



# WG Balancing of June 28<sup>th</sup> 2024

Hybrid meeting

28/06/2024



## For a smooth teleconference with 30+ people ... Some rules apply

- Please put yourself on mute at any time that you are not speaking to avoid background noise.
- If you receive a call, please ensure that you do not put this meeting **on hold**.
  - You can quit and reconnect later on.
  - You will be muted or kicked out of the session, if necessary.
- You will be requested to hold your questions for the end of each presentation.
  - Should you have a question, please notify via Teams or speak out if you are only via phone.
  - Share your question (with slide number) in advance so all participants may follow
  - Before you share your question, please announce yourself.
- If you have a poor internet connection, please dial-in.
- Finally, please be courteous and let people finish their sentences.
  - It is practically impossible to follow when 2 people are speaking at the same time in a teleconference.



## Agenda

13:00 – 13:45: EU & BE Balancing program update

13:45 – 14:00: Process for evaluating the temporary bid price limit for the contracted aFRR bids

14:00 – 14:30: Re-introduction of inter-TSO reserve sharing activations in the imbalance price calculation

14:30 – 14:45: aFRR dimensioning – launch parallel run

14:45 – 15:05: Deterministic Frequency Deviations – Follow-up 2024

15:05 – 15:15: Smart testing – modalities of availability testing

15:15 – 15:30: AOB



# Minutes of Meeting for approval

Minutes of Meeting of WG Balancing of 21/05/2024

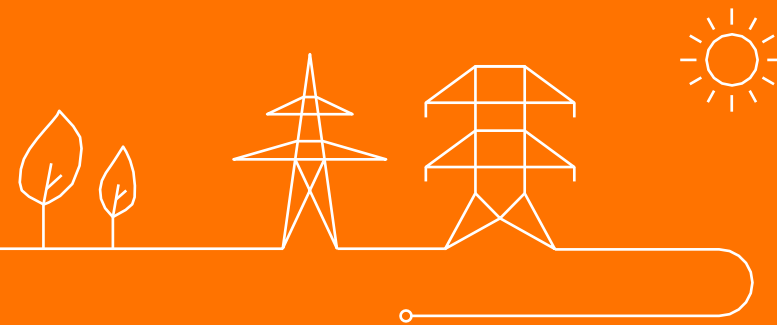
Comments

- **Suggestion to approve:**
- The MoM of 21/05/2024



# EU & BE Balancing Program Update

Cécile Pellegrin & Kris Poncelet

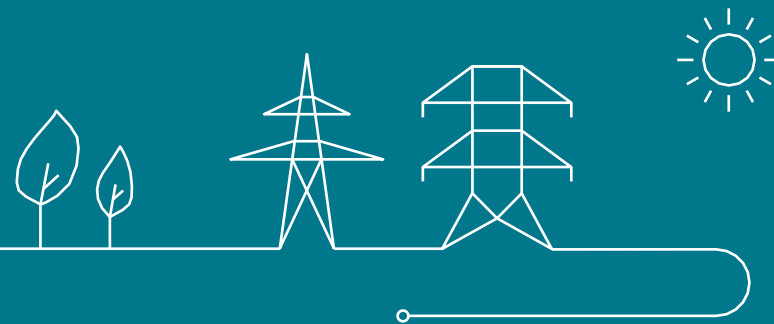


# Agenda of today's presentation

- iCAROS phase 1 & MARI Local go live
- PIM Roadmap including
  - aFRR Design Evolutions & Connection to PICASSO
    - Status regulatory track (including feedback on ACER decisions and impact on balancing rules)
    - Status implementations at European level
    - Status local implementation
  - Updated PIM Roadmap
- Coming stakeholder management interactions




# iCAROS phase 1 & MARI Local go live



# iCAROS phase 1 & MARI Local go live confirmed & effective

Mail of  
19/04/24

**USERS' GROUP**



Dear Market Party,

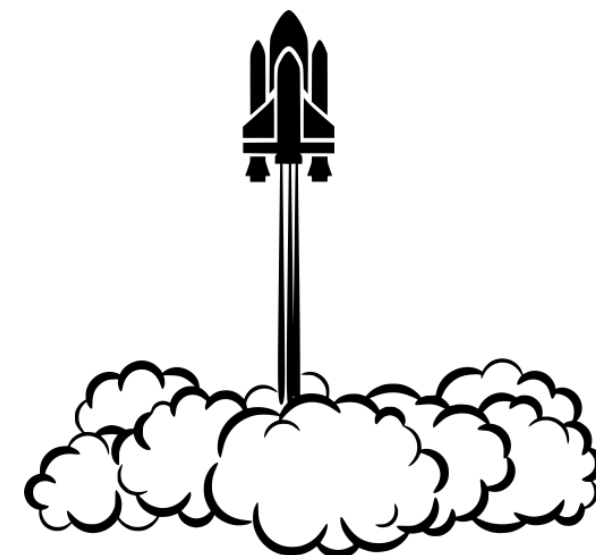
Elia would like to inform you that the Go-Live of iCAROS phase I and the MARI Local Go-Live are confirmed. As a result, the following regulated documents, as approved by the CREG, will enter into force on the **22<sup>nd</sup> of May 2024** (1<sup>st</sup> delivery date):

**Go-Live of iCAROS Phase I:**

- The updated Contract for [Outage Planning Agent](#);
- The updated Contract for [Scheduling Agent](#);
- The updated [Rules for Coordination & Congestion Management](#).

**MARI Local Go-Live:**

- The updated [BSP Contract mFRR](#);
- The updated [BRP Contract](#);
- The updated [Balancing Rules](#).



- As of **May 8, 2024**, the BSP were able to submit mFRR Capacity Bids for a delivery on May 22, 2024
- As of **May 10, 2024**, the OPA were able to submit an Outage Plan for a delivery on May 22, 2024
- As of **May 15, 2024**, the SA were able to:
  - Submit a Daily Schedule for a delivery on May 22, 2024
  - Submit Redispatching Energy Bids for a delivery on May 22, 2024
- As of **May 15, 2024**, the BSP were able to submit mFRR Energy Bids for a date on May 22, 2024.
- As of **May 22, 2024**, first possible requests of redispatching activations and return to schedule governed by the updated SA Contract & first possible mFRR activations governed by the updated BSP Contract mFRR



# iCAROS phase 1 & MARI Local go live

This go live is the materialization of a long trajectory and intense work & interactions with the Market Parties in each step of the projects including:

- Design updates of the different products & processes  
=> Outage planning, Scheduling, Redispatching, mFRR, Imbalance price formula
- Consultation on the updated regulated documents  
=> T&C OPA, T&C SA, Coordination Rules, T&C mFRR, T&C BRP, Balancing Rules



## iCAROS phase 1 & MARI Local go live

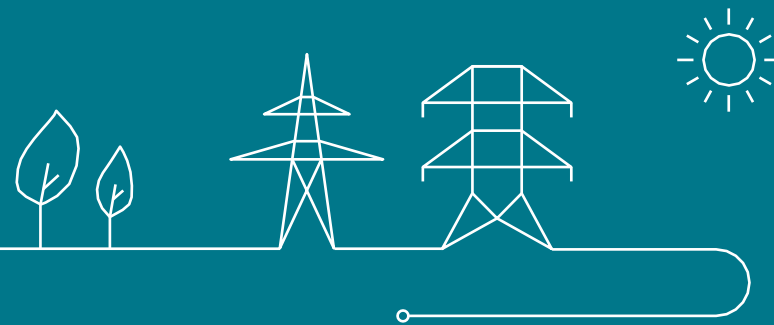
- Intense implementation efforts on ELIA's and Market parties' side
- Business testing protocols with Market parties (requiring intense involvement of all parties including to facilitate later testing)
- High focus & support in the preparation and follow-up of the go live

All leading to a successful go live.

➔ **ELIA wants to take the opportunity to thank all Market Parties having contributed to the discussions on design evolutions and the consultations, and to congratulate them for the successful implementation of these extensive and complex changes in their systems and processes**



# PIM Roadmap



## MARI Connection

- In December 2023, the consolidated planning for MARI, iCAROS Phase 1 and PICASSO was updated for the go live dates of MARI & ICAROS as follows :
  - Local go live of the new mFRR bidding and iCAROS phase 1 Mid May 2024
  - Connection to EU mFRR balancing energy platform June 2024
  - Connection to EU aFRR Balancing energy platform October 2024
- iCAROS phase 1 & MARI Local go live was confirmed for the 22<sup>nd</sup> of May 2024 (Delivery date)
- **Due to an insufficient progress of the Interoperability Tests (IOP Tests) with the MARI European Platform, ELIA's connection in June 2024 will unfortunately not be possible and ELIA will have to delay its accession for after the summer**
- **A detailed assessment is ongoing to be able to provide the updated Roadmap at the latest by the end of June**

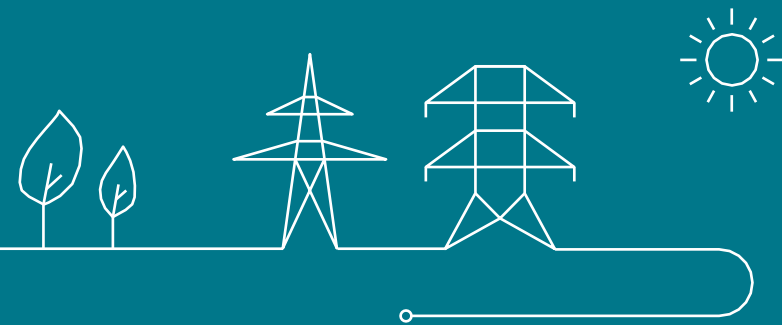


## Key considerations for the updated PIM roadmap

- While reassessing the PIM roadmap and the different underlying elements, ELIA took care of the following elements:
  - Ensuring the appropriate balance between ambition & realistic and stable planning for all parties involved
  - Providing transparency (also related to any remaining risks)
  - Securing the connection of PICASSO over the connection of MARI
  - Not taking risks with critical processes (local aFRR controller) that could lead to unacceptable situations (frequently having to revert to pro-rate activation of aFRR Energy Bids)
- In support, update assessment of the remaining work and progress was done.



