the Delivery Period and equals to the sum of all Capacity Remuneration for the Delivery Period divided by the sum of the Contracted Capacities for the same Delivery Period. Meaning that all Penalties related to the Missing Capacity above the Contracted Capacity will be settled on the same Average Capacity Remuneration price on the Delivery Period.

### 2.3.12 Contract escalation in case of recurring non-delivery on the obligations following a Secondary Market obligation

Like for any Availability Obligation for Contracted Capacity after the Auction, also for the Availability Obligation following a Secondary Market Transaction, the necessary penalizing actions should be in place to ensure that all Capacity Providers have sufficient incentives to deliver on their obligations. Penalties related to unavailability are the first line of defense. However, in case of recurring and/or severe underperformance, it should be possible to rely on more impacting sanctions and to escalate this.

Compared to Contracted Capacity following an Auction for which in any case a collateral is implicitly present by means of the potential to withhold the Capacity Remuneration, for CMU's carrying obligations following a Secondary Market Transaction, such Capacity Remuneration is not available to base incentives on. Alternative mechanisms should be explored.

Whereas a bank guarantee could fulfill a similar role as collateral like withholding the Capacity Remuneration, a bank guarantee – even if proportional to the participating volume (MW) – could still be perceived as a barrier for entry, particularly for smaller players whose access to financial means could be more challenging. Therefore, as a general principle, for Secondary Market Transactions an approach based on contract escalation measures has been opted for. This means that in case of underperformance, contractual parameters or the right to act on the Secondary Market could be impacted. This means, however, also that good performing CMU's have little to fear and still have easier access to the CRM than via a bank guarantee.

Related to this matter, three types of CMUs exist differentiated by their participation in the Primary Market solely, the Secondary Market solely or their participation in both Markets.

| TYPE | CMU with Primary Obligation only | CMU with Secondary Market Obligation only | CMU with Primary & Secondary Market obligations |
|---|---|---|---|
| Primary Market Remuneration as collateral | **Yes**<br>**(cf. stop-loss limit)** | **None, but…** | **Partial, but…** |

*Figure 16: Status of the collateral of a Primary Market*

For the first type, i.e. those CMU's with only having contractual obligations following their selection in the Primary Market - a CMU netting of the Capacity Remuneration and the Penalties & Payback Obligations has been considered sufficient as underlying 'collateral' to base incentives upon. Note that for the Availability Penalties and the Payback Obligation, a Stop-Loss limit equivalent to the yearly contractual value applies for each.

For the second (i.e. CMU's with only having contractual obligations following Transactions on Secondary Market) and third (i.e. CMUs with contractual obligations following their selection in the Primary Market Auction and following Transactions on Secondary Market) types, there is none or less collateral compared to the first type and a step further contract escalation is proposed according to the following principles.

**Type 1: CMU's with only having contractual obligations following their selection in the primary market Auction**

In the first type the standard Availability Obligations and Penalties and their escalation as proposed in the Design Note on Availability Obligations and Penalties applies.

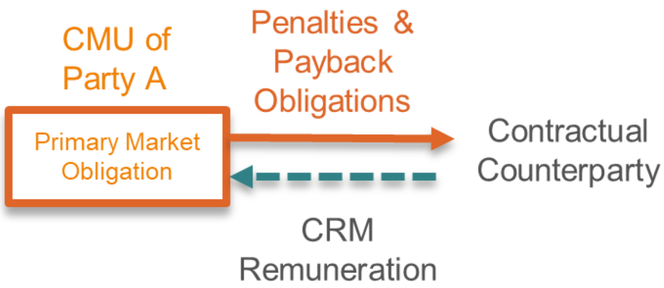



*Figure 17: CRM Remuneration as collateral of a Primary Market only CMU*

Like for all CMU's, in case of underperformances, only penalties as foreseen. However, after 3 consecutive underperformances of more than 20% of the Obligated Capacity, a first escalation occurs with a downwards of the remuneration to the delivered Capacity level (use of the collateral) while at the same time the Availability Obligations, Penalties & Payback Obligation remain on the Contracted Capacity level. If the CMU Capacity Provider fails to recover the Contracted Capacity level via its intrinsic portfolio modification or via a Secondary Market Transaction, after 2 Delivery Periods (years) the Contract Termination clause is activated.

**Type 2: CMUs with only having contractual obligations following Transactions on Secondary Market**

In the second type, the standard Availability Obligations and Penalties escalation is considered as insufficient as there is no Capacity Remuneration available that could be withheld.

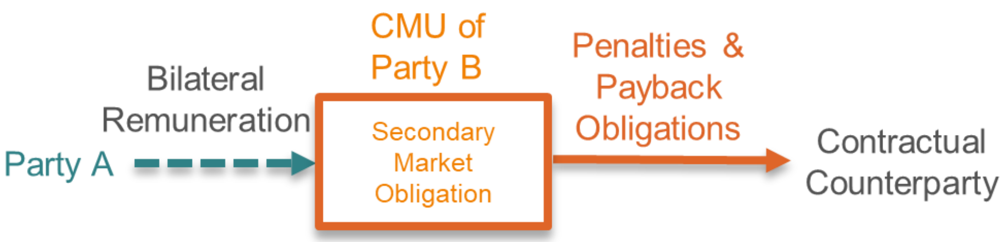



*Figure 18: Escalation as compensation to a lack of collateral for Secondary Market only CMU*

As for CMUs of Type 1, in case of underperformances, only penalties as foreseen.

