WG Balancing of 29th June 2023

Hybrid meeting

29/06/2023

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

Slight changes:

- 14:00 – 14:45 EU & BE Balancing Program Update
- 14:45 – 15:05 T&C BRP / Imbalance Price
- 15:05 – 15:25 aFRR Evolutions & Connection to PICASSO
- 15:25 – 15:35 **10' BREAK**
- 15:35 – 15:55 Winter Plan Balancing
- 15:55 – 16:15 Incentive on DFD
- 16:15 – 16:35 CRI filtering for aFRR
- 16:35 – 16:55 AOB – Incompressibility Issues

Minutes of Meeting for approval

Minutes of Meeting of WG Balancing of 16th May 2023

- **Suggestion to approve:**
- The MoM of 16/05/2023

EU & BE Balancing Program Update

Cécile Pellegrin / Aline Mathy / Arno Motte

Agenda of today's presentation

- Public consultations
- Implementation & Business Testing Protocols with market parties
- Coming stakeholder management interactions

Public consultations

Reminder WG BAL 16/05/23

Coming stakeholder management interactions

- Next interactions
  - Regular follow-up of implementation plans
  - More information regarding the content and organization of the business testing protocol with service providers, where still applicable, will be communicated in due time directly to service providers and through WG Balancing
  - Training/information session:
    - 25/05/23: mFRR bidding activation selection
    - “BSP Facilitations”

  - Public consultation for aFRR cap on TCO degradation (public consultation to be launched on 24/5)
  - Public consultation for T&C OPA, SA and coordination rules (target date for start unofficial public consultation : End of MAY/ Early JUNE 2023) **=> Launched (*)**
  - Public consultation for T&C mFRR, BRP and Balancing rules (target date for start unofficial public consultation : Early JULY 2023)

(*) Unofficial public consultation launched on 06/06/23 and official public consultation launched on 26/06/2023, end date 18/08/23

Public consultation for T&C mFRR, BRP and Balancing rules

- Public consultation for T&C mFRR
  - Unofficial public consultation to be launched Early JULY 2023 until end of August
  - FR/NL Documents will be added in the following weeks
- Public consultation for T&C BRP
  - See presentation here after
- Public consultation for Balancing Rules
  - Unofficial public consultation to be launched Early JULY 2023 until end of August
  - FR/NL Documents will be added in the following weeks

Public consultation for Balancing Rules

- Modification of the Balancing Rules includes
    - All needed changes for mFRR local go live, connection to MARI and connection to PICASSO and more specifically (not exhaustive):
        - The evolution in the mFRR and aFRR selections and activations
        - The principles of the CRI filtering as presented in the WS of 08/05/2023
        - The evolution of the FRR Activation Trigger (see here after)
        - The impact on publications
        - The transfer in T&C BRP of the determination of System Imbalance as well as the determination of the marginal incremental/decremental price

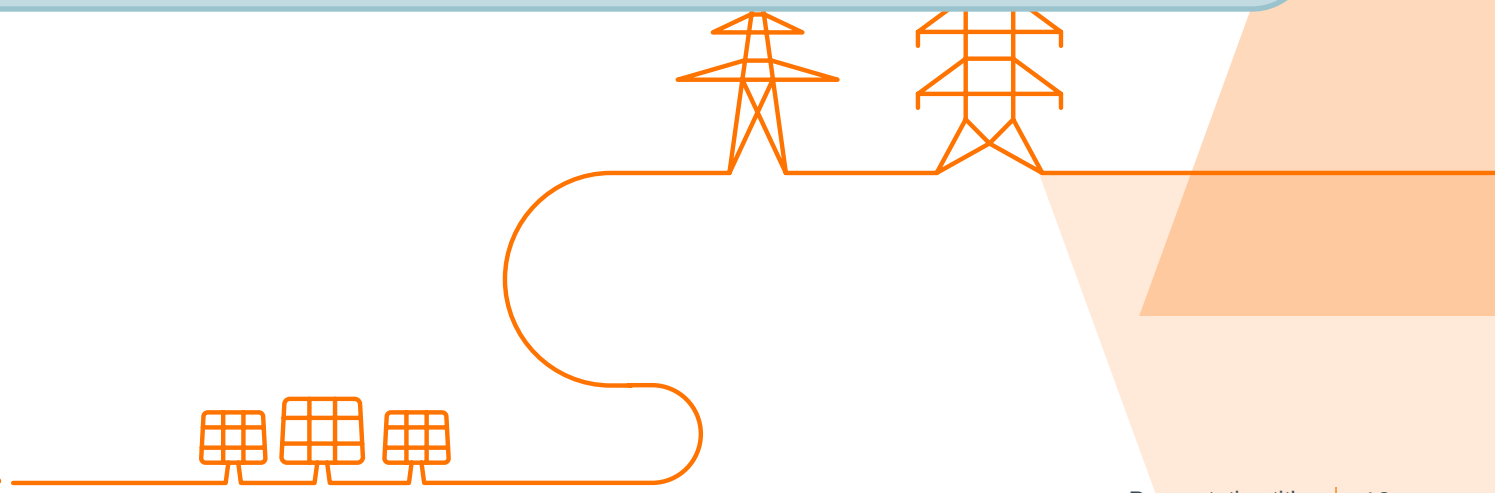
- The Balancing Rules will enter into force on the day of the entry into force of T&C BSP mFRR developed in the context of the accession to the mFRR-Platform. Some articles will apply only from or until specific moments
    - Until / as of ELIA's connection to the mFRR-Platform
    - Until / as of ELIA's connection to the aFRR-Platform

FRR Activation trigger

Context

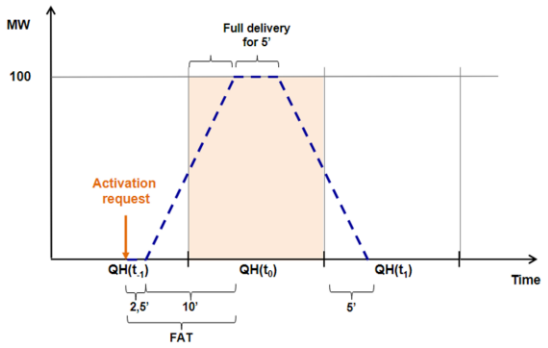
In the framework of the connection to the balancing platform, Elia:

1. has to adapt its activations to consider new timings defined at EU level
2. takes into account the design characteristics of the activation optimization function of MARI and the use of ATCs by the platforms

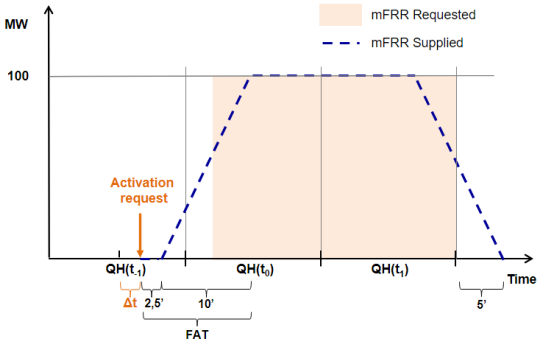


Scheduled Vs. Direct Activation on MARI

Profile SA



Profile DA



Elia will mainly use the Scheduled Activation (activation in T-10 for the next qh) because:

- The **Scheduled Activation is always cheaper** than the Direct Activation (activation from T-10 to T+5 until the end of the 2nd qh)
  - The Scheduled Activation uses first the bids in the merit order and activates (after netting) the cheapest ones
  - The price of the direct activation for a Qhi (prolonged in Qhi+1) is:
    - For Qhi the Max(Scheduled Activation Price Qhi; Direct Activation Price QHi)
    - For Qhi+1 the Max(Scheduled Activation Price Qhi+1; Direct Activation Price QHi)
- The **Scheduled activation optimizes the 2 directions at the same time** (enjoying then some netting potential) while the direct activation only optimizes one direction at a time
- The **Direct activation lasts** 2 quarter hours by default which might lead to overactivations for the 2nd QH

⇒ **Elia will mainly use the Scheduled Activation**
⇒ Direct Activation is ONLY used to cover large intra-QH variations and/or intra-QH variations that are likely to prolong to the next QH

Evolution of the mFRR Activation trigger

AS-IS:

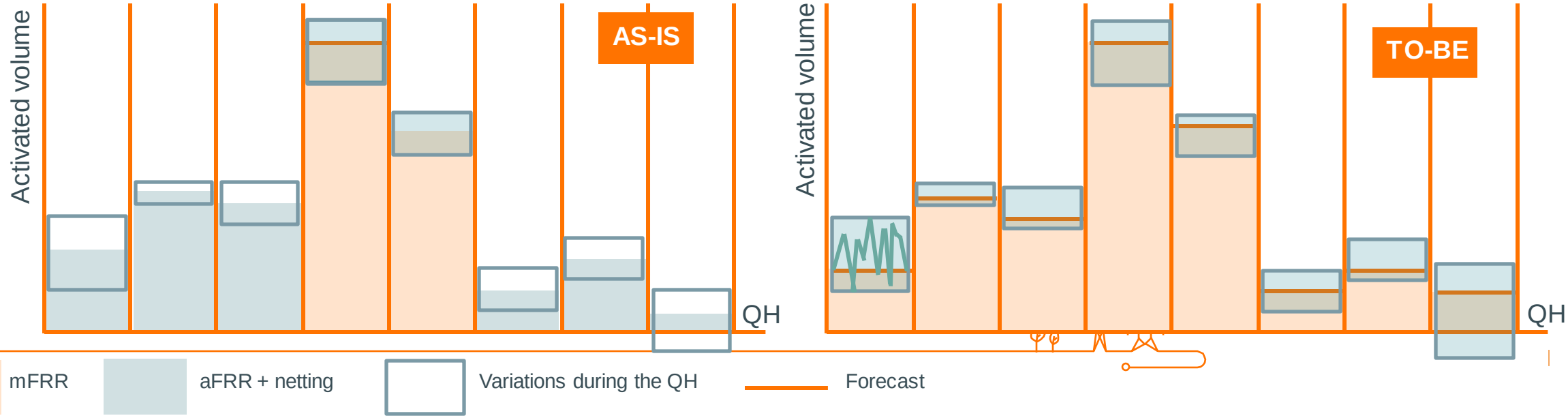
Today Elia assesses the SI on the first 10 min of the QH and activates mFRR bids for the next QH based on those observations.

TO-BE:

Using the MARI platform for the main part of our needs allows the best use of the platforms in terms of price convergence.

With MARI, Elia needs by design to take its activation decision on the mFRR volume earlier in the quarter and will impact the imbalance price later in the time

ELIA will determine its mFRR demand for Scheduled Activation on the basis of the best estimate of the System Imbalance for the next quarter hour to bring the ACE close to zero and/or relieve aFRR



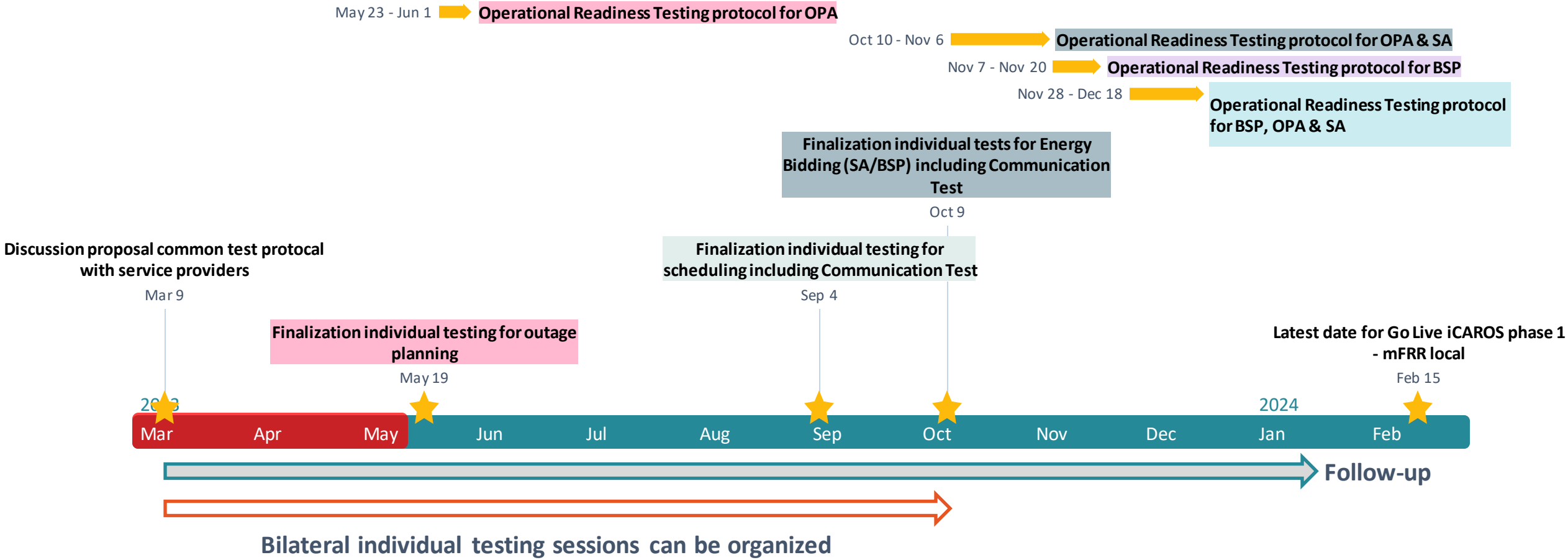
Stakeholder management interactions

GENERAL ORGANIZATION

Proposed planning

REMINDER: Development slots foreseen until go-live:

- 1st Thursday of every month
- 3rd Friday of every month



BUSINESS TESTING PROTOCOLS WITH MARKET PARTIES DEFINED

	Tests	Type	What	Who	When	
iCAROS	iCAROS_1	Reproduction of **real situation**	**Update** of an Availability Plan	OPA	Day I	23/05/2023
					Day II	25/05/2023
					Backup	01/06/2023
	iCAROS_2		**Initialization** of Schedules & RD Energy Bids	SA OPA	Day I	10/10/2023
					Day II	11/10/2023
					Backup	16/10/2023
	iCAROS_3		**Updates** of Schedules & RD Energy Bids	SA OPA	Day I	17/10/2023
					Day II	18/10/2023
					Backup	23/10/2023
	iCAROS_4	**Simulation** of scenario's	**Activations of RD, Return to Schedules Requests**	SA	Day I	24/10/2023
					Day II	25/10/2023
					Day II	26/10/2023
					Backup	06/11/2023
Back-up week 30/11 - 03/11/2023						

	Tests	Type	What	Who	When	
MARI	MARI_1	Reproduction of **real situation**	**Initialization** & **updates** of mFRR Energy Bids	BSP	Day I	07/11/2023
					Day II	08/11/2023
					Backup	13/11/2023
	MARI_2	**Simulation** of scenario's	**Activations of mFRR**	BSP	Day I	14/11/2023
					Day II	15/11/2023
					Day II	16/11/2023
					Backup	20/11/2023
Back-up week 20/11 - 24/11/2023						
iCAROS/MARI	iCAROS/MARI_1	Reproduction of **real situation**	**Initialization** of Schedules & RD/mFRR Energy Bids	BSP SA OPA	Day I	28/11/2023
					Day II	29/11/2023
					Backup	04/12/2023
	iCAROS/MARI_2		**Updates** of Schedules & RD/mFRR Energy Bids	BSP SA OPA	Day I	05/12/2023
					Day II	06/12/2023
					Backup	11/12/2023
	iCAROS/MARI_3	**Simulation** of scenario's	Combination of **activations** of **mFRR, RD** & **Return-to-Schedules Requests**	BSP SA	Day I	12/12/2023
					Day II	13/12/2023
					Day II	14/12/2023
					Backup	18/12/2023

Launch of the Business testing protocols with market parties

- Common test iCAROS_1 took place 23/5/2023 and 25/5/2023
- KAM energy will contact the service providers before holidays to discuss :
  - Results of common test iCAROS_1 will be communicated individually by KAM energy to market parties.
  - To discuss their individual implementation plan in relation to the upcoming common tests (the next common test iCAROS_2 is planified 10 or 11 October 2023).

Coming stakeholder management interactions

Coming stakeholder management interactions

- Next interactions

  - Regular follow-up of implementation plans
  - More information regarding the content and organization of the business testing protocol with service providers, where still applicable, will be communicated in due time directly to service providers and through WG Balancing
  - Training/information session:
    - 07/07/23 - “BSP/SA Facilitations & communication channels for OPA/SA/BSP”
    - See here after the workshops planned in the context of "aFRR Evolutions"
  - Public consultation for T&C mFRR, BRP and Balancing rules (Unofficial public consultation to be launched Early JULY 2023)

Contact persons

KAM Energy

Amandine Leroux / Arno Motté / Nicolas Koelman

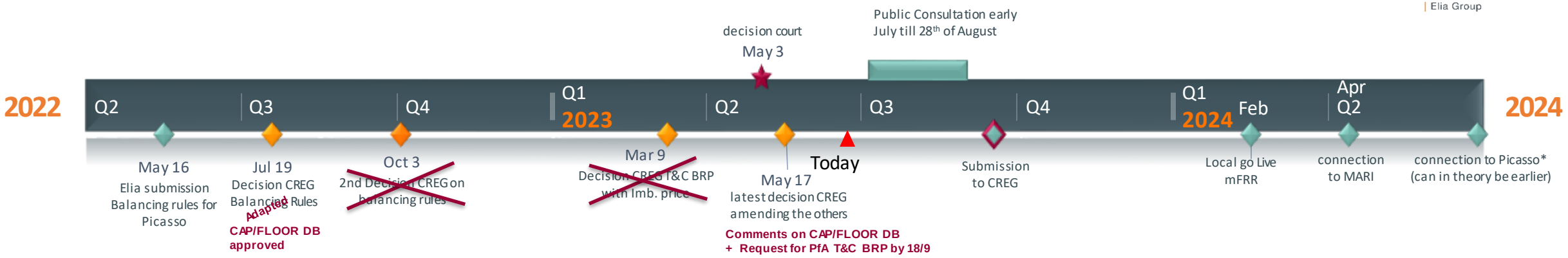
Implementation ad hoc sessions (on request)

- Q&A sessions dedicated to design and implementation questions
- IT questions & Live debugging sessions with ELIA IT-team

T&C BRP / Imbalance Price

Anna Tsiokanos

T&C BRP amendment for MARI



1. Interactions with other topics
   - **MARI**:
     - Coordinated with cleaning up of Bal Rules
     - T&C BRP will be consulted as much as possible in // with **other MARI documents** (T&C BSP, Balancing Rules)
   - **Tariff proposal:** some overlaps are introduced to address CREG's request (~describing Imbalance Price in T&C BRP) while respecting BE legislation (Art. 12 Elauw, Matif Methodology implying that Imbalance tariffs giving appropriate incentives have to be proposed in tariff proposal)
   - **EoEB** : a second public consultation of the T&C BRP with amendments in a different section will follow depending on the CCMD planning (cf. WG CCMD)

2. Practical modalities:
   - **Entry into Force:** aligned with EiF of Balancing Rules (& T&C BSP) which corresponds to local go live mFRR
   - 4 different situations are described

   - Track changes compared to current applicable T&C BRP (in force since 2021)

T&C BRP amendment for MARI – structure and content

- Art 29 : describes global tariff structure:

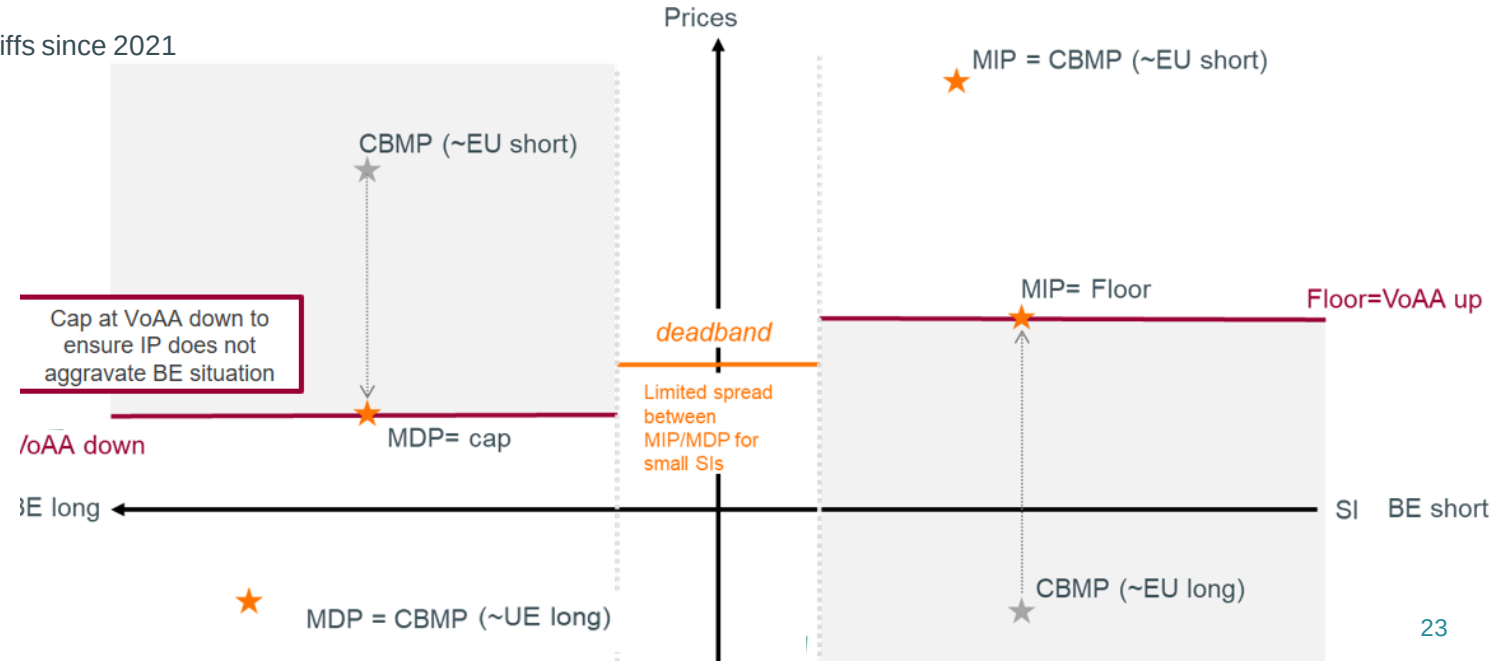
  Already in current T&C BRP but order of articles adapted to make structure clearer for reader

  - Refers to tariff proposal,
  - explains what are the Tariffs applicable to the BRP :
    - Tariff for the maintaining and restoring of individual imbalance + reference to the art 30 for the details calculation
    - Tariff for inconsistencies
  - Other: invoicing process, VAT…

- Art. 30:

  Details requested by CREG

  - Describes **SI calculation**
  - Main component: **MIP or MDP** depending on sign of SI
    - FLOOR and CAP will apply respectively on MIP and MDP
    - Dead band between +25 MW and -25MW
  - Additional component = **current alpha** also described in Tariffs since 2021



Proposed imbalance price formula compatible with MARI/PICASSO

- IP = deadband value — if -25 MW < SI(QH) < 25 MW
- MIP = max (floor , aFRR component , mFRR component) — if SI(QH) =< - 25 MW
- MDP = min (cap , aFRR component , mFRR component) — if SI(QH) >= 25 MW

- IP formula should not incentivize to aggravate the local SI => CAP & FLOOR with
  floor = max(VoAA up, VoAA down)
  cap = min(VoAA down, VoAA up)

- ✓ aFRR component should reflect the value of aFRR => formula already agreed : aFRR component = $\frac{\sum oc\,[(abs(aFRR\ SD\ oc,j))\ x\ CBMP\ oc,j]}{\sum oc\ (abs(aFRR\ SD\ oc,j))}$

- ✓ mFRR component => should reflect the marginal value of mFRR

  Proposal: max (res. Min) CBMP of mFRR satisfied demand in the relevant direction during the ISP

  mFRR component for MIP = $\max(CBMP_{SA,}, CBMP_{upward\ DA\ in\ previous\ ISP}, CBMP_{upward\ DA\ in\ current\ ISP})$

  mFRR component for MDP = $\min(CBMP_{SA,}, CBMP_{downward\ DA\ in\ previous\ ISP}, CBMP_{downward\ DA\ in\ current\ ISP})$

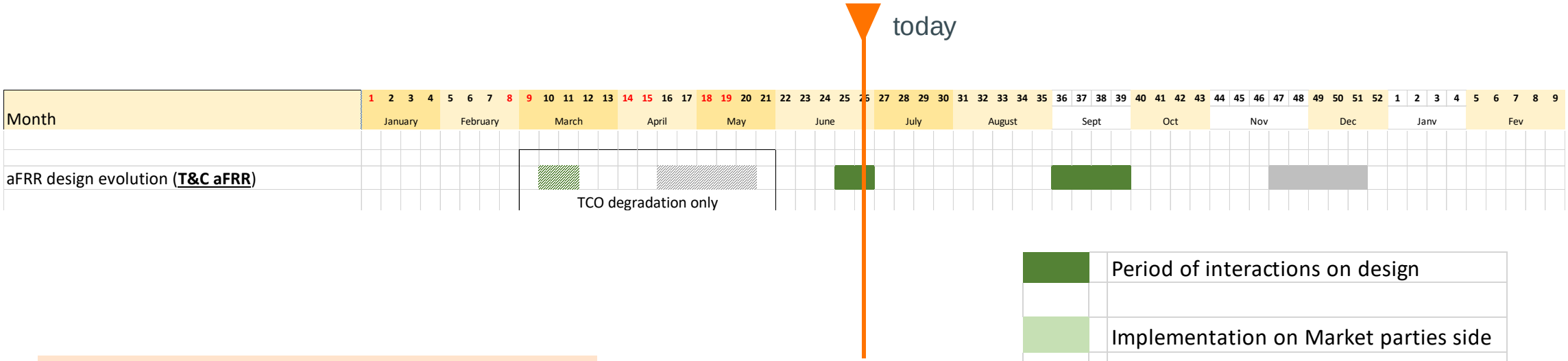
- ✓ IP formula should provide a neutral price signal in case BE is close to balance (|SI| smaller than 25 MW) => dead band = (CAP+FLOOR)/2

aFRR evolutions
Scope & Timing

Philippe Magnant

The aFRR track in the consolidated High level Roadmap

Market consultations & implementation period



	Period of interactions on design
	Implementation on Market parties side
	Consultation