# aFRR Design Evolutions & Connection to PICASSO



# Status regulatory track

## – European:

- **ACER decision** on the aFRR Implementation framework\* and pricing methodology\*\* is **expected to be published in the coming days**

- Based on preliminary information, **limited amendments to the Balancing Rules might be required following the ACER decision:**

- Article 12.7 of the Balancing Rules allowed Elia to change the volume/power threshold for elastic demand in case of alert or emergency state or in exceptional circumstances to prevent going to alert or emergency state. ACER's decision is however expected to contain a limitation that changing the volume/power threshold for elastic demand (relative to the volume/power threshold determined in accordance with the described formula/rules) within a quarter hour would only be possible in response to an effective change of system state.
- ACER's decision likely contains certain amendments to the terminology related to elastic demand (e.g., “elastic aFRR demand”, new definition of “power threshold of elastic aFRR demand”). For clarity, the terminology in the Balancing Rules could need to be adapted.
- **The amendments needed to the Balancing Rules are not expected to require re-doing a public consultation**

## – Local:

- The **T&C BSP aFRR has been submitted for approval** end of May
- The **Balancing Rules will be submitted for approval shortly after ACER decision**



On track



On track

\* Implementation framework for the European platform for the exchange of balancing energy from frequency restoration reserves with automatic activation in accordance with Article 21 of Commission Regulation (EU) 2017/2195 establishing a guideline on electricity balancing

\*\* Methodology for pricing balancing energy and cross-zonal capacity used for the exchange of balancing energy or operating the imbalance netting process in accordance with Article 30(1) of Commission Regulation (EU) 2017/2195 of 23 November 2017 establishing a guideline on electricity balancing

# Status implementations at European level

Recall: The proposals for amendments to the aFRR IF and the pricing methodology contained **two changes directly impacting the activation optimization function (AOF)** of the aFRR Platform:

## 1. Improving CBMP determination by considering local LFC output

- The improved CBMP determination will go-live one month after the publication of the ACER decision (i.e., before the connection to Elia)
- The required implementations have been implemented and are currently being tested



On track

## 2. Elastic demand implementation on European level\*

- The possibility to use elastic demand would become available one month after the publication of the ACER decision. However, the functionality would only be effectively needed/used as soon as a TSO submits an elastic aFRR demand.
- The implementation of elastic demand has been tested on a large suite of test cases via a Matlab prototype
  - The vast majority of test cases immediately yielded the expected results
  - Certain test cases did require additional considerations and amendments to the implementation solution. The amendments to the implementation solution have been approved by PICASSO Steering Committee only earlier this week and are now provided to the software developer.
- Developments on the core functionality of elastic demand have recently started by the software developer and will need sufficient testing



Developments still on track but with some remaining risks and little/no margin

\* The activation optimization function is to be adapted to consider the inelastic and elastic demands of different LFC Areas which could impact the central selection of aFRR Energy Bids, exchanges of reserves (and corresponding correction signals), cross-border marginal prices and (un)satisfied demands.



# Status local implementation

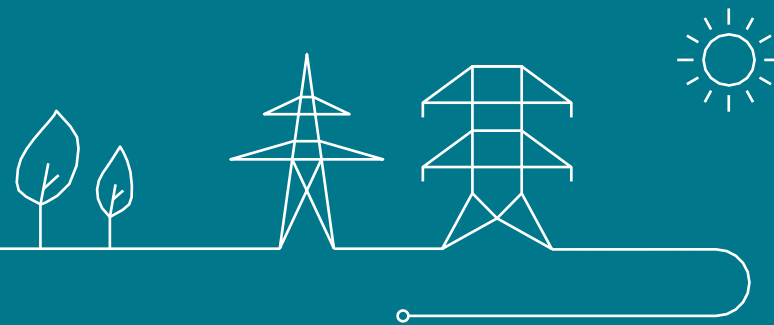
- In 2022, Elia was ready to connect to the aFRR Platform...
- ... however, the developments of the high-price **mitigation measures (elastic demand)** and **aFRR design evolutions significantly impact in particular the local aFRR controller:**
  - Local implementation of elastic demand:
    - Currently, the local aFRR controller “simply” selects every 4 seconds the bids according to a merit order principle up to the volume that needs to be selected (i.e., the “global control target”)
    - With the introduction of elastic demand, the merit-order selection needs to additionally consider, in the 4 seconds cycle, the price of the aFRR Energy Bid relative to the aFRR CBMPs to avoid the selection of bids that were not selected by the aFRR Platform due to inelastic demand (e.g., upward bids with a price > aFRR CBMP)
  - aFRR design evolutions (aFRR activation method):
    - Currently, selected bids are gradually activated considering the full activation time (currently being 7,5 minutes)
    - With the new aFRR activation method, BSPs can choose to specify a shorter ramping period per bid. The information on the level of the bid needs to be considered in the signal the aFRR controller sends to the BSP.
- The **local developments are progressing well...**
- ... but it must be considered that **extensive testing and stabilization of the local aFRR controller prior to using it in production is essential as the only fallback in case of issues with the aFRR controller is to revert to pro-rata activation**, which Elia believes to be acceptable only for highly rare events



Developments on track but sufficient time needed for required testing and stabilization period



# Updated PIM Roadmap





## Updated PIM Roadmap

- The update of the PIM Roadmap has been made to keep the same track for PICASSO
  - Putting the priority to be connected as soon as possible to PICASSO
  - While not taking unacceptable risks with a so critical process
- To avoid any impact on the planning of PICASSO Connection, MARI connection is planned in a second step
- Concretely, as you'll see here after,
  - Goal is to secure the PICASSO connection as soon as possible and more specifically target to connect to PICASSO in the 2nd half of Q4.
  - The connection to MARI platform should occur 3 months after the connection to the PICASSO platform.
- This updated PIM roadmap keeps our PICASSO connection in a similar timing to what is currently foreseen by RTE in the European accession roadmap

# Updated PIM Roadmap



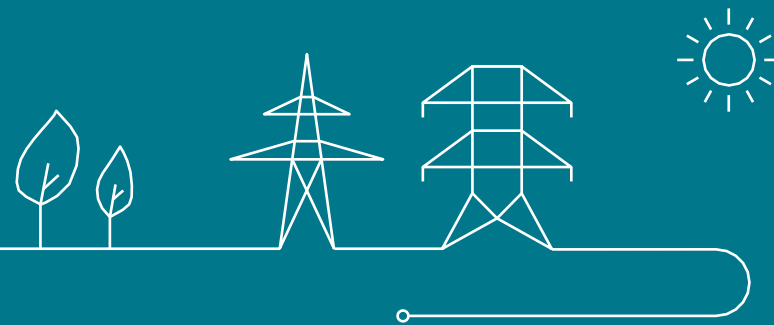
More precisely, based on the identified feasibility & risks and taking into account the importance of our connection to PICASSO, the roadmap has been adapted as follows:

- **Go-live of aFRR dynamic dimensioning & shift of aFRR Capacity auctions from D-2 to D-1** remains unchanged and foreseen for 1<sup>st</sup> of October
- A go live in November for **PICASSO Connection & aFRR Design Evolutions** is targeted subject to the confirmation of:
  - The appropriate, qualitative & stable implementation at EU level
  - The qualitative & stable interfacing between ELIA and the aFRR platform
  - The qualitative & stable implementation of the new functionalities within ELIA Real-Time applications and in the complete chain of tools

An update of the status will be done end of September when we'll have a better visibility.

- Change of **aFRR FAT (7,5 to 5 minutes)** will happen in the same time window as PICASSO Connection considering the limited time remaining before the legal deadline and end-of-year constraints for IT implementations
- **MARI connection** will be planned a quarter after PICASSO Connection (meaning end Q1 2025 if PICASSO connection takes place end Q4 2024)

# Others



# Coming stakeholder management interactions



- Next interactions

- 21/10/24 9:30-14:00 : taskforce iCAROS – Launch of iCAROS phase 2 design discussions – Outage Planning extension for large units and introduction for small units /Demand facilities
- 11/12/24 9:00-12:00 : taskforce iCAROS – Focus on intermediate learnings coming from go live iCAROS phase 1



# Contact persons



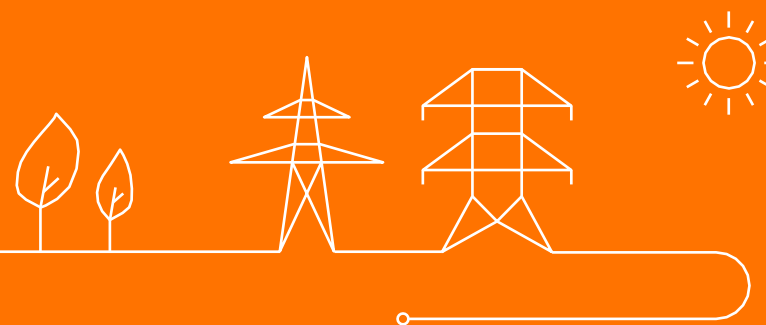
## **KAM Energy**

Amandine Leroux / Nicolas Koelman / Sybille Mettens



# Process for evaluating the bid price limit for contracted aFRR Energy Bids

Kris Poncelet





## Context

- The **2022 observation round exposed a risk of drastic cost increases for BRPs and Consumers in Belgium** in case 15 MWs of contracted aFRR Energy Bids with low prices would be replaced by 15 MW of contracted aFRR Energy bids at prices of 3.000 €/MWh in up and -2.500 €/MWh in down **following the connection to PICASSO.**
- The **bid price limit for contracted aFRR balancing energy bids** has been **proposed** in the T&C BSP aFRR **as a temporary measure** that is considered to be **required as long as there might not be sufficient competition to maintain aFRR cross-border marginal prices at acceptable and cost-reflective levels**, at least up to the volumes that are frequently activated to cover limited system imbalances.
  - Recall: the main identified risk related to periods where there is no/limited ATC available in the relevant direction.
- In the proposal for amendment to the T&C BSP aFRR, **Elia has taken a commitment to evaluate the temporary bid price limit** on a regular basis **and to establish a process for discussing the results with the CREG and market participants.**

## Objective today

**Present and discuss Elia's proposal for the evaluation of the temporary bid price limit**

# Objectives and approach for the evaluation of the bid price limit

- The impact of removing or relaxing the temporary bid price limit for contracted aFRR Energy Bids depends on whether the relaxation/removal would lead to the presence of high-priced contracted aFRR Energy Bids, which is currently unknown.
- However, two possible scenarios could be considered:
  - Scenario 1: The removal of the temporary bid price limit would not lead to the introduction contracted aFRR Energy Bids at prices above (below) + (-) 1.000 €/MWh
    - In this scenario, the temporary bid price limit would not have any impact (on energy nor on capacity)
  - Scenario 2: The removal or relaxation of the temporary bid price limit would lead to the introduction of contracted aFRR Energy Bids at prices above (below) + (-) 1.000 €/MWh
    - In this scenario, the bid price limit for contracted aFRR Energy Bids offers a mitigation against potentially significant cost increases for BRPs and consumers
- Considering the above, the **proposed approach for the evaluation:**
  - **will assume that a removal of the temporary bid price limit would lead to the introduction of high-priced contracted aFRR Energy Bids; and**
  - **has as objective evaluating whether and to what extent a safeguard in the form of a bid price limit would remain needed to limit drastic cost increases for BRPs and consumers in such a case.**

