8th Working Group
Consumer Centric Market Design

Elia – 14th November 2023

Wifi Access

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Agenda

- Co-existence of explicit and implicit flexibility for an efficient system
- E-Law & ToE Rules : status of the update
- Update on metering requirements

Co-existence of explicit and implicit flexibility - an efficient system

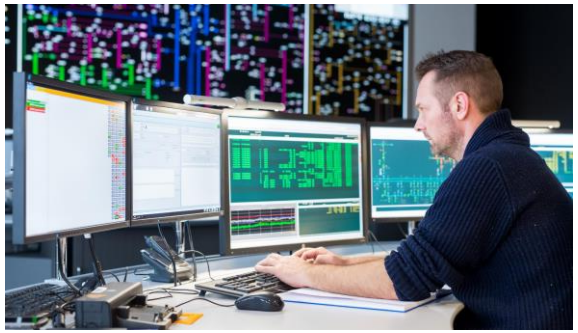
Supporti… paradigm shift with a real-time price…

Slide presented in WG CCMD on 27th October 2023

…s need a **clear signal** to determine the right moment to …gage flexibility :

✓ **Explicit activation** by System Operator

"Volume based" Flexibility



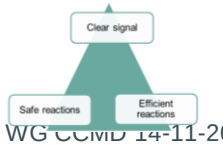
Explicit participation in the system comes with **technical and administrative constraints** that not all assets can afford ➔ in addition to the efforts made in order to **reduce entry barriers** to FRR products, **another possibility** has to be offered to assets to participate in the system in order to **capture the whole flexibility available.**

Focus of today's meeting

✓ **Implicit financial incentive, or Real-Time Price**

"Price based" Flexibility

Elia is therefore engaged in an **evolution of the imbalance price** in order to provide a clear price signal triggering safe and efficient reactions from the remaining flexibility to help **balance the system.**



From a theoretical perspective, the central balancing model* could seem appealing from a TSO perspective…

- ✓ The TSO is omniscient about the availability and price of the flexibility in the system

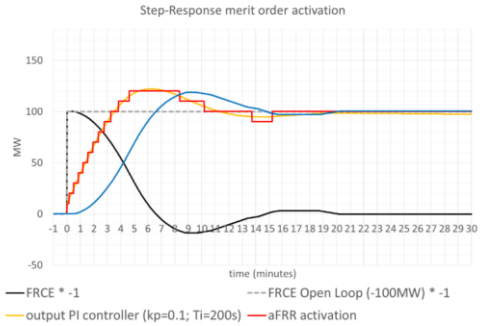
  The flexibility is put at the TSO disposal through *explicit* bidding

- ✓ This flexibility is firm

  There is an obligation to deliver in case of activation and it is subjected to activation control

- ✓ The TSO can regulate the system at a 4 seconds time scale

  aFRR demand can be adapted on a 4 seconds basis



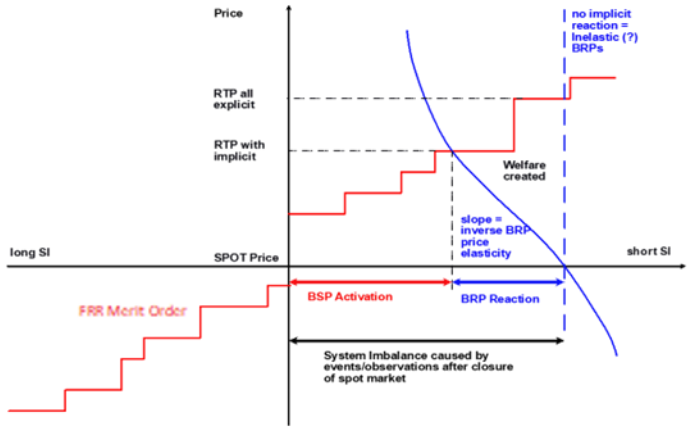
* Model relying only on explicit activations to balance the system

… however, in the practice, a fully centralized balancing model comes with several shortcomings

1. Loss of social welfare

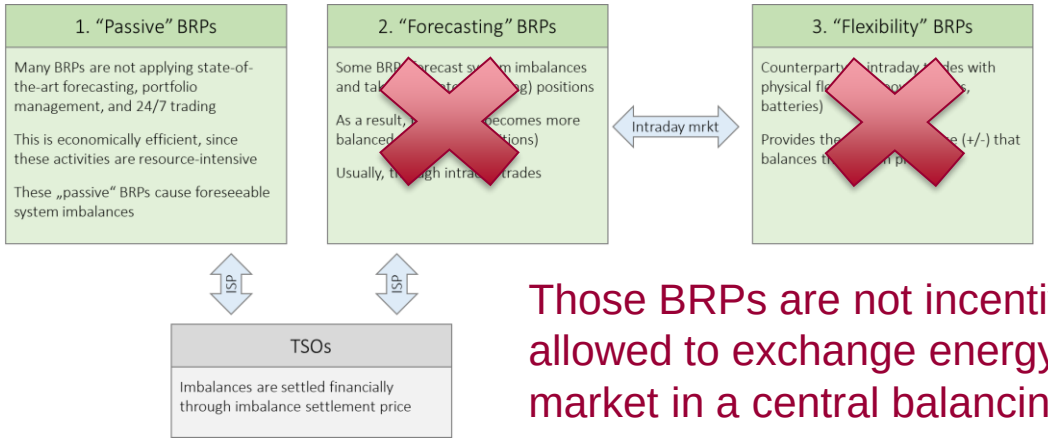
In the practice not all the assets are able to participate explicitly in the system (e.g. slow units with FAT incompatible with FRR requirements, industrial processes for which the available flexibility strongly depends on non electrical related business, small decentralized assets not compliant with the minimum technical requirements of FRR products, etc.).

In this reality, a full centralized model implies a loss of welfare:



… however, a full centralized balancing model comes with several shortcomings

2. Inefficient price back-propagation leading to the exclusion of some technologies from system participation (foreseeable imbalances not translated into a dispatch signal before balancing timeframe)



Those BRPs are not incentivized/not allowed to exchange energy on the ID market in a central balancing model

➔ Foreseeable imbalances are not solved/not translated into a dispatch signal before the balancing timeframe, which, by definition, excludes all the units unable to participate to the used balancing products from the resolution of residual imbalances (and hence de-optimizes the dispatch)

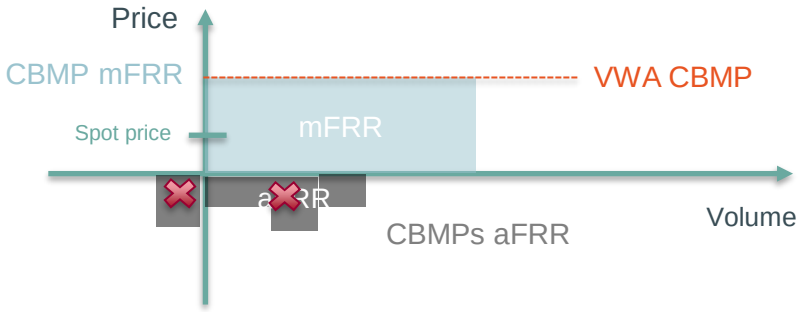
… however, a full centralized balancing model comes with several shortcomings

3. Implicit reactions are unavoidable anyway under the current EU regulation

EBGL, art 55.4: ”The imbalance price for negative imbalance shall not be less than the weighted average price for positive activated balancing energy from frequency restoration reserves and replacement reserves”

= marginal prices (CBMP)

An imbalance price based on marginal prices of activated FRR always provides a financial incentive to react implicitly, even in the (unrealistic) case where all the flexibility would be offered to the TSO explicitly.