Indicated periods remain indicative

Scope

Design evolution	Implementation impact for the BSPs
Possible local mitigation measures for PICASSO	Will depend on the measures
5’ FAT (Full Activation Time)	Mandatory – possible impact on offered volumes
Move aFRR capacity auction to D-1	Mandatory – operational impact
Incentive 2021: RT baseline	Optional implementation
Incentive 2022: activation method	Optional implementation
CCMD: individual correction model, opening LV	Optional implementation

- Minor modifications for aligning with other regulated documents

Planning

- Objective is to connect to PICASSO in 06/2024, before the legal deadline (07/2024) but not during summer holidays
- **Regulatory track**
  - ✓ We need CREG's approval of the T&C BSP aFRR for all needed re-tests / operational preparation to be done before the formal date connection date decision in OPSCOM.
    - ➔ CREG's approval needed end of 03/2024
    - ➔ Submission to CREG end of 02/2024
    - ➔ **Public consultation mid-November → mid-December 2023**
- **Entry into force**
  - ✓ 5' FAT at fixed date (18/12/2024)
  - ✓ Auction in D-1 aligned with go-live of aFRR dynamic dimensioning
  - ✓ Connection to PICASSO: 12/06/2024
  - ✓ Other modifications: 12/06/2024 in order to have sufficient margin with the local mFRR go-live and avoid multiple go-live dates

Scope & planning – implementation impact for BSPs

Design evolution	Implementation impact for the BSPs	Planning
Possible local mitigation measures for PICASSO	Will depend on the measures	12/06/2024
5' FAT (Full Activation Time)	Mandatory – possible impact on offered volumes	18/12/2024
Move aFRR capacity auction to D-1	Mandatory – operational impact	01/10/2024
Incentive 2021: RT baseline	Optional implementation	12/06/2024
Incentive 2022: activation method	Optional implementation	12/06/2024
CCMD: ind. correction model, opening LV	Optional implementation	12/06/2024

Stakeholder interactions

- 29/06: WG Bal : present scope and planning
- 19/09: Workshop 1
  - ✓ Information session on RT baseline, aFRR activation method, auction D-1, 5' FAT
  - ✓ Workshop on aggregation rules of DPs for aFRR LV
  - ✓ Workshop on mitigation measures for the connection to PICASSO: reminder of the context, actions at European level and actions at local level ➔ Elia's high level proposal for the connection in June.
- 12/10: Workshop 2
  - ✓ Calibration of the mitigation measures, taking into account stakeholder's comments
- Perimeter correction model of CCMD is discussed in WG CCMD

10' BREAK

Winter package balancing

Kristof De Vos

Context

- Towards the Winter 2022 – 23, Elia proposed a measure to deal with the imminent risk of unavailability of its reserve sharing agreement during tight market conditions in Western-Europe. In such cases, Elia cannot guarantee to have the balancing means available to cover its dimensioning incident.

  - **A dynamic increase of the mFRR balancing capacity to be procured with 250 MW (following the reduction of the sharing contribution to 0 MW during a Critical Grid Situation in neighboring countries).**
    - *This measure was approved by CREG on 22.12.2022 for Winter 2022-23*
    - *Elia implemented the measure until 31.03.2023*
    - *No CGS was triggered during last winter in neighboring countries*

  - **A bidding obligation for large coordinable units to offer mFRR during the first gate of the day-ahead balancing capacity tender (not applied during last winter)**
    - *The measure has been introduced by the Government as a Royal Decree based on Article 32 of the Electricity Law but Raad Van State pointed at concerns in terms of competences allocated to CREG by the European legislation.*

These measures were developed on short-term for Winter 2022-23. Elia proposes to introduce a more robust, general framework as from November 1, 2023.

Overview of current proposal

Winter 2022/23

Proposal to increase local mFRR balancing capacity requirements following expected unavailability of reserve sharing during tight market conditions in neighboring countries

Identified as risk when during scarcity problems in neighboring countries

Approved by CREG for Winter 2022-23

External trigger (RCC)
Critical Grid Situation in UK, DE, FR, NL

Proposal for a bidding obligation on mFRR BC 1st gate to manage foreseen liquidity problems when increasing balancing capacity requirements

Liquidity issues are very likely when increasing local mFRR BC requirements with 250 MW during regional tight market conditions

Proposed legal framework rejected by Raad van State

Winter 2023/24 and after

Elia had announced (cf. WG BAL 16/05) to further develop this towards a robust framework towards next Winter(s)

Bidding obligation

Applicable during tight market conditions in Belgium

Proposal Bidding obligation during tight market conditions

- Elia proposes to target potential liquidity problems in the Elia mFRR balancing capacity markets during tight market conditions
- Elia proposes to introduce the bidding obligation for such conditions in the regulatory framework (LFC block operational agreement)

Tight market conditions in Belgium (in scope)

What? Measure for periods with expected liquidity problems in the mFRR balancing capacity market during tight market conditions in Belgium with a risk that insufficient capacity is sold to Elia when market players do not offer in the balancing capacity auction to offer on EU energy markets

Why? Even in an adequate system, it is currently not prevented that capacity to cover balancing needs is sold on EU energy markets*.

Trigger? Based on a technical trigger (Critical Grid Situation process) while further investigations will be conducted towards feasible alternatives (e.g. price-based triggers)

Volumes not contracted in the mFRR first gate auction and sold in the day-ahead energy market are not available for the mFRR second gate

**A situation with increased need for balancing capacity (due to limited availability of reserve sharing) will occur in this case when tight market conditions are expected.*

Other (out of scope)

What: Liquidity problems arise when market participants do not offer available capacity in auctions for balancing capacity, even when it is not certain that the capacity is needed in the EU energy market.

Why? Prediction errors by market players,...

Liquidity problem in this case should be covered by the 2nd gate auction after the day-ahead market

Bidding obligation for mFRR and exceptional balancing measures foresee possibility to provide sufficient balancing means

Elia proposes a two phased approach concerning implementation of the trigger for the bidding obligation

1. In a first phase, for implementation on November 1, 2023 the trigger will be based on the existing Critical Grid Situation indicator as proposed in the Winter plan 2022-23. The temporary trigger will be based on a CGS for Belgium, complemented with France, as **indicator for tight market situations in Belgium**
   - *Contra : forecasts scarcity while issue to be covered may already occur in near-scarcity conditions*
   - *Pro : based on existing information process and can thus be implemented by November 1, 2023*

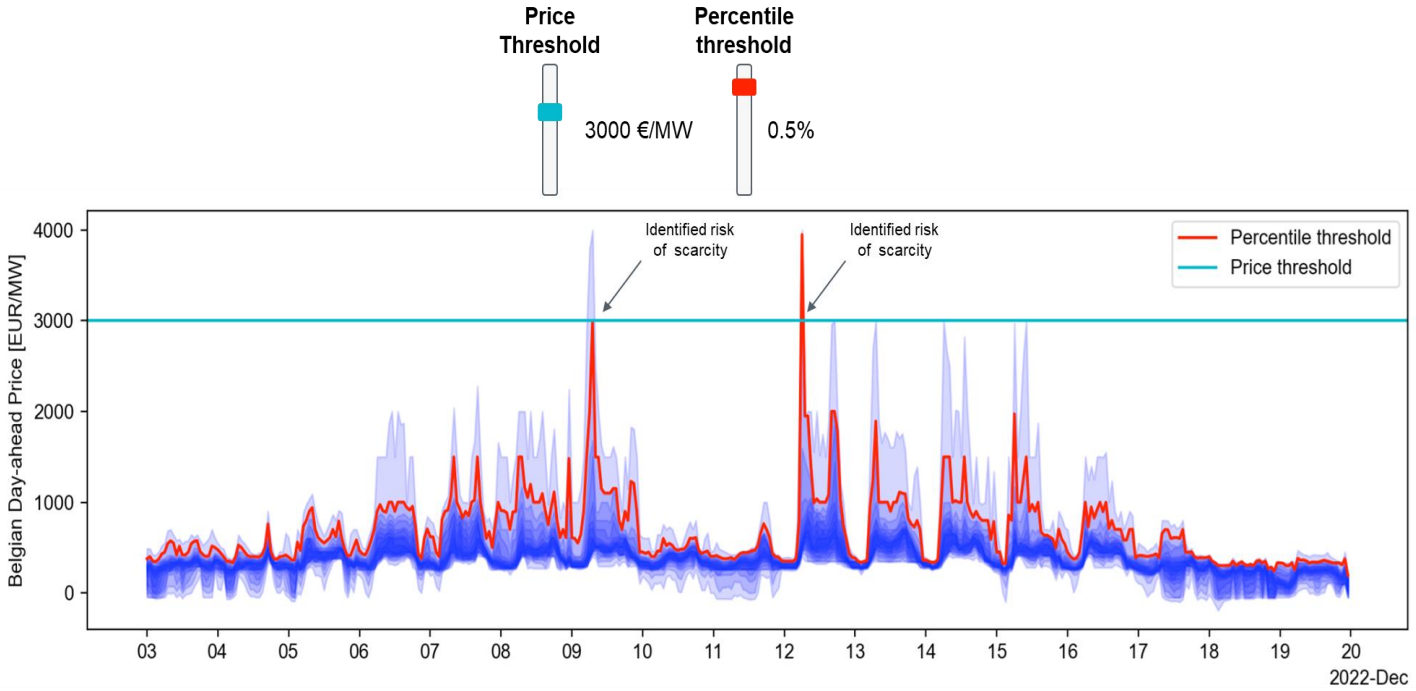
     ➔ *This tool is best possible solution on short-term, but does not allow to cover all situations*

2. In a second phase, Elia is checking the feasibility of alternative triggers, e.g. based on **price-based forecast of tight market conditions in Belgium.** In case Elia identifies potential solutions, this will be discussed with market parties in view of implementation for next Winters.
   1. *Contra : no 'on the shelf' solutions available for implementation towards upcoming Winter*
   2. *Pro : is better aligned with the objectives of the mechanism (tight market conditions)*

Probabilistic price spike forecast

- Elia will investigate a forecast that predicts the risk of tight market conditions early enough to be taken into account by Market Parties for the balancing capacity tender

- What is the probability a certain price threshold (1) will be exceeded in the next day with a certain percentile (2)?
  - Parameter 1 : price threshold
  - Parameter 2 : percentile threshold



* Shown forecast is for presentation purposes only, exaggerated values to make the concepts clear

Proposal (based on Proposal Winter 2022/23)

– LFC BOA - Article 13 'escalation procedure' in a new paragraph 9

Elia may impose a bidding obligation on the mFRR balancing capacity offered , when receiving from the relevant regional coordination centre a communication on a "Critical Grid Situation" concerning an adequacy issue in Belgium and or France.

a. *As from D-3, and until the publication of the positive balancing capacity to be procured following Article 6(5) of the LFC Means,*
   i. *Elia will inform the market (via its inside information platform, Elia Group IIP) about the bidding obligation as soon as reasonably possible after receiving the critical grid situation.*
   ii. *Elia can update the information to apply the bidding obligation*
b. *Elia will limit the application of the bidding obligation to CCTUs of day D related to the periods identified as being at risk.*
c. *Elia will provide the communications received from the regional coordination centre to the CREG as soon as reasonably possible after receiving the critical grid situation.*

When a 'bidding obligation' is imposed in line with the previous paragraph, BSPs are obliged to submit a bid at the first auction organised by the system operator at 10:00 D-1 of the CCTU(S) to which the bidding obligation applies and this :

- *for all available positive mFRR balancing capacity available to them through coordinated generation units,*
- *for each individual BSP within the limits of the balancing capacity published in line with Article 6(5) of the LFC Means*

250 MW Balancing Capacity increase

During unavailability of sharing agreements with neighbor TSOs

Assessment of the impact of tight market conditions in neighboring countries on the availability of reserve sharing

- **Dynamically increase of the mFRR balancing capacity to be procured with 250 MW** (following the reduction of the sharing contribution to 0 MW).
- This is triggered only after indications of tight market situations in one or more of the neighboring countries with which Elia has a sharing agreement.
- The increase of balancing capacity requirements will be triggered via CGS (Critical Grid Situation) process as a trigger for reducing the contribution of sharing and increasing the balancing capacity to be procured* :
  - Based on regional adequacy assessment processes conducted by the regional coordination centers
  - Includes an assessment of remedial actions
  - Insufficient remedial actions will result in a communication on a CGS to TSOs
  - The communication specifies which country is impacted by potential shortages