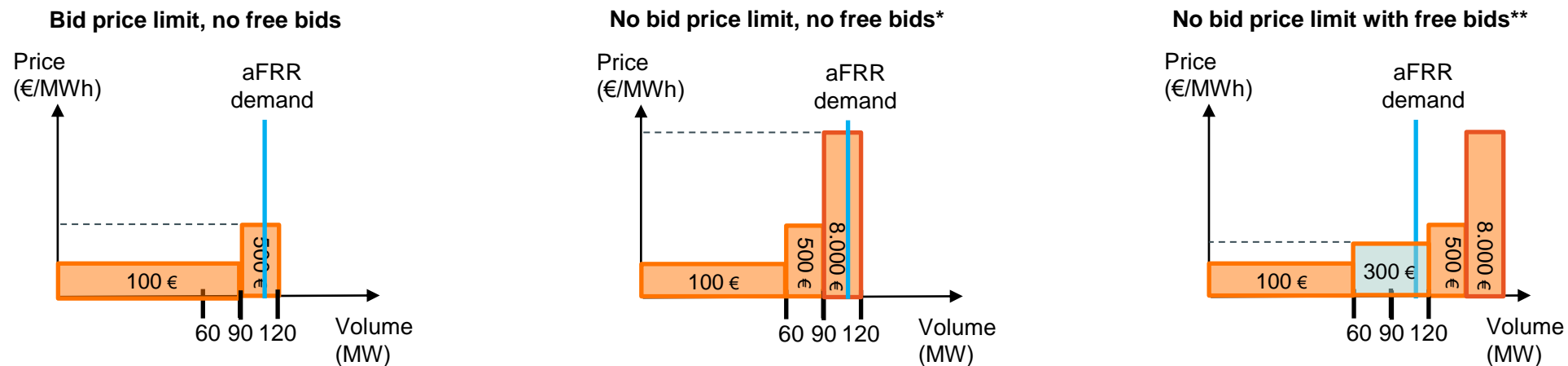
# Three key elements for evaluating the need for a bid price limit

## 1. Available ATC:

- The available ATC will determine how frequently we are exposed to the LMOL
- Recall that in case sufficient ATC is available in the required direction, Elia can access the significantly larger merit order(s) in other LFC Areas connected to PICASSO

## 2. Liquidity in the Belgian aFRR balancing energy markets:

- The impact of high-priced contracted aFRR Energy Bids would be avoided in case there would be sufficient free bids at low/moderate prices



## 3. Degree of market concentration in the aFRR balancing energy markets:

- With increasing market concentration, the potential for withholding aFRR Balancing Energy Bids and/or pricing aFRR Balancing Energy Bids (well) above the actual cost increases

\* Stylized example for illustration purposes assuming that 30 MW of contracted bids at 100 €/MWh are replaced by 30 MW of contracted bids at 8000€/MWh

\*\* Stylizes example for illustration purposes assuming an additional 60 MW of non-contracted bids at 300 €/MWh

# Objectives and approach for the evaluation of the bid price limit

The evaluation proposed by Elia consists of:

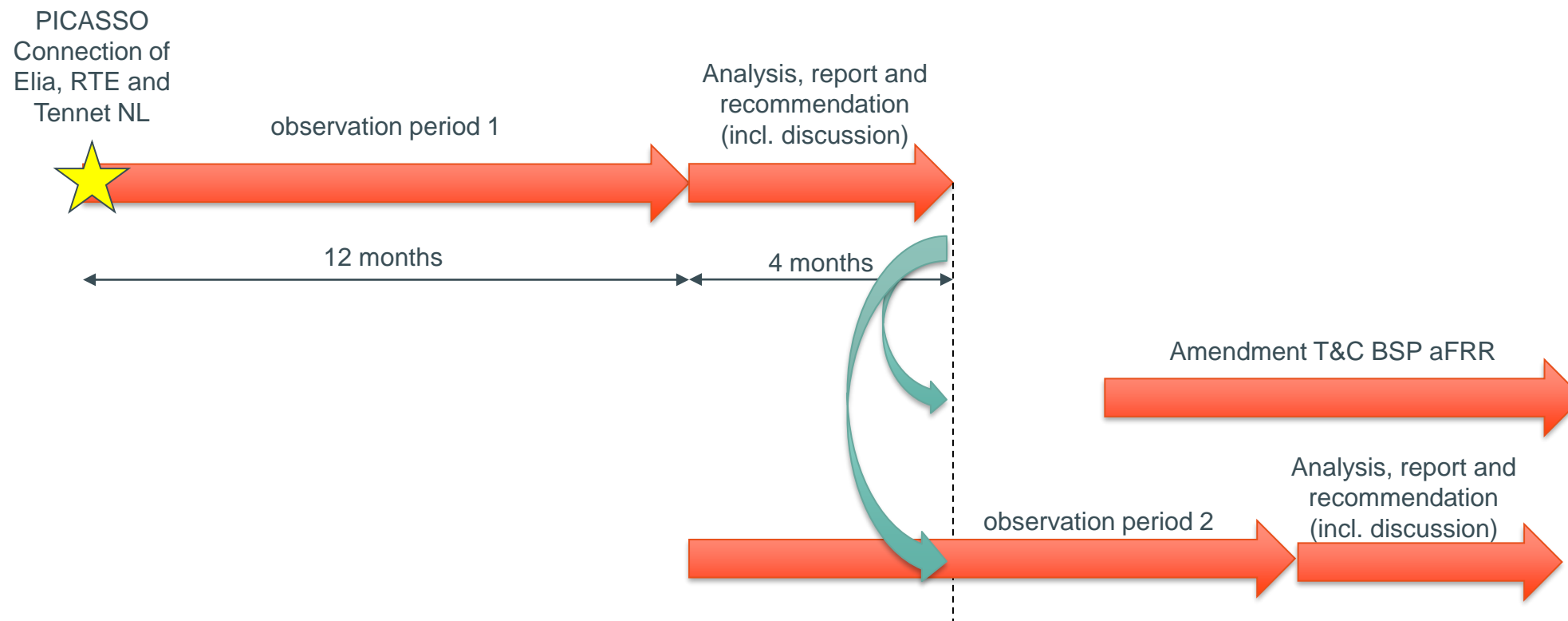
- The **quantification of key indicators** for measuring the Available ATC, the liquidity and the market concentration
- An **analysis based on the key indicators and their evolutions**. If considered necessary, the key indicators would be complemented via a scenario analysis and/or sensitivity analysis to estimate the impact of relaxing/removing the temporary bid price limit in moments with no/limited ATC
- A **recommendation on whether to maintain/remove/adjust the temporary bid price limit** for contracted aFRR Energy Bids.
- In case a change to the temporary bid price limit would be recommended, a proposal for the timing of introducing the recommended change in the T&C BSP aFRR
- Note that:
  - The evaluation will be presented and discussed with the stakeholders in the WG Balancing and with the CREG.
  - The recommendation will consider the indicators and analysis as well as possible future changes that might impact the recommendation. As such, Elia proposes to not base the recommendation solely on key indicators with pre-defined criteria/thresholds but rather to come to an informed decision following a discussion with all stakeholders.

# Proposed key indicators

- Available ATC\*
  - % of time with ATC Import < 20% of the dimensioned volume
  - % of time with ATC Import < 75% of the dimensioned volume
  - % of time with ATC Export < 20% of the dimensioned volume
  - % of time with ATC Export < 75% of the dimensioned volume
- Liquidity:
  - % of time with a volume of non-contracted upward aFRR Energy Bids available at prices  $\leq 1.000$  €/MWh that is lower than 20% of the dimensioned volume
  - % of time with a volume of non-contracted downward aFRR Energy Bids available at prices  $\geq -1.000$  €/MWh that is lower than 20% of the dimensioned volume
- Available ATC and liquidity combined:
  - % of time with ATC Import < 20% of the dimensioned volume & less than 20% of non-contracted upward aFRR Energy Bids available at prices  $\leq 1.000$  €/MWh
  - % of time with ATC Export < 20% of the dimensioned volume & less than 20% of non-contracted downward aFRR Energy Bids available at prices  $\geq -1.000$  €/MWh
- Market concentration:
  - Average of  $\frac{\text{Maximum volume of upward (downward) aFRR Energy Bids offered by a single BSP}}{\text{dimensioned volume}}$
  - Average of  $\frac{\text{Maximum volume of upward (downward) aFRR Energy Bids offered by a single BSP}}{\text{dimensioned volume}}$  for the moments with a volume of non-contracted upward (downward) aFRR Energy Bids available at prices  $\leq 1.000$  €/MWh ( $\geq -1.000$  €/MWh) that is lower than 20% of the dimensioned volume

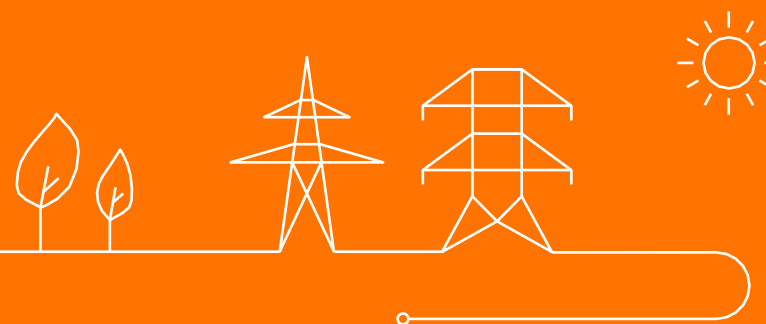
\* ATC refers to the ATC that can be used via PICASSO, i.e., the ATC in the direction of LFC Areas connected to PICASSO or LFC Areas sharing their ATC TSOs.