No aFRR activated in the positive direction (the TSO demand is fully netted and the aFRR CBMP is negative) but imbalance price equal to very positive mFRR CBMP ➔ aFRR units have financial incentive to produce more and have a positive RT imbalance

Even with a legal obligation to be balanced, implicit reactions are unavoidable (see German experience, TSOs which apply centralized balancing model that fear for the connection to the EU platforms, etc.). It therefore seems more efficient to allow and actively manage these implicit reactions than having to deal with unexpected, uncontrolled and illegal implicit reactions causing inefficiencies/grid issues.

Elia therefore believes that a model where implicit participation is recognized/ allowed and perfectly complements the explicit activations is more efficient than a fully centralized balancing model

In such a model, explicit and implicit participations co-exist and are both facilitated as far as possible.

Even when implicit reaction is allowed, several incentives to participate explicitly in the system remain:

- ✓ Access to a wider EU balancing market
- ✓ (Min) activation price known ex-ante (actual price based on PAC)
- ✓ Possible capacity fee
- ✓ Transfer of activation decision and risk to TSO

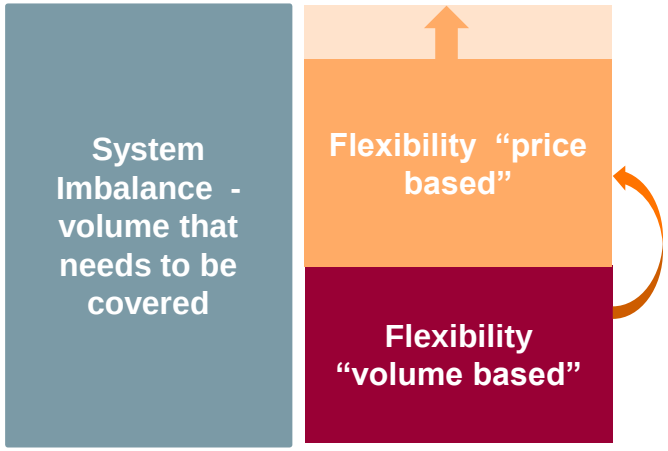
However, this model acknowledges the presence of implicit reactions and steers them/takes them into account to balance the system in the most efficient way.

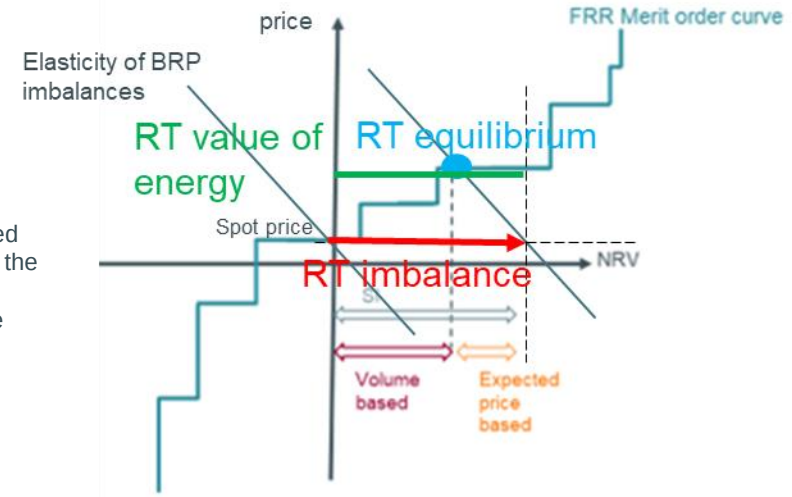
To balance the system in the most efficient way, Elia intends to develop a Smart Balancing Controller

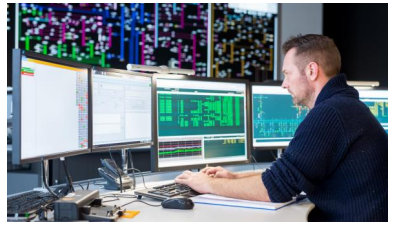
The objectives of the smart balancing controller are twofold :

1. **Propose the local TSO demand for mFRR Balancing Energy** for the next quarter-hour
2. **Calculate the forecast of the RTP** (in order to stimulate cost-effective price-based reaction)

In order to reach the most efficient RT equilibrium.