- In the framework of the proposals towards Winter 2023-24, CREG and stakeholders asked Elia to analyze the 'all (250 MW) or nothing' reduction after a CGS in one of the neighboring countries

- The objective of 'smartening' the measure would be to determine the balancing capacity reduction in function of operational information on the availability of the sharing agreement and by identifying ex ante the impact of the potential loss of one border on the availability of the 250 MW accounted in the dimensioning
  - ➢ During tight market conditions, Elia cannot engage in 'ad hoc' real time bilateral discussions and analysis with other TSOs which justified the 'all or nothing' nature of the proposed mechanism
  - ➢ On request of CREG and stakeholders, Elia further investigated the possibility to finetune the mechanism in view of pre-defining the impact of losing the availability of one or more of the sharing agreements

Regional correlation of tight market conditions

Tight market conditions are typically occurring as a regional event and the probability of losing availability of the sharing capacity on multiple borders at once is high

Probability to have prices <5 €/MWh when prices are <5€/MWh in Belgium

	DE	NL	FR	GB
2025	90-100%	90-100%	70-80%	60-70%
2026	90-100%	90-100%	70-80%	70-80%
2028	90-100%	90-100%	70-80%	70-80%
2030	80-90%	90-100%	70-80%	90-100%
2034	80-90%	80-90%	60-70%	90-100%

Probability to have prices >500 €/MWh when prices are >500€/MWh in Belgium

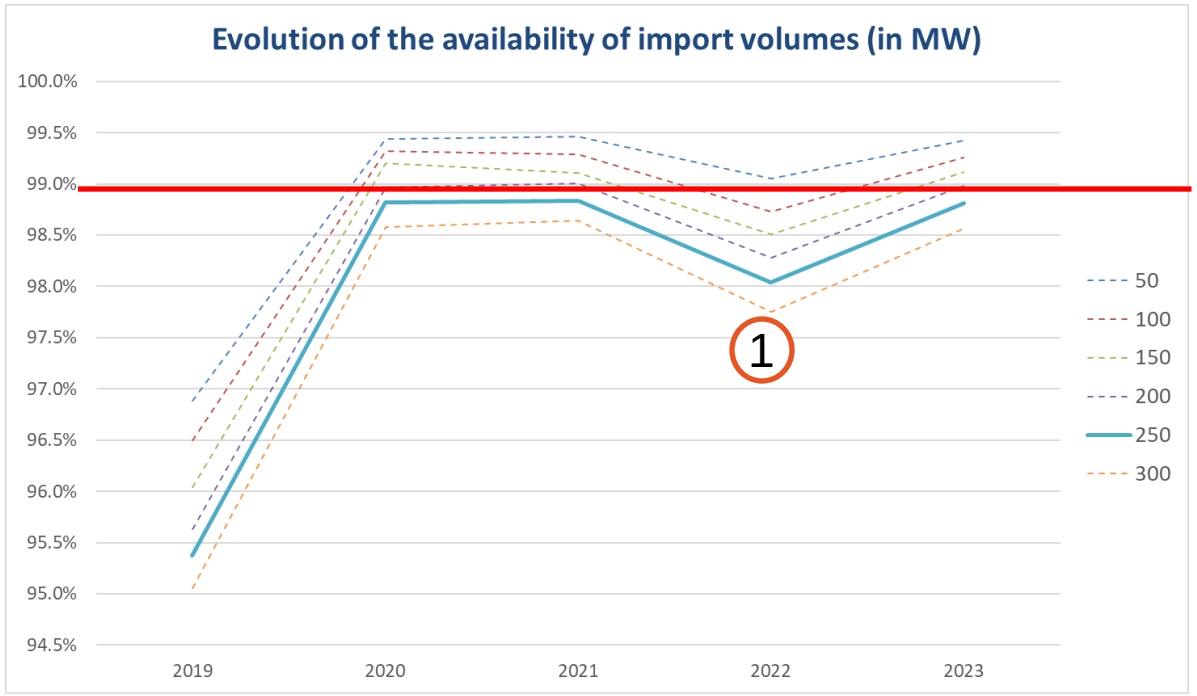
DE	NL	FR	GB
50-60%	30-40%	70-80%	50-60%
80-90%	60-70%	90-100%	50-60%
80-90%	60-70%	80-90%	70-80%
70-80%	60-70%	70-80%	70-80%
70-80%	80-90%	60-70%	70-80%

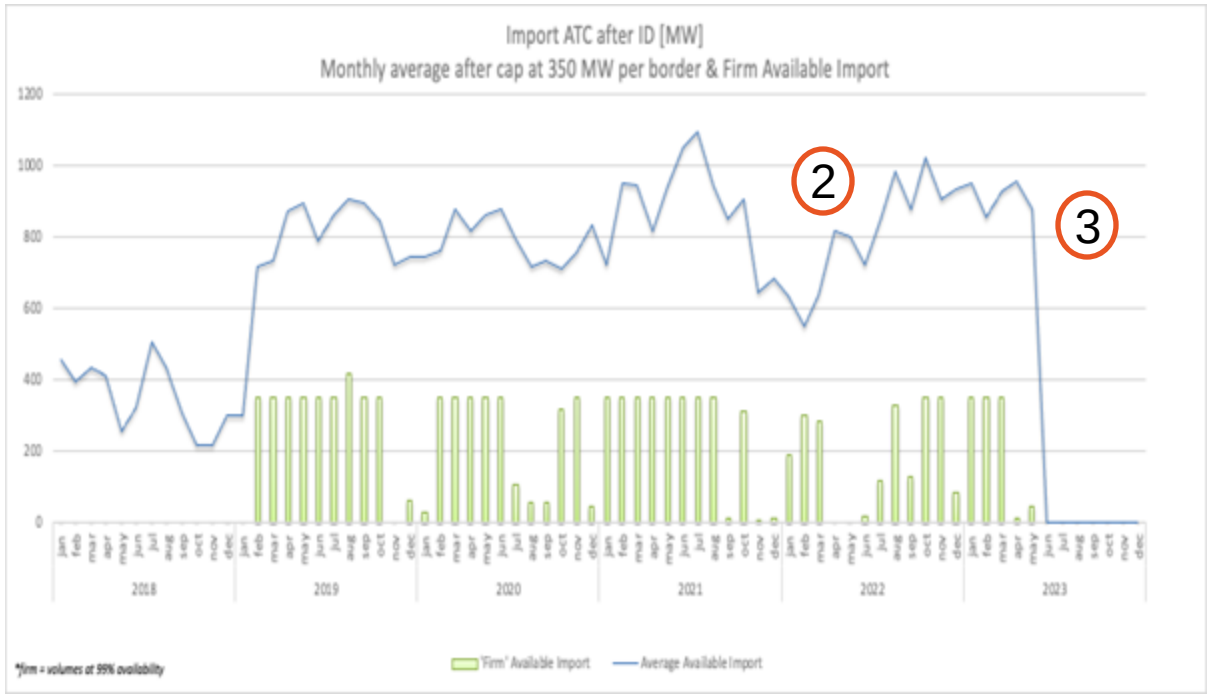
Adequacy and Flexibility study 2023

- Correlation with FR in 2025 is very high, and even increasing towards 2026
- Correlation with DE, NL, UK is lower but increasing over time (particularly with Germany as from 2026)

Evolution of the available ATC after ID

While the situation seems to have recovered in the first part of 2023, 'ATC after ID' on the four borders was below the targeted 99% levels





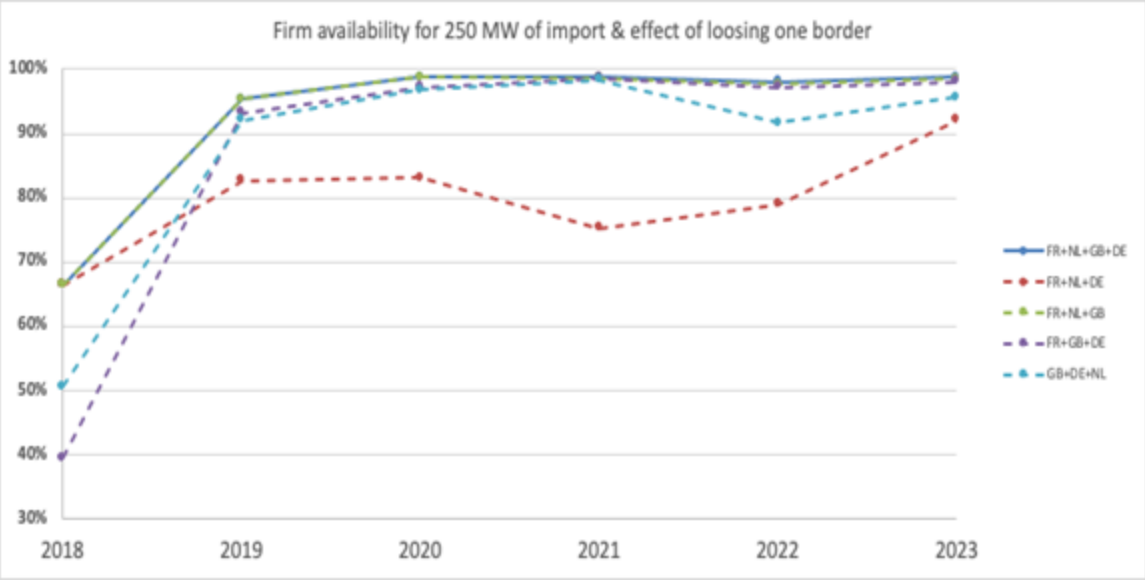
1 Targeted reliability levels (99%) on the availability of 250 MW ATC after ID on the four borders was not achieved in 2022.

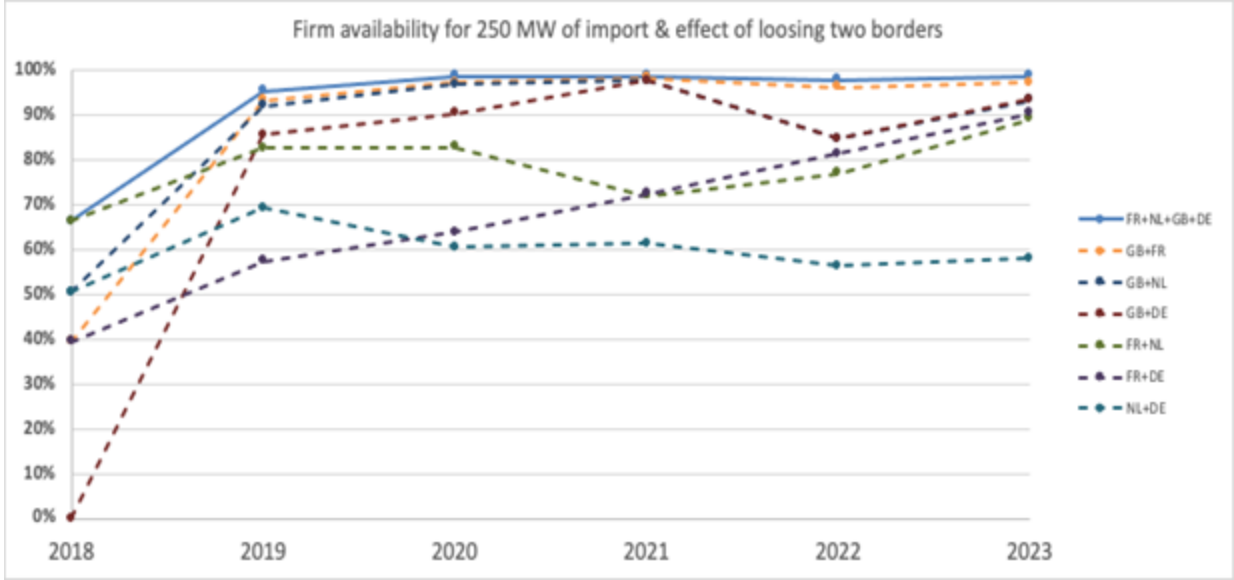
2 Recovery of the available ATC after ID mid-2022 following Core DA Capacity Calculation (due to improvement of the DA leftover extraction)

3 Outcome of the ongoing escalation process on CORE Intra-day Capacity Calculation (expected in first part 2024) is unknown (original parallel run indicated a reduction)

Impact assessment of unavailability on one or two borders

An assessment on the effect of losing one or two borders shows that the 250 MW sharing contribution mainly relies on GB and FR





Losing DE or NL can keep a similar level of reliability, based on the trend seen since 2021

Losing both DE and NL has a small effect on the availability of 250 MW for import