# Proposed process and timeline



# Re-introduction of inter-TSO reserve sharing agreement in imbalance price calculation

Caroline Bosschaerts



# Proposal of modifications of the Tariff Proposal to re-introduce the prices of mFRR sharing agreements in the Imbalance Price



Public consultation from **7<sup>th</sup> June 2024** until **21<sup>st</sup> June 2024**



Proposed changes to the Tariff Proposal with the objective to re-introduce the mFRR sharing prices in the calculation of the imbalance price in the exact same way as it was before:

1. An  $\alpha'$  component was added in order to re-introduce the mFRR sharing prices in the imbalance price formula
2. The calibration parameter of the  $\alpha$  component was adapted to account for the value of the  $\alpha'$  in its calculation

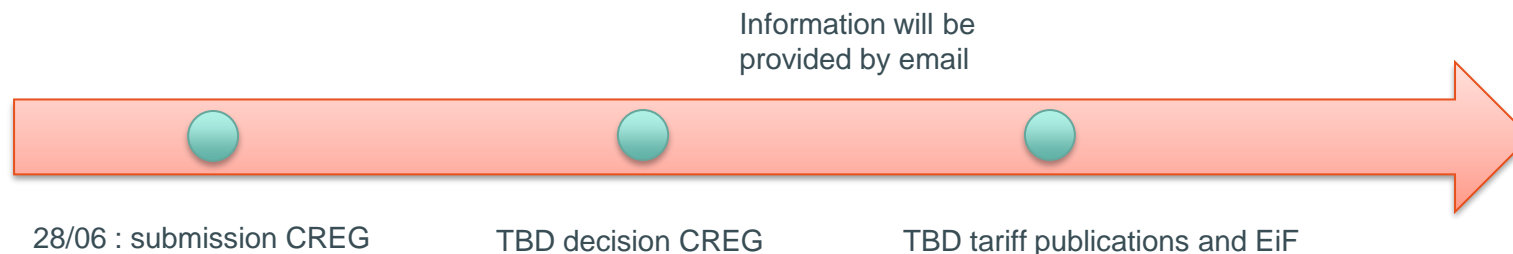


Two non-confidential answers received :

- FEBEG
- FEBELIEC



**No change in the regulated document, but an adaptation of implementation plan**





# General feedback from public consultation

Stakeholder	General feedback
<p><b>FEPEG</b></p>	<p>The preferred option is to <b>include the inter-TSO activation in the marginal price remuneration to the BSP</b> because it will be in line with the target market design when ELIA will be connected to MARI.</p> <p><b>If this is not possible</b> (hence: Elia could not amend the marginal price in the BSP remuneration), we believe there would be no basis to amend the current formulas of imbalance price in such a case. <b>We prefer in this case this issue to be solved with the connection to MARI/PICASSO instead of introducing a temporary and unequilibrated work-around.</b></p>
<p><b>FEBELIEC</b></p>	<p>Febeliec thus <b>fully supports</b> the proposal of Elia, <b>through the proposed quick fix solution</b> of a (temporary) additional alpha component, as this would be the fastest solution, and most strongly insists that this <b>solution should be implemented at the earliest possible opportunity</b>, to avoid any cost or grid security impacts in a summer with possible incompressibility issues which could require inter-TSO balancing agreement activations.</p>

If it is not possible to adapt the BSP remuneration, FEPEG would prefer accepting the risk to be exposed to financial incentives that are not necessarily in line with the BRP balancing obligation. Elia believes that the financial incentives brought by the imbalance tariff play a pivotal role, compared to the influence of legal obligations, in mitigating significant real-time imbalances and can hence not agree with FEPEG to live with this risk. Elia believes it is of the utmost importance to propose an imbalance price design that will encourage the market to solve the incompressibility situations as much as possible by itself before having to intervene with non-market actions.

# On the adaptation of the BSP remuneration

Stakeholder	Feedback received
<b>FEBEG</b>	<i>FEBEG urges ELIA to align the BSP and BRP remuneration in a way that it does not create an unjustified balancing margin. The preferred option is to <b>include the inter-TSO activation in the marginal price remuneration to the BSP</b> because it will be in line with the target market design when ELIA will be connected to MARI.</i>

Proposing a new remuneration scheme for the BSPs in this emergency context is not deemed desirable nor feasible for several reasons:

1. It is not compatible with the timing of the mitigation measure:  
The measure could, in practice, not enter into force before the end of the summer, and hence probably not (much) before the connection to the first European balancing platform, which would make the measure irrelevant since :
  - the highest risks of incompressibility situations would already be behind us when the measure would enter into force;
  - the measure will be obsolete as from the moment we connect to the first European balancing platform
2. It is neither in line with the previously applicable market design, nor with the target market design, and it therefore requires a sound analysis and careful discussions before going for it:
  - What about the level playing field between the Belgian BSPs and the BSPs of neighboring countries?
  - Once Elia is connected to MARI and as long as all the TSOs with which Elia has an mFRR sharing agreements (hence including National Grid in UK) are not connected to MARI, there will remain differences between the remuneration of the BSP – that has to be based on the cross-border marginal price calculated by MARI – and the marginal price of the cross-border activations performed at Elia's request.
3. It creates additional implementation costs and it possibly impacts the timing for the connection to the European balancing platforms

# On the need for an accurate imbalance price publication in real-time

Stakeholder	Feedback received
<b>FEBEG</b>	<i>FEBEG wants to emphasize the need to have accurate imbalance price publications in real-time (and not ex-post).[...] We urge Elia to publish in real-time an accurate imbalance price, which gives the right incentives to market parties (without ex-post correction (up to one month later)). Publications of UMM on Elia IIP does not cover the issue raised in this paragraph</i>

Elia shares Febeg's opinion that accurate imbalance price publications are crucial in real-time. Keeping in mind the fact that the measure needs to enter into force as soon as possible, Elia proposes the following adjustments compared to the commitment described in the public consultation :

- Elia will do its best to have the close to real-time imbalance price (both 1' and 15') publications correct as from the beginning of August (except in case of activation of the mFRR sharing agreement with Amprion where the price is only known ex-post, and hence where we would continue working with UMM as described in the explanatory note);
- To cover the period between the entry into force (targeted in the beginning of July) and the beginning of August:
  - Elia will publish UMM informing that mFRR sharing agreements are being activated and that the imbalance price published in the 1' and 15' close to real-time publications might be less extreme than the settlement price. This UMM will refer to the "balancing energy volume and price components" publications for more information about the marginal price of the ongoing mFRR sharing activations;
  - Elia will adapt its "balancing energy volume and price components" publications ( Balancing Energy volume and price components 15 (elia.be) and Balancing Energy volume and price components 1 (elia.be)) – both on elia.be and in the respective APIs - to include two additional columns that display the marginal price of the mFRR sharing activations that are made at Elia's request in the upward (resp. downward) direction.

The 1' publications will only take into account the prices of the activations of mFRR sharing agreements with TenneT, RTE and NG. The 15' publications will account for the prices of the activations of mFRR sharing agreements with TenneT, RTE and NG close to real-time, and will be updated with the price of the activations of mFRR sharing agreement with Amprion once it is known. Additionally, the UMM communicated in case of activations with Amprion will refer to a German index (called the Imbalance Price Estimator) that might give an order of magnitude of the real-time value at which energy is exchanged in Germany.

Changes on Balancing energy prices components publication:  
 - Elia.be 1 min  
 - Elia.be 15 min  
 - OpenData 1 min NRT  
 - OpenData 15 NRT  
 - OpenData 1 min historical  
 - OpenData 15 min historical

Situation at 12/06/2024 from 13:13 to 14:11

Quarter	Minute	Quality status	SI (MW)	ACE (MW)	Incremental Prices				Decremental Prices					
					MIP (€/MWh)	Floor (€/MWh)	aFRR+ (€/MWh)	mFRR+ (€/MWh)	MDP (€/MWh)	Cap (€/MWh)	aFRR- (€/MWh)	mFRR- (€/MWh)		
13:15 > 13:30	13:22	NotVail...	-191,659	-0,722	188,771	1,780	0,000	0,000	0,000	0,000	0,810	0,000	0,000	0,000
13:15 > 13:30	13:21	NotVail...	-188,448	-2,187	184,691	1,85					0,780			
13:15 > 13:30	13:20	NotVail...	-181,145	-0,404	177,883	1,943					0,611			
13:15 > 13:30	13:19	NotVail...	-172,938	-6,337	167,732	1,950					0,195			
13:15 > 13:30	13:18	NotVail...	-169,671	-6,761	162,483	1,668					0,344			
14:00 > 14:15	14:11	NotVail...	-390,227	-4,283	219,00	103,72	106,27	219,00	8,90	8,90	8,90			
14:00 > 14:15	14:10	NotVail...	-384,811	-1,875	219,00	103,72	106,21	219,00	8,90	8,90	8,90			
14:00 > 14:15	14:09	NotVail...	-379,174	-3,570	219,00	103,72	106,50	219,00	8,90	8,90	8,90			
14:00 > 14:15	14:08	NotVail...	-369,405	-2,463	219,00	103,72	106,79	219,00	8,90	8,90	8,90			
14:00 > 14:15	14:07	NotVail...	-361,366	-5,126	219,00	103,72	107,24	219,00	8,90	8,90	8,90			
14:00 > 14:15	14:06	NotVail...	-347,709	-3,723	219,00	103,72	107,65	219,00	8,90	8,90	8,90			
14:00 > 14:15	14:05	NotVail...	-335,962	-3,338	219,00	103,72	107,11	219,00	8,90	8,90	8,90			
14:00 > 14:15	14:04	NotVail...	-332,814	-0,337	219,00	103,72	107,08	219,00	8,90	8,90	8,90			
14:00 > 14:15	14:03	NotVail...	-339,958	0,086	219,00	103,72	107,09	219,00	8,90	8,90	8,90			
14:00 > 14:15	14:02	NotVail...	-347,518	-0,484	219,00	103,72	107,25	219,00	8,90	8,90	8,90			
14:00 > 14:15	14:01	NotVail...	-355,993	-4,695	219,00	103,72	107,68	219,00	8,90	8,90	8,90			
14:00 > 14:15	14:00	NotVail...	-348,299	12,610	219,00	103,72	105,94	219,00	8,90	8,90	8,90			
13:45 > 14:00	13:59	NotVail...	-406,077	2,281	241,92	103,72	105,31	241,92	16,00	16,00	16,00			
13:45 > 14:00	13:58	NotVail...	-411,330	3,438	241,92	103,72	105,18	241,92	16,00	16,00	16,00			
13:45 > 14:00	13:57	NotVail...	-420,995	3,341	241,92	103,72	105,19	241,92	16,00	16,00	16,00			
13:45 > 14:00	13:56	NotVail...	-430,607	3,155	241,92	103,72	105,26	241,92	16,00	16,00	16,00			
13:45 > 14:00	13:55	NotVail...	-440,816	3,707	241,92	103,72	105,32	241,92	16,00	16,00	16,00			
13:45 > 14:00	13:54	NotVail...	-455,048	4,728	241,92	103,72	105,32	241,92	16,00	16,00	16,00			
13:45 > 14:00	13:53	NotVail...	-475,066	2,896	241,92	103,72	105,32	241,92	16,00	16,00	16,00			
13:45 > 14:00	13:52	NotVail...	-496,214	3,069	241,92	103,72	105,32	241,92	16,00	16,00	16,00			
13:45 > 14:00	13:51	NotVail...	-516,262	2,210	241,92	103,72	105,36	241,92	16,00	16,00	16,00			
13:45 > 14:00	13:50	NotVail...	-539,754	2,196	241,92	103,72	105,42	241,92	16,00	16,00	16,00			
13:45 > 14:00	13:49	NotVail...	-572,966	3,174	241,92	103,72	105,49	241,92	16,00	16,00	16,00			
13:45 > 14:00	13:48	NotVail...	-611,106	4,794	241,92	103,72	105,68	241,92	16,00	16,00	16,00			
13:45 > 14:00	13:47	NotVail...	-645,992	-4,565	241,92	103,72	106,10	241,92	16,00	16,00	16,00			
13:45 > 14:00	13:46	NotVail...	-644,135	-8,281	241,92	103,72	106,03	241,92	16,00	16,00	16,00			
13:45 > 14:00	13:45	NotVail...	-647,956	-2,478	241,92	103,72	106,91	241,92	16,00	16,00	16,00			
13:30 > 13:45	13:44	NotVail...	-455,143	-11,889	135,00	103,72	109,35	135,00	-323,37	12,82	-323,37			
13:30 > 13:45	13:43	NotVail...	-457,610	-11,699	135,00	103,72	109,35	135,00	-296,62	12,82	-296,62			
13:30 > 13:45	13:42	NotVail...	-464,4...	-13,107	135,00	103,72	109,36	135,00	-171,31	12,82	-171,31			