However, after 3 consecutive underperformances of more than 20% of the Obligated Capacity, a first escalation occurs with a suspension of the CMU for further Transactions to buy obligations in the Secondary Market (first protection to compensate the lack of collateral) while at the same time the Availability Obligations, Penalties & Payback Obligation remain at the Contracted Capacity level.

If the CMU Capacity Provider fails to recover the Contracted Capacity level via its intrinsic portfolio modification or via a Secondary Market Transaction, after 20 working days a termination clause is activated with the specifics that the Capacity Provider remains responsible for the already contracted obligations (Obligated Capacities) prior to the clause activation and with a possible suspension of further Transactions for the Capacity Provider (or from other subsidiaries of the mother company of the Capacity Provider) on the remainder of the current Delivery Period, the next Delivery Period and the next upcoming Y-4 and Y-1 Auctions. Only after those, the Capacity Provider can participate again (if successfully prequalified).

**Type 3: CMUs with contractual obligations following their selection in the Primary Market Auction *and* following Transactions on Secondary Market**

In the third type, the standard Availability Obligations and Penalties escalation are considered as partially sufficient as there is some Capacity Remuneration in play that could be withheld, but proportionally (potentially significantly) less compared to the situation for Type 1.

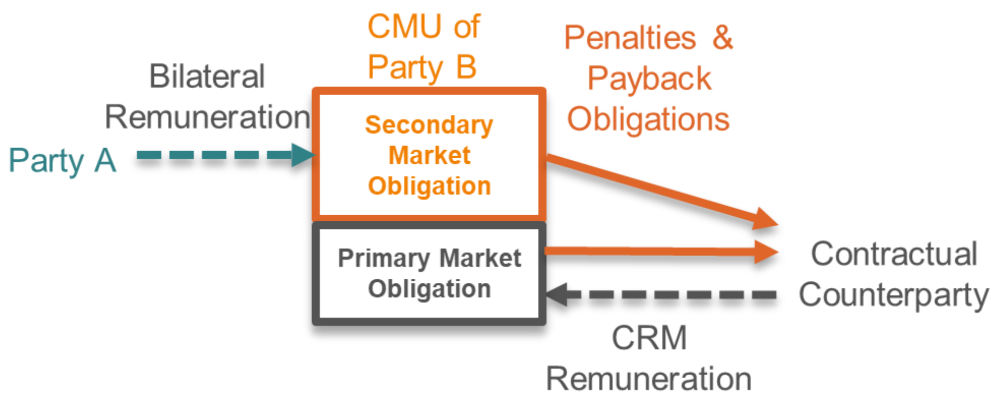



*Figure 19: Escalation as compensation to a lack of collateral for Primary & Secondary Market CMU*

As for CMUs of Type 1, in case of underperformances, only Penalties as foreseen.

However, after 3 consecutive underperformances of more than 20% of the Obligated Capacity, a first escalation occurs with a suspension of the CMU for further Transactions to buy obligations in the Secondary Market (first protection to compensate the lack of collateral) while at the same time the Availability Obligations, Penalties & Payback Obligation remain at the Contracted Capacity level. On top, a downwards of the remuneration equivalent to the undelivered capacity level (use of the collateral) will be applied. This is justified as the level of the collateral could be very limited (e.g. 1MW in the Primary Market having a Capacity Remuneration, and 100MW in the Secondary Market).

If the CMU capacity provider fails to recover the Contracted Capacity level via its intrinsic portfolio modification or via a Secondary Market Transaction, after 20 Working days the Termination clause is activated with the specifics that the Capacity Provider remains responsible for the already contracted obligations (Obligated Capacities) prior to the clause activation and that a possible suspension of further Transactions for the Capacity Provider (or from other subsidiaries of the mother company) on the remainder of the current Delivery Period, the next Delivery Period and the next upcoming Y-4 and Y-1 Auctions. Only after those, the Capacity Provider can participate again (if successfully prequalified).

**Design Proposal #10: Contract escalation for the Secondary Market Transactions**

After 3 consecutive underperformances of more than 20% of the Obligated Capacity, a first escalation occurs with a suspension of the CMU for further Transactions to buy obligations in the Secondary Market and if applicable a downwards of the Capacity Remuneration equivalent to the undelivered capacity level.