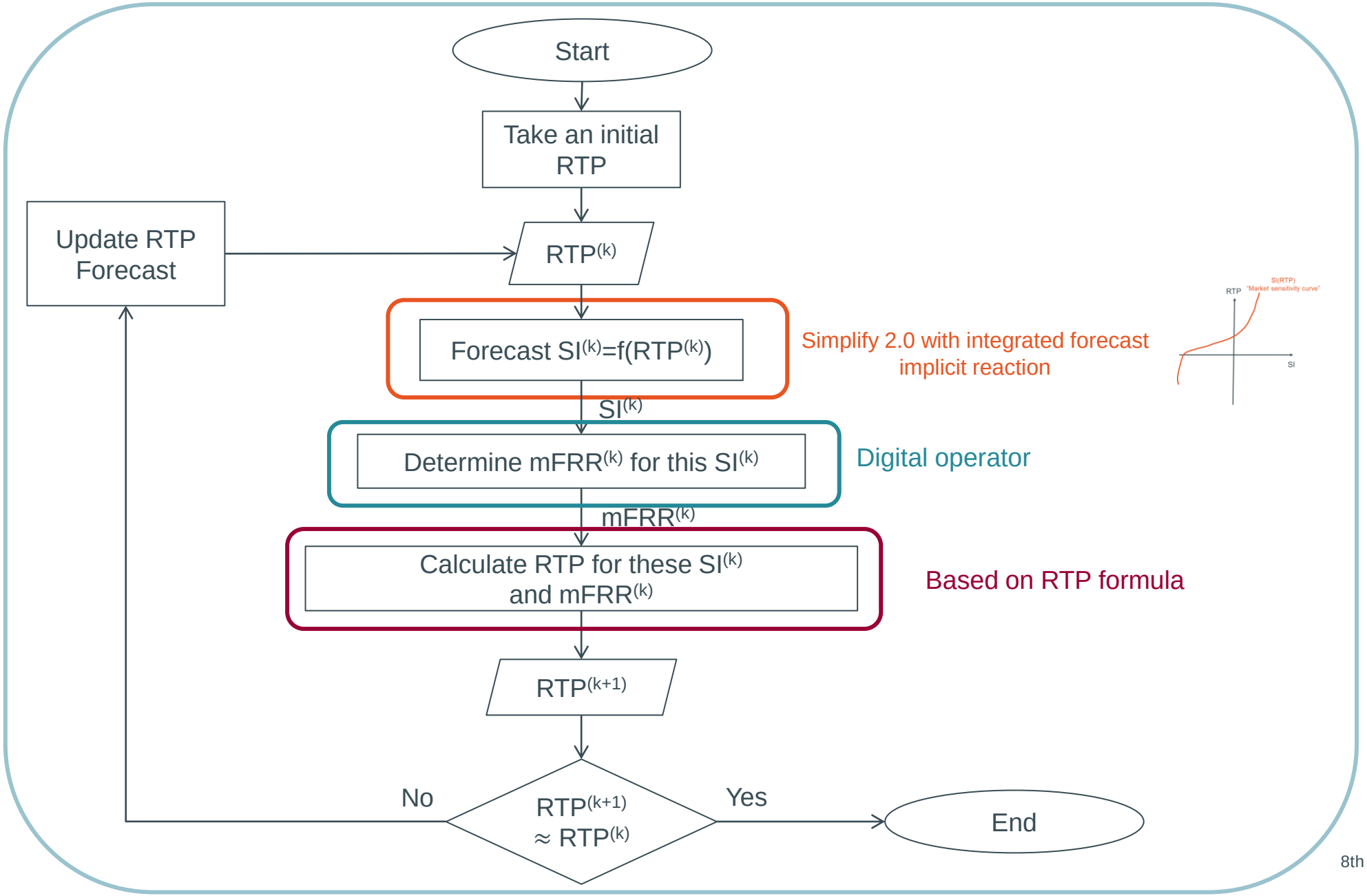


Today's way of functioning:

For a given System Imbalance to be solved the dispatcher activates an explicit volume of balancing energy +/- lower than the effective SI knowing/guessing that there will be a certain volume of price-based reaction.

Smart Balancing Controller – building blocks

/!\ the illustration below is just an example to fix the ideas regarding how the algorithm could look like



Simplify 2.0 with integrated forecast implicit reaction

Digital operator

Based on RTP formula

Integration of the different building blocks to form the smart balancing controller*

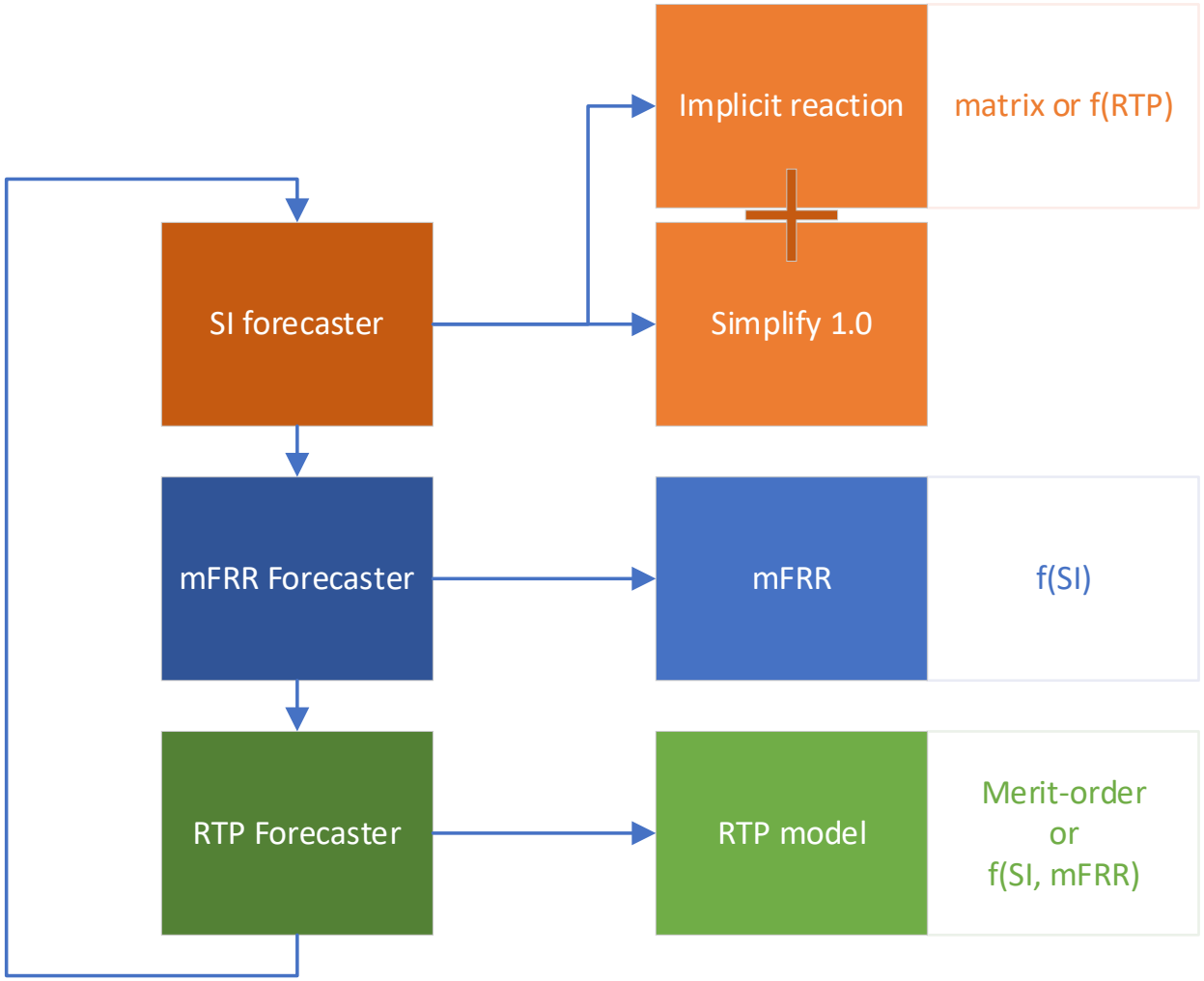
** Based on local situation (before connection to EU BAL platforms) otherwise an additional forecasting module is probably required to forecast platforms clearing prices*

Smart Balancing Controller – Proof of Concept

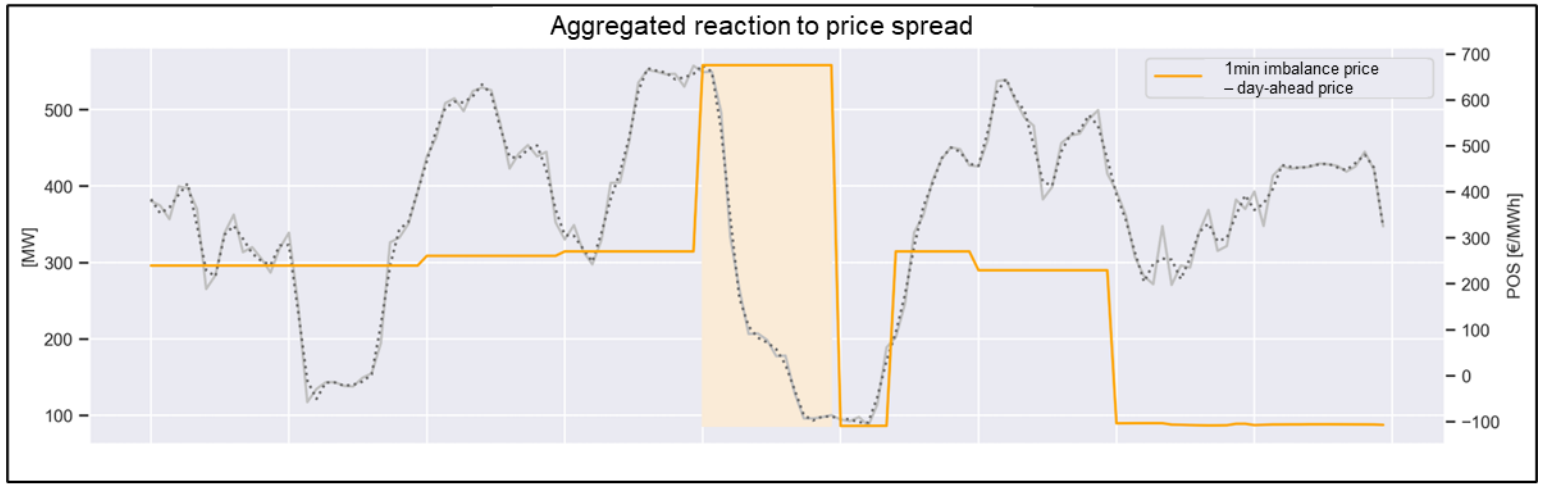
Proof of concept for the Smart Balancing Controller aims at:

- Test the loop convergence, the calculation time, etc.
- Gather feedback from market engineers on SI forecast
- Perform what-if analyses

SBCPortal (consumercentricity.io)

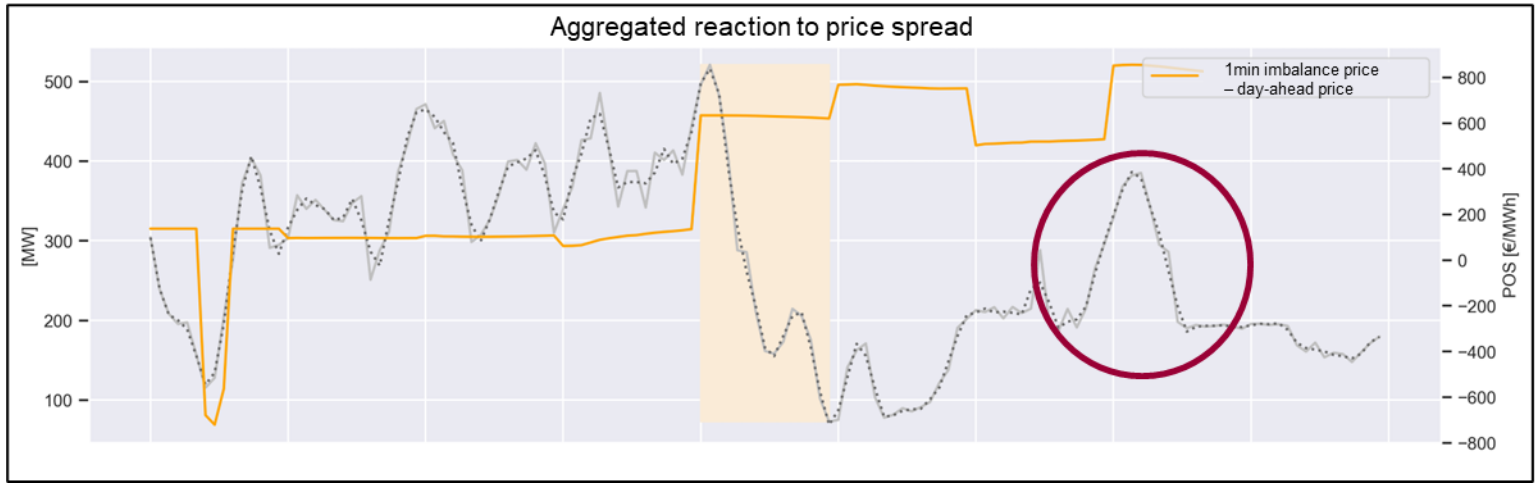


Implicit reaction at demand side – Examples



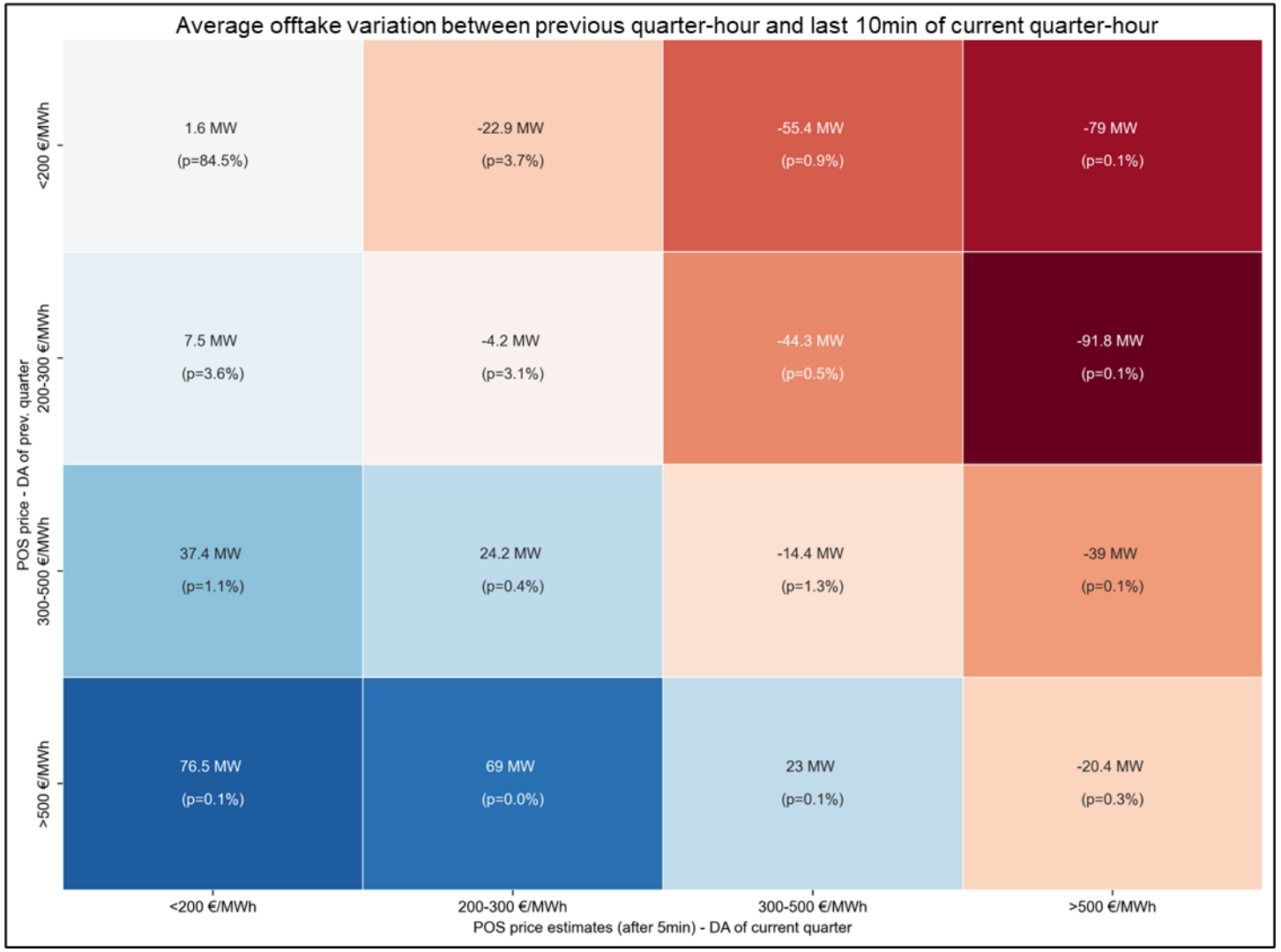
The consumption decreases steeply when the imbalance prices are high.