New Column Reserve Sharing+ (€/MWh)

New Column Reserve Sharing- (€/MWh)

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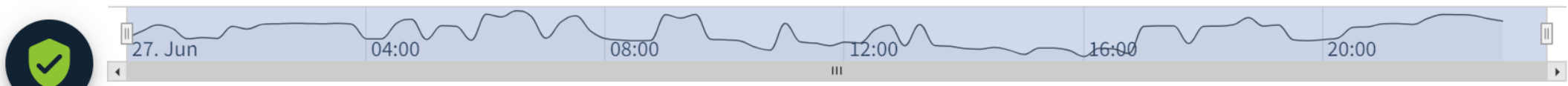
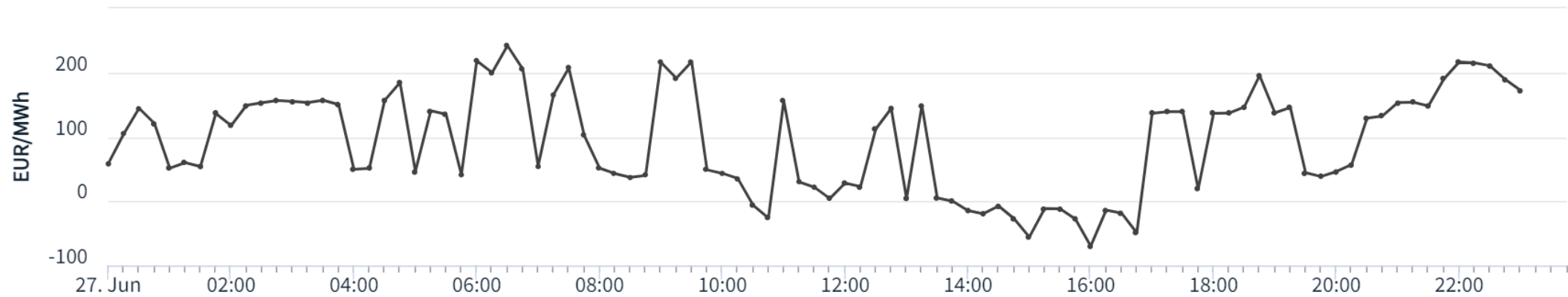
Contact

Any questions about balancing public  
 Email us



 Diagramm  Tabelle

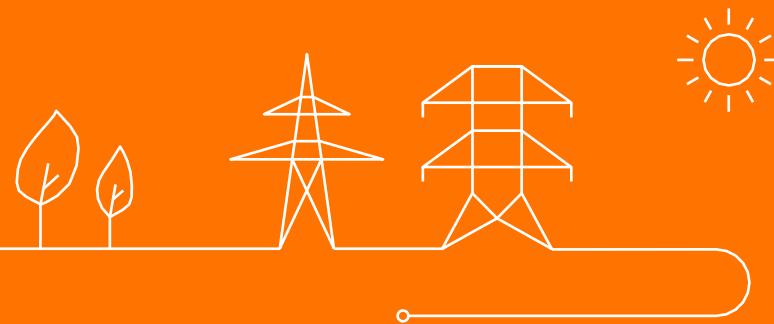
AEP-Schätzer vom 27.06.2024



→ AEP-Schätzer

# aFRR dimensioning – Parallel run

Kristof De Vos



## Context

**On July 19, 2023, CREG approved Elia’s proposal on dynamic aFRR dimensioning (Decision B2538) for implementation on October 1, 2024 (delivery date)**

- The implementation date is confirmed on February 22, 2024 (Decision B2748) with the approval of the fallback procedures in case of technical problems with the daily calculation.

*Article 2 (version July 19, 2023) – “The modifications in Article 8, Article 9 and Article 10 will enter into force on October 1, 2024 after the approval of the CREG. The modifications will not enter into force before the implementation of the aFRR balancing capacity gate closure time at 9 AM D-1 after approval in a next version of the Terms and Conditions for balancing service providers for Frequency Restoration Reserve with automatic activation (aFRR), hereafter referred to as T&C BSP aFRR “*

**Elia specified to CREG and Market parties to have :**

- IT implementation ready as from 30.06.2024, the latest
- Launch parallel run on 01.07.2024 until 30.09.2024 to gain experience on the results
- Effective implementation of the method by 01.10.2024 (delivery date)

Cf. WG BAL special  
session on reserve  
dimensioning  
15/02/2023

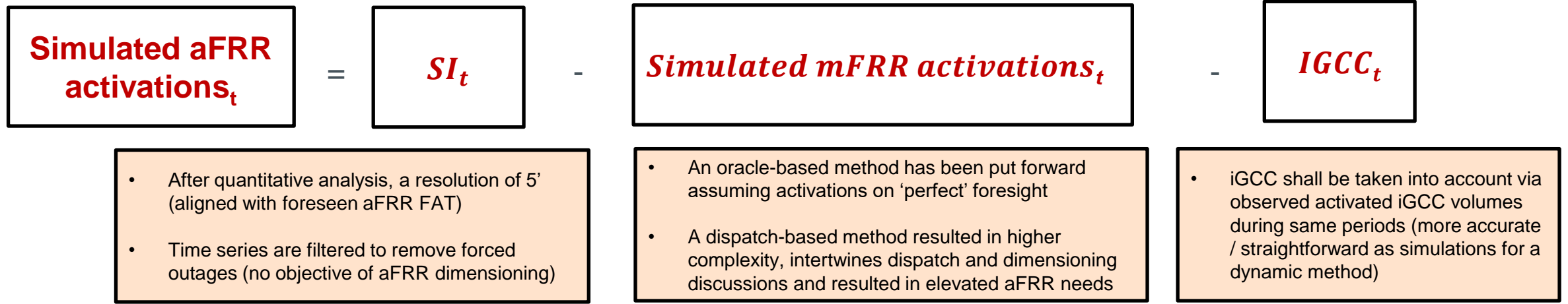
**The objective of the parallel run is two-fold :**

- Allow market parties to get a view on the behaviour of the dimensioning in order to prepare their bidding strategies
- Allow Elia to assess the performance of the algorithm based on latest system conditions

It is to be reminded that aFRR dimensioning will directly steer the aFRR balancing capacity to be procured

# The dynamic probabilistic methodology is the engine of the methodology

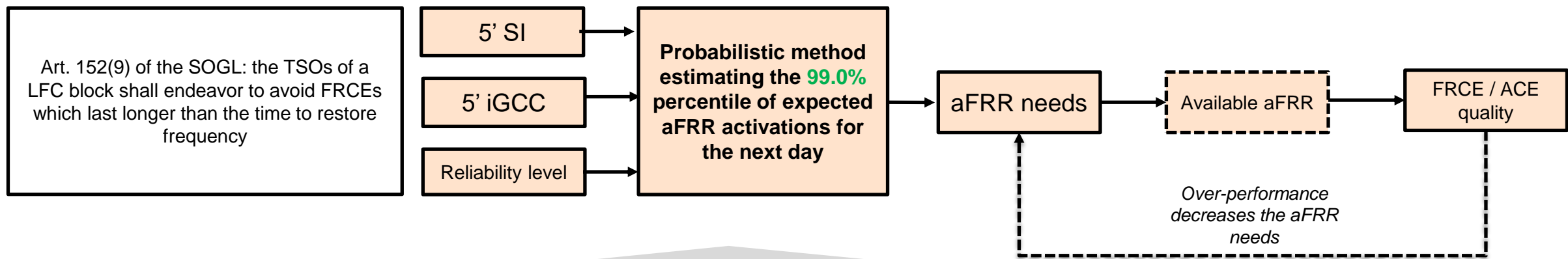
- The method used is one where the aFRR needs are dimensioned to cover 99% of simulated aFRR activations based on historic LFC block imbalances, iGCC and mFRR activations.



- The aFRR needs will be dimensioned based on day-ahead predicted system conditions, similar to the FRR dimensioning process. Machine learning algorithms are trained to capture relations between the features (predicted system conditions) and the dependent variable (aFRR simulations)



# The feedback loop complements the probabilistic method to adapt the aFRR needs in function of the performance on the FRCE target parameters



The aFRR needs are reviewed in function of the performance on the FRCE target parameters

Calibrate the aFRR needs sufficient to meet the FRCE target parameters in line with Art. 157(2) and Article 128

**Calibrate the reliability level on the FRCE target parameters**

Assess every month the FRCE quality in terms of the latest target parameters published by ENTSO-E.

Reduction or increase of the aFRR needs if FRCE performance exceeds or falls below a certain threshold

Monitor that aFRR needs sufficient to meet the frequency target parameters in line with Art. 127(4)

## Projections presented in 2023

### – Simulations presented to the market on 15/2/2023 specified following results

- Expected static result of 153 MW (up) / 158 MW (down) for 2021
- Expected dynamic result of 152 MW for 2021
- Projection towards 2024 of 170 MW (before FRCE feedback) with day-to-day variations between 160 MW and 210 MW
- **Projection towards 2024 of 119 MW (after FRCE feedback) with day-to-day variations between 109 MW and 163 MW**

Elia expects that aFRR volumes will increase over time (towards 2026) to the probabilistic result when FRCE target parameters are tightened by ENTSO-E given issues with frequency quality. In such case the feedback loop will lead to lower decrease (or potentially even an increase) of the volumes.