If the Capacity Provider fails to recover the Contracted Capacity via its intrinsic portfolio modification or via a Secondary Market Transaction, after 20 Working days the termination clause is activated with the specifics that the Capacity Provider remains responsible for the already contracted obligations (Obligated Capacities) prior to the clause activation and that a possible suspension of further Transactions for the Capacity Provider (or from other subsidiaries of the mother company) on the remainder of the current Delivery Period, the next Delivery Period and the next upcoming Y-4 and Y-1 Auctions. Only after those, the Capacity Provider can participate again.

## 2.4 Secondary Market Eligible Volumes

The purpose of the Section is to describe the eligibility regarding the Transaction Capacity. It starts in 2.4.1 with the description of the different sources of Transaction Capacity possibilities, to introduce in 2.4.2 with the generic formula of the maximal authorized Transaction Capacity between two non-Energy Constrained CMUs (Transaction of type 1).

In regards to their specifics features, the section 2.4.3 will describe the different cases related the definition of the maximal authorized Transaction Capacity of Transactions involving at least one Energy Constrained CMU(s).

### 2.4.1 Sources for liquidity in the Secondary Market

As introduced in section 1.3.2, there are generally four sources of liquidity for the Secondary Market:

- Extra available capacity of the contracted CMUs in the Primary Market for the same Delivery Period (i.e. the volume equivalent to (1-Derating Factor) x Reference Power)
- Prequalified CMUs having participated in the Primary Market Auctions, but that were not selected and contracted (as they were not in-the-money)
- Newly prequalified capacities that haven't participated in the Primary Market
- Opt-out Volumes that have not yet been accounted for in the Auction volume (i.e. for which no dummy bid hasn't been introduced in the Auctions for the considered Delivery Period). Note that other Opt-out Volumes cannot be accommodated in the Secondary Market as this would imply a potential double-counting of the same capacity (i.e. first by lowering the volume procured via the primary market Auction and secondly via allowing it take obligations in the Secondary Market).

**Extra Available Capacity of the contracted CMUs in the Primary Market Auctions for the same Delivery Period**

A first source of liquidity of the Secondary Market is the extra tradeable capacity of the selected CMUs in the Primary Market Auctions having an obligation for the concerned Delivery Period.

As for these CMUs, their Contracted Capacity is lower than the Reference Power due to the application of a Derating Factor, it is possible to find extra volumes on some specific periods in time in order to take over an 'extra' obligation. This volumes equals Reference Power x (1-Derating Factor).

For instance, in case of a Non-Energy Constrained CMU such as a thermal unit, when the installation is fully available for the energy market, its entire Nominal Reference Power is available, incl. the volume above the Contracted Capacity.

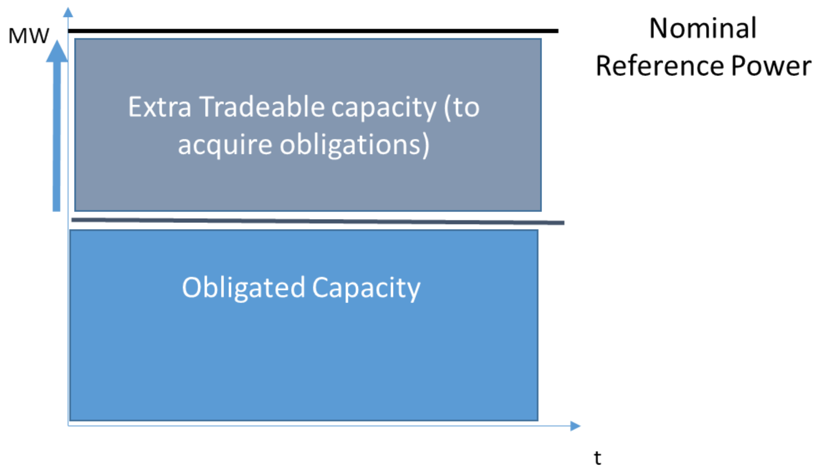



*Figure 20: Extra Tradeable capacity of a Non-Energy Constrained CMU*

**Prequalified CMUs having participated in the primary market Auction, but that were not awarded a Capacity Contract**

Another source of liquidity is the participation in the Secondary Market of any volumes which did participate in the Primary Market but that haven't been selected.

In the following Auction example, the CMU E is existing (or would nevertheless enter the market prior to the Delivery Period) and hasn't been contracted in the Auction for the Delivery Period. This CMU E could however participate in the Secondary Market.

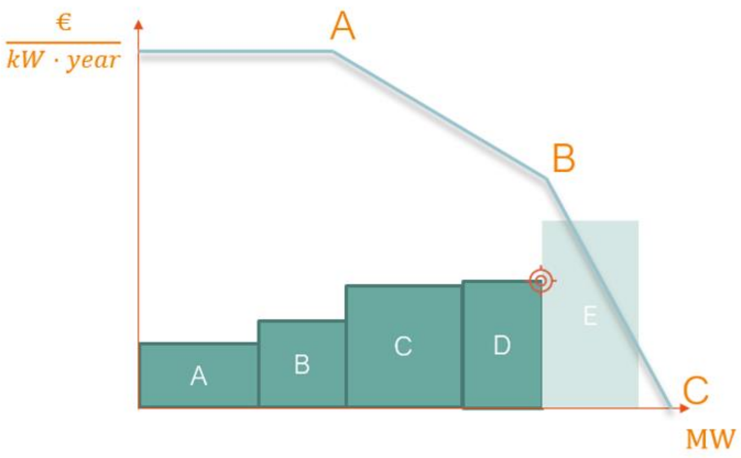



*Figure 21: Unsuccessful CMU E from the primary market Auction*

**Newly prequalified capacities that haven't participated in the Primary Market Auction**

Another source of liquidity concerns any newly prequalified capacities. Those capacities weren't participating to the Primary Market (they were for instance not yet sufficiently developed at that time). They also have to be prequalified and monitored at the same level as all the selected Auction CMUs.

