INFORMATIVE NOTE

Explanatory Note related to the Public Consultation on the Terms and Conditions for Voltage Service Provider

2025 update of the Voltage Service Provider Terms and Conditions

Content

Content **2**

Practical information **3**

Introduction **4**

Split of T&C and Tender Procedure Public Consultations **6**

Change of the references to the Federal Grid Code to CREG Code of Conduct **7**

General evolutions introduced in the VSP T&C update **7**

1. Service activation control 8

1.1 Manual control service type 8

1.2 Automatic control service type 9

2. Remuneration reduction 10

3. Communication system and availability signals 11

3.1 New types of messages between Elia and the Market Parties 12

3.2 Updating the communication protocol 18

4. Definitions of Starting Up and Shutting Down for the zerotage signal 19

5. Technology-neutral rewording 20

6. Simplified participation of non-mandatory units 20

7. Introduction of MVAr activation requests with an end time 20

8. Activating assets either shut down or in Power Saving Mode 22

9. Startup voltage memory when transitioning under Pmin 26

10. Reactive power ramp rate 27

Practical information

This note aims to contextualize the documents that are submitted for public consultation by Elia.

At the end of the public consultation, all non-confidential comments will be made public on Elia's website, with an explanation of how Elia responded to these remarks or the reasons why they were not considered. Elia will respect the request for confidentiality and/or anonymity of respondents.

Comments concerning items outside the scope of the documents will not be considered by Elia.

The non-confidential documents submitted for consultation can be consulted on the Elia website.

The official public consultation starting with the documents subject to the public consultation being available in Dutch and French, lasts one month. Reactions must be sent using the online form available on the Elia website and no later than the deadline mentioned on the website.

Questions relative to the consultation can be sent to the following email address:

consultations@elia.be

Introduction

Transmission System Operators (TSO) need to manage the voltage and the reactive power flux to ensure the security and reliability of the electrical grid.

According to article 27 and 29 of the System Operation Guideline (SOGL), the objective of the voltage and reactive power management is to maintain the voltage inside the operational limits and to respect voltage stability criteria. To this end, TSOs shall monitor reactive power flows and reactive power reserves and determine the system state pursuant to article 19 of the SOGL and shall apply remedial actions to maintain or restore the voltage in the operational limits. Pursuant to article 29 of the SOGL, TSOs shall ensure that at any time the required volume of reactive power reserves is available. TSOs shall monitor the availability of the voltage and reactive power control services and assess the forecasted needs against the availability of reactive power services, in line with Article 108 and 109 of the SOGL.

In this context, Elia published in October 2018 a **Study on the future design of the ancillary service of voltage and reactive power control** to address the required changes of the Voltage and Reactive Power Control Service due to :

- the introduction of Network Codes in the Federal Grid Code,
- the shift in the energy landscape in Belgium from large centralized to small decentralized generation
- the required rewording of the Terms and Conditions to make them technology neutral, and
- the requirement to let parties other than the Access Responsible Party to deliver the Voltage and Reactive Power Control Service

In December 2023, Elia published another document **Voltage service and reactive power control review and recommendations for design optimizations** as part of the Public Consultation of February and March 2024. This document included a description of the proposed changes to the MVAr service.

The present Explanatory Note describes the changes implemented in the new Voltage and Reactive Power Control Service Terms and Conditions submitted to Public Consultation from March 2025 until April 2025. As the General Conditions of the Terms and Conditions have not been modified, they are removed from the Terms and Conditions submitted to the Public Consultation.

In addition to the present introduction, this document contains a chapter explaining the reasons behind the split of Public Consultations between the Terms and Conditions on one hand and the Tender Procedure on the other hand, followed by a chapter “General evolutions introduced in the VSP T&C” divided in seven sections:

- Section 1 presents the changes of the service activation control
- Section 2 presents the changes to the remuneration reduction

- Section 3 presents the changes of the communication system and availability signals
- Section 4 presents the changes implemented to make the Terms & Conditions wording more technology-neutral
- Section 5 presents the changes made to simplify the participation for non-mandatory units
- Section 6 presents the new functionality of start-up of assets in stand-by for the service
- Section 7 presents the new reactive power ramp rate requirement

Split of T&C and Tender Procedure Public Consultations

Elia is launching two separate Public Consultations on the changes brought to the Voltage and Reactive Power Control Service:

- A Public Consultation whose launch is currently foreseen mid-March 2025 until mid-April 2025 (exact dates to be defined) on the updated Terms & Conditions, and
- A Public Consultation whose launch is currently foreseen during the first quarter of 2026 on the updated Tender Procedure.

This split of Public Consultations is deemed necessary by Elia for 2 reasons:

- The technical communication changes required for the exchanges between Elia and the VSPs in the period 2027-2028 may require an extensive period of implementation both within Elia and for the VSPs. As the Terms & Conditions define the new communication exchanges, they must be finalised as soon as possible to enable the finalisation of Elia's VSP communication implementation guidelines ;
- The changes brought to the Electricity Law in 2022 imply that Elia must provide a study on the availability of the Voltage and Reactive Power Service. Delivering this study to the CREG and the subsequent review of this document will take several months. The outcome of this review may impact the procurement approach. The tender procedure might therefore need to be updated by the end of 2025, and the Public Consultation must follow, most likely during the first quarter of 2026.

The Public Consultation of the Terms & Conditions should therefore be organised early in 2025 for IT implementation reasons, whereas the Public Consultation of the Tender Procedure must wait until early 2026.

Change of the references to the Federal Grid Code to CREG Code of Conduct

Due to changes of the legal framework (CREG decision of 20th October 2022 adopting the first Code of Conduct for electricity transmission grid management), the references to articles of the Federal Grid Code are modified to references of the Code of Conduct according to the table of matches uploaded on Elia's website (**French version** and **Dutch version**).

Extension of the current VSP contractual conditions and start of the 2027-2028 VSP contract on Feb 1st 2027

As the proposed modifications to the Elia-VSP communication system are significant with this update of the VSP T&C, and due to a recent Return-of-Experience from the implementation of other similar projects, Elia proposes to extend the current VSP contractual conditions currently applicable up to December 31st 2026 23:59 to January 31st 2027 23:59.

This extension would avoid a Go-Live of the new system on January 1st 2027 00:00, which corresponds to a moment of low support from IT resources in case of required bug fix. Moreover, as February 1st 2027 is a Monday, this change facilitates the settlement processes as well. This change would therefore be interesting for Market Parties to ensure a good IT support for the Go-Live and may reduce administrative burdens.

