aFRR Energy Management Strategy Requirements

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1. Introduction

Since the opening of the aFRR product to all technologies, an increased number of assets with Limited Energy Reservoir (LER) have shown interest in participating to the aFRR capacity and energy markets. The volume of assets with LER is expected to increase significantly in the future, providing an opportunity for increase of liquidity and reduction of costs in the aFRR market.

There is however a risk associated that the aFRR service may not be available continuously when Elia needs it, as long aFRR activations in a same direction can't be excluded. This is illustrated in the example below, for the delivery day of the 25th of April 2022. Depending on the size of the reservoir, a BSP which has an aFRR obligation for which it relies on a DP with LER might need an Energy Management Strategy (EMS) to be able to deliver the service continuously due to the deplation of its reservoir.

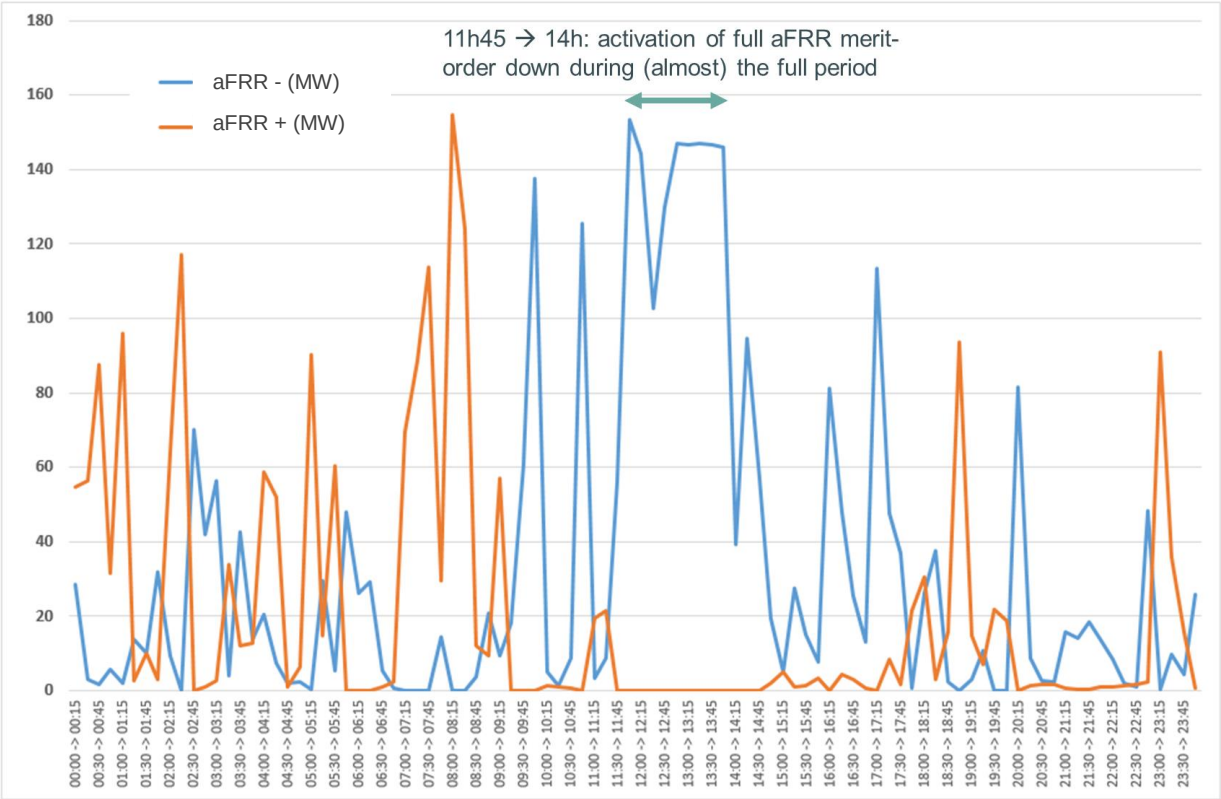

Figure 1: example of continuous downward activation of aFRR for a period of more than 2 hours (example for 25/04/2022)