Available ATC after ID related to system conditions

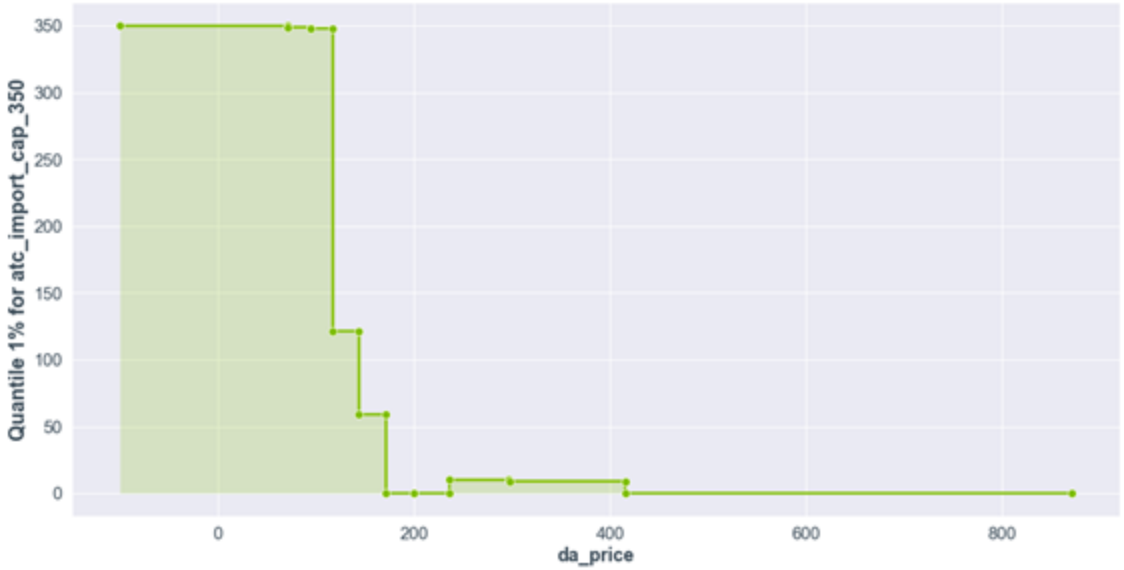
Under a perfect forecast assumption

Elia refers to its non-contracted mFRR balancing means roadmap for implementation of dynamic sharing strategies as 2027.

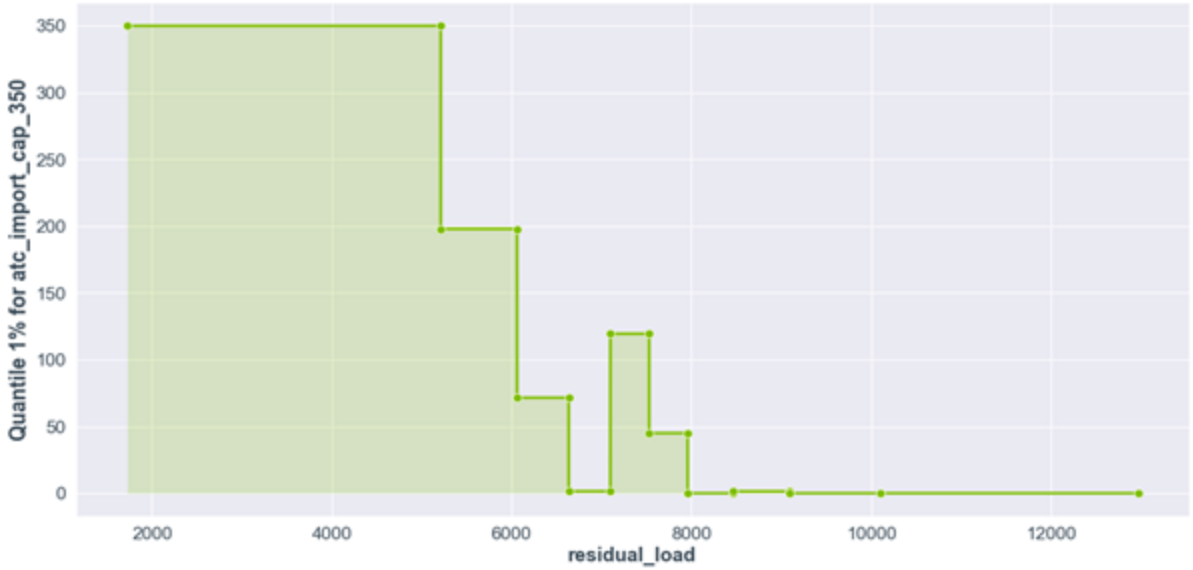
Availability of ATC after ID are substantially lower during tight market conditions

Elia conducted an intermediate analysis (May 2021 until April 2023) to predict available ATC after ID based on straightforward system conditions to increase / decrease sharing contributions during particular conditions:

- Time related conditions (hour of day, month of year) did not reveal significant dynamic potential
- Price and residual load related conditions reveal a certain potential but requires advanced probabilistic forecasting



When price is above ~ 400 EUR/MWh, with 99% confidence, there is 0 MW available.



When residual load is above ~ 8000 MW, with 99% confidence, there is 0 MW available.

Conclusions

- During tight market conditions, Elia cannot engage in ‘ad hoc’ real time bilateral discussions and analysis with other TSOs which explains the ‘all or nothing’ nature of the proposed mechanism

- On request of CREG and stakeholders, Elia investigated the possibility to finetune the mechanism in view of defining the impact of losing the availability of one or more of the sharing agreements ex ante

A quantitative analysis on the historic available ATC after ID shows that :

- **Observation 1:** tight market conditions are typically occurring as a regional event and that the probability of losing availability of the sharing capacity on multiple borders at once is high
- **Observation 2:** while the situation seems to have recovered in the first part of 2023, ‘ATC after ID’ on the four borders was below the targeted 99% levels
- **Observation 3:** an assessment on the effect of losing one or two borders shows that the 250 MW sharing contribution mainly relies on GB and FR
- **Observation 4**: Availability of ATC after ID are substantially reduced during tight market conditions

- *Following these observations, and the uncertainty related to the outcome of the escalation process on the CORE IDCC methodology (foreseen in 2024), Elia proposes to maintain the current ‘all or nothing’ approach and consider potential modifications after return of experience after implementation of the IDCC methodology.*
- *Despite the observed reduction of ATC availability in 2022, Elia currently justifies maintaining the 250 MW contribution under normal conditions following the observed recovery in 2023, as well as the prevalence of the UK contribution being unaffected by the uncertainty of CORE IDCC methodology.*

Proposal

Article 4(7) - ~~From November 1, 2022 until March 31, 2023,~~ Elia may temporarily reduce the contribution of the positive shared capacity, included in the dimensioning as specified in Article 4(6), to 0 MW when receiving from the relevant regional coordination centre a communication on a "Critical Grid Situation" concerning an adequacy issue in one or more countries with which Elia has a sharing agreement.

a. *As from D-3, and until the publication of the positive balancing capacity to be procured following Article 6(5),*
   i. *Elia will inform the market (via its inside information platform, Elia Group IIP) about the reduction of the contribution of the positive sharing capacity to 0 MW as soon as reasonably possible after receiving the critical grid situation.*
   ii. *Elia can update the information to reduce the contribution of the positive sharing capacity to 0 MW.*
b. *Elia will limit the contribution of the positive sharing capacity to 0 MW for one or more CCTUs of day D related to the periods identified as being at risk.*
c. *Elia will provide the communications received from the regional coordination centre to the CREG as soon as reasonably possible after receiving the critical grid situation.*
d. *Elia will yearly report to the CREG on the availability of the shared volumes with neighbouring countries during periods related to a CGS, at the latest one month after March 31~~, 2023~~.*

Overview of current proposal under discussion with CREG

Winter 2022/23

Proposal to increase local mFRR balancing capacity requirements following expected unavailability of reserve sharing during tight market conditions in neighboring countries

Identified as risk when during scarcity problems in neighboring countries

Approved by CREG for Winter 2022-23

External trigger (RCC)
Critical Grid Situation in UK, DE, FR, NL

Proposal for a bidding obligation on mFRR BC 1st gate to manage foreseen liquidity problems when increasing balancing capacity requirements

Liquidity issues are very likely when increasing local mFRR BC requirements with 250 MW during regional tight market conditions

Proposed legal framework rejected by Raad van State

Winter 2023/24 and after

Re-submit proposal as a general measure, independent of season or year

Elia investigated short-term solutions to refine the 'all or nothing' nature of the mechanisms but does not recommend such approaches at this point, i.e. before implementation of the CORE ID capacity calculation

External trigger (RCC)
Critical Grid Situation in UK, DE, FR, NL

Evolution towards dynamic sharing approaches towards 2027 (cf. roadmap)

External trigger (RCC)
Critical Grid Situation in BE + FR

Investigation of price-based forecasts towards Winter 2024-25

Elia proposes to follow recommendations of RvS and implement this proposal via the regulatory framework (time constraints made this impossible for Winter 2022/23)

Elia proposes to enlarge the scope to tight market conditions in Belgium to anticipate potential liquidity problems in the future

Elia investigated forecast-based tools to refine the identification of tight market conditions (e.g. predicting risk of extreme price spikes) but these concepts require further investigation, development and testing

Complementary to ongoing initiatives

– Elia has several ongoing initiatives to increase liquidity (and competition) to manage procurement cost, including during tight market conditions.

1. *Elia already opened balancing capacity products for all technologies on all voltage levels and has launched several initiatives to encourage BSPs to bid their capacity in the mFRR balancing capacity auctions*

2. *CCMD Design for developing a market model based on individual perimeter correction (at access point or behind) allowing smaller BSPs to enter the market more rapidly than with existing ToE/Opt-out models (end-2023 for TSO grid users)*

3. *LV Market model to open up the aFRR and mFRR markets segments to LV assets*
   - *aFRR fast track for 2023*
   - *mFRR test in 2023, and full implementation in 2024*

These existing initiatives should help to avoid liquidity problems on long-term but are deemed insufficient to secure the system on short term, e.g. upcoming Winter(s)

Next steps (parallel track for LFC Means / LFC BOA)

- Presentation WG BAL on June 29, 2023
- Launch consultations on Friday August 18, until September 15, 2023 (4 weeks)
- Submission to CREG on September 29, 2023

- **Entry into force on November 1, 2023**

Incentive on DFD

Arnaud Attanasi

Agenda

Introduction

- Planning
- Definition: What is a Deterministic Frequency Deviation (DFD)?
- TSO contribution and regulation
- Approach of the study

Models for DFD and ACE prediction

- Predicted variables and models characteristics
- Methodology
- Model Results

Mitigation measures

- Comparison of possible mitigation measure
- Decision tree

Planning of the study

29th June 2023: WG Balancing

Presentation of the DfD results to Market Parties

22nd December 2023: Final report

- Test results (minimum 1 month)
- If applicable: implementation plan

Window for POC tests

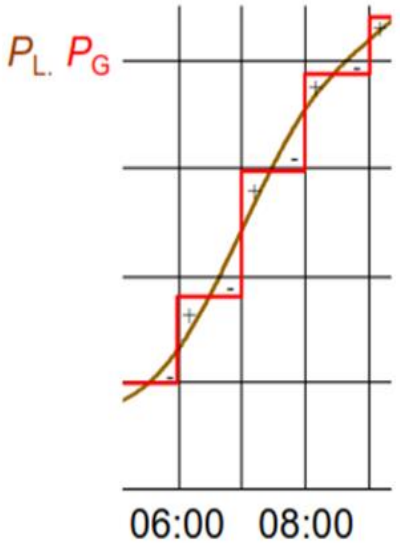
May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Jan

1st September 2023: Consultation of a draft report

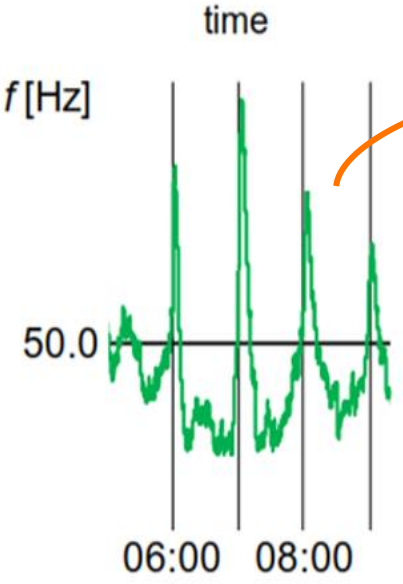
- Description of the method used to select the dataset and the final model
- Results of the comparison based on statistical indicators
- Advantages and Disadvantages of the models
- Proposal/Relevance of publications related to DfD's
- If applicable: recommendations in terms of tool implementation