Elia considers that this proposed change is aligned with EU Directive 2014/25/EU Article 89 for the following reasons:

- This change is necessary as the secure grid operation could be jeopardized in case of communication issues not addressed quickly enough during the Go-Live of the new VSP communication system on January 1st 2027. The extension of the current contractual conditions improves the chances of a successful Go-Live.
- Delivery of the reactive power services is very local and replacement of VSPs by other VSPs is not always feasible to deliver the same quality of service.

To prevent similar implementation issues in the future, Elia proposes to end the future VSP contracts on Jan 31st 23:59.

Elia would like to get feedback from the Market Parties on this proposed extension of the current VSP contractual conditions and start of the 2027-2028 VSP contract on Feb 1st 2027, before proceeding to align

with the regulatory authorities, obtain their approval and implement required steps to extend the current contractual VSP conditions up to 31st of January 2026 23:59.

General evolutions introduced in the VSP T&C update

Service activation control

Instead of using random activation samples as basis for the service activation control, Elia will take (almost all) 15 minutes timesteps into account in the service activation control process.

Why do we implement this change?

The switch towards continuous activation control eliminates the risk that market parties will be unfairly subjected to remuneration reduction for momentary failures in the samples. As such, the real quality of the service delivered is used as a reference and as a basis for the remuneration reduction.

Manual control service type

For the manual control service type, for every quarter-hour, the requested reactive power (Q_{req}) of all time steps is compared to the measured reactive power (Q_{meas}).

The equations used to determine the correct delivery of the manual control service type are given here:

$$Limit\ inf. \leq\ Q_{req} = Q_{req,manual}\ \leq Limit\ sup.$$

$$Limit\ inf. =\ Q_{req} - Tolerance$$

$$Limit\ sup. = Q_{req} + Tolerance$$

$$Tolerance = 7.5\% * Q_{tech,max}$$

Where $Tolerance$ has a minimum value of 1 MVAr and a maximum value of 25 MVAr.

The following time steps are exceptions for the above comparison between Q_{req} and Q_{meas}:

- The timestep (quarter hour) of the setpoint request
    - The obligations for this timestep remain the same as in the current market design:
        - The VSP has 10 seconds to confirm the reception of this setpoint.

- Following this, the VSP needs to attain this setpoint within the tolerance band defined by $Limit\ inf.$ and $Limit\ sup.$ for at least two successive 30'' Reactive Power measurements within 5 minutes.
- If one of these obligations is not achieved, the timestep (quarter hour) will be considered as failed and a value of zero will be used for the Q_{meas} in the activation control and remuneration reduction scheme.

— The timestep (quarter hour) of the setpoint request, in case it spans 2 timesteps
  - If the request spans 2 quarter hours, only the second timestep can be considered as failed (put to a zero value) if the requested setpoint was not achieved within the requested timeframe.
  - Hence, the first timestep and thus the timestep in which the setpoint request was received will not be modified for the activation control.
  - If however, the requested setpoint was already achieved during the first timestep, the setpoint request will be considered correctly executed.

Automatic control service type

The rules applied to the manual and automatic control service types are the same. However, instead of comparing the measured values to a static Q_{req}, which is the case for the manual control service type control, the formula below is used to calculate the Q_{req} for the automatic control service type.

$$Q_{req} = -\frac{\alpha_{eq} * \left(GV\ (t) - V_{startup}\right) * 0{,}45 * P_{tech,max}}{U_{norm\_expl}} + Q_{initial}$$

Where

— α_{eq} is the Technical Unit sensitivity coefficient (see formula below)
— $GV\ (t)$ is the 15-minute measurements of the Grid Voltage
— $V_{startup}$ is the average Grid Voltage value of the quarter-hour during which the unit started up
— $P_{tec\ ,max}$ is the maximum technical power
— U_{norm_expl} is the standard operational Grid Voltage under which the Technical Unit is foreseen to operate, as agreed in the Technical Unit's Connection Contract
— $Q_{initial}$ is the Reactive Power measured at the quarter-hour following the quarter-hour at which the Controlling Technical Unit started up for the last time (meaning the last moment in time where the Technical Unit's $P_{measured}$ started to exceed its Minimum Active Power Threshold in Injection, in Offtake or in Compensator Mode) or measured at the quarter-hour following the quarter-hour in which a manual Setpoint is requested.

The Technical Unit sensitivity coefficient is calculated with this formula:

$$\alpha_{eq} = -\frac{\frac{\Delta Q}{0{,}45 x P_{nom}}}{\frac{\Delta GV}{U_{norm\_expl}}}$$

The equations used to determine the correct delivery of the automatic control service type are identical to the equations used for manual control service type:

$$Limit\ inf. \leq\ Q_{req} = Q_{req,manual}\ \leq Limit\ sup.$$

$$Limit\ inf. =\ Q_{req} - Tolerance$$

$$Limit\ sup. = Q_{req} + Tolerance$$

$$Tolerance = 7.5\% * Q_{tech,max}$$

Where $Tolerance$ has a minimum value of 1 MVAr and a maximum value of 25 MVAr.

To implement the changes to the activation control, a revision of the remuneration reduction scheme is required as well. The proposed changes are described in the next section.

Remuneration reduction

When the Service is not delivered correctly, the remuneration of the VSP is reduced to incentivise solving the issue as quickly as possible.

Why do we implement this change?

The new remuneration reduction system penalizes the VSP proportionately to the quality of the service delivered each time step and does not distinguish between manual and automatic control service type.

For every quarter-hour, a variable $Discrepancy$ is calculated from the difference between Q_{req} and Q_{meas} (in absolute value) to which $Tolerance$ is also subtracted. $Tolerance$ is included in the calculation of $Discrepancy$ to account for measurement errors:

$$Discrepancy =\ |Qreq - Qmeas| - tolerance$$

A negative value of $Discrepancy$ is replaced with zero.

The absolute value of the product of $Discrepancy$ with the price of the last MVAr supplied $priceLastMVArSupplied$ and an additional remuneration reduction factor corresponds to the $Remuneration\ Reduction$ each quarter-hour:

$$Remuneration\ Reduction\ = |Discrepancy * 1.5 * priceLastMVArSupplied|$$ in case of underdelivery, i.e. $(|Q_{meas} < Q_{req}|)$

$$Remuneration\ Reduction\ = |Discrepancy * 0.5 * priceLastMVArSupplied|$$ in case of overdelivery, i.e. $(|Q_{meas} > Q_{req}|)$

For each month, the values of each $Remuneration\ Reduction$ are summed per quarter-hour.

