



7th Working Group Consumer Centric Market Design

Elia – 27th September 2023

Wifi Access

Username: usersgroup@elia.be

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Agenda

- **Real-Time Price : why & what?**
- **Status on E-Law update & way forward for CCMD Services**
- **UsersGroup resolution on a recommendation to accelerate the development of flexibility**
- **AOB**

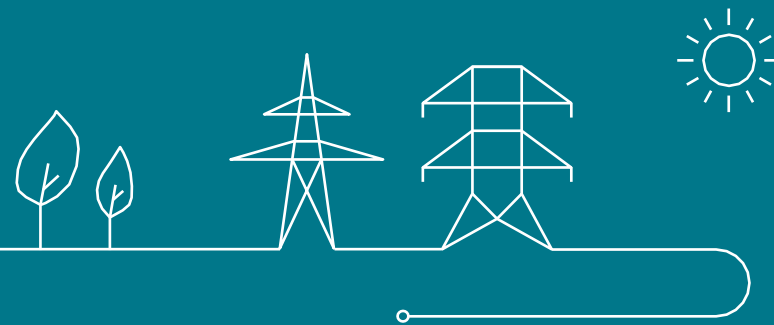
Real-Time Price Why & What?

Suggested timeline for the co-construction of a vision/roadmap for RTP evolutions

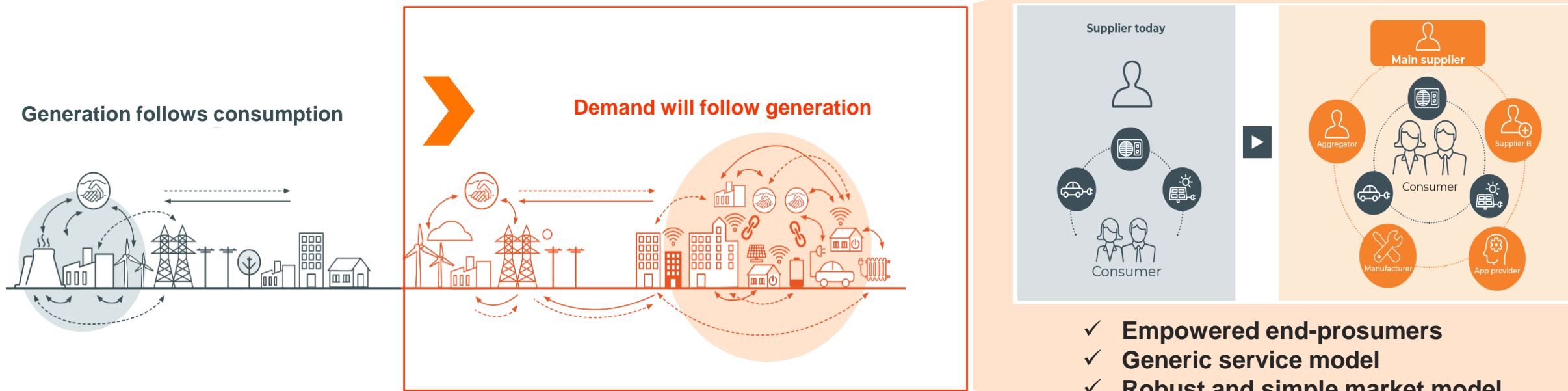


Why a “real-time price”?

Why should the Imbalance Price evolve?



The roadmap to net zero implies a paradigm shift



Supporting the paradigm shift with a real-time price...

Flexible assets need a **clear signal** to determine the right moment to engage 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**.

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

“Price based” Flexibility

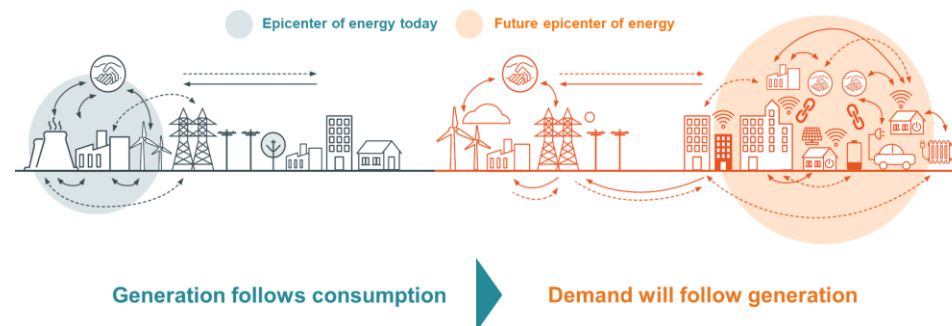


Elia is therefore engaged in an **evolution of the imbalance price** in order to provide a clear price signal triggering safe and efficient reactions from the remaining flexibility to help **balance the system**.



... i.e. an imbalance price evolving from a penalty to a clear incentive for all BRPs

The current imbalance tariff is a **penalty** for the **imbalances** (in the wrong direction) of BRPs who have **the legal and physical obligation to be balanced** (or, in some conditions**, help the system) in real-time



The future imbalance tariff should provide a clear **incentive** to **all BRPs** to help balance the system in real-time.

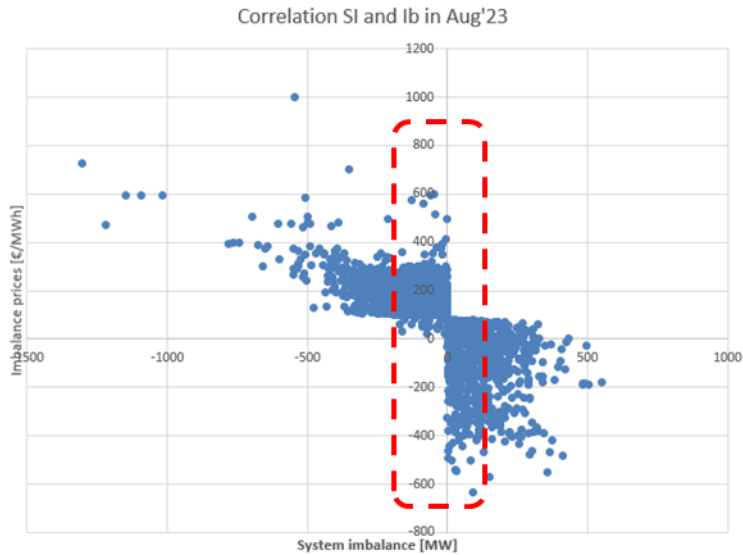
To do so, the future imbalance tariff should evolve towards a **self-sufficient** signal, it should be **known as soon as possible** and it should aim at **using the flexibility available in the system in the best possible way***.