**Opt-out Volumes that have not yet been accounted for in the Auction volume**

A last source of liquidity concerns CMUs having opted for an Opt-Out (not 'fast track') for the concerned Delivery Period. Such Opt-out Volumes are considered to be possibly integrated for the part of their asset that hasn't been considered in the Primary Market Auction dummy Transactions (according to Design Note Auction Algorithm). Note that other Opt-out Volumes cannot be accommodated in the Secondary Market as this would imply a potential double-counting of the same capacity (i.e. first by lowering the volume procured via the Auction and secondly via allowing it to take obligations in the Secondary Market).

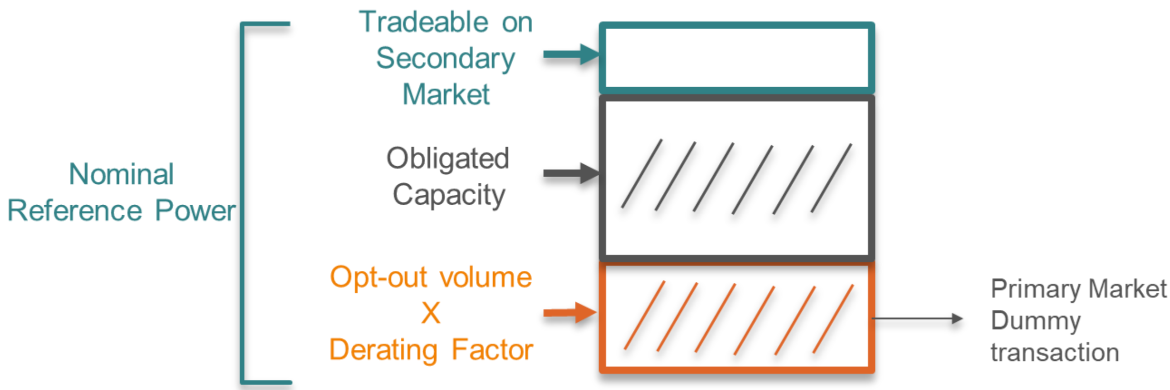



*Figure 22: Opt-Out participation in the Secondary Market (according to the Opt-Out design note "IN" status)*

**Design Proposal #11: Types of CMU capacity authorized to participate to the Secondary Market**

All duly prequalified CMU for the Delivery Period may participate to the Secondary Market. For the CMU in pre-delivery monitoring, the same process will apply.

The Fast Track Prequalification Process cannot be considered sufficient to prequalify for the Secondary Market.

The Secondary Market allows for those CMUs to acquire new obligations either via:

1-The extra tradeable capacity of the assets delivering in the CRM on the Delivery Period

2-The prequalified CMUs having participated in the Auction on the Primary Market and not selected on the period

3-The newly prequalified CMUs that weren't participating in any Auction previously, not even at the mandatory prequalification phase

4- The share of Opt-Out Volume that has not resulted in a reduction of the CRM Required Volume (dummy bid), is allowed to participate in the Secondary Market for the Delivery Period to which the Opt-out notification relates.

### 2.4.2 General rule on the determination of the volume eligible for a Secondary Market Transaction

As previously mentioned in section 2.2, all Transactions will be executed in MW on the Transaction Period. The Capacity Providers with prequalified CMUs have the possibility of Transactions:

- Either to sell their obligation up to their total Obligated Capacity acquired in the Primary Market or Secondary Market
- Either to buy/acquire extra obligations up to certain remaining amount

Nevertheless, for the market parties' comprehension and calculation of Secondary Market potential; from the product perspective, a distinction has to be made between a Transaction between non-Energy Constrained CMUs and a Transaction involving at least one Energy Constrained CMUs.