The distinction is made between over- and underdelivery (in absolute terms) for the following reasons:

1. Recuperation of the "overpaid" remuneration, since Q_{req} is used for this purpose (this is the "1" in the $Remuneration\ Reduction$ formula of the underdelivery): the $Discrepancy$ must at least be removed from the remuneration to rescale the remuneration to what was actually delivered
2. Incentive for the VSP to maintain their obligations (this is the "0.5" in the $Remuneration\ Reduction$ formula, which has been calibrated to ensure a seamless reactive power control service quality between the former contractual period and the upcoming contractual period).

However, in case of an overdelivery (the absolute value of Q_{meas} is higher than the absolute value of the Q_{req}), there is no need to recuperate the "overpaid" remuneration since Q_{req} was exceeded, hence the use of "0.5" for overdelivery and "1.5" for underdelivery.

With this approach, VSPs will only be penalized for the non-delivered MVArhs. The reduction factor was determined to maintain a good level of service quality.

Communication system and availability signals

The communication with Elia enables market parties to send and receive messages to be able to correctly deliver the service when Elia requests an activation. The application that is currently being used to communicate with the market parties is Revolt. This application allows Elia to send setpoints, which the market parties need to achieve.

Why do we implement this change?

The current system creates issues for Market Parties that can only partly deliver the service and it does not give all the information useful to the Technical Units dispatch optimization.

Elia proposes to implement changes according to 2 dimensions:

— Adding new types of messages for electronic exchange between Elia and the Market Parties
— Updating the communication protocol itself

New types of messages between Elia and the Market Parties

Power Saving Mode

Technical Units connected to the power grid through power electronics converters may feature a Power Saving Mode, defined in the T&C as:

> *"Low-power steady-state consumption mode of Technical Units asynchronously connected to the power grid via an electronic power converter. In this Mode, the Technical Unit is still connected to the power grid and the absolute value of its active power is less than the absolute value of its Minimum Active Power Threshold in Injection Mode and, if available, less than the absolute value of its Minimum Active Power Threshold in Compensator Mode. Automatic voltage regulation of Controlling Unit is not available in Power Saving Mode."*

As the Technical Unit can quickly enter Compensator Mode from Power Saving Mode (time to repower the power electronics converters), the Manual Control service is available in such an operating mode, but not the Automatic Control service. Elia may therefore send a signal to Technical Units in Power Saving Mode to enter Compensator Mode and reach a defined reactive power setpoint under the modalities of the Manual Control service.

The VSP must indicate which of its Technical Units have a Power Saving Mode available in the table of the T&C Annex 1.

When one of its Technical Units enters or leaves Power Saving Mode, the VSP must indicate to Elia which unit(s) enter(s) or leave(s) the Power Saving Mode.

Availability Status

Elia has translated the requirements of the SOGL (Art. 54 and 92) for reactive power control services similarly to what has been done for active power under the Outage Planning Agent (OPA) service. For reactive power, Elia deems that the availability messages do not require a framework as stringent as the OPA service. To improve the grid operation and to help identifying the best techno-economic assets to activate for reactive power control service, the following Availability status are however kept from OPA and Elia requests that the VSP transmits these Availability Status for each of its Technical Units:

- "**Available (A)**"
  - This status applies to VSP Technical Units in normal operation but also to Technical Units whose reactive power control bands must be reduced for maintenance purpose.
  - The VSP must send any planned change of the reactive power control band to Elia, as soon as possible, and up to 1 hour before the planned maintenance.
  - The reactive power control band of a VSP Technical Unit in this status must not be reduced to a single point (see "Unavailable" status)
  - Units that are shut down or in Power Saving Mode outside maintenance periods, forced outage periods or testing periods are also in Available Status.
- "**Unavailable (U)**"
  - This status applies to VSP Technical Units **unable to provide the reactive power service during maintenance**. The minimum and maximum available reactive powers for those Technical Units have therefore identical values.
  - The VSP must send any planned change of the reactive power control band to Elia, as soon as possible, and up to 1 hour before the planned maintenance.
- "**Testing (T)**"
  - In line with SOGL Art. 92 §2, applies to VSP Technical Units for which **a test is planned which may have a potential impact on the transmission system**.
  - The VSP must warn Elia **1 month in advance** to allow a thorough analysis of the impact of the test on Elia's power grid.
  - In Testing status, the Technical Units may still have a reactive power control band available to inject or absorb reactive power, or may have no available control band.
- "**Forced Outage (FO)**"
  - Forced Outage Status applies to VSP Technical Units experiencing either an **unforeseen** reduction of their reactive power control band or an unforeseen complete unavailability of their reactive power control service.
  - Forced Outage Status can be communicated at the earliest 1 hour before the modification of the reactive power control band.
  - In Forced Outage status, the Technical Units may still have a reactive power control band available to inject or absorb reactive power, or may have no available control band.

The VSP must communicate through the External Communication Layer **a reason for each change of the Availability Status** in free text format. These data will be used by Elia to draw statistics on the availability of reactive power assets (reactive power derating, maintenance ratios, forced outage ratios…).

If safe operation of the power grid requires it, Elia may occasionally request a VSP 5 days in advance to modify its maintenance or testing plans (Technical Units with Status Unavailable or Testing) to Available Status to deliver the reactive power control service. The 5 days are deemed sufficient to let the VSP take action to delay maintenance or testing.

If Technical Units spend a significant period of time in Available Status at reduced reactive power compared to the contractual reactive power control band ($|Q_{min\ Available}|<|Q_{tech\_min}|$ or $|Q_{max\ Available}|<|Q_{tech\_max}|$), Elia may request the VSP 5 days in advance to return these Technical Units to contractual reactive power control band and send reactive power setpoints within this contractual reactive power control band.

In some cases such as assets connected to Elia's Grid with flexible access, the modification of the availability may originate from Elia. In such cases, Elia will send the information on the expected change of availability or on the expected unavailability to the VSP.

There is no cost or remuneration reduction associated to a change in Availability Status. Elia considers that for the reactive power control service, such incentives could represent a barrier to transparency and would complexify the Availability declaration system for marginal effects as the control service is used in real time. Declaration of Availability Status is designed to require very little efforts from the VSP to deliver an Availability Plan that will significantly help with the operation of Elia's Grid.