Therefore, market parties and Elia have identified the need to clarify the rules in order to:

- Reduce entry barriers while limiting the risk of undelivered volumes
- Create a transparent functioning of assets with LER in the market to guarantee a fair competition between market parties
- Provide clear guidance to BSPs for their business plan

The use of assets with LER in the aFRR market is regulated in the Contract BSP aFRR:

- Article II.3.8 of the Contract BSP aFRR specifies that "*each Delivery Point with Limited Energy Reservoir should be included in an energy management strategy, as described in Annex 2.D. ELIA validates the energy management strategy or provides a justification for rejecting it. The BSP will, at all times, operate the Delivery Point with Limited Energy Reservoir in line with the energy management strategy validated by ELIA*."

- A Delivery Point with Limited Energy Reservoir is defined as "*A Delivery Point that contains a Technical Unit which is unable to continuously activate its rated power in the same direction for a period of 4 hours due to the depletion of its energy reservoir, considering that only 50% of the energy reservoir was available at the start of the activation.*"
- Furthermore, Annex 2.D (Energy management strategy) explains that "*the energy management strategy aims to prove the ability of a Delivery Point with Limited Energy Reservoir, on its own or together with other Delivery Points of the Pool, to comply with requirements for provision of the aFRR Service as these are stipulated in Art. II.12.*

  The required information for the energy management strategy is described in the document "aFRR Energy Management Strategy Requirements" which is published on the ELIA website and is available on demand by e-mail to contracting_AS@elia.be."

The objective of the present "aFRR Energy Management Strategy Requirements" document is to:

- Describe allowed strategies
- Describe the information required from the BSP to demonstrate that its EMS is compliant

Important remark: the approval by Elia of the BSP's EMS aims at guaranteeing that the BSP will be able to provide the service according to Art. II.12 of the Contract BSP aFRR. It's however in no case an approval of the pricing strategy of the BSP.

Besides its EMS, Elia asks the BSP to provide the State of Charge (SoC) of each DP with LER to Elia in real-time. This data will be used for monitoring purposes.

2. Energy Management Strategies

Preliminary remarks:

- The list of strategies presented in this document is not exhaustive. When a BSP considers using a strategy which is not listed in the present document, it will describe it in its EMS. Elia will analyse whether the strategy is considered to lead to compliant provision of the product. When necessary, Elia will update the present document to clarify the rule for all market parties. Elia will informally consult market parties and publish the updated document on the website.
- In case of manipulation of the market or in case an approved strategy still results in a non-compliant delivery of the aFRR service, Elia may adapt the EMS requirements accordingly by defining additional conditions or by withdrawing the strategy from the list of approved strategies. In this case, Elia will justify the decision, informally consult market parties and publish the updated document on the website.
- The EMS submitted by the BSP to Elia is considered as confidential and will not be published. The CREG will however have access to it and will have all information needed to ensure an equal decision process for all market parties.
- The BSP has the possibility to use a combination of strategies.

2.1. Summary of the strategies

The table below provides an overview of the allowed and not allowed strategies. The following sections of chapter 2 further elaborate on each strategy.

	Allowed	Not allowed
Use of SoC supporting technical units	X (see conditions in §2.2)	
Tranfer of obligations	X (see conditions in §2.3)	
Use of tolerance band in activation control		X
Imbalance charging		X
Use of ID market	X (see conditions in §2.6)	
Asymmetric pricing	X (see conditions in §2.7)	

Table 1: overview of the allowed and not allowed strategies

2.2. Use of SoC supporting technical units

Principle : the BSP uses other technical units to recharge/discharge the DP with LER. He has 2 possibilities to do so:

- The BSP uses another DP in its aFRR pool, which can be used to manage the reservoir of the asset with LER when needed, while still delivering the aFRR requested by Elia
- The BSP has an agreement with the operator of a "back-up technical unit"[1], which can be used to manage the reservoir of the asset with LER when needed, while still delivering the aFRR requested by Elia

This strategy is considered as acceptable as part of the EMS of the BSP, under the conditions and common understanding adressed in the present section.