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**

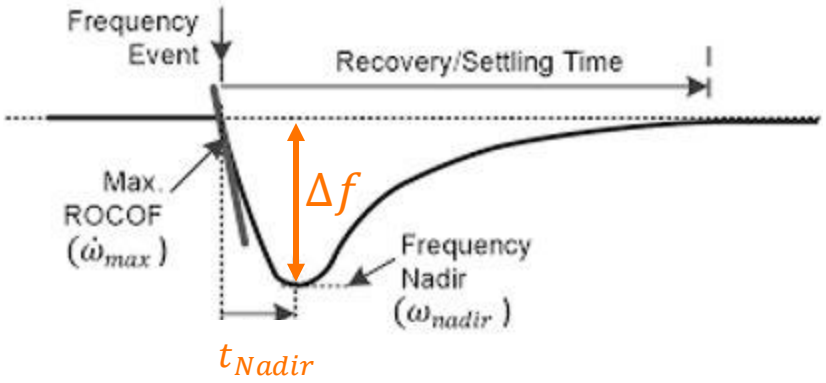


Load and generation difference during a change of Market Time Unit (MTU)



Generates a frequency deviation of more than 75mHz

DFD event inspection

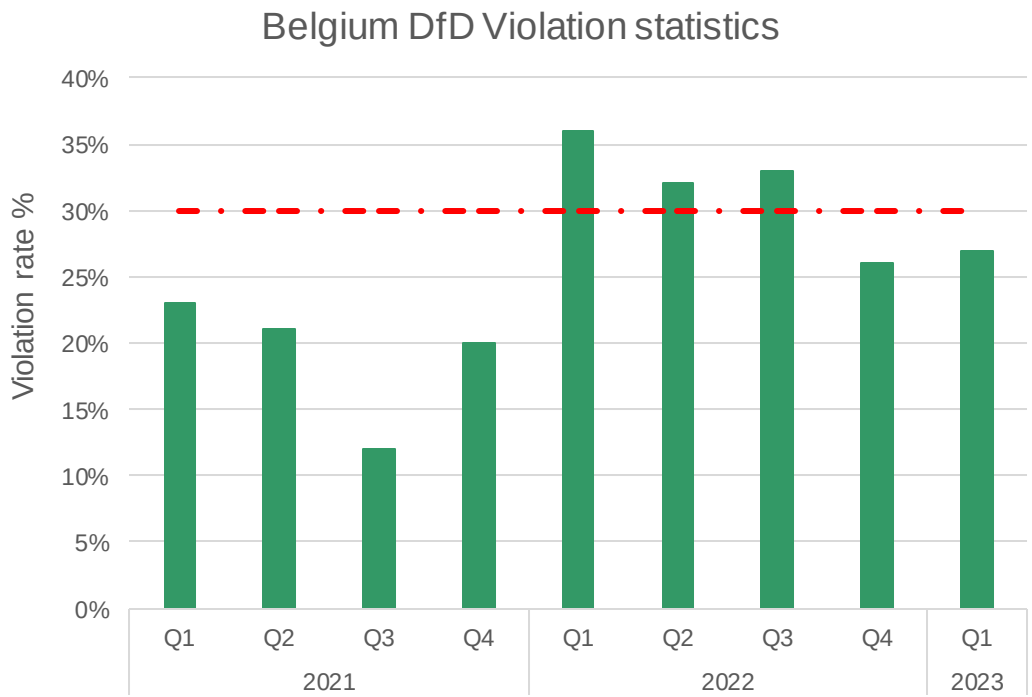


The frequency nadir is defined as the the moment the frequency reaches its extremum and where the ACE value will define the Elia ACE contribution

TSO contribution and regulation

The occurrence and amplitude of DFD's remain too high in Central Europe and **Elia's contribution is regularly above ENTSO-E limits**. (|ACE(t_{Nadir})| >217MW for Elia zone)

- Before 2022, Elia was exceeding its ACE limitation for less than 30% of the DFD events (ENTSO-E limit)
- From 2022, Elia is exceeding more often the 30% limit rate of DFD contribution



The ENTSO-e report on DFD of 2019 mentions that TSO's, which didn't implement any solution while the number of DFD's remains high would have to acquire additional reserves as default solution (= penalty).

Approach

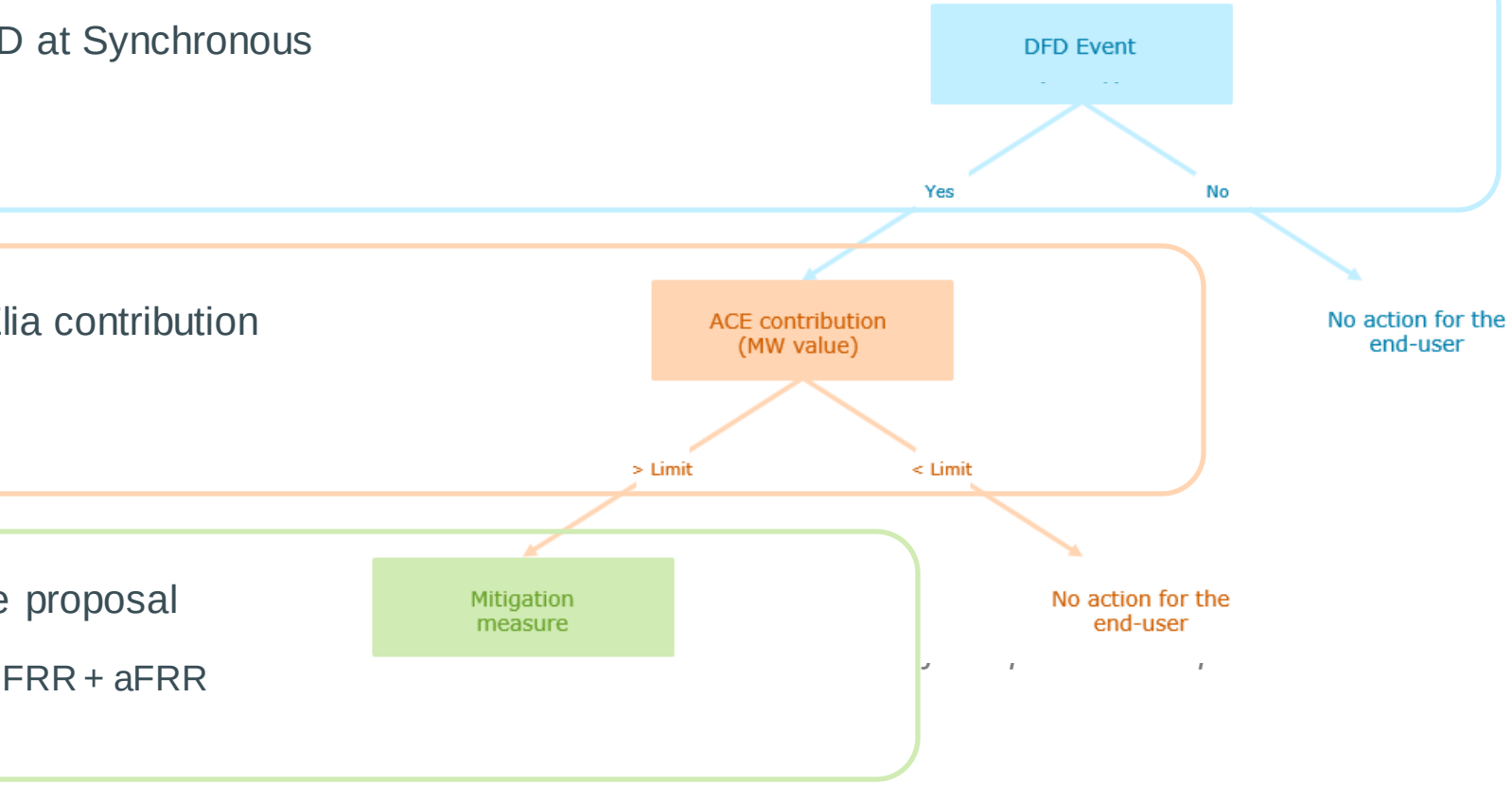
Two different Models and two different Set of Variables

1. Prediction of a DFD at Synchronous Area level

2. Prediction of the Elia contribution (LFC Block)

3. Mitigation measure proposal

→ mFRR / aFRR / mFRR + aFRR



Flowchart of the product scope

Models

Predicted variables and models characteristics

DFD Event

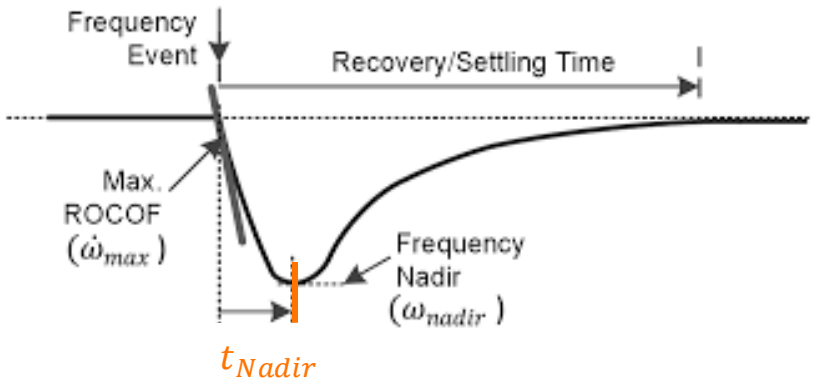
Categorical variable : -1 = Negative DFD (frequency drop)

0 = No DFD

1 = Positive DFD (frequency rise)

ACE contribution (MW value)

Continuous variable: <u>Instantaneous</u> ACE at the Nadir



Timing/Resolution/Forecasting

Start :	D-1 10 pm
Forecast Horizon:	96 Qh of the next day or the leftover of the day

DFD Event | ACE contribution (MW value)

Methodology

Model and data selection

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

Model

4 families of supervised machine learning models

Optimal training set length and model sensitivity

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

Data

Data identification

Correlation analysis

Features selection

- BorutaShap
- PCA
- RFE

Evolutive: features not selected today can be used in the future

Model setting and data collection

Model

Pipeline setup

Data

Data in datalake

Forecasting model in operation

Data preparation and cleaning

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

Training pipeline

Model tuning pipeline

Model parameter sweep

= Fine tuning of model

E.g.: Number of layers in a neural network model

Forecasting pipeline

Forecast

Model Results

DFD Event

Model Type	Precision	f1	Recall
Logistic regression	0,87	0,87	0,88
ANN (1 hidden layer)	0,89	0,89	0,90
SVM	0,898	0,90	0,90
Random Forest	0,897	0,90	0,90

Both SVM and Random Forest have a better Precision, f1 & Recall than ANN and Logistic Model.

ACE contribution (MW value)

Model Type	MAE (MW)	RMSE (MW)	Max Error (MW)	SD Error (MW)	R^2
Linear regression	77,56	106,62	498,84	106,65	0,29
ANN (1 hidden layer)	79,24	106,62	538,52	108,87	0,27
SVM	75,12	106,66	531,23	106,70	0,29
Random Forest	69,23	100,49	558	100,52	0,37

Random Forest improves the performance (Feature selection & optimization of the models will refine the selection of the models)

Disclaimer – Results, still under validation.

Mitigation Measures

Comparison of possible mitigation measure

Sensitivities were performed on:

The start and end time of the aFRR activation

The proportion of aFRR and mFRR used

Q3-Q4 2021 – Q1 2022	Status Quo	aFRR	mFRR	aFRR_mFRR
Costs per avoided violation upwards (k€) **		-11,7	-7,4	-13,4
Costs per avoided violation downwards (k€) **		21,6	94,8	107,3

Sensitivities on mFRR were not performed as mFRR was considered as not worth continuing the investigations on.

Sensitivity on aFRR	Q3-Q4 2021 – Q1 2022	aFRR	...	aFRR	aFRR	...
	Start	-7		-5	-2	
	End	7	...	2	7	...
	%age upward ACE violations solved	65%		40%	14%	
	%age downward ACE violations solved	52%		39%	26%	

Based on historical events and considering perfect forecast, we analyzed which of the potential mitigation measures was the most efficient one:

- aFRR: tuning of the controller output during a specific time window
- mFRR: additional mFRR activations
- aFRR + mFRR: a combination of the 2 other measures

The efficiency is based on the cost per avoided violation:

$$\frac{\Delta NRV\ costs}{\#ACE\ viol,old\ -\#ACE\ viol,new}$$

What it costs us to avoid a violation

The combination aFRR & mFRR offer a good option for upwards violations but not for downwards violations. On an operational point of view, in the awaiting for automation, it's easier and safer to consider an option that would be similar in both cases and that would require the use of only one product.

The option aFRR -5/+2 offers the best compromise as common measure for upwards and downwards violation (40% of resolution). This level of resolution is sufficient to reduce violations below 30%* in the worst observed period (Q1 2022) considering a forecast that is only correct 50% of the times.

So the **aFRR (-5/+2) seems to be the most pragmatic initial choice** even though it does not solve all violations.

*ENTSO-E threshold

** Sign Convention: (+) price to pay

Mitigation measure

Decision tree

AIM : Avoid the penalty (and so improve ACE quality) while not trying to solve all violations.