Figure 1 illustrates a case of a VSP identifying an upcoming maintenance period with reduced reactive power control band stretching from Quarter-hour 8 until Quarter-hour 18 in this example. The VSP can warn Elia up to 1 hour (4 Quarter-hours) ahead of the maintenance period starting on Quarter-hour 8, namely up to Quarter-hour 3 included. The Technical Unit remains in Available Status throughout this entire period.

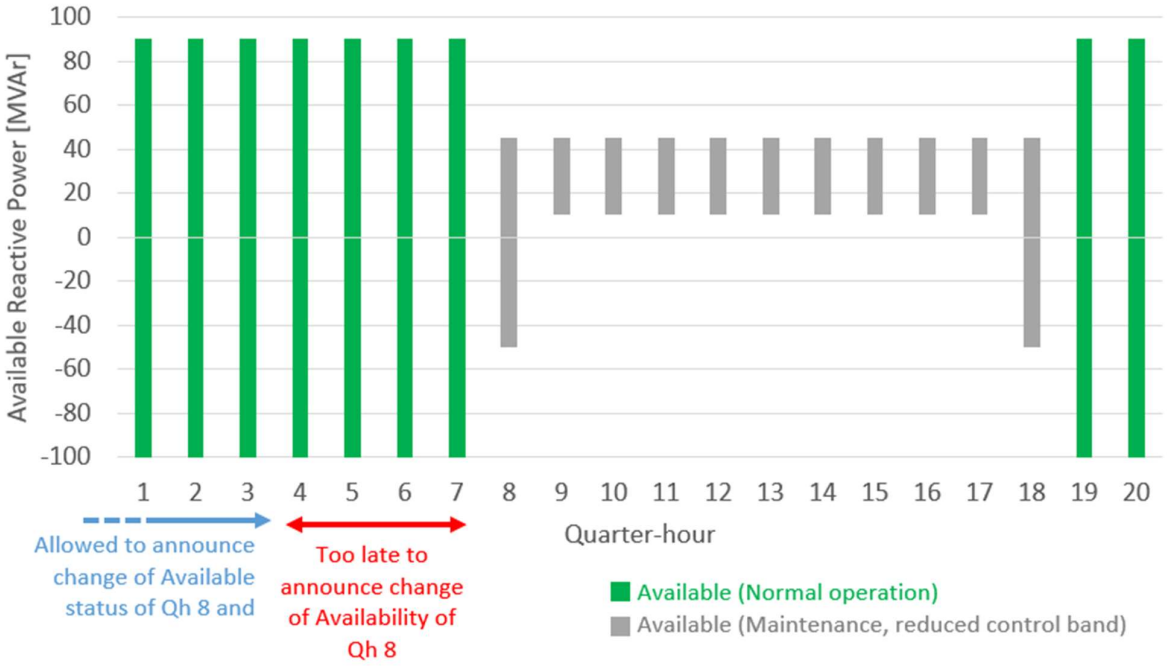

Figure 1 - Example of a VSP Technical Unit undergoing maintenance from Quarter-hours 8 until 18, with a reactive power control band still available, Status Available from Qh 1 until 24

Figure 2 illustrates a case of a VSP identifying an upcoming maintenance period with a reduction of reactive power control band on Quarter-hour 8 (Available Status), then no reactive power control available from Quarter-hour 9 until Quarter-hour 17 (Unavailable Status), and then the return of a reduced reactive power control band on Quarter-hour 18 (Available Status) before the return of full reactive power control band availability at Quarter-hour 19 and beyond (Available Status). The VSP can warn Elia up to 1 hour (4 Quarter-hours) ahead of the maintenance period starting on Quarter-hour 8, namely up to Quarter-hour 3 included.

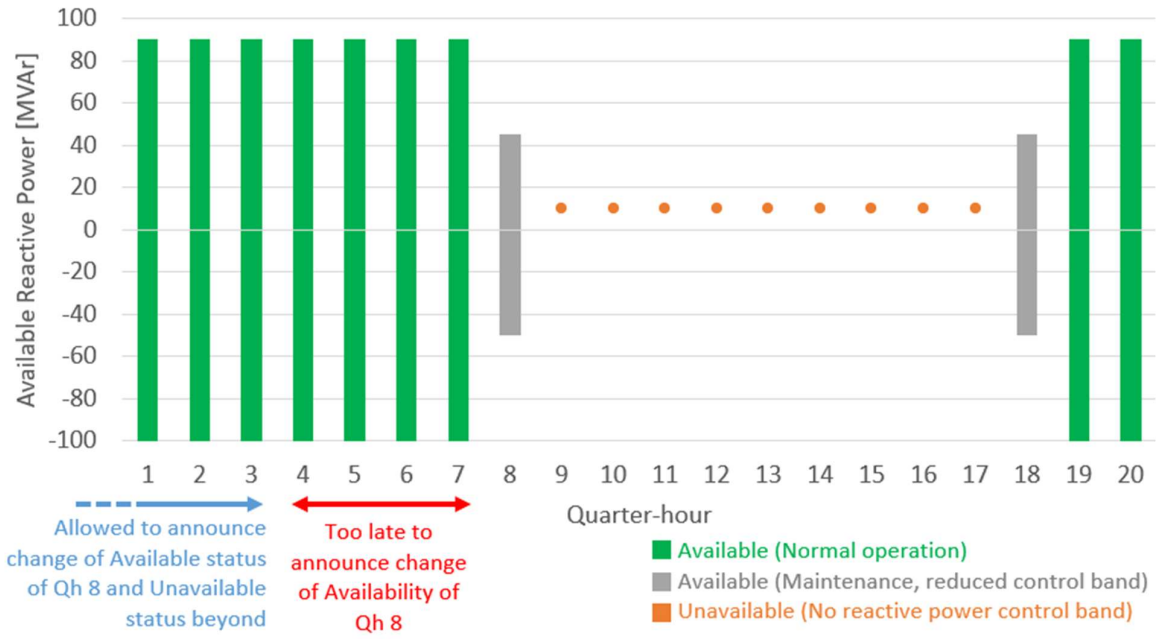

Figure 2 - Example of a VSP Technical Unit undergoing maintenance from Quarter-hours 8 until 18, with a reactive power control band still available on Qh 8 and Qh 18 (Status Available until Qh 8 and from Qh 18), but with Status Unavailable from Qh 9 until Qh17

Figure 3 illustrates a case of a VSP Technical Unit going through an unforeseen reduction of its reactive power control band from Quarter-hour 8 until Quarter-hour 18 (Status Forced Outage). In this case, the VSP did not identify this outage starting in Quarter-hour 8 more than 1 hour ahead of Quarter-hour 8: the Forced Outage Status is therefore applicable. The notification to Elia of this Forced Outage should be done as soon as possible, up to 1 hour before the outage (from Quarter-hour 4 in this case), but can also be provided afterwards.