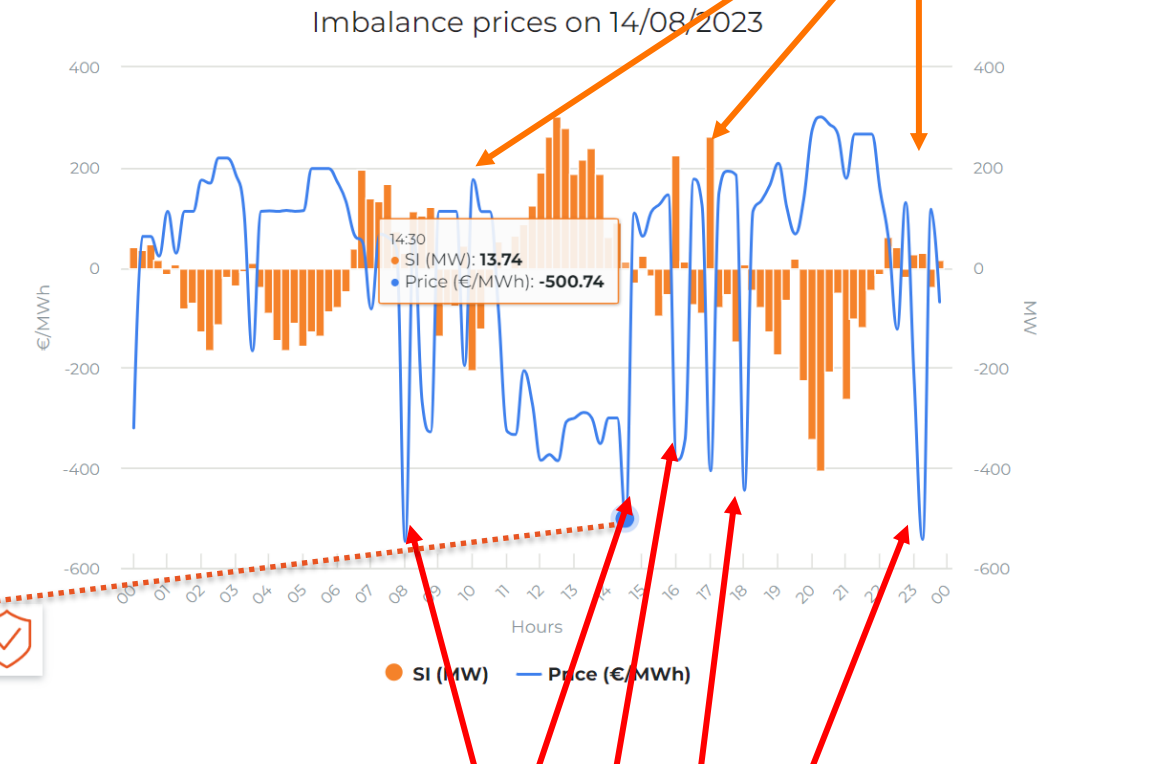
* E.g. in an integrated EU balancing market, the imbalance tariff should be the result of an optimization taking a.o. into account the price of the flexibility available abroad, but also the grid constraints on the borders.

** For BRPs with physical assets in their portfolio, that, due to their market situation, are able to quite accurately anticipate the imbalance tariff at the end of the ISP

Example of situations where the current IP is not a clear incentive, but rather merely a penalty