Cost for no action

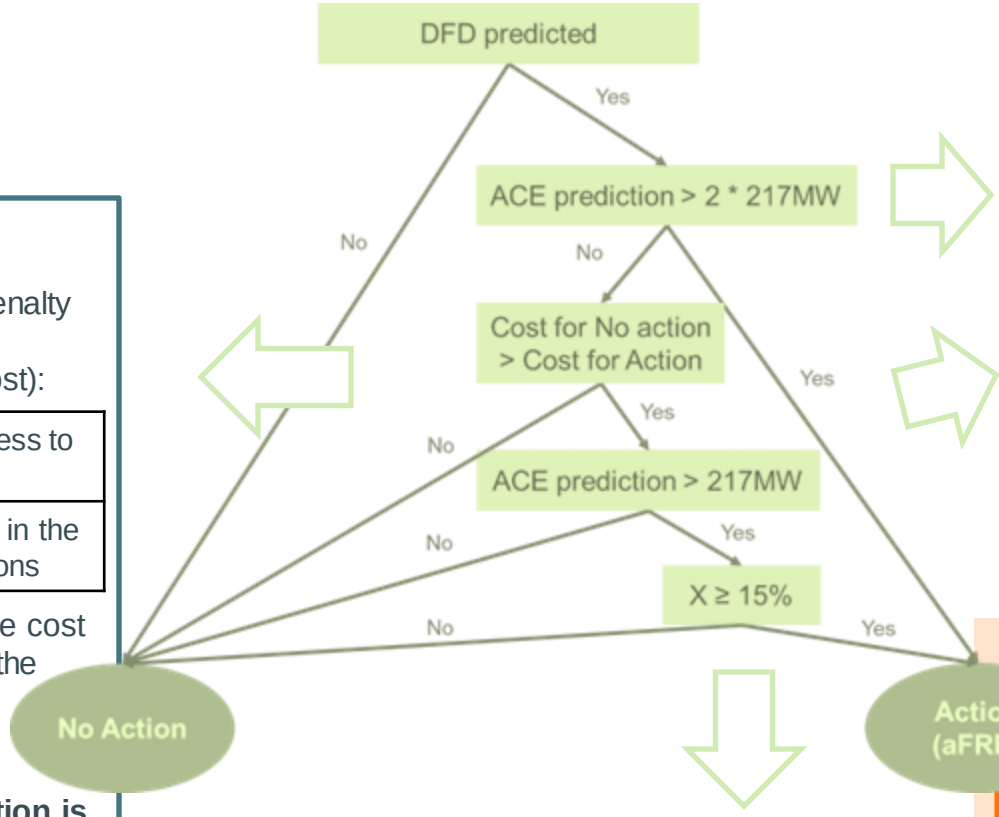
RISK: ENTSO-E considers applying a penalty for TSOs exceeding the cap of 30% of violations (cost for no action = penalty cost):

FCR	Cheaper	Pure penalty: useless to improve violations
aFRR	More expensive	Could slightly help in the reduction of violations

FCR has been considered to calculate the cost for no action as it is cheaper and as it is the main ENTSO-E proposal.

By extrapolating current capacity prices, analysis showed that the **cost for no action is currently higher than the cost for action.**

The cost for no action will be re-evaluated regularly.



Elia takes action only if a DFD is forecasted AND if the forecasted ACE contribution exceeds 217MW*

<u>Very large ACE contribution:</u>

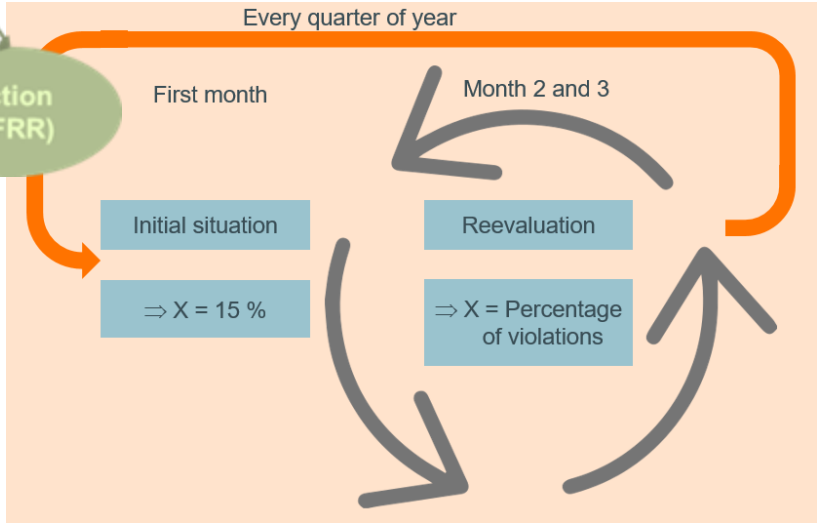
Elia MUST react in any case as no reaction could impact the network severely.

<u>(Normal) ACE contribution:</u>

Elia will react if the cost for no action is higher than the cost for action and if the number of violations is too close from the threshold of 30%.

X: Go-live with **a Monthly Update**

Target model aims for an updated value of the % of violation in real-time.



* 217MW: Elia Contribution Threshold

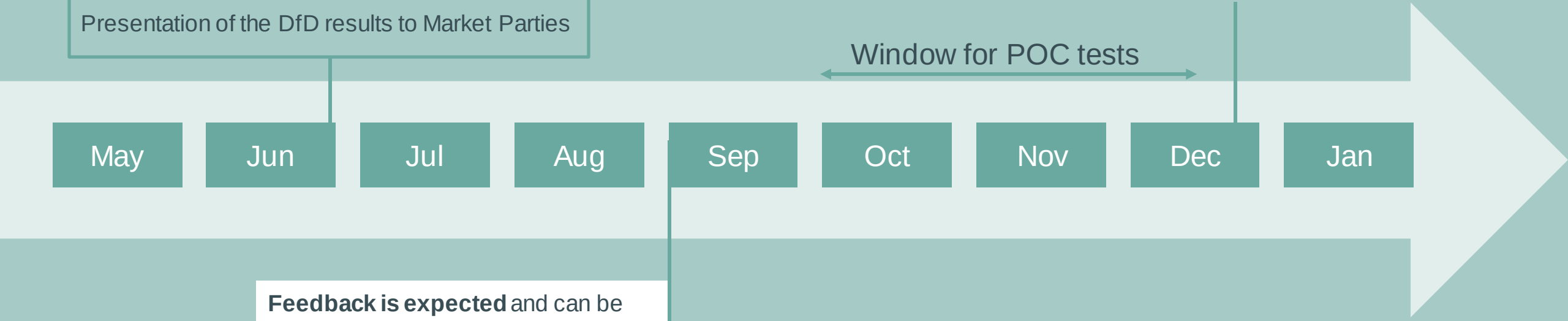
Next steps

29th June 2023: WG Balancing

Presentation of the DfD results to Market Parties

22nd December 2023: Final report

Window for POC tests



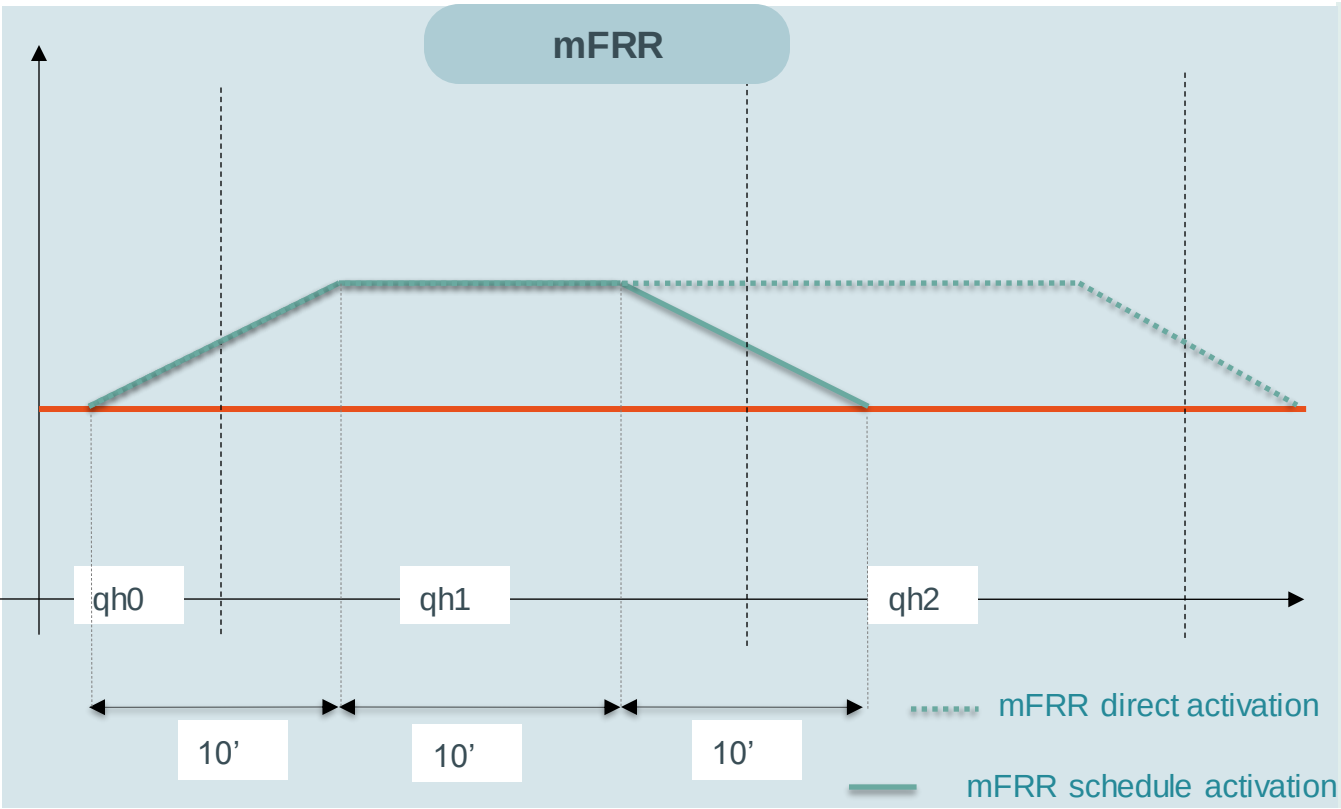
Feedback is expected and can be provided via e-mail to Arnaud Attanasi (Arnaud.Attanasi@elia.be) and Aline Mathy (Aline.Mathy@elia.be)

1st September 2023: Consultation of a draft report

CRI Filtering for aFRR

Arnaud Attanasi

Different filtering strategy for mFRR & aFRR

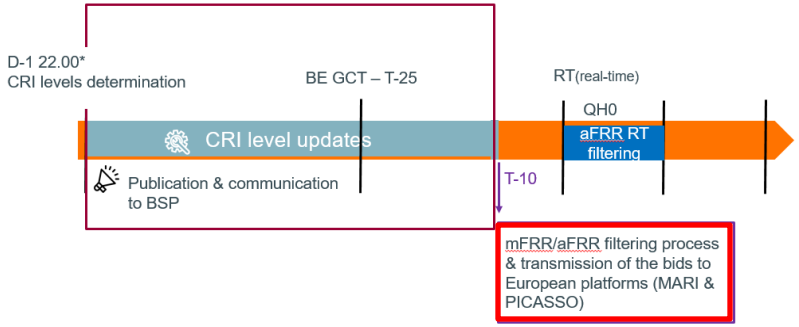


- Activation > 15’
- Activation request sent once before the activation

- Activations < 15’
- Activation request sent each 4’’

In order to **minimize the filtered volumes** and thanks to **the specificities** of aFRR, Elia will use a different filtering process for aFRR and mFRR

Conditions for filtering aFRR Energy Bids

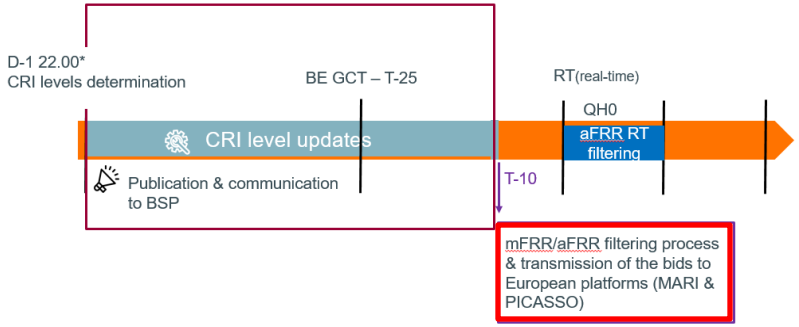


- aFRR Energy Bids will be filtered when following conditions are met
  1. The electrical zone of one of the DPs included in the aFRR Energy Bid is defined as High (or Medium CRI)

     AND
  2. The Real-Time Security Analysis based on measurements (every 5min) identified an overload on a network grid element due to aFRR activation

- This approach allows to reduce the occurrences of filtering of aFRR Energy Bids. It's suitable to aFRR because of the possibility to deactivate aFRR during a QH, reducing possible overloads to durations < 15 minutes, which is acceptable.