If the VSP had identified this outage more than 1 hour ahead of Quarter-hour 8, the VSP would have to announce it as a change of the Available Status for Quarter-hour 8 and 18, and Unavailable for Quarter-hours 9 to 17 (see the case of Figure 2).

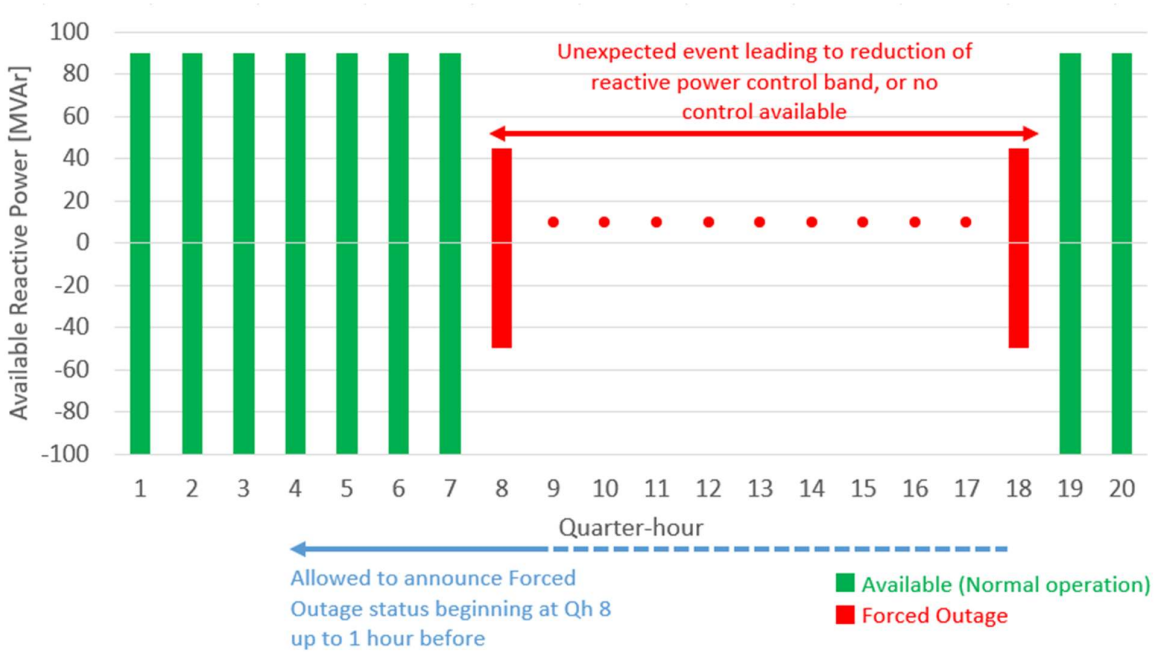

Figure 3 - Example of a VSP Technical Unit experiencing an unforeseen reduction of reactive power control band between Qh 8 and Qh18 (Status Forced Outage) – Some reactive power control band still exists on Qh 8 and Qh 18 but there is no reactive power control available from Qh 9 until Qh 17

Control service type availability

Next to the Availability Status, Elia has identified that the availabilities of automatic & manual control service types of reactive power must also be communicated:

- **Automatic & Manual Control available**
  - The reactive power control band is still available, whether it is reduced or not.
  - The Availability Status Available, Testing and Forced Outage are compatible with this control service type availability.
- **Automatic & Manual Control unavailable**
  - The reactive power control band is not available.
  - This corresponds to the Availability Status Unavailable.
- **Power Saving Mode**
  - This operating mode is defined in Section 0 and in the T&C.
  - The Availability Status Available is compatible with this control service type availability (i.e. Manual Control is available during Power Saving Mode, and Automatic Control will be available after entering the Compensator Mode)

Signals of activation requests with activation end time

Elia introduces activation requests specifying an activation end time for some assets, typically equipped with Compensator Mode. While the end time of these activation requests is not reached, the asset is required to keep providing MVAr services. If there is no active power market opportunity to pursue, in which case the asset would generally either shut down or go to Power Saving Mode, the asset is now required to keep delivering reactive power control services by moving to Compensator Mode, or if the Compensator Mode is not available to Injection Mode in offtake. These activation requests with end times can be extended with new end times. Practically, Elia sends an **activation end time extension request signal** to the VSP for the relevant Technical Units. This message contains the new end time for the Service activation extension.

Additional details on the modalities of this activation are provided in Chapter 0.

Activating units either shut down or in Power Saving Mode

If a system engineer and or an optimization supporting tool identifies that activating a Technical Unit that is either in shut down or in Power Saving Mode is the most techno-economic solution to solve reactive power requirements, Elia sends a **start-up request signal** for this asset to go to Compensator Mode, if available, otherwise to Injection Mode to offtake just enough active power from the grid to go to Injection Mode and deliver the reactive power control service.

Additional details on the modalities of this start-up are provided in Chapter 0.

Updating the communication protocol

Updating the communication protocol would allow for an easier interaction with Elia for the market parties. The current setup requires a lot of third-party changes (often by the original producer of the asset) to send and receive the messages. A newer, more up-to-date communication protocol would simplify the setup.

From 2027 onwards, Elia requires to switch the communication system used between Elia and the VSP to the **External Communication Layer**. The format of all communications through this platform is based on the CIM standards, with some modifications defined by Elia when local needs require it. Elia will publish around end of Q1 2025 – beginning of Q2 2025 an Implementation Guide containing:

- Technical description of the External Communication Layer.
- Overview of communication flows the Voltage Service Provider.
- Description of all messages exchanges.
- Message format definition (MarketDocuments)

Note that for all the incoming data (assets unavailabilities and acknowledgment messages), Elia will create a webclient in which Market Parties can introduce their data manually. The webclient will offer a user interface where Market Parties can have a view on the status of (automatically or manually) sent data. The documentation concerning this solution will be sent in a later phase.

The External Communication Layer will be the main communication channel, with the web based application as alternative. In case of unavailability of the External Communical Layer and of the web based application, emails and phone communications are used as backup channels.