In the example, this leads to a reaction of more than 400MW upwards.

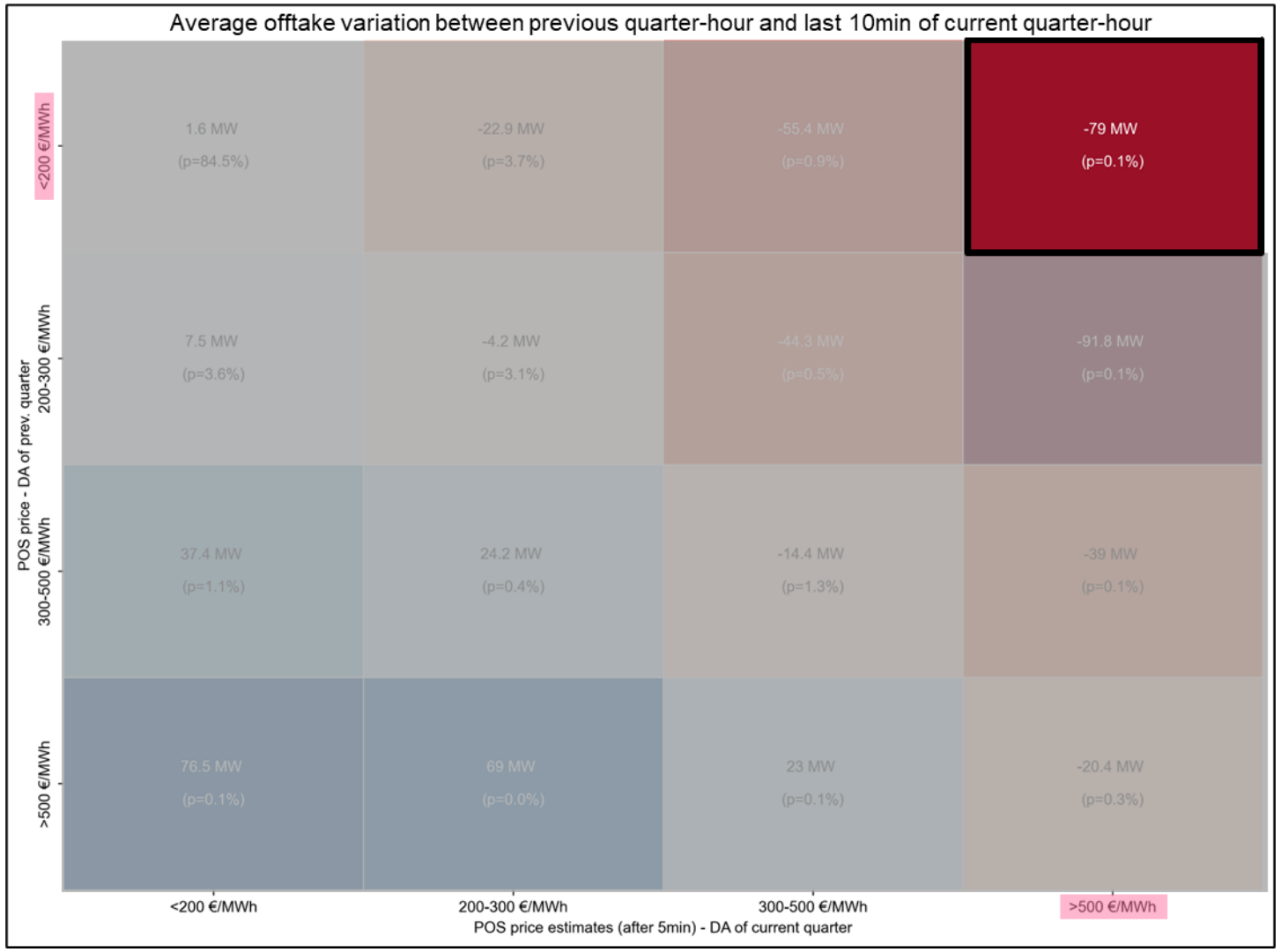


In case the imbalance prices stay high, the consumption stays low. Nevertheless, the consumption profile is not flat which shows a possible incompatibility with explicit flexibility.

Quantification of the implicit reaction at demand side



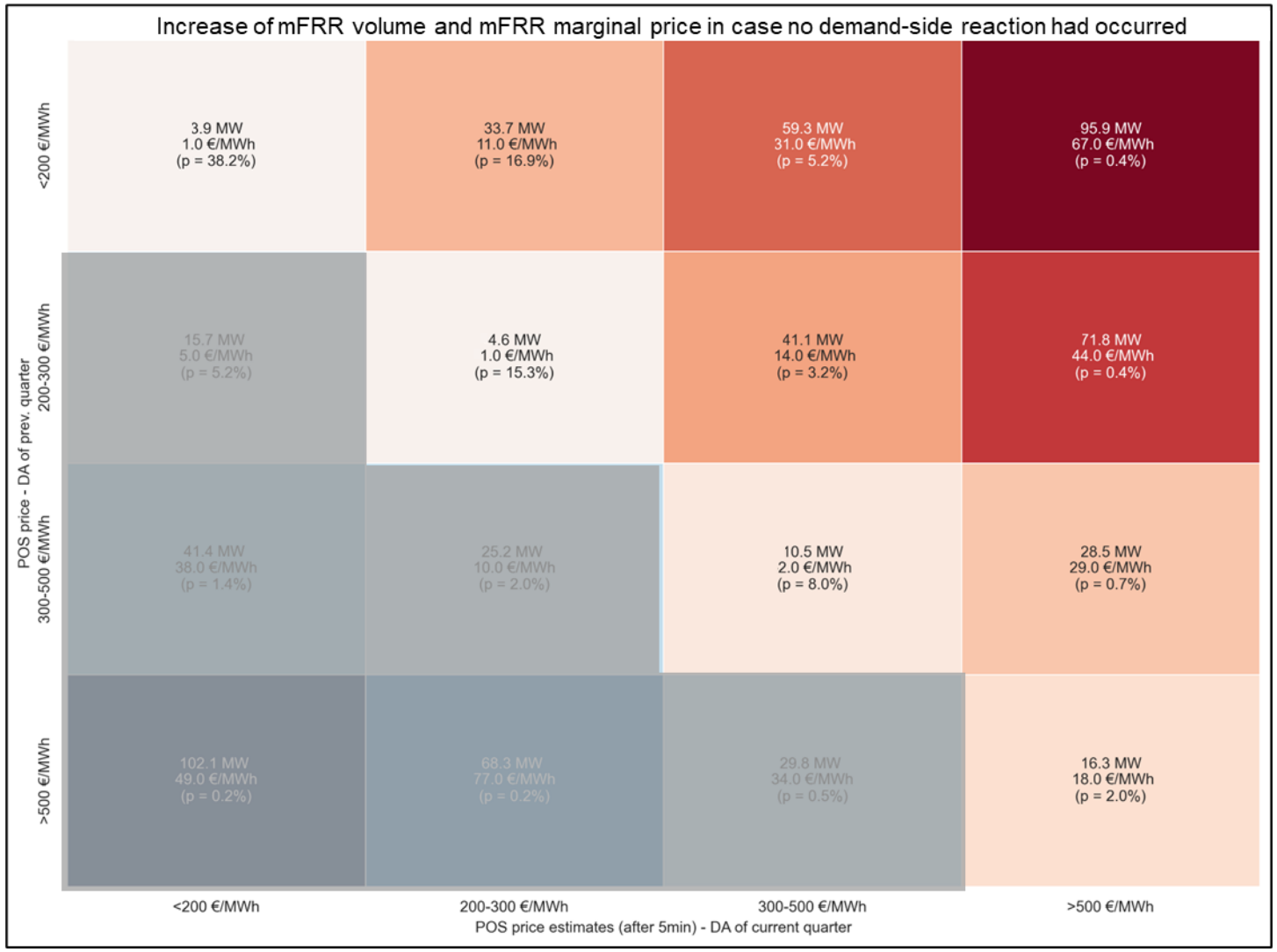
Quantification of the implicit reaction at demand side