*Results during parallel run are expected to be slightly higher due to increasing SI variations (based on 2023-24 training data) compared to the simulations presented in the study (based on 2020-21 training data)*

*Additional caps of 64% / 144 % are put on the average dynamic probabilistic (after feedback loop) result over the last 12 months*

- *This would floor the result at 75 MW and cap the result at 168 MW at the launch of the method*
- *These floors and caps will gradually increase (or decrease) with the average result over the last 12 months*



# Publications

On a bi-weekly basis, Elia will publish the daily results via an excel file on its website:

<https://www.elia.be/en/electricity-market-and-system/system-services/keeping-the-balance>



## Dimensioning of balancing services

Elia determines the volume of balancing services that is required to keep the balance in the control area, taking into account forecast of renewable generation and the demand, as well as the risk of a dimensioning incident (for example, a sudden drop in generation following an unplanned outage of a power plant). In line with Article 213 of the Code of Conduct, Elia publishes following documents after approval by the regulator:

- the **LFC block operational agreement** specifying amongst others the dimensioning rules for Frequency Restoration Reserves or 'FRR' (also referred to as aFRR and mFRR);
- the **LFC Means** specifying the methodology which determines the → **volumes of balancing capacity** for aFRR and mFRR to be procured.

### Relevant documents

[Current LFC Block Operational Agreement \(in English\)](#)

[Current LFC Means \(in English\)](#)

[Explanatory Note on the ELIA LFC Block Operational Agreement \(in English\)](#)

[Explanatory Note on the LFC Means \(in English\)](#)

[Elia's balancing report 2022-23](#)

[aFRR parallel run results](#)



Previous versions available in the library

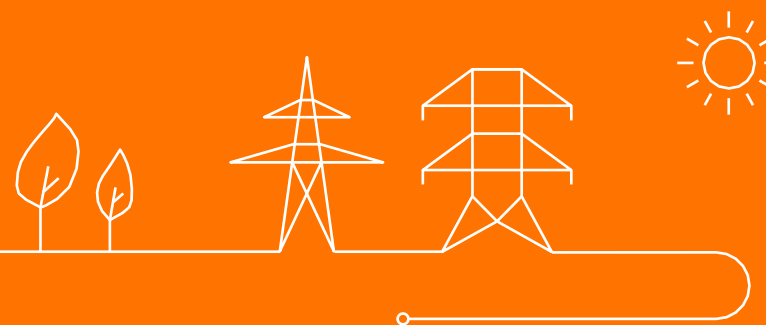
Date	Method	aFRR needs [MW]				FRCE feedback loop [%]				Floors and Caps [MW]				
		Positive		Negative		m-1 FRCE correction factor		y-1 FRCE correction factor		Final FRCE correction factor		Positive		Negative
		PROB99 (before FRCE)	aFRR needs (after FRCE)	PROB99 (before FRCE)	aFRR needs (after FRCE)						Floor	Cap	Floor	Cap
Jul-01	Static	160	130	160	130	80%	80%	80%	64%	64%	75	168	75	168
Jul-02	Dynamic	150	125	150	125	80%	80%	80%	64%	64%	75	168	75	168

With further information in the "information tab".



# Deterministic Frequency Deviation Follow-up 2024

Ayoub Ben Ayed



# Agenda

## Reminder

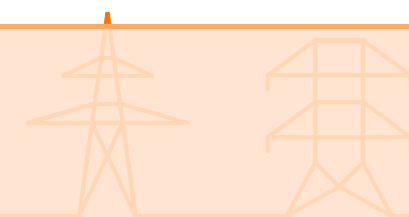
- Definition: What is a Deterministic Frequency Deviation (DFD)?
- Global Approach and Methodology

## Working Package

- Milestones

## Intermediate results

- Data selection
- Model selection
- Additional (on-going) analysis



## Conclusion

- Next steps

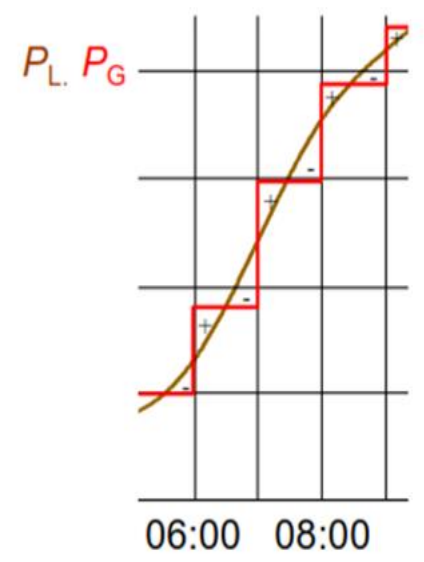




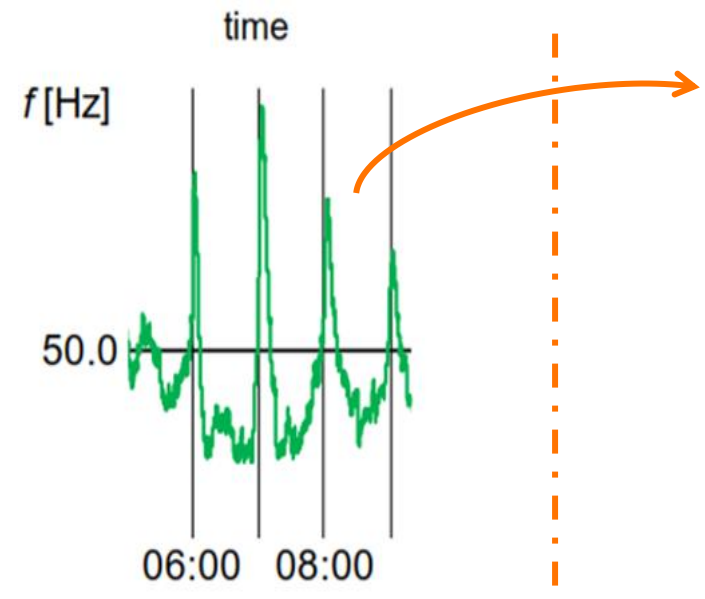
# What is a Deterministic Frequency Deviation (DFD)?

Deterministic Frequency Deviations (DFDs) are phenomena which occur on a **regular basis** as a result of **load and generation difference during a change of Market Time Unit (MTU)** and so, which generate a **frequency deviation of more than 75mHz**

Reminder

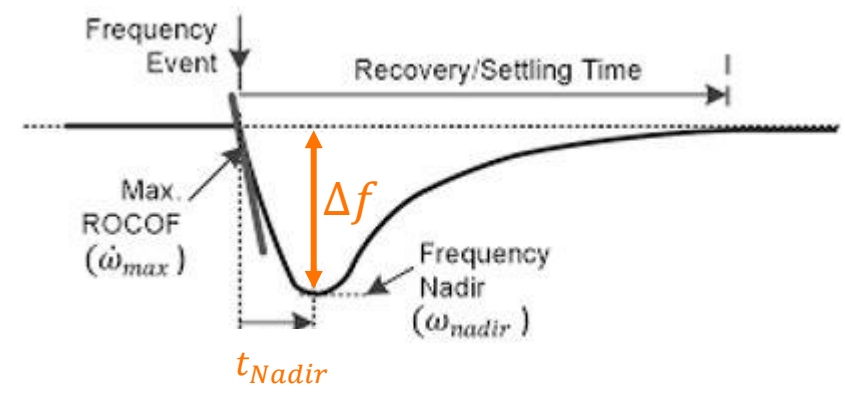


Load and generation difference during a change of Market Time Unit (MTU)



Generates a frequency deviation of more than 75mHz

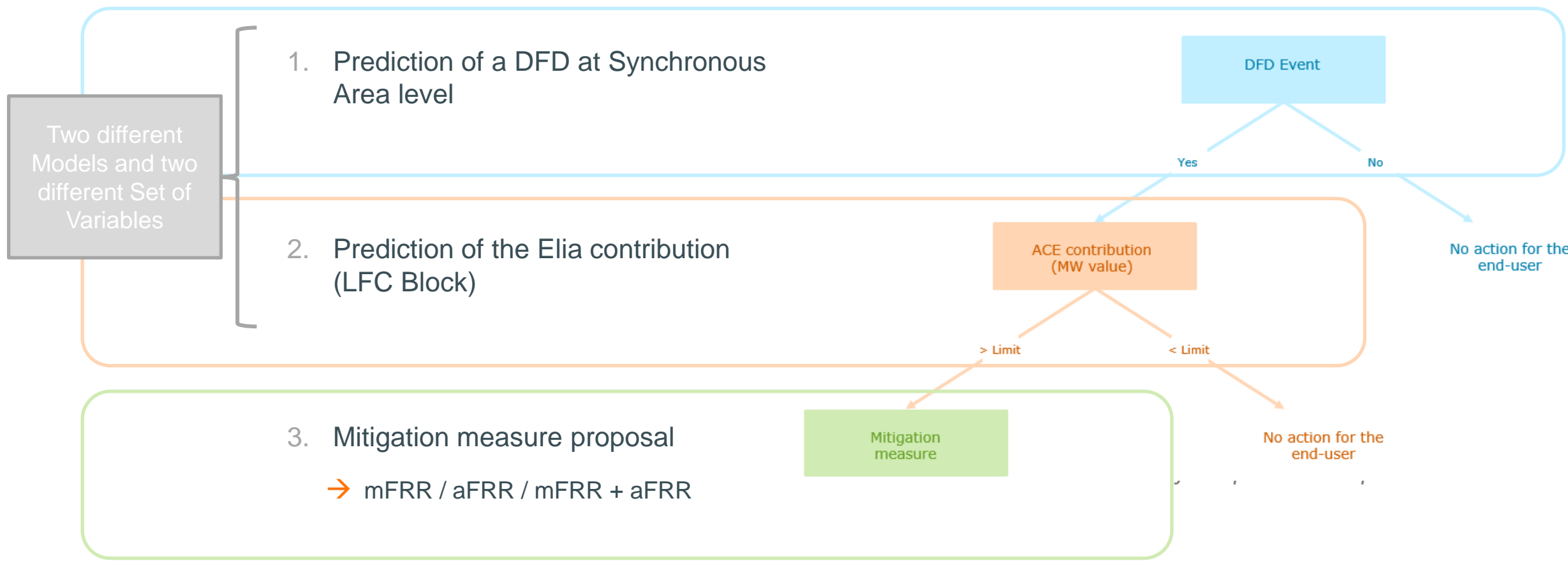
## DFD event inspection



The frequency nadir is defined as the the instantaneous ACE at the moment the frequency reaches its extremum