Process in case of filtering of aFRR Energy Bids

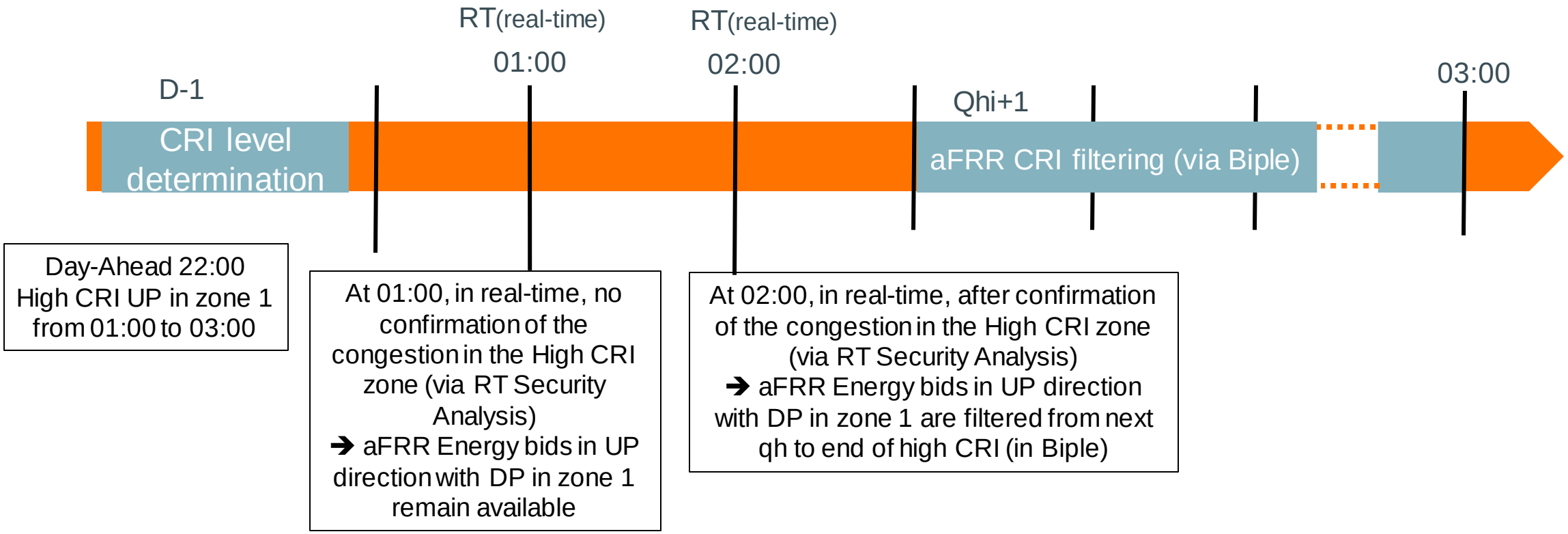


- **aFRR filtering**: In T-10 in case the conditions (previous slide) are fulfilled, the aFRR Energy bid will be filtered for the next QHs, and the BSP will be requested to make best effort to adapt his aFRR Energy bids in such a way that no volume would unnecessarily be declared unavailable (cf. BSP aFRR Contract Article II.11.18)

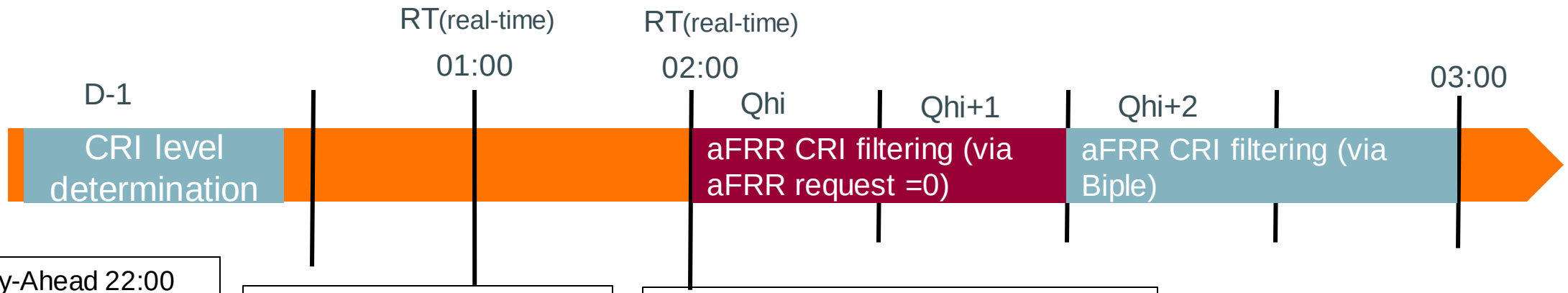
- **aFRR RT filtering**: in case the congestion needs to be solved during the QH due to grid element incident or violation of operational limits:
  - ✓ The aFRR requested of the BSP is instantly set to 0MW ➔ as portfolio activation is allowed and as the BSP receives only one aFRR Requested signal, this is the only way to avoid that the DP causing the congestion is delivering aFRR
  - ✓ The activation control will not be performed for that QH
  - ✓ Elia will provide an ex-post justification

- Important precisions :
  - ✓ If the overload occurs less than 10 minutes before the end of the QH, the aFRR Requested will remain at 0MW for the next QH
  - ✓ BSP aFRR Contract Article II.11.18 remains applicable even when reducing the filtering occurences. In order words, in case of medium or high CRI, the BSP will still receive a notification before aFRR Balancing GCT and the BSP is subject to the best effort obligation

Example filtering aFRR – inter qh – “happy flow”



Example RT filtering aFRR – inter qh – in extreme situations



Day-Ahead 22:00
High CRI UP in zone 1 from 01:00 to 03:00

At 01:00, in real-time, no confirmation of the congestion in the High CRI zone (via RT Security Analysis)
➔ aFRR Energy bids in UP direction with DP in zone 1 remain available

At 02:00, in real-time, after confirmation of the congestion in the High CRI zone (via RT Security Analysis) **& need to manage immediately**
➔ aFRR Energy bids in UP direction with DP in zone 1 are filtered from current qh to qh+1 (**via aFRR request = 0**) and from qh+2 to end of high CRI (in Biple)

How often?

See next slide

aFRR RT filtering: how often?

- Approach for this high-level evaluation
  - RT CRI filtering is assumed to occur when following conditions are met
    1. An aFRR bid with a DP in a high CRI zone is activated in the direction of the congestion
    2. An incident occurs
  - Focus on the most congested zone, with **~4%** occurrence of high CRI in 2022 in each direction
  - Bidding and activation data of 2022
- Taking into account that DPs in this electrical zone are used **18%** of the time and that the probability of an incident on a 150kV line is evaluated at **1,2%**, the resulting orders of magnitude is **3 events per year**.
- These numbers don't take into account:
  - The medium CRI levels, as the aFRR energy bids will be the first in line to benefit from the cap
  - The other electrical zones, which are much less but still sometimes congested, which should increase the occurrences
  - The best effort obligation for the BSPs to move their capacity obligation to other DPs, which should reduce the occurrences

AOB – Incompressibility actions

Anna Tsiokanos/ Amandine Leroux

Context

- The Belgian system has experienced several situations with incompressibility in the recent weeks
- In preparation of the summer period, Elia investigated the possible procedures that can be activated within the current legal framework

LFCBOA
Art. 7. 2 and 7.3

Balancing Rules
Art. 8.13.17

- Exceptional measures on top of balancing resources to reduce FRCE (cf. SOGL 152.12)
- Activation of units that cannot provide FRR ➔ Units or Volumes with Technical Limitations (~units > 25 MW that have the obligation to put their remaining margin at Elias disposal according to FGC*)
- Activation according to modalities of SA contract (RD bid activated to solve FRCE)
- Activation price (currently free and not cost based) is reflected in MDP and hence in imbalance tariffs

Process

1. Detection

- **1x/week , on Thursday 6pm**
- **UMM 1 :** Market informed of Incompressibility Risk for specific days and time periods
- **D-1 6pm:** if risk confirmed **UMM 2: Balancing Warning** calling for new downward volumes (as usually done when the downward balancing reserve could not be sufficient)

Thursday W-1
+ Bal. Warning D-1

SA sends RD bids

(see next slide)

2. Reception bids & Notification to Market

- After reception of bids at **D-1 8pm UMM 3* Market Results** with the received anonymized volume (MW shut down per MTU block, (Unique) Price €/MWh)
- *Elia is investigating whether the volumes are (also) published in ARC otherwise they will be published in the UMM on the IIP (inside info platform)

D-1 20h

3. Balancing

Full MO is followed according to balancing rules (aFRR, mFRR, Reserve Sharing with **UMM 4** as usually done when reserve sharing is activated)

EU Extraordinary procedure for frequency deviation

Follow-up Real-Time evolution

Continuous evaluation

Real-Time

4. Activation of RD bids (shut down)

- Once all balancing means are depleted while there is a significant amount and/or persistent ACE
- Elia may activate concerned RD bids following technico-economical merit order
- **Impact on imbalance price during ramping down** – typical period considered: 2Qh
- **Publication**: Activated Volumes and Marginal Prices will appear on the website in the "INTER-TSO" category

Long Balancing Activation

LC/NC: Limited and Not Coordonnable unit

How to introduce a “shutdown” redispatching energy bid?

Concerned Delivery Points

Production units included in SA Contract
Coordinable (C) : time to shutdown (Pmin to 0 MW) > 15 min
Limited Coordinable (LC)
Non Coordinable (NC)

Trigger = publication on Thursday week W-1

for **each day identified “at risk”** in the publication, process hereunder should be followed

Process = existing SA contractual framework

DA schedule submission process, for period 10:00 to 16:00

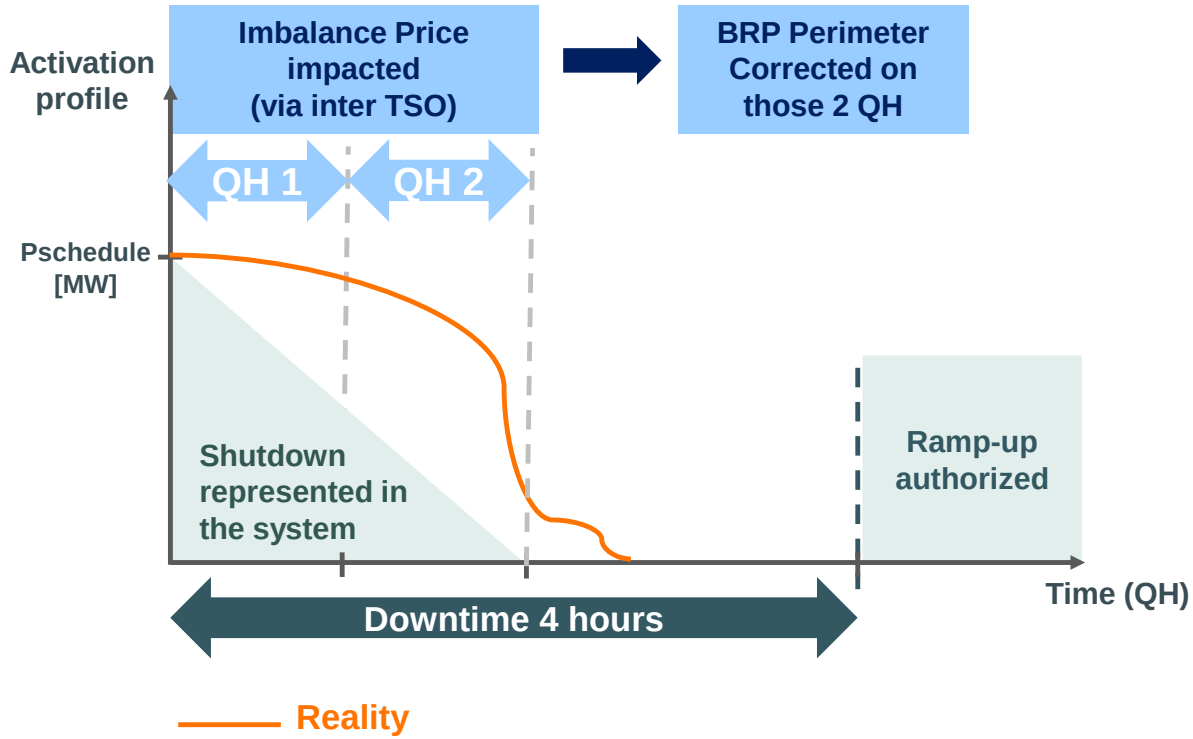
- ✓ Submit prices (≠ 13 499 €/MWh) per quarter hour
- ✓ Volume determined implicitly (difference between schedule and 0 MW)

Activation Profile

Elia will request the shutdown **on 2 QH (30min)**

⇒ **Total cost** should take into account:

- ✓ A stop of 4 hours
- ✓ Start-up cost (if relevant)
- ✓ Total volume to shut down will be divided into two equal part spread over the 2 QH



AOB – Next WG Balancing

Loup Vanderlinden

Next WG Balancing

- WG Balancing 27/09/2023 09:00 – 13:00
- WG Balancing 14/11/2023 14:00 – 18:00