14/08/2023
 Non validated data for 14/08/2023
 Inefficient system oscillations



aFRR - sets the price

Quarter	Start	Quality	Calcul	NRV (MWh)	SR (MWh)	GVV (MWh)	IGCC (MWh)	R2 (MWh)	BE (MWh)	R3 (MWh)	R3 Flex (MWh)	Inter-Tz (MWh)	GOV (MWh)	IGCC (MWh)	R2 (MWh)	BE (MWh)	R3 (MWh)	Inter-Tz (MWh)	
14/08/2023 14:30:00	14/08/2023 14:30:00	Non-validated	14/08/2023	121.685	-111.582	263.189	164.651	98.584	141.500	0.000	0.000	14.900	141.500	0.000	0.000	14.900	141.500	0.000	14.900
14/08/2023 14:30:00	14/08/2023 14:31:00	Non-validated	14/08/2023	123.322	-86.658	268.822	168.894	95.927	141.500	0.000	0.000	14.900	141.500	0.000	0.000	14.900	141.500	0.000	14.900
14/08/2023 14:30:00	14/08/2023 14:32:00	Non-validated	14/08/2023	106.487	-87.074	247.987	158.143	89.845	141.500	0.000	0.000	14.900	141.500	0.000	0.000	14.900	141.500	0.000	14.900
14/08/2023 14:30:00	14/08/2023 14:33:00	Non-validated	14/08/2023	82.296	-49.979	232.795	150.855	82.901	141.500	0.000	0.000	14.900	141.500	0.000	0.000	14.900	141.500	0.000	14.900
14/08/2023 14:30:00	14/08/2023 14:34:00	Non-validated	14/08/2023	83.782	-48.383	228.282	149.639	75.642	141.500	0.000	0.000	14.900	141.500	0.000	0.000	14.900	141.500	0.000	14.900
14/08/2023 14:30:00	14/08/2023 14:35:00	Non-validated	14/08/2023	62.674	-28.222	204.427	136.238	68.389	141.753	0.000	0.253	14.900	141.902	0.000	0.402	14.900	141.902	0.000	14.900
14/08/2023 14:30:00	14/08/2023 14:36:00	Non-validated	14/08/2023	51.222	-30.289	193.123	131.583	61.540	141.902	0.000	0.402	14.900	141.851	0.000	0.351	14.900	141.851	0.000	14.900
14/08/2023 14:30:00	14/08/2023 14:37:00	Non-validated	14/08/2023	40.790	-29.869	182.841	126.118	56.523	141.812	0.000	0.312	14.900	141.781	0.000	0.281	14.900	141.781	0.000	14.900
14/08/2023 14:30:00	14/08/2023 14:38:00	Non-validated	14/08/2023	33.598	-30.741	175.419	121.308	54.073	141.756	0.000	0.256	14.900	141.756	0.000	0.256	14.900	141.756	0.000	14.900
14/08/2023 14:30:00	14/08/2023 14:39:00	Non-validated	14/08/2023	26.280	-26.709	168.082	114.843	53.418	141.754	0.000	0.234	14.900	141.754	0.000	0.234	14.900	141.754	0.000	14.900
14/08/2023 14:30:00	14/08/2023 14:40:00	Non-validated	14/08/2023	19.389	-18.931	161.125	107.435	53.690	141.716	0.000	0.216	14.900	141.716	0.000	0.216	14.900	141.716	0.000	14.900
14/08/2023 14:30:00	14/08/2023 14:41:00	Non-validated	14/08/2023	14.024	-15.789	155.759	102.724	53.035	141.703	0.000	0.203	14.900	141.703	0.000	0.203	14.900	141.703	0.000	14.900
14/08/2023 14:30:00	14/08/2023 14:42:00	Non-validated	14/08/2023	8.753	-8.658	150.469	98.884	51.685	141.809	0.000	0.209	14.900	141.809	0.000	0.209	14.900	141.809	0.000	14.900
14/08/2023 14:30:00	14/08/2023 14:43:00	Non-validated	14/08/2023	-0.461	7.005	141.242	91.821	49.421	141.809	0.000	0.209	14.900	141.809	0.000	0.209	14.900	141.809	0.000	14.900
14/08/2023 14:30:00	14/08/2023 14:44:00	Non-validated	14/08/2023	-8.097	16.845	132.711	86.024	46.728	141.809	0.000	0.209	14.900	141.809	0.000	0.209	14.900	141.809	0.000	14.900

Very negative IP while BE zone is almost balanced → very punitive IP (to which BRPs with RES are the most exposed)

Feedback from market participants confirms the need for a RTP

We have growing opportunities to help the system in RT, but we will only do so through implicit reactions so we need a clear price signal

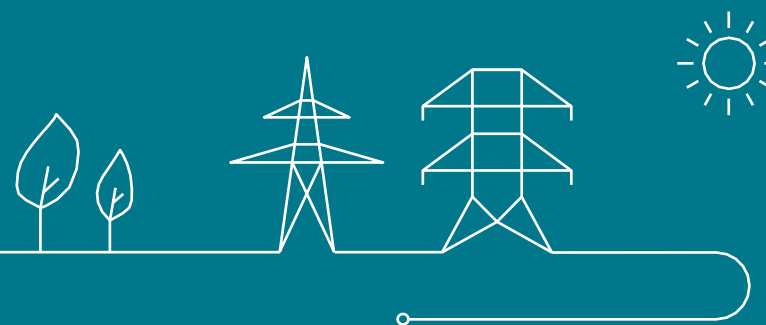
It becomes more and more complicated and risky to react to the imbalance price. Even when the initial SI is large, system switches occur within the ISP. The price signal should account for the expected market price reaction in order to avoid overshoots and instabilities

We sometimes lack certainty about the imbalance price until the end of the ISP. A forecast of the imbalance price would be welcome.