**The Non-Energy Constrained Assets that may trade their extra available capacity or cover their missing capacity**

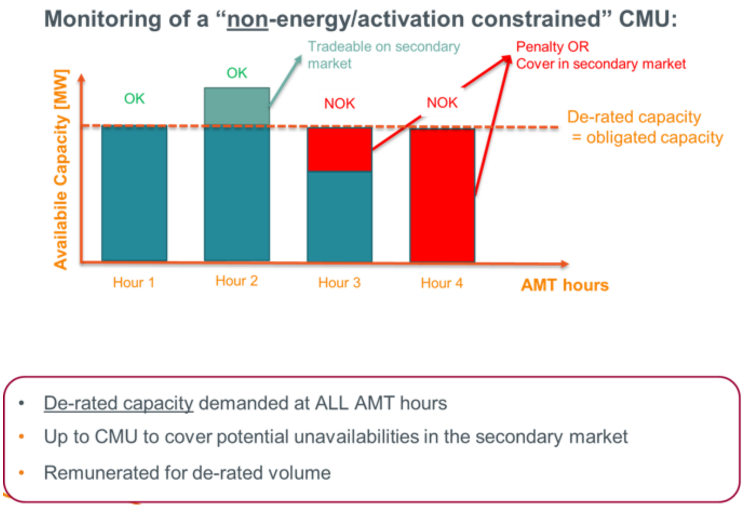



*Figure 23: Extra tradeable capacity or missing capacity of a non-Energy Constrained CMU*

To take over new obligations in the Secondary Market for the Transaction Period, the non-Energy Constrained CMU of a Buyer of an Obligation has a maximal authorized Transaction Capacity equals to:

*MAX(0 ;Nominal Reference Power (CMU,t) – Obligated Capacity (CMU, t) – Opt-Out Volume(CMU, t) * Derating Factor (CMU))*

Where *Opt-Out volume (CMU, t)* is the volume considered as IN, and after multiplied by the Derating Factor is offered as a dummy bid in the Auction according to Auction Design Note.

To be released of an obligation in the Secondary Market for the Transaction Period, the non-Energy Constrained CMU of a Seller of an Obligation has a maximal authorized

Transaction Capacity equals to:

*max(0 ;Obligated Capacity (CMU, t))*

For obvious reasons, this prevents to sell more than what has been contracted in the previous Primary and Secondary Market Transactions.

For the sake of clarity, *Obligated Capacity (CMU, t)* is incorporating the previous Secondary Market Transactions for the same period so that the formula could be used at any time to measure the capabilities of Transactions.

This above reasoning for non-energy constraints is not different for Energy Constrained CMUs except that on SLA hours the consideration of the Opt-Out Volume is related to the SLA level, so without application of the Derating Factor (cf. 2.4.3) and that it may trade only in ex-post their hourly available volume on the non-SLA hours (cf. 2.3.8 and 2.4.3).

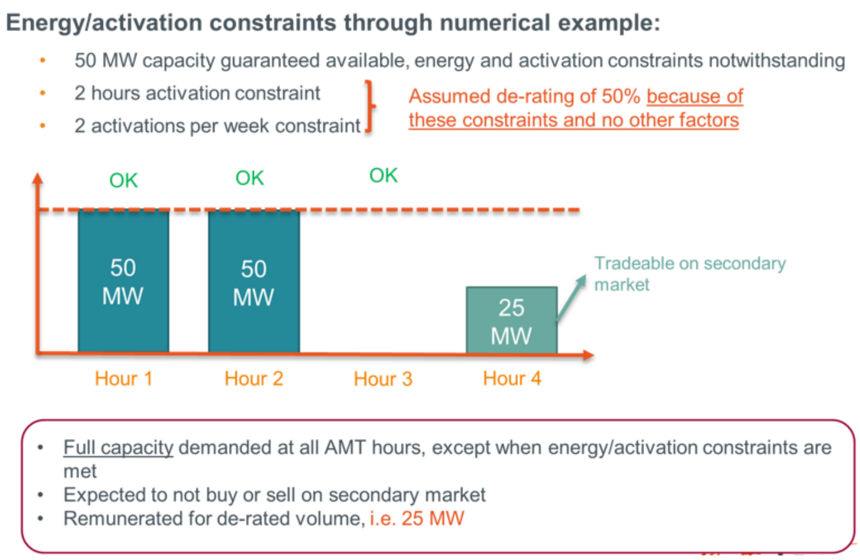



*Figure 24: Extra tradeable capacity of an Energy constrained CMU*

The previous CMU maximal authorized volume of Transaction to take over obligation is becoming (will be more specified in 2.4.3. under the light of its SLA specifics):

> *MAX(0 ;Nominal Reference Power (CMU,t) – Obligated Capacity (CMU, t) – Opt-Out Volume(CMU, t))*

As the previous CMU the maximal authorized volume of Transaction to be released of its obligations:

> *MAX(0 ;P obligated (CMU, t))*

There are the four possible types of Secondary Market Transactions:

For the first Type (1) (Non-Energy Constrained ⇔Non-Energy Constrained) Eligible Volumes are already described in Section 2.4.2. as the Transaction occurs between two

Non-Energy Constrained CMUs, the general formulas remain valid without further specifications.