Definitions of Starting Up and Shutting Down for the zerotage signal

This feature was introduced in the previous version of the VSP T&C: it allows Elia to send a zero reactive power injection/absorption setpoint to a Technical Unit while its active power remains under its Minimum Active Power in Compensator Mode and Injection Mode.

Why do we implement this change?

The definitions of Technical Unit Starting up or Shutting Down are missing in the current terms and conditions and prevent the implement of the “zerotage” feature.

The definitions of Technical Unit Starting up or Shutting Down have now been added:

- **Starting Up :** « Transient period of increasing active power injection or offtake starting from 5% of the Minimum Active Power Threshold in Injection Mode until either the Minimum Active Power Threshold in Injection Mode or, if available, in Compensator Mode. »
- **Shutting Down :** « Transient period of decreasing active power injection or offtake starting from either the Minimum Active Power Threshold in Injection Mode or, if available, in Compensator Mode, until the Technical Unit’s active power drops below 5% of the Minimum Active Power Threshold in Injection Mode. »

These definitions are needed as assets able to inject active power and without Compensator Mode have more complex transition periods (Starting Up and Shutting Down) and can hardly provide reactive power services during these transition periods.

Technology-neutral rewording

Why do we implement this change?

The current terms and conditions are at some points written from the perspective of large conventional power plants. This does not hinder other units to participate but creates some unclarities.

This T&C article has been modified to remove these barriers:

— Article II.3.16 « Controlling Technical Units » d) : The second part of this sub-article has been rewritten to avoid references to alternators. The text now reads : « Any Reactive Power control limitation at steady state of a Technical Unit shall not impede operation of the voltage control ». This refers to the values of the Reactive Power Technical Control band which must be defined based on steady-state limitations of the Technical Unit.

Simplified participation of non-mandatory units

Why do we implement this change?

Small-scale units with non-mandatory participation to the MVAr service face an entry barrier as currently, pre-qualification tests are required for each individual unit. This modification will facilitate participation of small-scale units through aggregation

Article II.3.3 g) now enables the prequalification test to be performed on the aggregation of all Technical Units located behind the same Service Measurement Point. This is aligned with the Incentive Note §4.10.1.2 to facilitate the participation of non-mandatory units through aggregation of these units.

Introduction of MVAr activation requests with an end time

Currently, assets whose active power is larger than their Minimum Active Power Threshold in Injection or Offtake are considered available for the MVAr Service. These requests have no end time. Automatic and Manual Control Types cease to take effect once the active power drops under the respective Minimum Active Power Threshold.

Why do we implement this change?

Due to the increasing penetration of assets whose active power injection and offtake may drop more often under the respective Minimum Active Power Threshold, and due to the larger penetration of small-scale generation units, Elia may face a reduction in assets available for the MVAr service. Elia therefore proposes to extend the availability of existing assets when needed for MVAr service.

A new type of activation request is introduced with an end time. This end time serves to limit the impact on the asset operation of the extension of the activation request and to ensure that the related costs for the safe grid operation will be limited.

For conventional generators, Elia will rely on the historical activation request system (without end time): when the active power of those conventional generators drops under the Minimum Active Power Threshold, these units cease to provide reactive power services.

For PV, wind, BESS and future demand synchronised with renewable generation such as large-scale electrolysers, Elia has designed this new activation request with an end time to prevent frequent stops of the reactive power service by these assets. Their active power injection or offtake sometimes depends on very short scale phenomena such as renewable power or short-term market opportunities.

Assets activated with an end time are required to remain in the Compensator Mode or in the Injection Mode (with possible transitions from one Mode to another when the activation request has not reached its end time). The Compensator Mode corresponds to a low offtake of active power to deliver the required MVAr Service. If the asset does not have a Compensator Mode but can offtake active power in Injection Mode while delivering the MVAr service, then this activation request with an end time maintains the asset at the Minimum Active Power Threshold in offtake to use as little active power as possible (minimizing costs) while delivering the MVAr service.

This estimated activation end time may be extended by Elia.

The Balance Responsible Party (BRP) perimeter of the Technical Unit receiving an activation request with an end time is corrected for all quarter-hours meeting these two conditions:

1. The asset is in Compensator Mode or at the Minimum Active Power Threshold in offtake; and
2. The end time of the activation request has not been reached.

The operator of the asset is therefore free to change the active power injection or offtake during the activation request to pursue market opportunities, but doing so will stop the correction of the BRP perimeter.

For assets with limited offtake duration (storage devices, demand assets nearing business-acceptable limits…), the VSP can announce a future Unavailability Status of the asset when the VSP identifies that the

activation request end time exceeds the asset limited offtake duration, at the latest up to one hour before this limit. If there is less than one hour before the asset meets its limit in offtake, the Forced Outage Status can be used instead to Elia know about the future limitation. This will allow Elia to resort to alternative (and more costly) reactive power solutions.

Implementation date of activation requests with an end time

As the BRP contract must be updated to introduce the possibility of BRP perimeter correction in the context of a Voltage and Reactive Power Control Service activation request, this feature of activation request with an end time for the Service cannot be enforced before the validation by the competent regulatory authorities of the updated BRP contract.

Activating assets either shut down or in Power Saving Mode

Why do we implement this change?

Due to the increasing penetration of assets whose active power injection and offtake may drop more often under the respective Minimum Active Power Threshold, and due to the larger penetration of small-scale generation units, Elia expects to face a reduction in assets available for the MVAr service. Elia therefore proposes to include the possibility to bring shut down assets or assets in Power Saving Mode up to a Mode enabling the MVAr service.

Due to the changing landscape of the voltage and reactive power controlling assets and reactive power control requirements, Elia introduces the possibility for Elia to contact VSPs in real time to switch on Technical Units whose active power is at that time lower than the Minimum Active Power Threshold in Compensator Mode or in Injection Mode. These units are required to enter Compensator Mode if available, otherwise to increase active power up to the Minimum Active Power Threshold in offtake to provide the MVAr Service.

These assets may be initially shut down or in Power Saving Mode.

Note on Power Saving Mode

The recent introduction of assets connected to the transmission grid with power electronics has led Elia to define a Power Saving Mode for these specific assets. In this mode, these assets are not disconnected from the grid, and they still offtake a minimal amount of energy from the transmission grid, under the Minimum Active Power Threshold of both their Compensator Mode and their Injection Mode.

These assets in Power Saving Mode can however quickly resume normal operation and offtake or injection active power in a matter of a few minutes of power electronics conversion system repowering.