When applying this strategy, the aFRR baseline of the DP with LER send by the BSP to Elia will be impacted[2]. This is illustrated in the example below, where for the sake of simplicity we consider no aFRR activation during the charging of the DP:

[1] Being the grid user himself or the BRP of the technical unit.

[2] Exception in the case of a DP inside the aFRR pool: the BSP may decide to deliver the aFRR with the SoC supporting technical unit instead of with the DP with LER. The difference is that the baseline of the battery doesn't necessarily have to be adapted as illustrated in the example below

- A DP with LER is only participtating to the aFRR service and has an aFRR energy bid of 10MW in both directions. The SoC of the DP with LER is at 25% before activation
- To recover an optimal SoC close to 50% (which allows the DP with LER to provide aFRR up and down during the long duration activations), the DP with LER will have to charge. To do so, it starts charging by offtaking 5MW from to grid, while the other technical unit starts injecting 5MW in to the grid.
- In the absence of aFRR activation, the DP with LER will offtake 5 MW from the grid. As a result, the aFRR baseline of the DP with LER is changed from 0MW to 5MW[3]

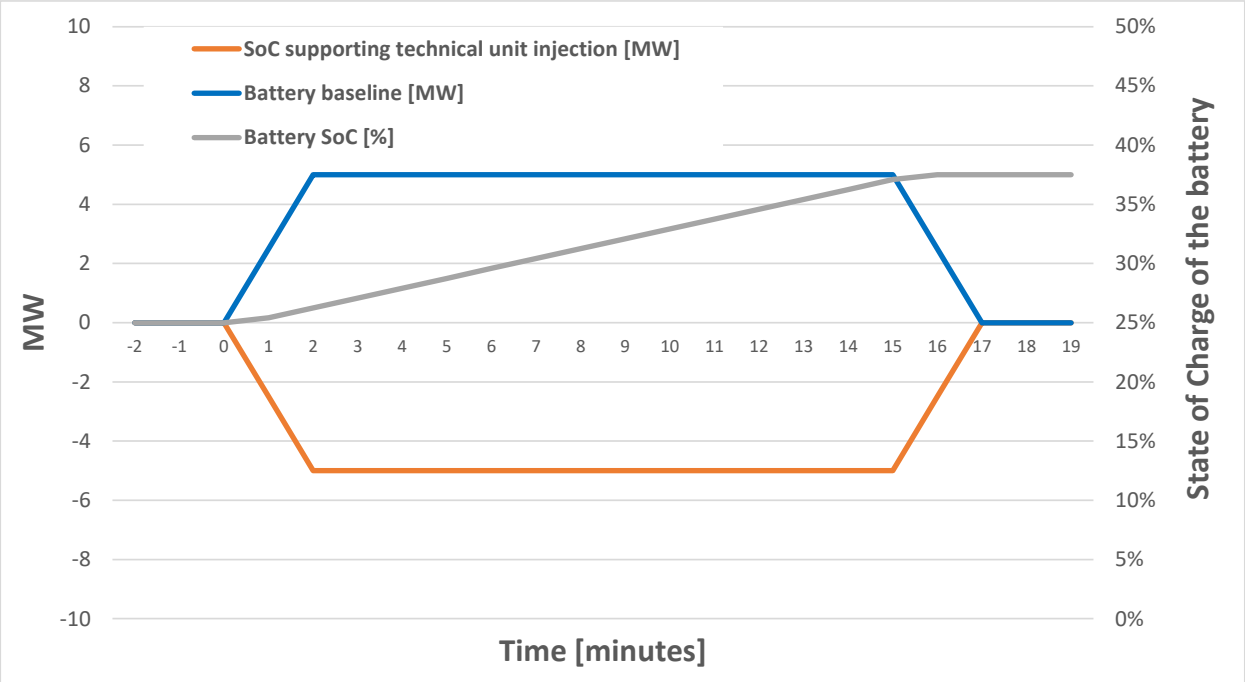

Figure 2: impact of the use of a SoC supporting technical unit on the baseline of the DP with LER

The change of baseline of the DP with LER must be traceable to the use of the SoC supporting technical units. Elia might monitor BSP's behavior using a SoC supporting technical unit, a.o. by performing ex-post spot check for moments with continuous activation in the same direction. Upon request of Elia, the BSP has to justify its baseline modification and explain how he operated the DP with LER and the SoC supporting technical unit used for recharging/discharging during that specific moment.