The three other types require further specifications in regards to the SLA-related constraints, it will be described in the 2.4.3.:

The four types are summarized in:

| **Authorized Transactions** | **SELLER OF ITS OBLIGATION** | **BUYER OF THE OBLIGATION** |
|---|---|---|
| **Type 1** | Non-Energy Constrained | Non-Energy Constrained |
| **Type 2** | Energy Constrained | Non- Energy Constrained |
| **Type 3** | Non-Energy Constrained | Energy Constrained |
| **Type 4** | Energy Constrained | Energy Constrained |

*Figure 25: Authorized Transaction types*

### 2.4.3 Specific rules on the Eligible Volume for a Secondary Market Transaction for Energy-constrained CMUs

#### 2.4.3.1 The Energy-Constrained Transactions during SLA hours

The present chapter 2.4.3.1. is covering the capabilities of an Energy Constrained CMU in a framework of a Secondary Market Transactions on SLA hours.

The prequalified CMUs have the possibility of engaging into Secondary Market Transactions:

- Either to sell their obligation up to their Obligated Capacity acquired in a Primary Market Auction or a Secondary Market Transaction
- Either to buy/acquire extra obligations on the same CMU

The key change compared to the rules described above for Non-Energy Constrained Assets is that Transactions may occur between an Energy-Constrained CMU and another CMU, meaning the Transaction types 2, 3 and 4. It is then important to take into account properly the Derating Factor (specifically resulting from the limitation of the energy constraint) for a conversion in order to get back to a Obligated Capacity which is allowing such Transaction to occur within the standard formula exposed in 2.4.2.

| **Authorized Transactions** | **SELLER OF ITS OBLIGATION** | **BUYER OF THE OBLIGATION** |
|---|---|---|
| **Type 2** | Energy Constrained | Non- Energy Constrained |
| **Type 3** | Non-Energy Constrained | Energy Constrained |
| **Type 4** | Energy Constrained | Energy Constrained |

*Figure 26: Energy constrained Transaction types*

In section 2.4.3.1.1 the focus is on type 2. Section 2.4.3.1.2 deals with type 3 and in section 2.4.3.1.3 type 4 is covered.

#### 2.4.3.1.1 The type 2 specifics: Energy Constrained as seller, non-Energy Constrained as buyer

For a Transaction with an Energy-Constrained CMU as Seller of an Obligation, the Transaction Capacity is deducted after application of the Derating Factor on the desired decrease of its Obligated Capacity.

This will be applied using the latest published Derating Factors for the concerned SLA.

Firstly, the Transaction Capacity (e.g. 2MW) is calculated based on the desired decrease of the Obligated Capacity (e.g.8MW) multiplied by the Derating Factor (e.g. 0,25) in order to be transferred. Secondly, the Transaction Capacity (e.g. 2MW) transferred is simply added to the non-Energy Constrained CMU Obligated Capacity (5MW becoming 7MW).

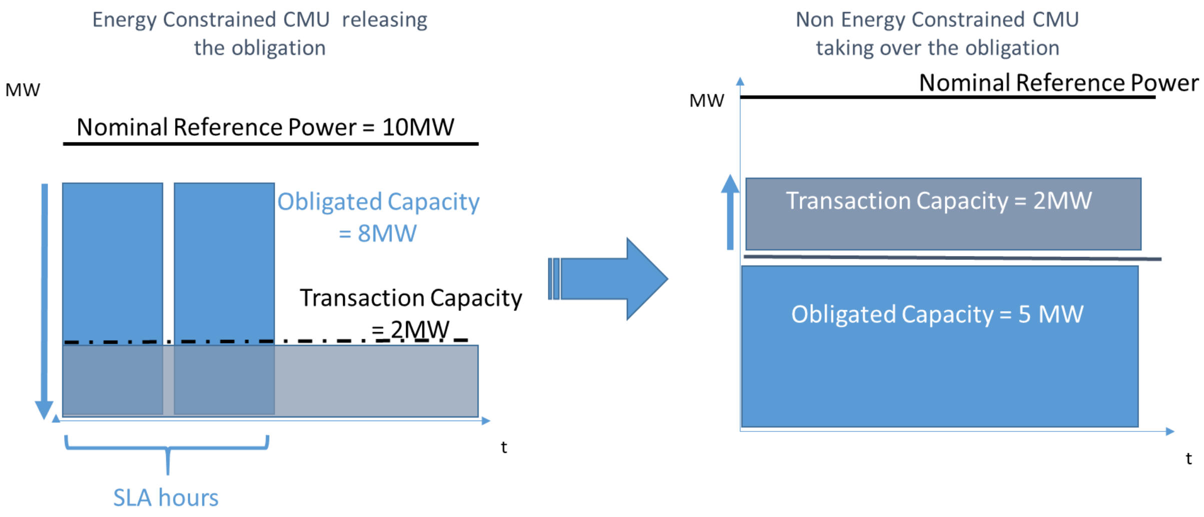



*Figure 27: Type 2: Energy Constrained CMU Selling its obligation to a non-Energy constrained CMU*

#### 2.4.3.1.2 The type 3 specifics: non-Energy Constrained as Seller, Energy Constrained as Buyer

Compared to Type 2, Type 3 doesn’t have to convert with a Derating Factor from the Seller perspective its decrease of Obligated Capacity to calculate the Transaction Capacity.