The VSP shall indicate in Annex 1 of the T&C the maximum start-up time of its Technical Units to reach the Compensator Mode if available, otherwise to Injection Mode in offtake.

This change in active power of the Technical Unit is illustrated in Figure 4, showing an initial Technical Unit status with no active power injection/offtake, or in Power Saving Mode, increasing its active power offtake just enough to enter Compensator Mode and deliver the Service.

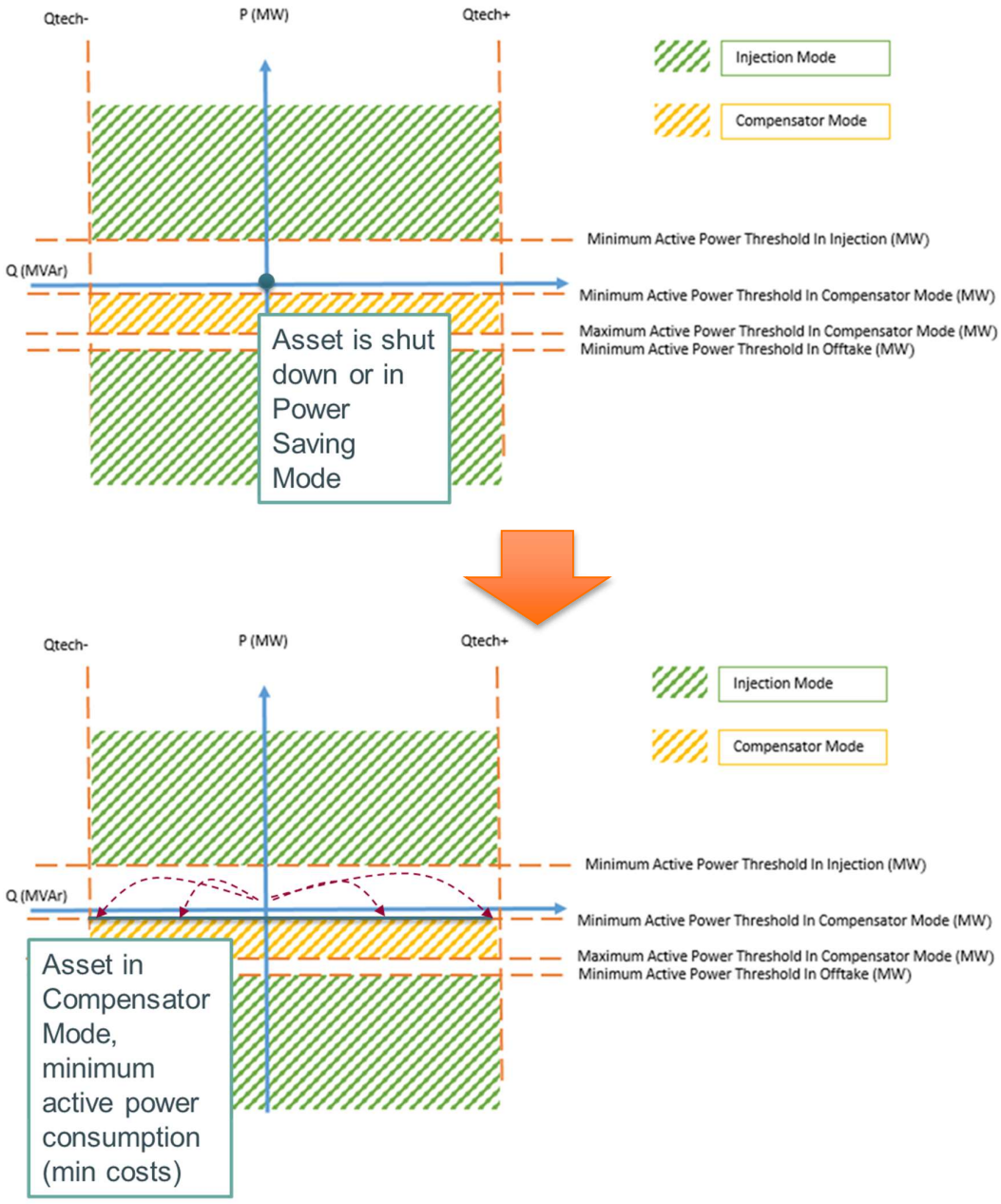

Figure 4 - Asset equipped with Compensator Mode either started up or taken out of Power Saving Mode and brought to the Minimum Active Power Threshold for Compensator Mode to deliver the Voltage and Reactive Power Control Service

For assets not equipped with Compensator Mode but able to provide reactive power control service while offtaking active power (some Batteries Energy Storage Systems and Demand Response assets both with-out Compensator Mode fall within this category), Elia requests an increase of active power offtake up to the Minimum Active Power Threshold for Offtake, hence enough to provide the Voltage and Reactive Power Control Service.

This is illustrated on Figure 5.

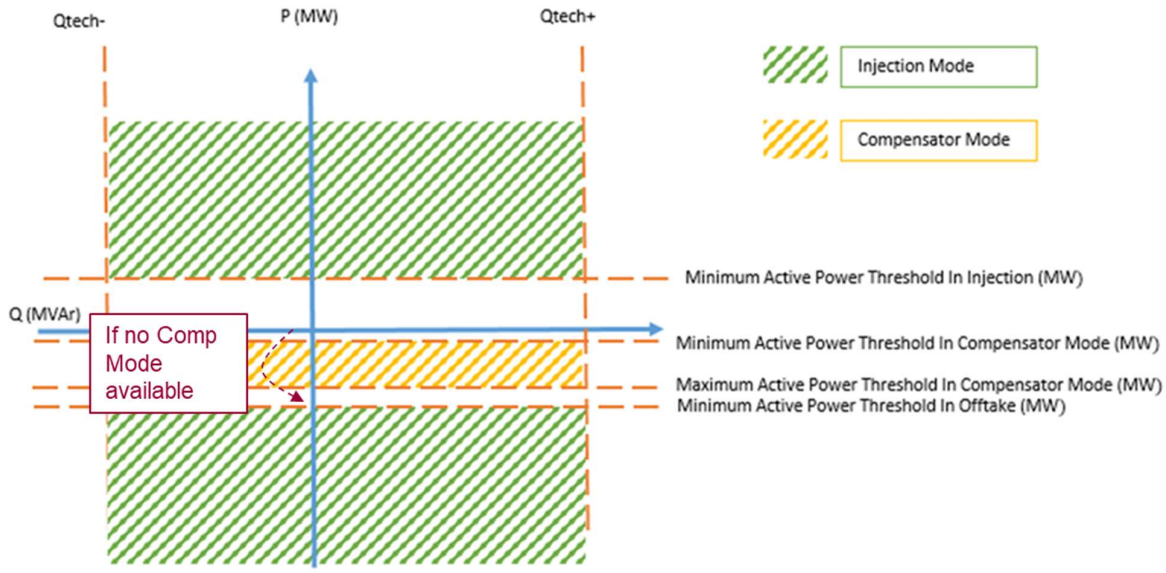

Figure 5 - Asset not equipped with Compensator Mode but able to provide the Service whilst offtaking active power started up or taken out of Power Saving Mode and brought to the Minimum Active Power Threshold for Offtake