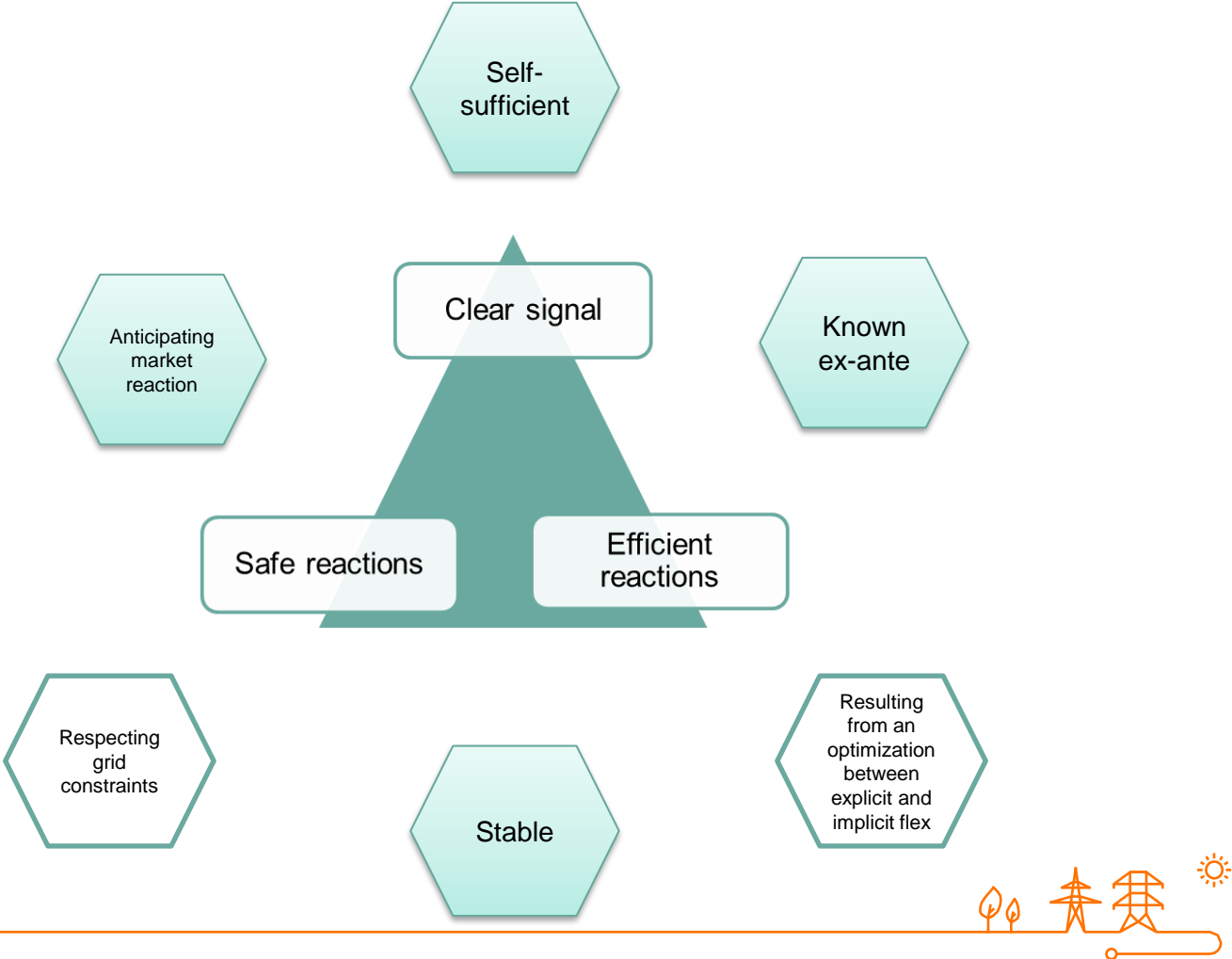


What is a good “real-time price”?

Which evolutions of the Imbalance Price are needed?



A good RTP is a *clear* signal incentivizing *safe* and *efficient* market reactions

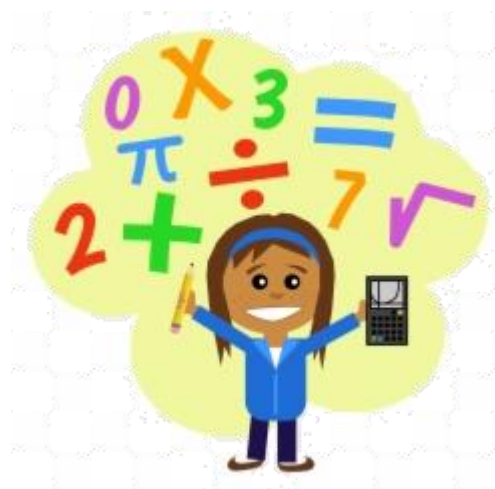




Evolution of the Imbalance Price formula



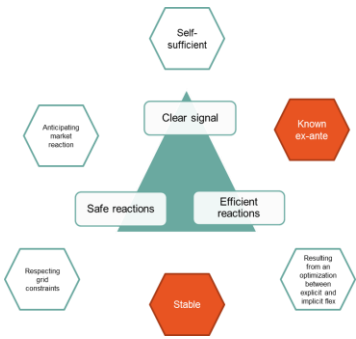
The current imbalance tariff reflects the **cost of the (marginal) activation of FRR** in the direction that helps solving the average system imbalance observed over the ISP. This comes with lots of non-convexities and is sometimes unrepresentative of the RT value of energy.



In the future, the imbalance tariff should aim at **reflecting** in the best possible way and at any moment **the RT value of energy**.

See next presentation





From real-time/ex-post calculation to ex-ante forecast



The current imbalance tariff is only **known at the end of the ISP***. **Real-time calculations** of the imbalance tariff are published on a one minute basis **during the ISP**, but these publications **do not reflect the expected evolution of the system** until the end of the ISP or over the upcoming ISP's.



In the future, a **forecast** of the imbalance tariff should be made available **before the beginning of the ISP** and be updated **within the ISP**, so that the maximum flexibility can be engaged in the system in an efficient and safe way (e.g. avoiding intra-ISP oscillations)

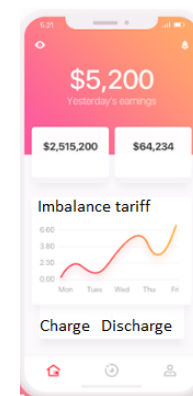


* Imbalance Settlement Period (currently equal to 15')

From multiple to single key indicator



The current one minute publications of imbalance tariff **cannot be used in a stand-alone manner** by BRPs to efficiently calibrate implicit reaction (e.g. the BRPs need to look at the BE SI and to anticipate other BRPs' implicit reaction to avoid switching the system*)



In the future, Elia could facilitate BRPs in calibrating their implicit reaction **by publishing Imbalance Price forecasts** that already take into account the other parameters that BRPs should otherwise look at (e.g. that consider the expected total implicit reaction), hence making it easier for small/new market participants to help the system.