But as the Buyer of the obligation has energy constraints covered via an SLA, he may take over an extra Transaction Capacity only if that one is converted in a (higher) Obligated Capacity using the Derating Factor according to its SLA and according to the Availability Obligations and Penalties conversion for an Energy Constrained CMU.

Firstly, Transaction Capacity from the Seller is defined (e.g. 2MW). Secondly, the Transaction Capacity transferred has to be converted into an increase of the Obligated Capacity, such increase is considered as the Transaction Capacity (e.g. 2MW) divided by the Derating Factor (e.g. 0,6666), giving an increase of the Obligated (e.g. from 5MW to 8MW as 5MW + (2MW/0,6666)).

Increase of the Obligated Capacity of the Buyer of the obligation is equal to its previous Obligated Capacity plus [Derated MW obligation / divided by (Derating Factor(SLA of the CMU))].

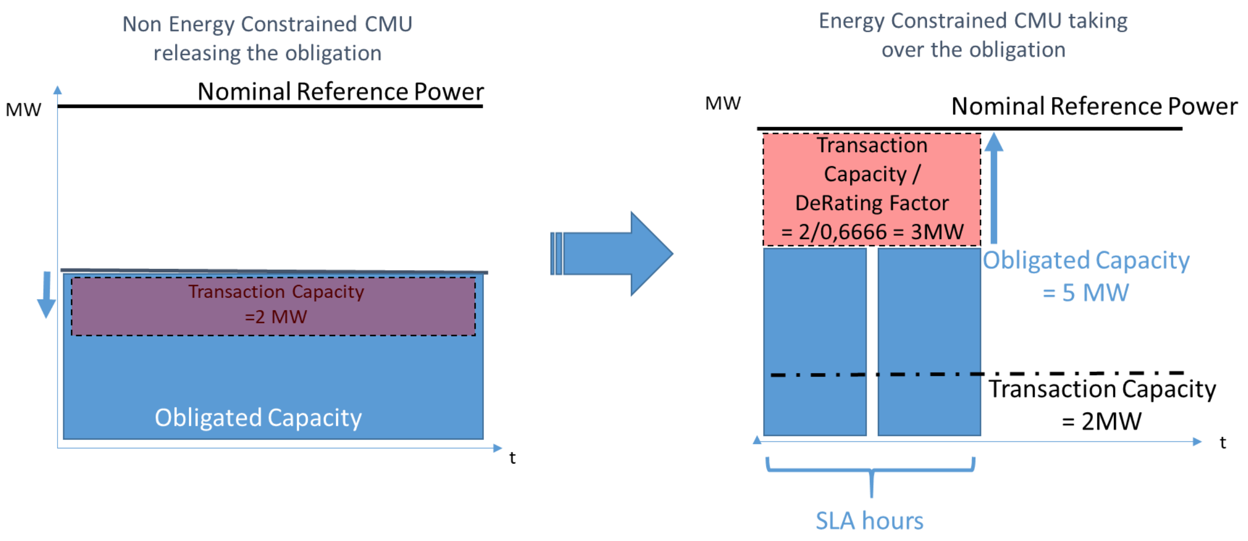



*Figure 28: Type 3: Non-Energy Constrained CMU Selling its obligation to an Energy constrained CMU*

#### 2.4.3.1.3 The type 4 specifics: Energy Constrained as seller, Energy Constrained as buyer

As the buyer and the seller may have different SLAs, Type 4 is a combination of both constrained of Type 2 and Type 3.

For a Transaction with an Energy-Constrained CMU as Seller of an Obligation, the Transaction Capacity is deducted after application of the Derating Factor on the desired decrease of its Obligated Capacity.

This will be applied using the latest published Derating Factors for the CMU SLA.

Firstly, the Transaction Capacity (e.g. 1MW) is calculated based on the desired decrease of the Obligated Capacity (e.g. 1,5MW) multiplied by the Derating Factor (e.g. 0,6666) in order to be transferred (e.g. 1,5MW on which is applied a Derating Factor of 0,6666 → 1MW).

Secondly, the Transaction Capacity (e.g. 1MW) transferred has to be converted into an increase of the Obligated Capacity, such increase is considered as the Transaction Capacity divided by the Derating Factor (e.g. 1MW divided by 0,5 → increase of 2MW).

Increase of the Obligated Capacity of Buyer of the obligation is equal to its previous Obligated Capacity plus [Derated MW obligation / divided by (Derating Factor (SLA of the CMU))] (e.g. 5MW + (1MW / 0,5) = 7MW).