# Approach

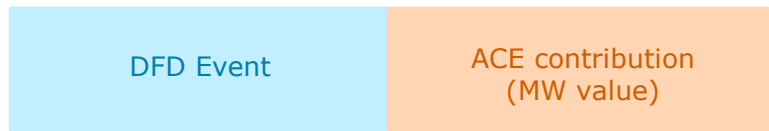
Reminder



Flowchart of the product scope

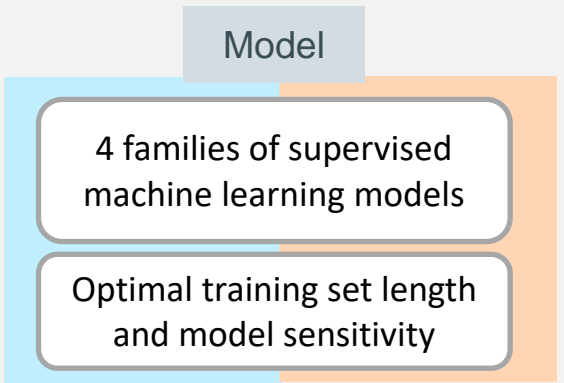


# Methodology

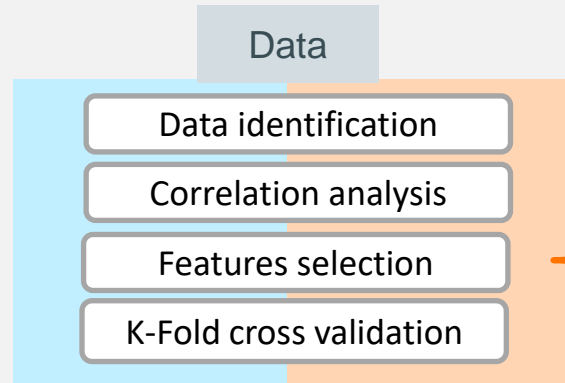


Model and data selection

- Linear and Logistic regression
- Neural Network
- Support Vector Machine
- Random Forest

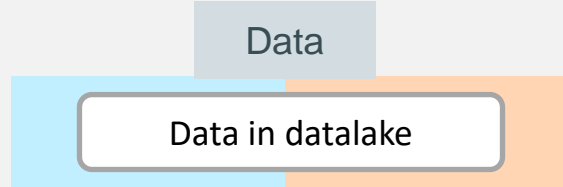
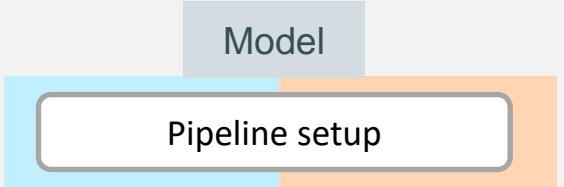


From 2 years of data to an optimal subset of 3 months

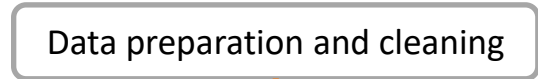


- BorutaShap
  - PCA
  - RFE
- Evolutive: features not selected today can be used in the future

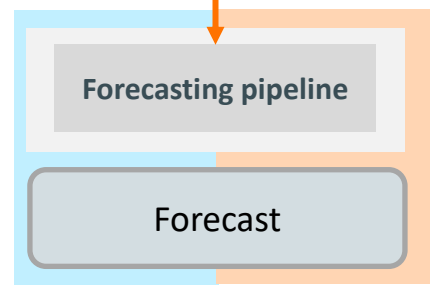
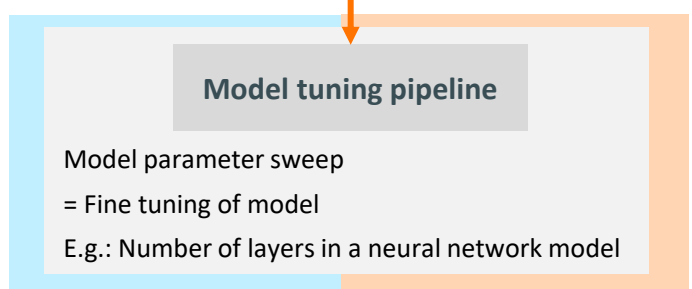
Model setting and data collection



Forecasting model in operation



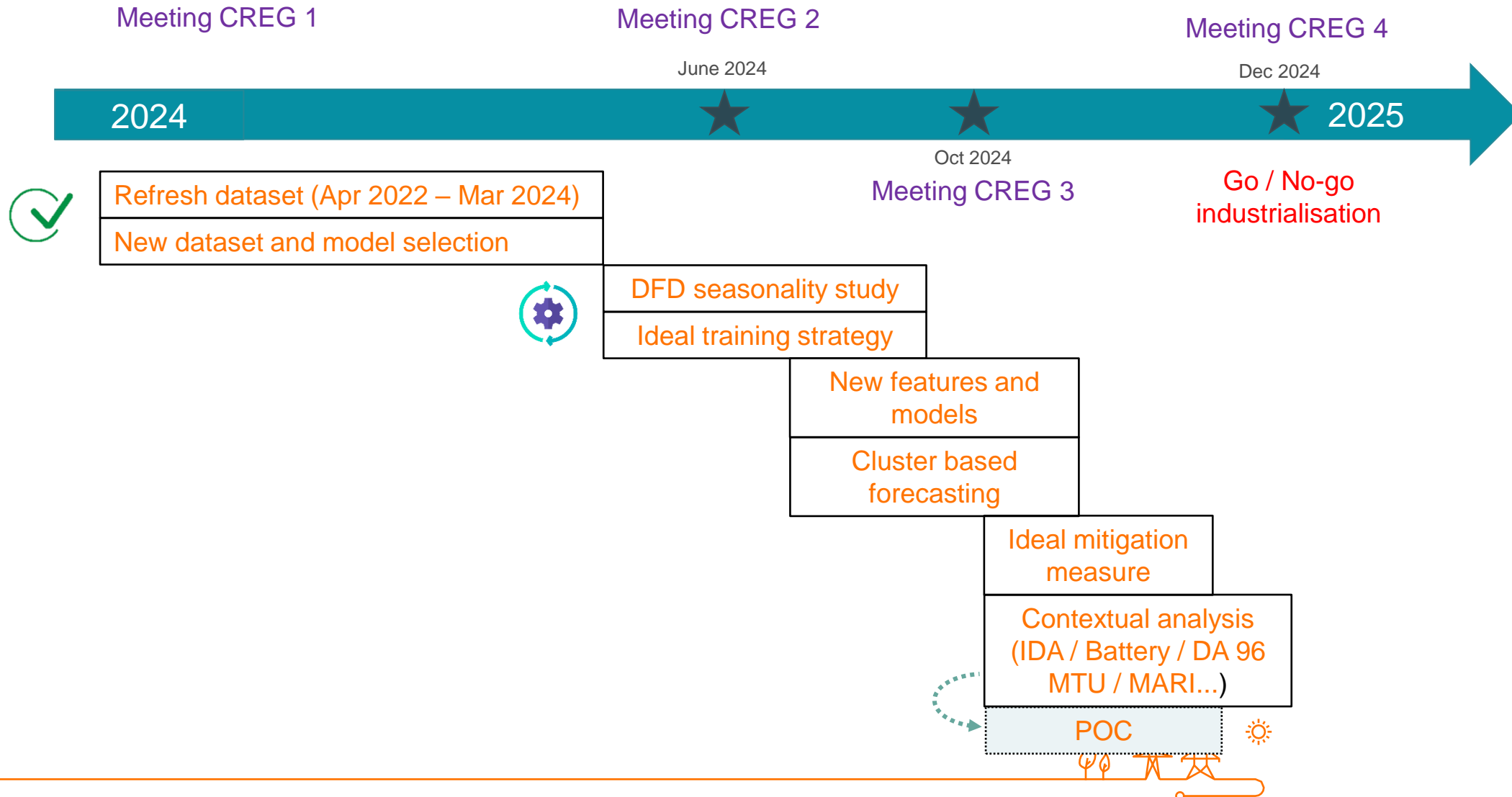
- Imbalance class handling,
- Interpolation of missing data,
- Filter outliers,
- ...



Reminder




# Milestones (Cf. CREG incentive 2023)







# Data Selection

- Dataset: April 2021 to April 2022 → April 2022 to April 2024
- More systematic approach to generate derived features (derivatives, lagged, **sinus/cosinus**, ...) 
- Shorter period and more frequent data selection are considered
- New data can “easily” be added


DFD Event

8 → 23 retained variables:

- Regulated variables (aFRR, iGCC) 
- ACE contribution (previous QHs) 
- Time based feature
- Load/Gen other TSOs

ACE contribution  
(MW value)

37 → 44 retained variable:

- Load/Gen other TSOs
- ACE contribution (previous QHs)
- Regulated variables (mFRR, aFRR, iGCC) 
- ~~HDVC Nemo~~
- ~~Schedule of Dpsu's~~

# Model selection

## DFD event model performance

- Tree based method still perform best (random forest or gradient boosting)
- Re-selecting the data allows to recover previous offline performance: **50% DFD Up/Down identified**

➔ Next step: Optimize data selection and include new datasets

Model	Optimal parameters	Test Period	F1-score			
			Downward DFD	No DFD	Upward DFD	Macro average
Random forest classifier	Depth: 16	AVR 2021 – AVR 2022 (offline)	<b>0.334</b>	<b>0.977</b>	<b>0.348</b>	<b>0.553</b>
		NOV 2023 (POC)	0.272	0.987	0	0.420
Random forest classifier	Depth: 16	AVR 2023 – NOV 2023 (offline)	0.22	0.98	0.06	0.42
Hist Gradient boosting	Max depth = 16 L2reg = 14		0.27	0.98	0.09	0.45
<b>Gradient Boosting</b>	<b>Max depth = 18 L2reg = 115</b>	APR 2022 – DEC 2023 (offline)	<b>0.266</b>	<b>0.966</b>	<b>0.2</b>	<b>0.492</b>
<b>NEW</b> TPOT classifier: [Extratree classifier, Standard scaler, Gaussian NB]	Bootstrap: False Max features: 0.65 Min samples leaf: 4 Min samples split: 3 N estimators : 100		/	/	/	0.451