Note: in order to ensure that the BRPs of the DP with LER and of the other technical unit are not unbalanced by the recharging/discharging period, the BSP shall make the necessary contractual agreements with the BRPs and/or with the grid user.

[3] Reminder sign convention: Net Offtake from the ELIA Grid is considered as a positive value, net Injection into the ELIA Grid is considered as a negative value.

The conditions to have the other technical unit used for recharging/discharging inside or outside the aFRR pool are the following:

- For SoC supporting technical units with schedules, Elia has access to schedules and measurement data. Therefore, these SoC supporting technical units can but do not have to be included in the aFRR pool
- For SoC supporting technical units without schedules, as there is no possibility for Elia to trace the baseline modification to the use of the SoC supporting technical unit if this unit is outside the aFRR pool, it is requested to include the SoC supporting technical units in the aFRR pool (f.i. part of the aFRR Supporting Providing Group).
- An exception however is granted to technical units without schedules that participate to a FSP Contract DA/ID and for which the activation is perfomed in line with the conditions of the FSP Contract DA/ID, as Elia has access to the data necessary to allow traceability of the baseline modifications.

2.3. Transfer of obligations

Principle: the BSP uses a transfer of obligations according to Art. II.10 and Annex 8 of the Contract BSP aFRR.

For the sake of clarity, transfer of obligations is allowed for a BSP identifying that it might not be able to provide the service. However, it cannot be accounted for in the EMS submitted by the BSP, as there is no guarantee that the BSP will find a counterpart.

2.4. Use of the tolerance band of the activation control

Principle: the determination of the aFRR Energy Discrepancy takes into account a permitted deviation (cf. Annex 13 of the Contract BSP aFRR). Using the resulting tolerance band as strategy would consist in delivering more or less than the aFRR requested based on the SoC of the DP with LER, while avoiding penalties.

This strategy is not allowed. It would lead to systematic discrepancies in the service delivery, while this is obviously not the objective of the tolerance band.

2.5. Imbalance charging

Principle: recover the SoC by offtake from (injection in) the grid without compensation by SoC supporting technical units or trades on the ID market.

The strategy is not allowed for the reasons explained below.

In practice, a BSP doing imbalance charging would change the baseline of its DP with LER and its BRP would be exposed to the imbalance tariff.

Example:

- A battery doing only aFRR and offering 10MW in both directions has a 20% SoC
- To recover an optimal SoC, the battery starts offtaking 5MW from the grid without compensating the reaction elsewhere within its BRP portfolio (no trades or activations), changing its baseline accordingly to +5MW

- The aFRR requested for the bid including this battery is 5MW. As a result, the aFRR service would be considered as delivered (DPbaseline = +5MW and DPmeasured = 0MW), while the energy will not be produced

2 cases can be distinguished:

- Imbalance charging while the aFRR Energy bid containing the DP with LER is activated
- Imbalance charging when the aFRR Energy bid containing the DP with LER is not activated

In the 1st case, imbalance charging comes down to not delivering the service. As a result:

- The energy is not delivered while the capacity has been paid for (non-contracted bids have the possibility not to offer in a given direction if the SoC is at risk)
- The aFRR demand could potentially increase (except in sutations where Elia is fully netted by PICASSO), leading to the activation of aFRR Energy bids further in the merit-order and hence socializing the costs

In the 2nd case, imbalance charging could potentially lead to:

- Instability of the aFRR regulation. For example, when a 5MW upward bid containing a DP with LER is deactivated, the impact on injection / offtake is the combination of:
    - The stopping of the 5MWs injection corresponding to the aFRR bid (which is the expected behaviour)
    - The starting of 5MW offtake from the grid in order to recharge the DP with LER

  In this example, deactivating the aFRR Energy bid containing a DP with LER would double the expected impact on the injections / offtakes from the grid, potentially leading to the reactivation of that same bid. The same effect could apply in the activation phase.
- The aggravation by the BSP of the system imbalance in order to recover its SoC

2.6. Use of ID market

Principle: the BRP_{BSP} uses the ID market to manage its SoC.