How to read this graph ?

- Previous quarter-hour spread: <200€/MWh
- Current QH spread (at 5min): >500€/MWh
- Average offtake variation: -79MW

Theoretic impact on mFRR Up volumes and prices



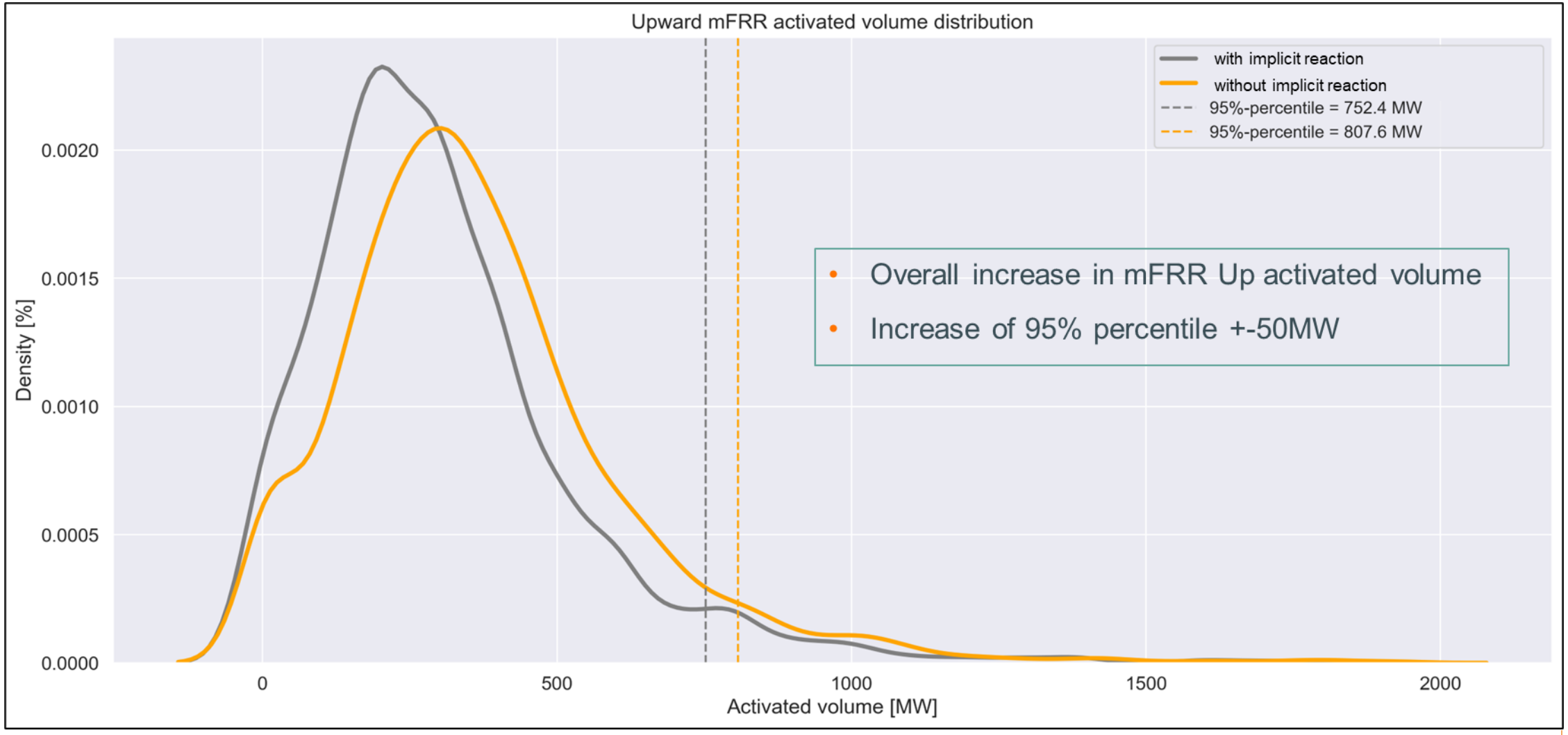
Hypothesis : the implicit reaction has not occurred and needed to be activated as mFRR (upwards). Only quarter-hours with mFRR activation are considered.

Results :

- the average mFRR Up volume that would have been activated
- the average mFRR Up marginal price increase
- the occurrence

Theoretic impact on mFRR Up prices distribution

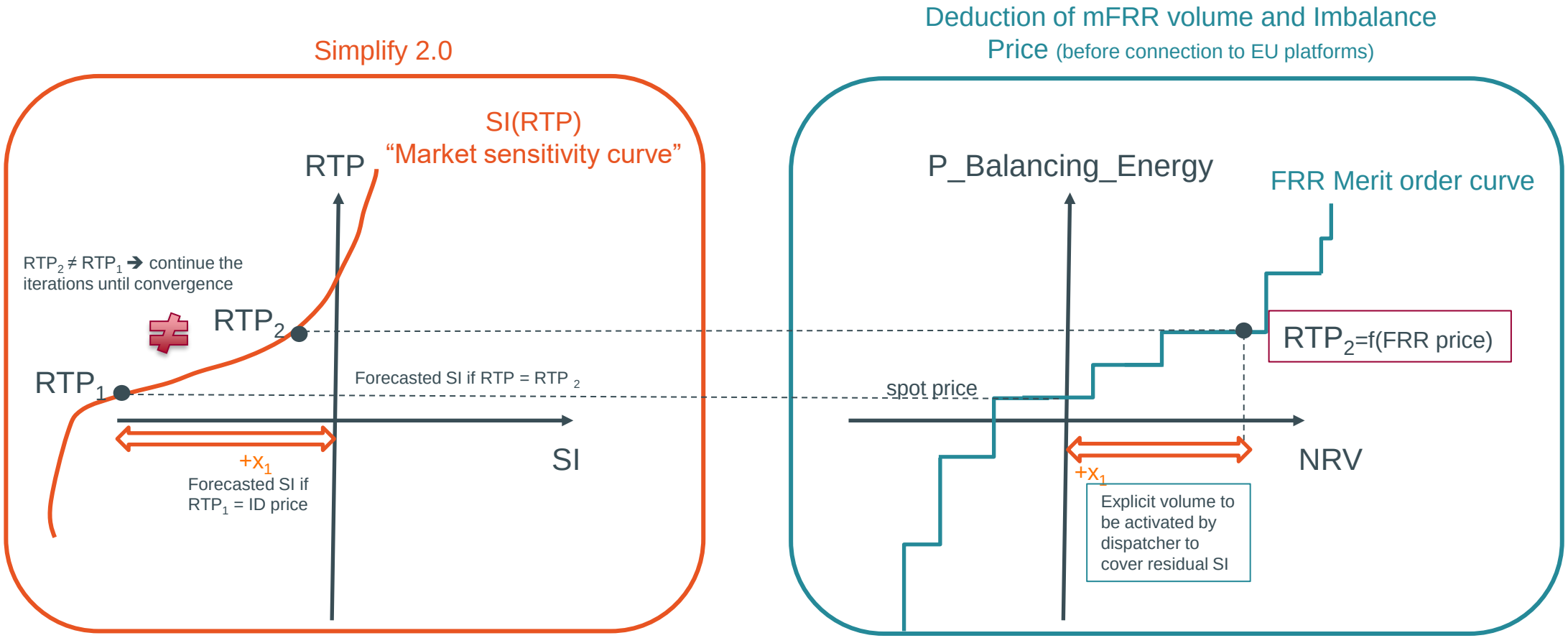
Theoretic impact on mFRR volumes distribution