# Model selection

## ACE contribution model performance

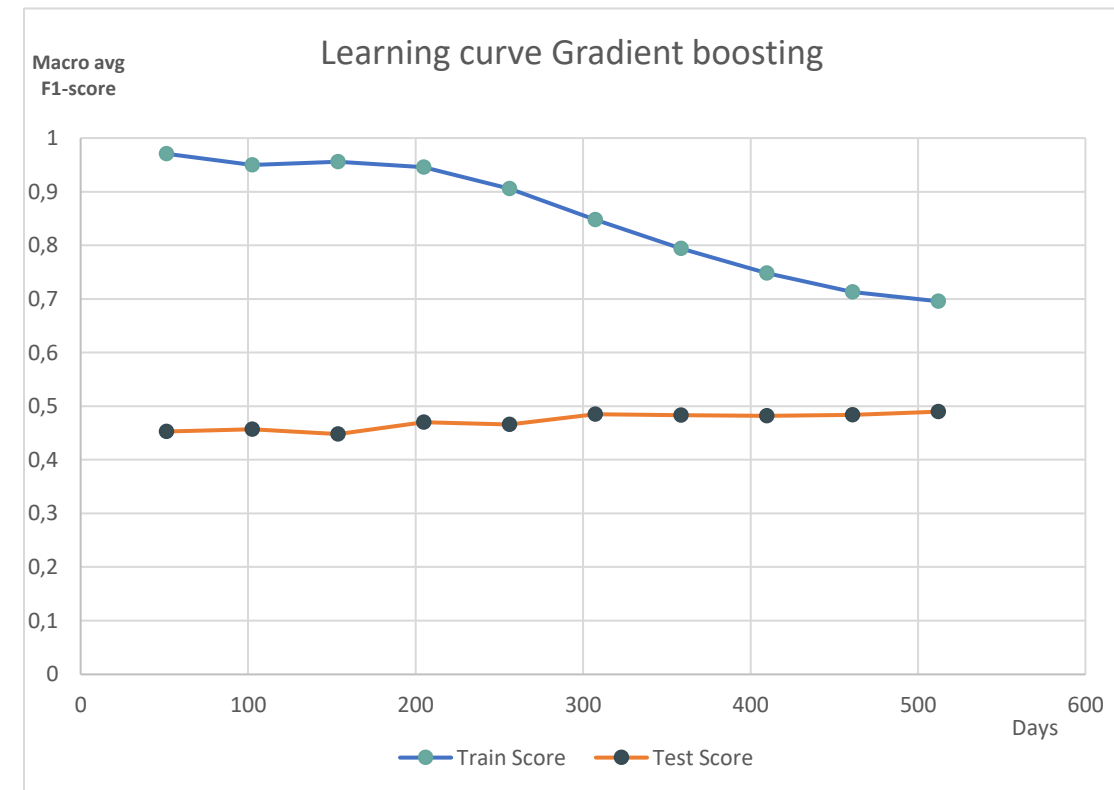
- Tree based method still perform best
- Automated Machine Learning algorithm (TPOT) performs best (all analysis considered)

**➔ Next step: Consider additional models and optimize larger set of parameters**

Model	Optimal Parameter	Test Period	R <sup>2</sup>	MAE	RMSE
Gradient boosting	Max depth = 15	AVR 2021 – AVR 2022 (offline)	0.171	72.84	102.21
		NOV 2023 (POC)	0.238	123.00	171.21
	Max depth = 5 L2reg = 80	APR 2022– DEC 2023 (offline)	0.171	65.742	92.417
<b>NEW</b> TPOT regressor: [RidgeCV, Random forest regressor]	Bootstrap: True Max features: 0.25 Min samples leaf: 8 Min samples split: 11 N estimators: 100	APR 2022– DEC 2023 (offline)	<b>0.186</b>	<b>65.224</b>	<b>91.613</b>

## Additional (on-going) analysis

- Adding new variables:
  - New large contributors: Bulgaria (BG) and Albania (AL)
  - Renewables production (solar and wind) per TSO
  - Regulated volume related to MARI / PICASSO
- Additional model (Ridge regressor, etc.)
- Optimise larger set of parameters
  - + larger sets for the best model
- Adapt the training strategy
  - Data selection based on the 3 previous month
- Identify ideal training set length
  - Overfitting is important
- Replay of the data to “simulate” POC situation







## Conclusion:

DFD event forecast close to previous offline performance

Improvement of ACE contribution forecast of 11MW RMSE

➔ Confirming initial results & combined performance that were sufficiently good to apply the cheapest mitigation measure at the time

## Next steps:

Improve data selection and training strategy

Introduce new datasets and models

DFD seasonality study

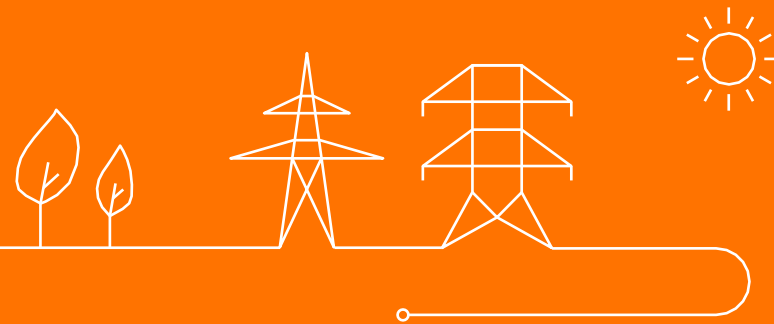
Rework mitigation measures based on updated product characteristics



# Smart testing

## Modalities of availability testing

Carsten Bakker



## Context – Smart testing methodology

In the context of the smart testing, Elia is also performing **a review of the modalities of availability testing**. As a reminder, one change was already identified regarding the maximum number of availability tests to be performed:

*“**Two test regimes** are introduced to limit the impact (in volume) of availability tests:*

- 1. The first test regime **aims to ensure** that a significant part of **the contracted capacities** from a BSP is **compliant***
  - 1. A maximum of 12 availability tests per year will be performed*
- 2. The second test regime aims **to keep in check the compliancy** of a BSP but with a **lower volume of availability tests***
  - 1. A maximum of 6 availability tests per year will be performed ”*

**Elia requests input from the market parties on the modalities of availability testing. For information, Elia summaries in the following slides the current modalities related to the organization and execution of the availability tests.**



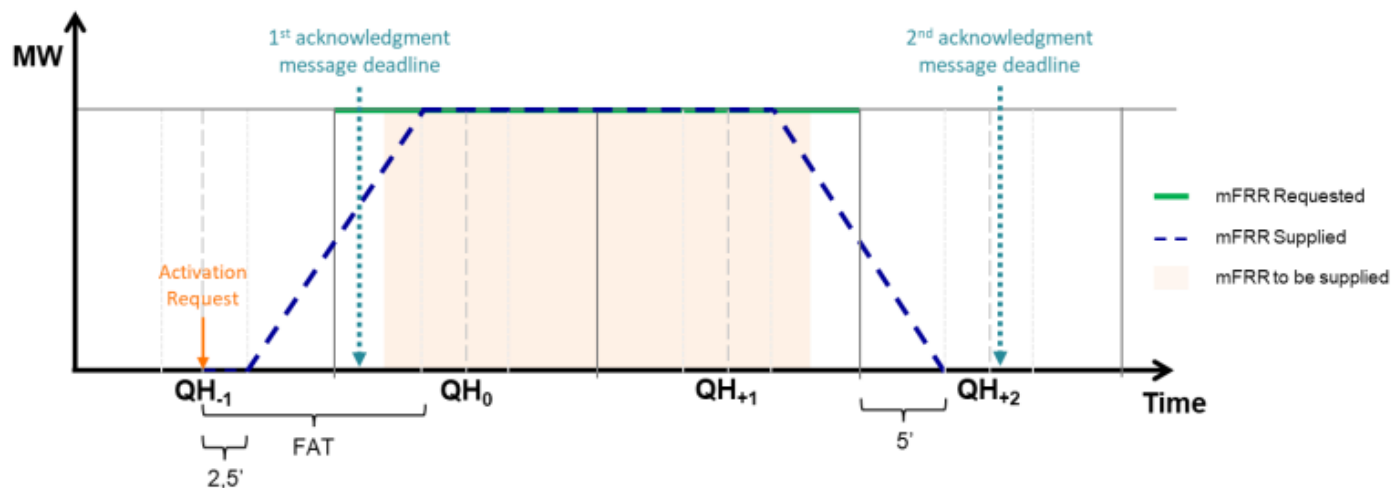
## Article 13: Availability testing

- An availability test consists of the **activation for two consecutive quarter-hours of one or more contracted mFRR Energy Bid(s)** and these bids are set to Unavailable by Elia for the duration of the test
- The BSP **can only use the Delivery Points** included in the activated contracted **mFRR Energy Bid(s)** for the provision of the availability test.
- An availability test can be triggered at any moment by ELIA in accordance with the following rules:
  - ELIA has the right to test all the mFRR Awarded **at least once a Year**
  - ELIA has the right to perform at least **one availability test per month**
  - ELIA has the right to **test all Delivery Points** included in the Pool of the BSP **once a Year**
- ELIA considers an availability test as **failed if the mFRR Missing MW is greater than 0 (zero)**
- Availability tests are **not remunerated by ELIA**



## Annex 11: Availability testing

- The activation request of an mFRR Energy Bid submitted for the quarter-hour QH0 is sent **7.5 minutes before the start of the concerned quarter-hour QH0**;
- After receiving the activation request, the BSP disposes of **12.5 minutes (Full Activation Time) to reach the mFRR Requested**;
- After the Full Activation Time, the BSP delivers the mFRR Requested **until 5 minutes before the end of the quarter-hour QH+1**;
- The ramping down to the Baseline starts **5 minutes before the end of the quarter-hour QH+1**.



## Annex 11: Availability testing

- ELIA can request a **partial or a full activation** of the concerned mFRR Energy Bid(s) in accordance with the specifications set by the BSP during the submission of the concerned mFRR Energy Bid(s)
- For each tested mFRR Energy Bid including Delivery Point(s) DPPG, **the BSP can choose on which Delivery Point(s)**, listed in the concerned mFRR Energy Bid, **it performs the availability test**;
- For any tested mFRR Energy Bid, **the BSP must comply with all applicable communication requirements**



## Review of the modalities

If case of remarks or improvements to the current modalities of availability testing **please reach out to:**

Your KAM energy  
&  
[Carsten.bakker@elia.be](mailto:Carsten.bakker@elia.be)

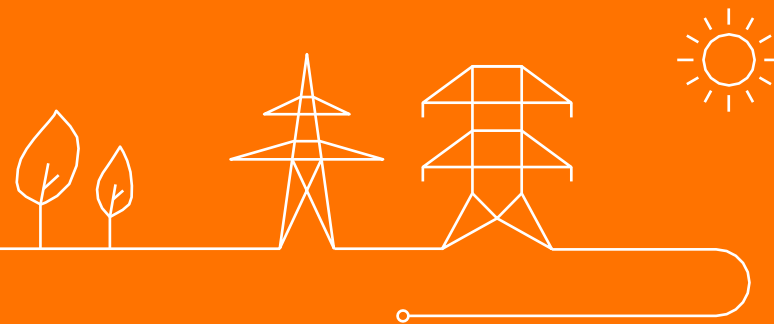
Thank you!





# AOB – Next WG Balancing

Thomas Van der Vorst



## Next WG Balancing

- **Dates for 2024:**
  - WG Energy Solutions 30/09/2024
  - WG Energy Solutions – November – Date to confirm
  - WG Energy Solutions – December – Date to confirm