This strategy is considered as acceptable as part of the EMS of the BSP, under the conditions and common understanding adressed in the present section[4].

For the sake of simplicity, we consider in this section that the BRP_{source} is the same party as the BRP_{BSP}. When this is not the case, the BSP shall make the necessary contractual agreements with the BRPs and/or with the grid user in order to ensure that the balancing position of the different parties is not impacted during the recharging/discharging period.

Imposing a SoC supporting technical unit to be reserved for each asset with LER delivering aFRR can be suboptimal from an economic perspective. Accessing alternative recharging assets on the intraday market may be economically beneficial.

[4] For the sake of clarity, the use of the DA market is also allowed, under the same conditions

There is however a risk that the ID trade is not corresponding to a change of the injection in (offtake from) the grid. This can be illustrated in the example below:

- The Belgian system is short, the SoC is reaching its limit
- A counterparty BRP is long and accepts to be closer to a balanced position
- An ID deal is settled between the BRP_{BSP} and the counterparty BRP which is long

This leads to a balanced position of the BRP_{BSP}, as the ID deal will solve the issue of the SoC of the battery and the aFRR service will be considered as delivered (as the BSP will have modified its baseline in an appropriate way), but physically, there is no change of the injection in (offtake from) the grid as the counterparty BRP is only trading his already present imbalance. This eventually leads to an equivalent to imbalance charging, as in total there will be more offtake in the system.

This risk is expected to be much higher if the ID deal is occurring close to real-time, as assets which have the technical ability to react fast are expected to be either offered as balancing energy to Elia, or already used for self-balancing.

An additional risk is the limited liquidity on the local ID market close to real-time.

This strategy is considered as acceptable as part of the EMS of the BSP, under the following conditions:

- The ID deal must be closed at least 1 hour before the start of the delivery of the quarter-hour (i.e. before the gate closure time of the cross-border ID market). ID deals beyond this 1 hour limit are not allowed. This provision allows to limit the risk of trades without impact on grid injection (offtake) and to increase the liquidity, especially in critical situations for the grid
- The ID trades assumed to be always available are 1h-blocks, not QH-blocks (see justification below)
- The nomination must be instructed on the Elia HUB ID until 1 hour before the start of the quarter-hour and must be tagged as being used for SoC management[5]
- The ID trade can but does not have to be settled through a NEMO. However, it is not allowed to have a framework agreement with a BRP accepting to sell or buy the volumes required by the BRP_{BSP} without the BRP taking the necessary actions to compensate the trade

Statistics of 2021 show that, between 1h30 and 1h before the start of the delivery of the quarter-hour, transactions for 1h blocks took place on EPEX Spot or Nord Pool in more than 98% of the time. Therefore, the BSP has the possibility to assume in its EMS simulations that the liquidity for 1h-blocks on the ID market is always present. However, should it appear that a BSP fails to deliver the service due to SoC management issues and this because of a lack of liquidity on the ID market at the moment of delivery, it will trigger a modification of the present EMS requirements. BSPs relying on ID trades will have to adapt their EMS accordingly.

The conditions listed above provide confidence on the use of ID deals as part of the EMS. However, taking into account the impact on the service delivery in case it would appear not to be working properly, Elia:

- Will consider introducing an energy availability test in a next evolution of the Contract BSP aFRR. As the energy availibility test aims at covering a risk which is inherent to DPs with LER, it would only be applied to

[5] This functionality is to be added by Elia in the Elia hub ID

BSPs including in their pool one or several DPs with LER. The complete design, including the associated penalty regime in case of failed test, is still to be defined.