* Calibration of implicit reaction might become even more complex with the connection to EU balancing platforms



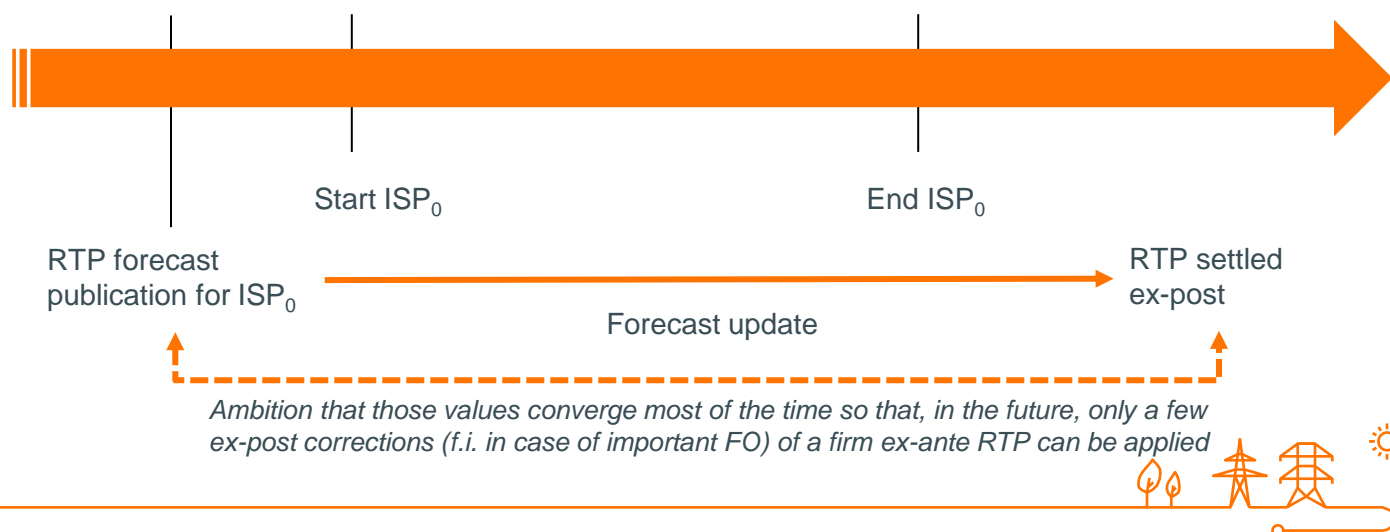
Ex-ante real-time price forecast...

... Of an ex-post settled/corrected price

A real-time price forecast should be published before the beginning of the ISP...

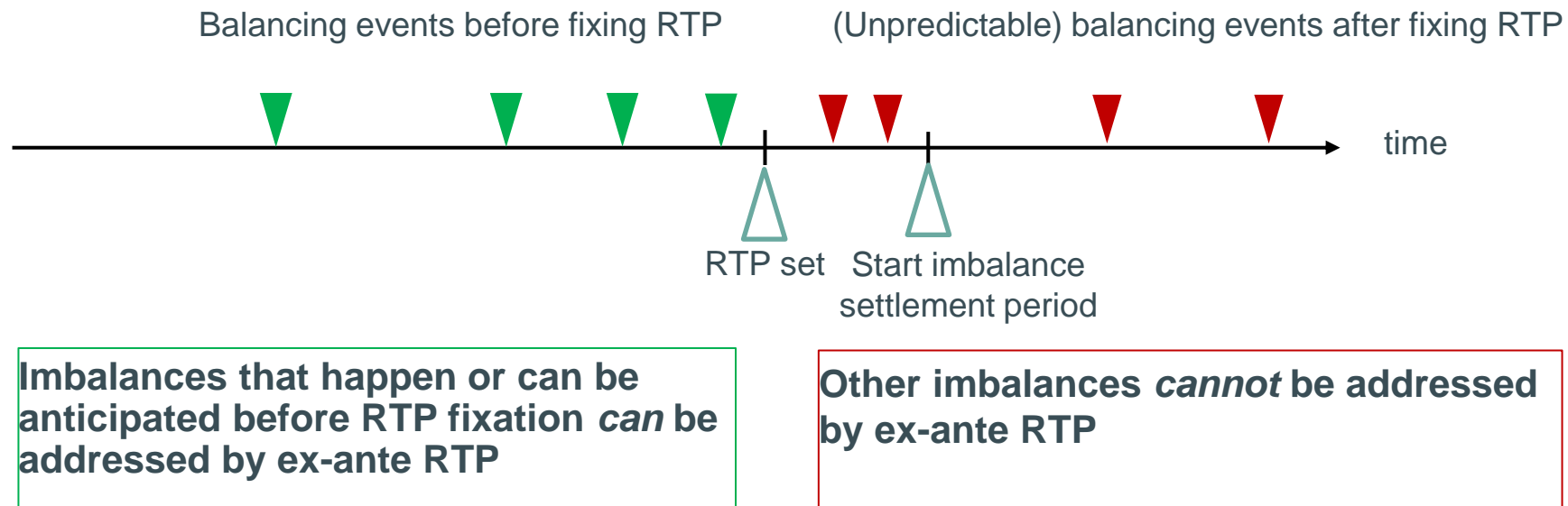
... However, correction of this price forecast should be allowed until the end of the quarter-hour (the real-time price being hence settled ex-post) in order to efficiently mitigate some risks (see next slides):

- In case of large unexpected balancing events (e.g. large FO) occurring after forecast publication
- Due to the lumpiness of the market sensitivity curve
- In case of flaw in the TSO forecasting model
- Due to tentative of RTP manipulation by market participants





A firm ex-ante RTP does not allow solving (unpredictable) balancing events in real-time



Ex-ante publication of a RTP forecast that is continuously updated until the end of the quarter-hour (hence with a RTP being settled ex-post) allows managing unexpected imbalances occurring after publication.