Back-up slides

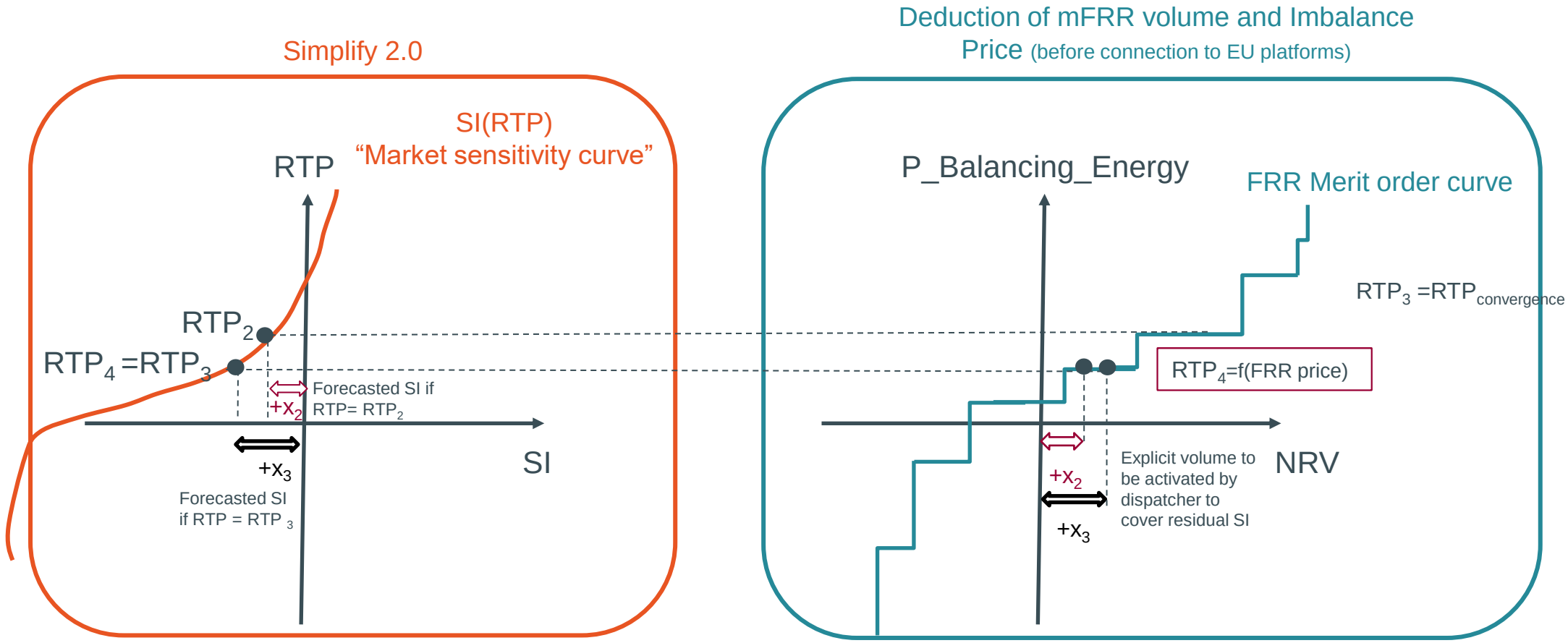
Example of Smart Balancing Controller convergence…

Simplified example assuming a purely local balancing market under copper-plate conditions



Example of Smart Balancing Controller convergence…

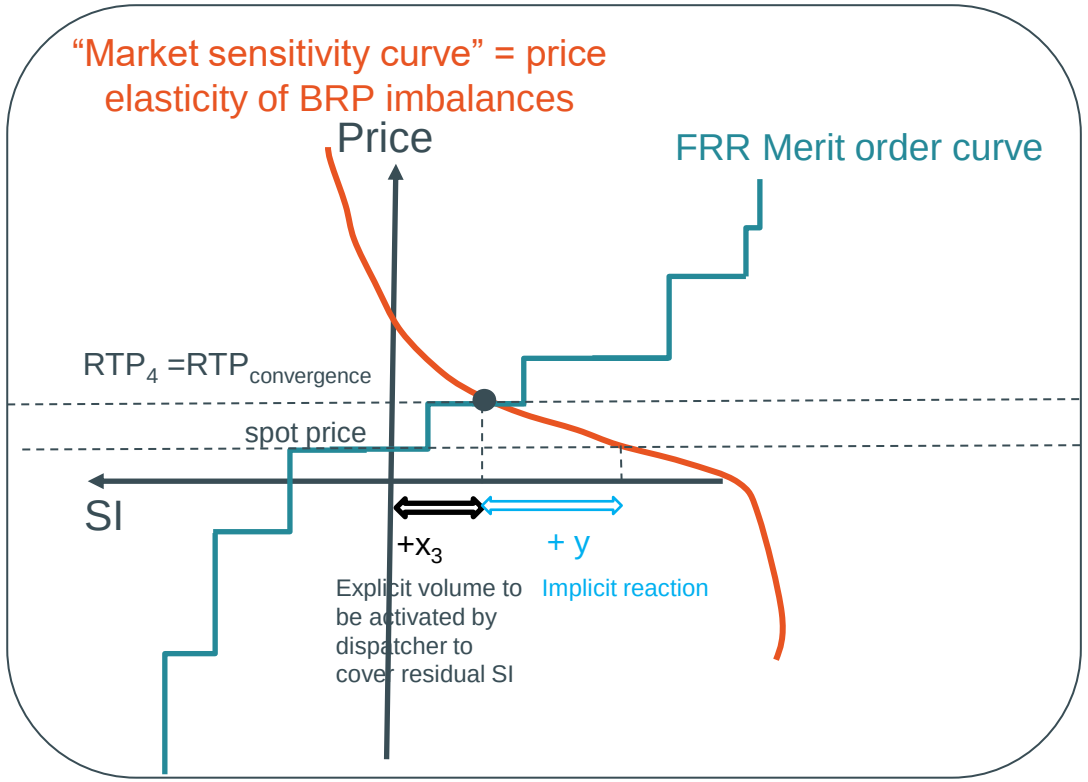
Simplified example assuming a purely local balancing market under copper-plate conditions