The VSP must present in Appendix 1 of the T&C of the Service the **costs of start-up** of its unit to Compensator Mode if its Technical Unit is equipped with such a Mode, or to Injection Mode in offtake if its Technical Unit is not equipped with a Compensator Mode. This obligation to provide a start-up cost is only applicable to assets offtaking active power to provide the Voltage and Reactive Power Control Service. This includes all assets equipped with electronic power converters with Compensator Mode, Battery Energy Storage Systems without Compensator Mode and Demand assets without Compensator Mode. This start-up cost will be reimbursed by Elia.

The start-up request from Elia will contain an estimated end time for the Voltage and Reactive Power Service activation (cf Section 0). This estimated activation end time may be extended by Elia.

Implementation date of the activation of assets either shut down or in Power Saving Mode

As the BRP contract must be updated to introduce the possibility of BRP perimeter correction in the context of a Voltage and Reactive Power Control Service activation request, this feature of activation request with an end time for the Service cannot be enforced before the validation by the competent regulatory authorities of the updated BRP contract.

Startup voltage memory when transitioning under Pmin

Why do we implement this change?

Currently, the startup voltage $V_{startup}$ is dropped from VSP Controlling Technical Units controller memory when the unit active power drops under the Minimum Active Power Threshold of either the Injection Mode or Compensator Mode, even if the active power increases again above this Minimum Active Power Threshold within the quarter-hour. This controller behaviour complicates the safe operation of the power grid under increasing volatility of the power generation profiles.

Elia therefore modifies the introduction of Annex 8 of the T&C of the Service to specify that this startup voltage must be memorised for 15 minutes by the controller of the VSP Technical Units once the active power drops under the Minimum Active Power Threshold P_{min} of every Mode. If the Technical Unit then enters either Compensator or Injection Mode, then this startup voltage must be reused to deliver the Service again.

This transition from one Mode to another is illustrated on Figure 6: in Phase 1, the Technical Unit active power drops below the P_{min} in Compensator Mode and thus the controller forgets the startup voltage $V_{startup}$ used in Phase 1. With this modification, once entering Phase 2, the Phase 1 startup voltage $V_{startup}$ must be reused.

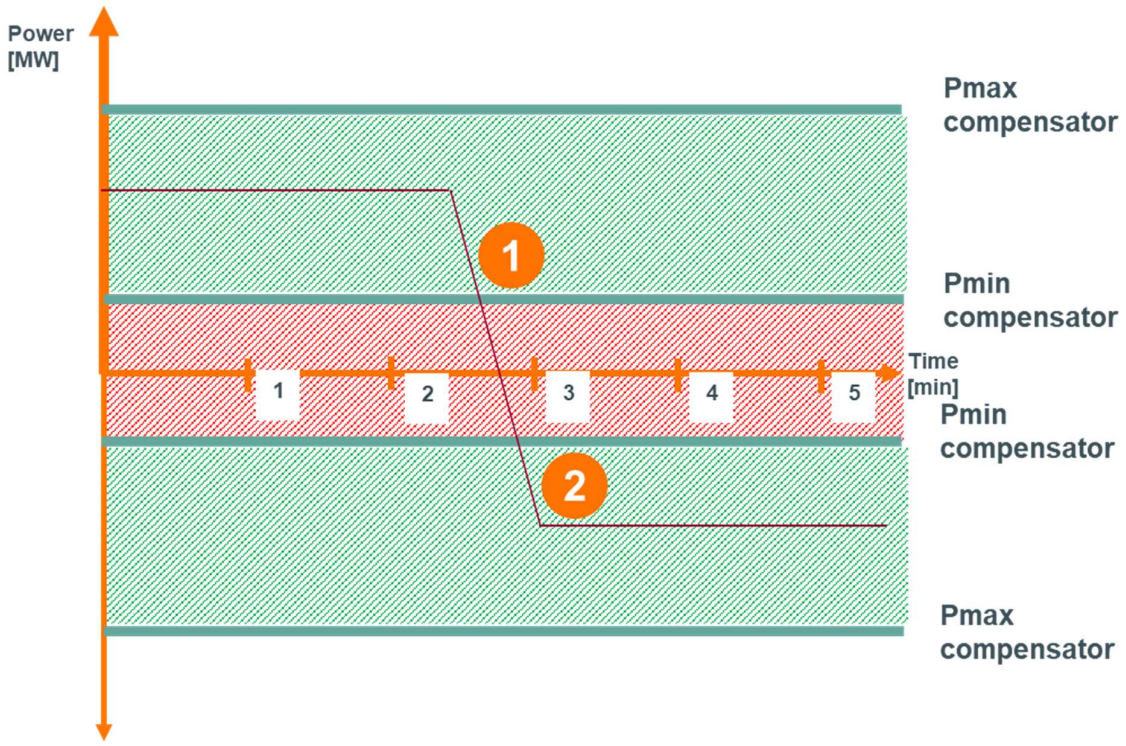

Figure 6 - Illustration of the change from Injection Mode to Compensator Mode and then to Injection Mode again (in offtake), during which the startup voltage is erased from the Technical Unit controller memory

Reactive power ramp rate

Why do we implement this change?

New technologies enabled by power electronics converters such as HVDC transmission lines can vary reactive power absorption and injection at such a high rate that it could cause operational issues on the power grid.

Elia therefore introduces a reactive power ramp rate for Technical Units able to control their reactive power ramp rate. During the pre-qualification process, Elia and the VSP will assess the maximum reactive power ramp rate that the Technical Unit can technically achieve. If this ramp rate can be excessive for the grid operation, Elia will set a reactive ramp rate for those Technical Units in Annex 1 of the T&C.