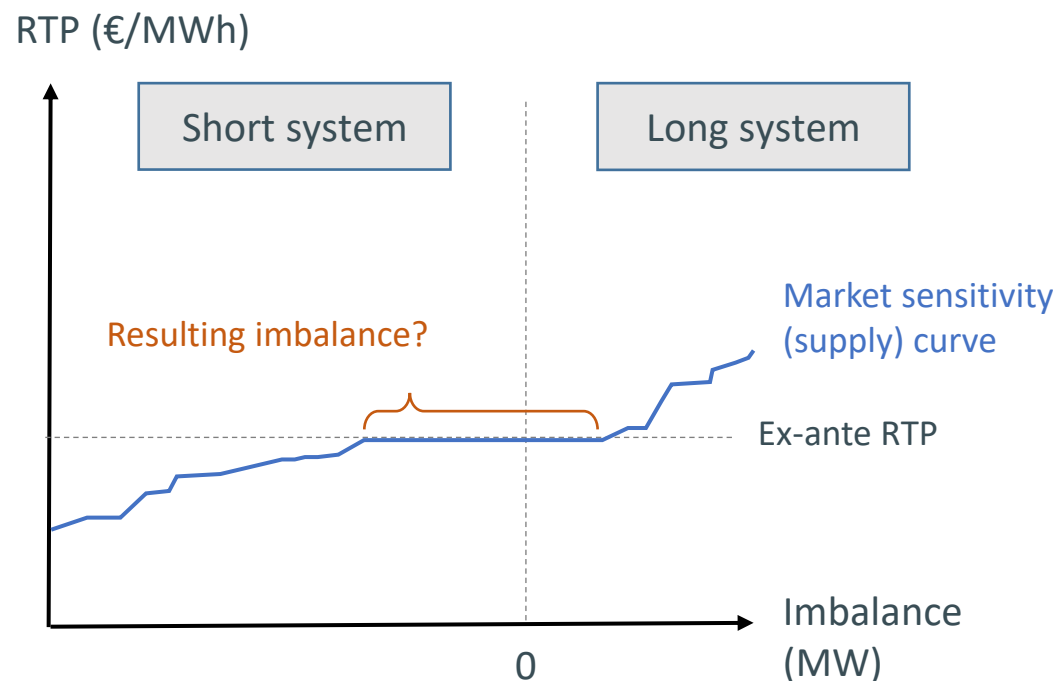
In case of lumpy market sensitivity curve, there exists not always a RTP that can resolve the imbalance

What is lumpiness?

- Large flat step in market sensitivity curve due to same/similar activation price of large or similar assets

Lumpiness in practice

- One obvious lumpiness occurs at an RTP of 0 €/MWh – all market-based renewables curtail generation
- Large flat steps can also be due to large or similar assets (e.g. batteries, electric vehicles)
- Uncertainty about the market sensitivity curve increases the problem even further



Continuous updates of the RTP throughout the ISP allow the market to progressively adjust its implicit reaction until the system converges towards the equilibrium

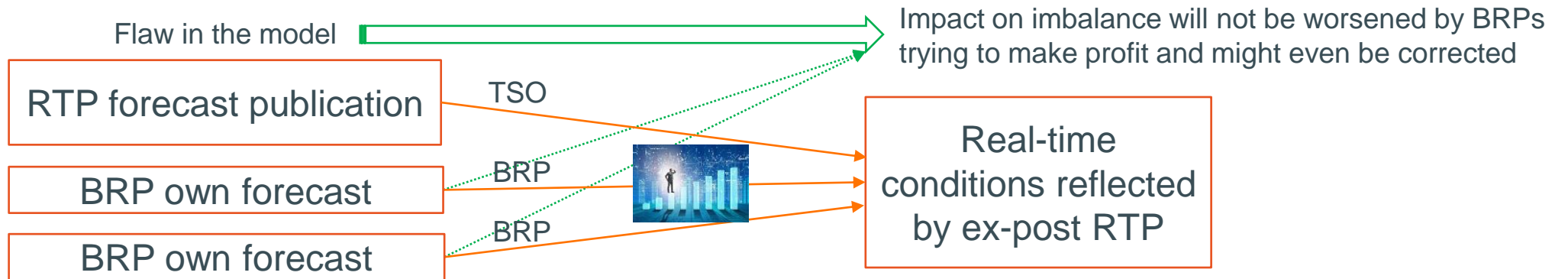


Any flaw in the TSO forecasting model may be used to make parasitic profit

When the TSO sets an ex-ante RTP, he is the only entity trying to forecast the real-time conditions of the system. All the other entities try to forecast the prediction of the TSO (i.e. the ex-ante RTP). Any flaw in the TSO model may be used by the BRPs to make profit...



... instead of being corrected by the BRPs having their own forecast of the real-time conditions.



An ex-post RTP incites own predictions and corrections of wrong expectations from TSO.



An ex-ante RTP may incentivize BRPs to keep open positions (that don't help the system) until RT, in order to avoid market price reactions

Ex-ante RTP is an infinitely deep market

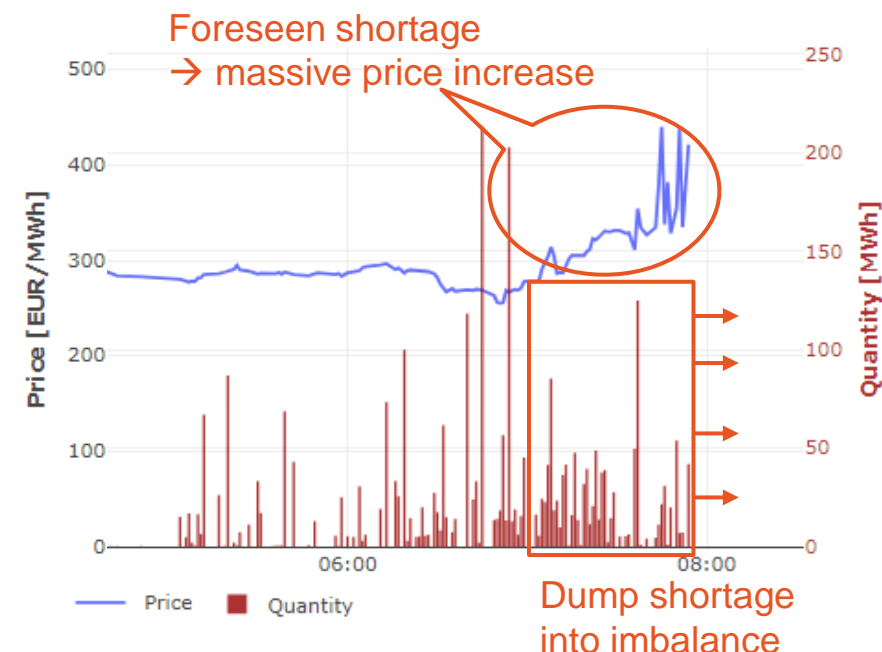
- Firm RTP is effectively an unlimited-volume buy-and-sell offer by the TSO: there is no feedback from volumes to prices → like a market with unlimited depth
- Day-ahead and intraday markets yield a price reaction when volumes are dumped on them