…Towards RT equilibrium

Simplified example assuming a purely local balancing market under copper-plate conditions

RT equilibrium



Output of Simplify 2.0
y = forecasted Implicit reaction for a RTP = RTP $_{convergence}$

deduction: x3 = explicit volume to be activated by dispatcher in order to among others set the RTP

E-Law & Transfer of Energy Rules - Status

Elia is currenctly working on next release of ToE rules which will offer several new possibilities

1. Content:

Current ToE Rules

- 3 regimes:
  - ToE with aggregated compensation BSP→ Supplier
  - Opt-Out
  - Pass-through
- ToE is imited to DP_{PG} offtake only
- Market Segments:
  - mFRR
  - SDR
  - DA/ID
  - aFRR : Opt-out and PT only

Next Release ToE Rules

- 4 regimes:
  - ToE + aggregated compensation BSP→ Supplier
  - ToE + individual correction
  - Opt-Out
  - Pass-through
- ToE is also open to DP_{PG} injection
- Market Segments:
  - mFRR
  - SDR
  - DA/ID
  - aFRR : Opt-out and PT and two ToE regimes

2. Planning

Elia is currently preparing the above mentionned changes in anticipation of the amendement of the E-law

Public consultation will be launched asap depending on the planning of this E-law amendement

Exact phasing of above mentionned evolutions, especially @DSO grid, is under assesment and will formally be discussed within synergrid

Metering requirements – Update

Introduction

Submetering requirements

- Elia has published the following documents on the website:
  - General technical requirements for submetering solutions.
  - Technical requirements for private measurement devices (for aFRR).

- Measurement Instrument Directive (MID) and Koninklijk besluit betreffende meetinstrumenten is applicable for energy meters and is currently to be followed for each financial transaction.

In the framework of the go-live of multiple BRP, energy communities and explicit flex for grid users connected to the Elia grid and the opening of aFRR low voltage, Elia has performed a thorough analysis of the submetering requirements.

Updated submetering requirements for grid users (of Elia and CDSs) connected to the federal transmission grid

Updated submetering requirements

Applicable for:

- Multiple BRP
- Energy communities
- Balancing services
  - mFRR (energy)
  - aFRR (power)

Some requirements can be weakened while still allowing acceptable deviations

- TI/TPs of 1% out of market
- Alignment of TI/TP accuracy
- Lower requirements for existing installations

AS IS situation

Connecting power	Minimum accuracy class of components in the submeter device		
	TP	**TI**	**Wh/W**
> 20 MVA	0,2	0,2s	0,2s
>= 5 MVA < 20 MVA	0,2	0,2	0,2
>= 1 MVA < 5 MVA	0,2	0,2	0,5
>= 100 kVA < 1 MVA	0,2	0,5	1

Situation as from 01/12/2023

Connecting power	Minimum accuracy class of components in the submeter device		
	TP	**TI**	**Wh/W**
> 10 MVA	0,2	0,2	0,2s
>= 5 MVA < 10 MVA	0,2 (*)	0,2 (*)	0,5s (*)
>= 1 MVA < 5 MVA	0,2 (*)	0,2 (*)	0,5
>= 100 kVA < 1 MVA	0,5	0,5	1

(*) Elia can allow an accuracy of 0,5 for installation put into service before 01/12/2023

Updates are marked in red

MID requirements for assets smaller than 100kVA

- Currently, any **financial transaction** with **energy meters** including customer billing **(**xBRP, energy communities, mFRR and aFRR with Transfer of Energy), **requires MID compliancy, i.e 2% accuracy**

- But currently MID requirements are potentially too stringent for an effective flexibility market for assets smaller than 100 kVA
  - **Market assets like EV chargers and heat pumps are currently in many cases not meeting the MID requirements**
  - If MID is to be required, Elia would have to **disqualify almost all current meters** (assets), including all embedded meters.
  - The benefit of adding an **additional MID meter** would be **insufficient to cover the additional costs**.
  - → The current EU legislation on metering requirements is drafted having smart meters (at access point) in mind and is not fitting the need of introducing flexible assets (submetering) in the flexibility market
  - → Elia ***would encourage to allow a derogation for submetering from the EU legislation or (or to be modified to fit purpose for submetering)***

Proposed submetering requirements for the future

- For assets with connecting power smaller than 100 kVA, actually observed **accuracy levels are up to 10%** and not MID compliant.

- **Submetering requirements between 2% and 10%** depending on the connecting power should be the target for the future.

- Elia wants to evolves for **all flexibility services** towards these accuracy requirements either via a **derogation of MID or via a modification of MID**.

Submetering requirements aligned with MID for today

However, Elia must today still be compliant with MID for energy meters, leading to the following proposal:

Applicable for:

- Multiple BRP
- Energy communities
- Balancing services
  - mFRR (energy)
  - aFRR (power) Transfer of Energy (including individual correction)

Situation as from 01/12/2023

Connecting power	Minimum accuracy class of components in the submeter device		
	TP	**TI**	**Wh/W**
> 10 MVA	0,2	0,2s	0,2s
>= 5 MVA < 10 MVA	0,2 (*)	0,2 (*)	0,5s (*)
>= 1 MVA < 5 MVA	0,2 (*)	0,2 (*)	0,5
>= 100 kVA < 1 MVA	0,5	0,5	1
< 100 kVA	NA	0,5	2 (**)

(*) Elia can allow an accuracy of 0,5 for installation put into service before 01/12/2023
Updates are marked in red
(**) IEC norm of 2% corresponds to MID 3,5% class A

Proposal for update of submetering requirements for all grid users

Proposed submetering requirements – aFRR without Transfer of Energy

- For aFRR without transfer of energy, only **power meters** are required and consequently, compliancy with MID is not required.
- Therefore, less strict metering requirements are already today possible for assets below 100kVA

Connecting power kW	Requirement inaccuracy [IEC terminology]
≥ 32 <100	2%
≥11 < 32	3.5%
≥4 < 11	6%
< 4	10%

Assumption:

- Small assets are combined in a **portfolio with a minimum bid size of 100 kW**
- The minimum portfolio accuracy is simulated **to be compliant to the IEC norm 2%** (MID 3,5% class A), however, the MID compliancy is not required on individual asset level

These metering requirements will be proposed to the regional regulators in the context of the opening aFRR LV via the relevant documents of Synergrid.

Summary and next steps

Summary and next steps

Elia relaxed the metering requirements where possible:

- For assets larger than 100kVA, alignment of TI and TP and considering already existing installations (for grid users of Elia and CDS connected to the federal transmission grid).
- For aFRR (<100kVA) without Transfer of Energy no energy meters are required and thus no MID compliancy is needed.

Today, Elia must be compliant with MID for energy meters for assets smaller than 100kVA.

Elia wants to evolves for all flexibility services towards the **accuracy requirements between 2% and 10%** either via a derogation of MID or via a modification of MID.

For moving forward, Elia will draw attention to this topic at European and national level and will advocate for an update of the EU legislation or a derogation.

Thank you for your participation

Next Working Group CCMD: **18th of December @9h30**