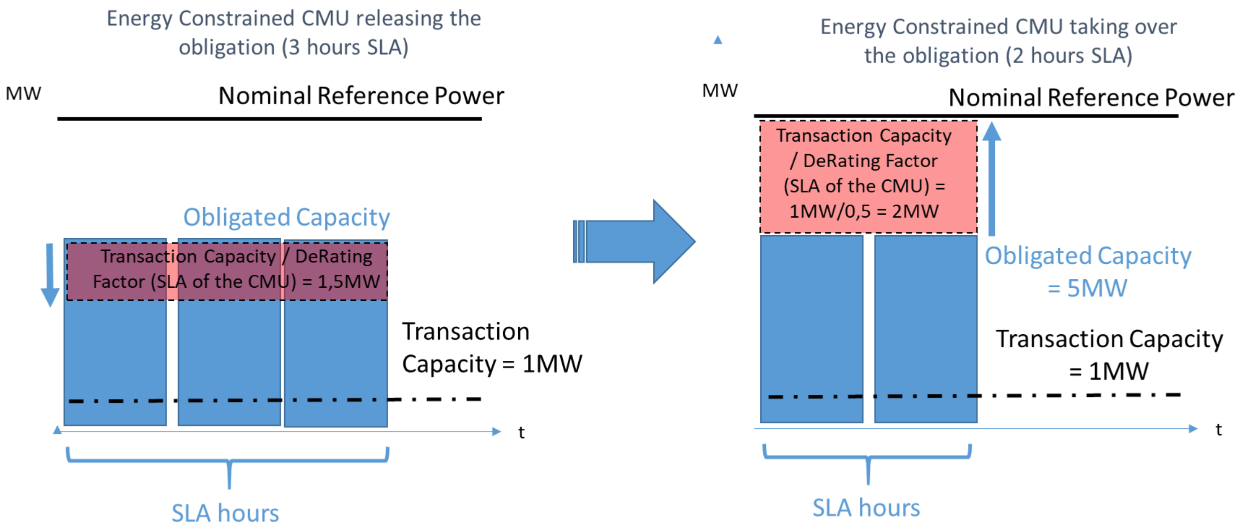



*Figure 29: Type 4: Energy Constrained CMU Selling its obligation to an Energy constrained CMU*

#### 2.4.3.1.4 The generic rule for non-energy constraints and SLA hours of the energy constrained

**Design Proposal #12:** Transaction Capacity **eligibility for non-Energy Constrained and Energy Constrained on their SLA hours**

To take over new obligations in the Secondary Market for the Transaction Period, the non-Energy Constrained CMU of a Buyer of an Obligation has a maximal authorized Transaction Capacity equals to:

*MAX(0 ;Nominal Reference Power (CMU,t) – Obligated Capacity (CMU, t) – Opt-Out Volume(CMU, t) * Derating Factor (CMU))*

Where *Opt-Out volume (CMU, t)* is the volume considered as IN, and after multiplied by the Derating Factor is offered as a dummy bid in the Auction according to Auction Design Note.

To be released of an obligation in the Secondary Market for the Transaction Period, the non-Energy Constrained CMU of a Seller of an Obligation has a maximal authorized Transaction Capacity equals to:

*MAX(0 ;Obligated Capacity (CMU, t))*

To take over new obligations in the Secondary Market for the Transaction Period, the Energy Constrained CMU of a Buyer of an Obligation has a maximal authorized Transaction Capacity equals to:

*MAX(0 ;Nominal Reference Power (CMU,t) – Obligated Capacity (CMU, t) – Opt-Out Volume)))*

Where *Opt-Out volume (CMU, t)* is the volume considered as IN, and after multiplied by the Derating Factor is offered as a dummy bid in the Auction according to Auction Design Note.

To be released of an obligation in the Secondary Market for the Transaction Period, the Energy Constrained CMU of a Seller of an Obligation has a maximal authorized Transaction Capacity equals to:

max(0 ;Obligated Capacity (CMU, t))

For the Energy Constrained CMUs as Buyer of an Obligation, the Obligated Capacity will be updated by adding the Transaction Capacity divided by the latest publication of the Derating Factor for its SLA Category.

For the Energy Constrained CMUs as Seller of an Obligation, the Obligated Capacity will be updated by deducting the Transaction Capacity divided by the latest publication of the Derating Factor for its SLA Category.

For the non-Energy Constrained CMUs as Buyer of an Obligation, the Obligated Capacity will be updated by adding the Transaction Capacity.

For the non-Energy Constrained CMUs as Seller of an Obligation, the Obligated Capacity will be updated by deducting the Transaction Capacity.

#### 2.4.3.2 The Energy Constrained Transactions on non-SLA hours

**Design Proposal #13: Transaction Capacity eligibility for non-Energy constrained and Energy constrained on their non-SLA hours**

The same applies as Design proposal 9 except that the Transactions are mandatory traded in ex-post and with a Transaction Period granularity of hours.

## 2.5 Timing of the solution deployment

As mentioned by the CRM Law, the Secondary Market will have to be created no later than one year before the start of the first Delivery Period. As the first Delivery Period intends to start on 1st November 2025, the Secondary Market should be open as of no later than 1$^{st}$ November 2024.

**Design Proposal #14: deployment timing of the Secondary Market**

The Secondary Market entry in force will occur no later than one year before the first CRM Delivery Period.

ELIA and the Contractual Counterparty will be in best effort approach to deliver upfront.