- Will monitor BSP's behavior, a.o. by performing ex-post spot check for moments with continuous activation in the same direction. Upon request of Elia, the BSP has to justify its baseline modification and explain how he operated the DP with LER during that specific moment..
- Will consider withdrawing this possibility, if there are reasonable suspicions that service delivery is at risk, especially in case no SoC supporting technical unit is available for the BSP. Elia is aware that this is unfavourable from a regulatory stability point of view, but consider that the alternative would be not to allow the use of ID deals in the EMS.

It has to be noted that the BSP has to be able to still deliver the offered volume even in case of recharging/discharging in the same direction as the requested activations. For example, a BSP who relies only on a 10MW DP with LER to deliver aFRR, who plans to submit bids with a same volume in both direction and who needs to buy 4MW on the ID market according to its EMS, can not bid more than 6MW in each direction in the capacity auctions. As a result, in this case, a derating of 4MW is necessary.

2.7. Asymmetric pricing

Principle: the BSP adapts its bid's price based on the SoC, reflecting the opportunity costs for the BSP, which as a consequence increases / decreases the probability of being activated in a given direction.

This strategy is considered as acceptable as part of the EMS of the BSP, under the conditions and common understanding adressed in the present section.

This strategy can be efficient in reducing the costs on the aFRR market as

- It is efficient in limiting the need to rely on SoC supporting technical units or ID trades
- The bids containing DPs with LER are expected to be earlier in the merit order in the direction improving the SoC

However, the aim of the asymmetric pricing cannot be that the BSP is positioning the bid at the end of the merit-order in function of the SoC, which would potentially lead to a significant and artificial increase of costs. Elia refers to the CREG's presentation during the workshop on the 24th of February 2022 for more details[6].

In any case, this strategy is not sufficient on its own, as it cannot be excluded that all bids in the local merit-order are activated.

As stated in the introduction, the approval by Elia of the BSP's EMS aims at guaranteeing that the BSP will be able to provide the service according to Art. II.12 of the Contract BSP aFRR. It is however in no case an approval of the pricing strategy of the BSP.

[6] The presentation is available on this link: **https://www.elia.be/en/users-group/workshop/20220224-workshop**

3. How to demonstrate that the service is delivered

3.1. Possible approaches

The BSP has to 2 possibilities to demonstrate that it can continuously deliver the aFRR requested, in compliancy with Art. II.12 of the BSP contract aFRR

The 1st possibility is to use a deterministic analysis. For example, the use of a dedicated SoC supporting technical unit which is always available to completely cover long term activations.

Alternatively, the demonstration can be based on a statistical analysis. For example, the use of a dedicated SoC supporting technical unit which does not cover the full volume or has a LER itself. In this case, the analysis has to be performed on historical data, based on the information provided by Elia in the excel file "aFRR EMS requirements - data.xls". More information is provided in Section 3.3.

3.2. Minimum content of the EMS to be submitted by the BSP

The EMS of the BSP shall contain at least the following information:

- The characteristics of the DP(s) with LER: nominal power (MW), reservoir capacity (MWh)
- An explanation on how the DP with LER will be offered by the BSP
- If not exclusively dedicated to aFRR, the indented use of the DP with LER:
    - A description of the other uses
    - The ratio between the power and the content of the reservoir dedicated to aFRR
    - How the BSP will manage the split between the other uses and the participation to the aFRR service
- The assumptions used (liquidity on XB ID market is assumed to be present)
- An exhaustive description of the strategies used, for example
    - What level of SoC triggers activation of SoC supporting technical unit(s) or an ID trade
    - What are the characteristics of the SoC supporting technical unit(s)
    - …
- The type of analysis (deterministic or statistic) used for demonstrating that the BSP will be able to deliver the service continuously

3.3. Additional requirements in case of statistical approach

When the demonstration is based on a statistical analysis, the following additional information is requested in the BSP's EMS:

- In case of use of asymmetric pricing, a description of the assumptions used. For example:
    - How do energy bid prices evolve with the SoC
- Time series for the full studied period with the following data, with a 1' granularity
    - The SoC
    - The Control Target determined by Elia
    - The bid prices for activation in upward and downward direction

- aFRR requested of the bid containing the DP with LER
- The baseline of the DP with LER
- The volumes activated with a SoC supporting technical unit (justifying baseline modifications)
- The volumes traded on the ID market (justifying baseline modifications)

- The report shall include graphical representations of the evolution of those parameters for the following selection of days
  - The 5 days where the SoC reached the highest value (on a 1' average basis)
  - The 5 days where the SoC reached the lowest value (on a 1' average basis)
  - The 5 periods with the highest consecutive aFRR energy activation request by Elia in the positive direction
  - The 5 periods with the highest consecutive aFRR energy activation request by Elia in the negative direction

  The signification of "periods with the highest consecutive aFRR energy activation request by Elia" is illustrated in the figure below

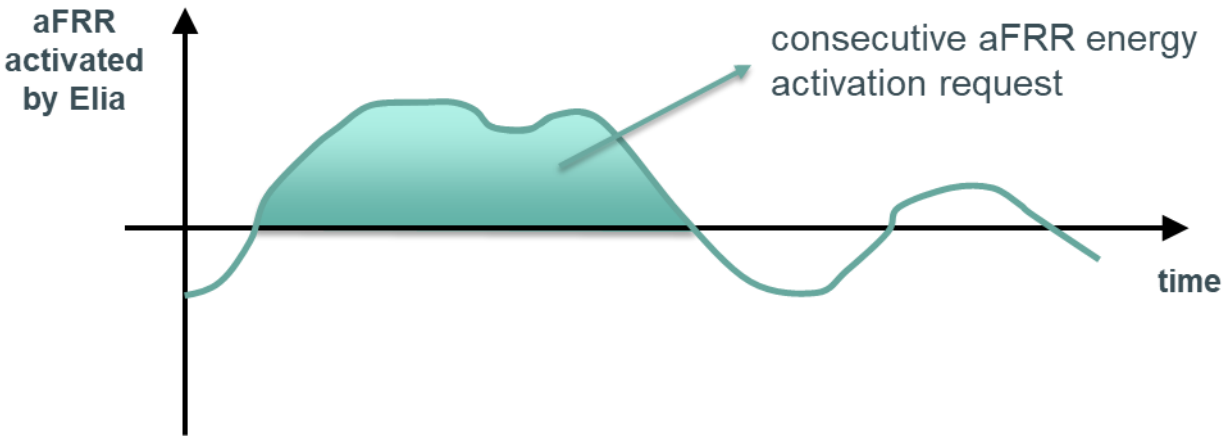

Figure 3: periods with the highest consecutive aFRR energy activation request by Elia (here: in the positive direction)

An excel file is at disposal on the Elia website[7], containing:

- The necessary input data for the BSP to perform its statisitical analysis
  - 1' granularity data of the Control Target determined by Elia's aFRR controller
  - The local merit orders
- The template for the time series to be provided as output of the analysis by the BSP

[7] **https://www.elia.be/en/electricity-market-and-system/system-services/technical-documentation-concerning-the-provision-of-ancillary-services**

Should the historical data used for the demonstration appear not be representative anymore, Elia may request an update of the statistical analysis. In this case, BSPs having used a statistical demonstration will have to perform the analysis again and, if necessary, adapt their EMS.

4. Possible future evolutions

The penetration of DPs with LER in the aFRR market is expected to grow, but is currently still quite limited. Therefore, while the publication of EMS requirements aims to provide as much clarity as possible with the knowledge we have today, further evolutions of the EMS requirements are possible, for example to account for:

- New strategies that would be discussed with market parties
- An increase of market share of DPs with LER, decreasing the efficiency of strategies counting on asymmetric pricing
- The connection to PICASSO, which will potentially impact the length and frequency of activations
- Experience with DPs with LER active on several markets
- Results of monitoring of the behavior that will be done by Elia

New requirements may result in the need for a BSP to update its EMS.