To avoid price reaction on intraday market, actors may prefer postponing trade to RT

- Imagine a shortage of a BRP that is predictable close before real-time
- With ex-post RTP : Best option is to trade intraday, even if it drives up prices
- With firm ex-ante RTP: Best option is to hide that shortage and dump it into imbalance

Intraday trading close to delivery

Example 26/09/2022 8 am



Ex-post corrections of RTP remove the incentive for the market players to keep open positions that do not help the system in real-time



Problem

An ex-ante RTP may incentivize market actors to withhold relevant information or influence market data

Imagine the TSO uses spot market prices to determine ex-ante RTP

- To balance an expected imbalance, RTP must deviate from spot market prices
- If BRPs can have the TSO believe that the system will be short, they know that whatever the last intraday price, the RTP will be higher
- BRPs therefore have an incentive to buy energy on the intraday market in order to sell it at a higher price in real-time, making intraday price increase
- The TSO does not know whether spot prices reflect scarcity or result from parties taking open positions against the RTP

→ TSO can not use market prices as input for RTP estimation

Ex-post corrections of RTP remove the incentive for the market players to withhold information or manipulate market data



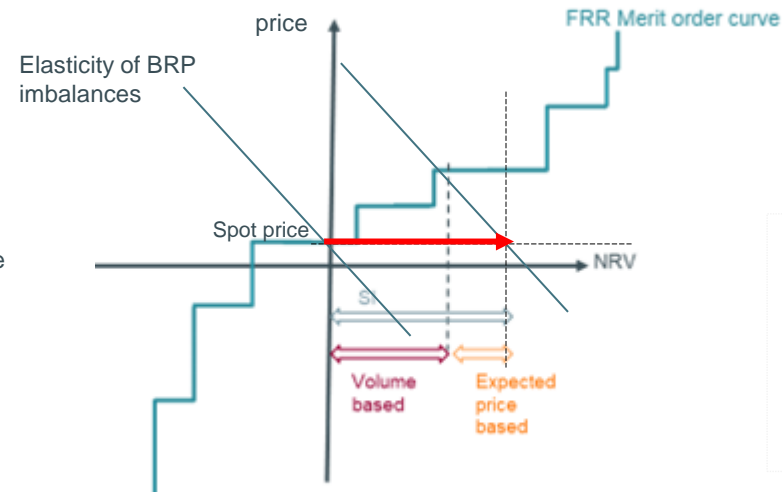
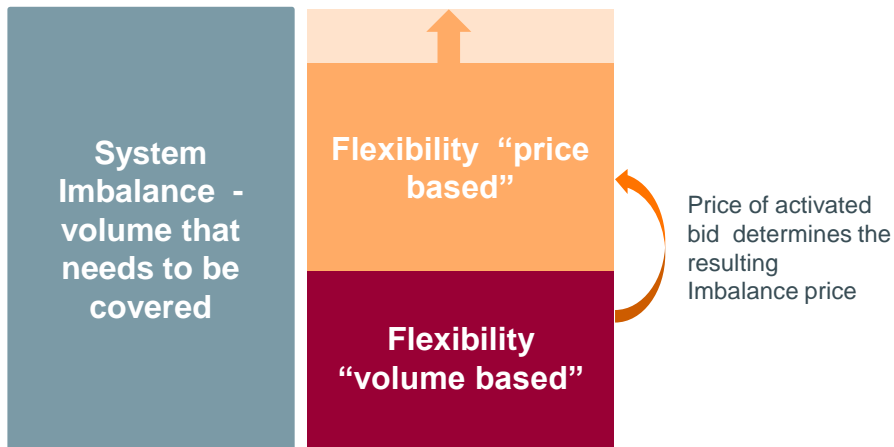
From multiple to single key indicator...

... being the output of a smart balancing controller

Towards a smart balancing controller

Objectives of the smart balancing controller:

Balance the system in the most efficient way by triggering an adequate price based implicit reaction that complements the activated explicit balancing energy bids (volume based)



Today's way of functioning:

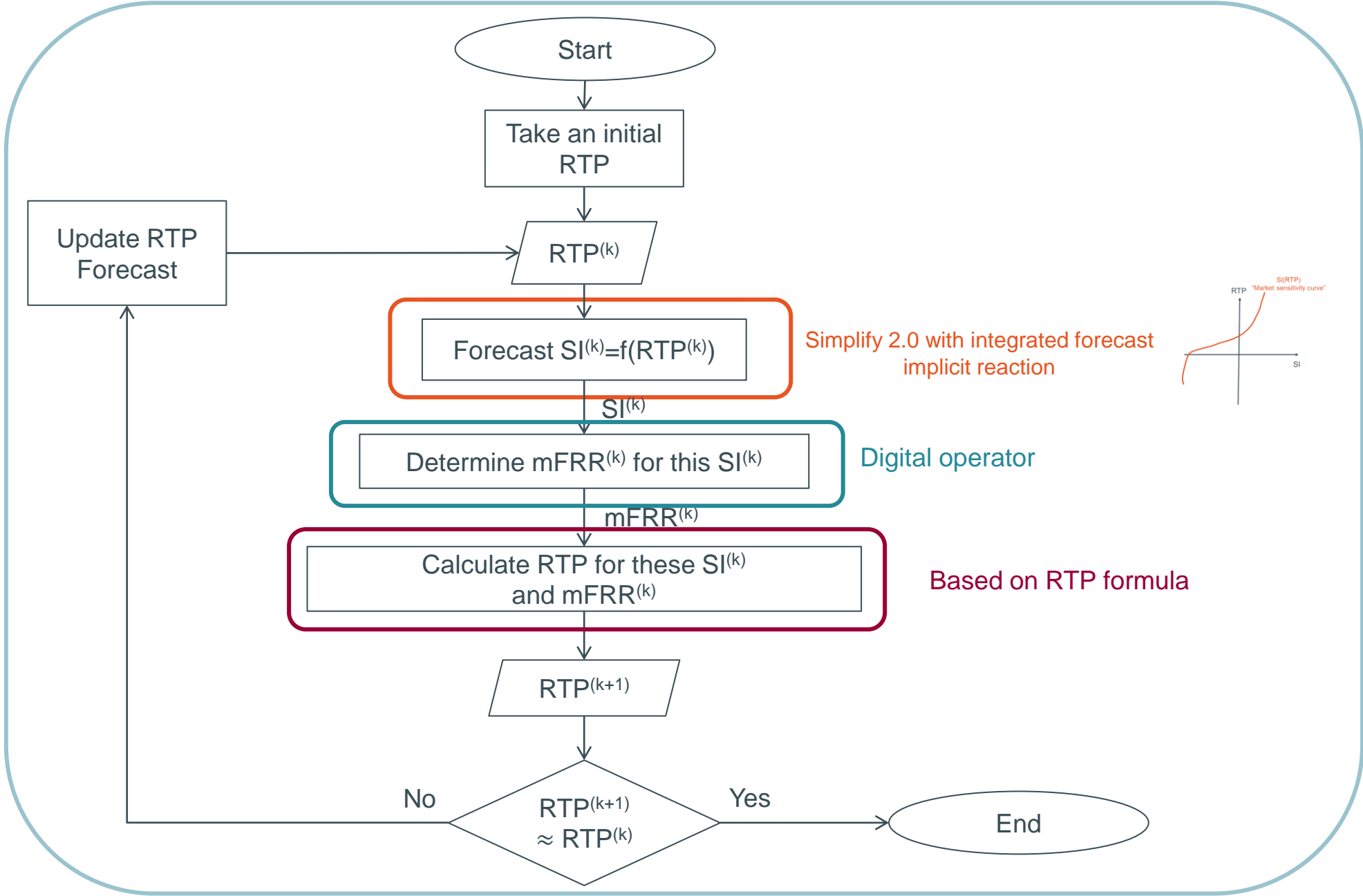
For a given System Imbalance to be solved the dispatcher activates an explicit volume of balancing energy +/- lower than the effective SI knowing/guessing that there will be a certain volume of price-based reaction.

Outputs of the final smart balancing controller (~decision variables):

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

Smart Balancing Controller – building blocks

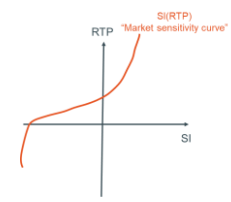
!/\ the illustration below is just an example to fix the ideas regarding how the algorithm could look like



Simplify 2.0 with integrated forecast implicit reaction

Digital operator

Based on RTP formula



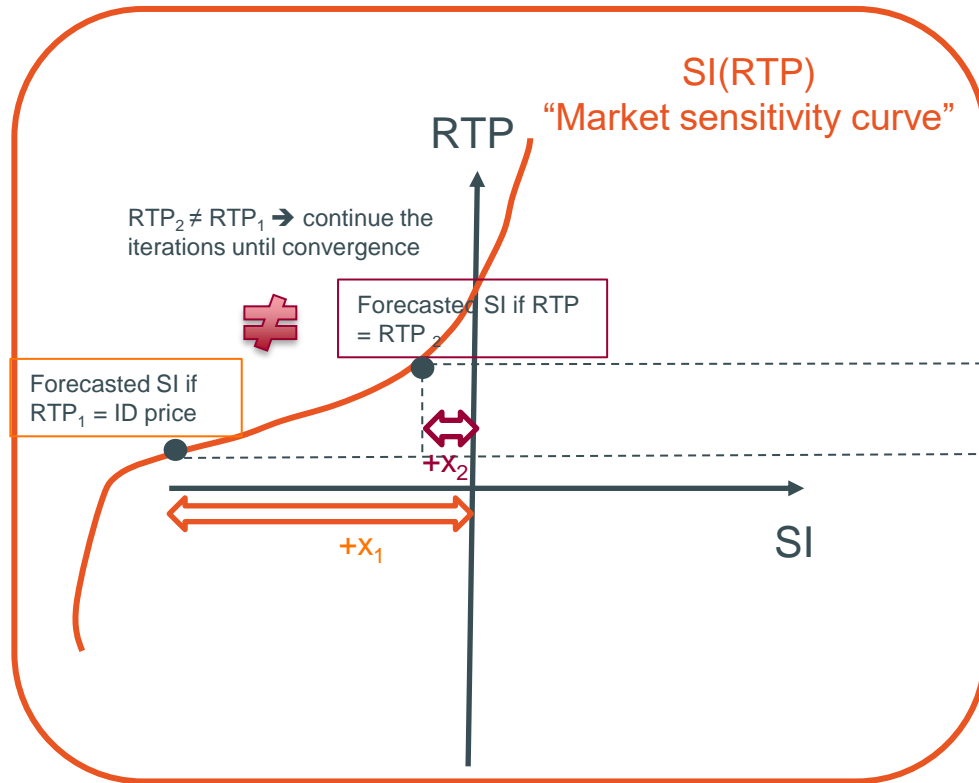
Integration of the different building blocks to form the smart balancing controller*

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

Example of Smart Balancing Controller convergence...

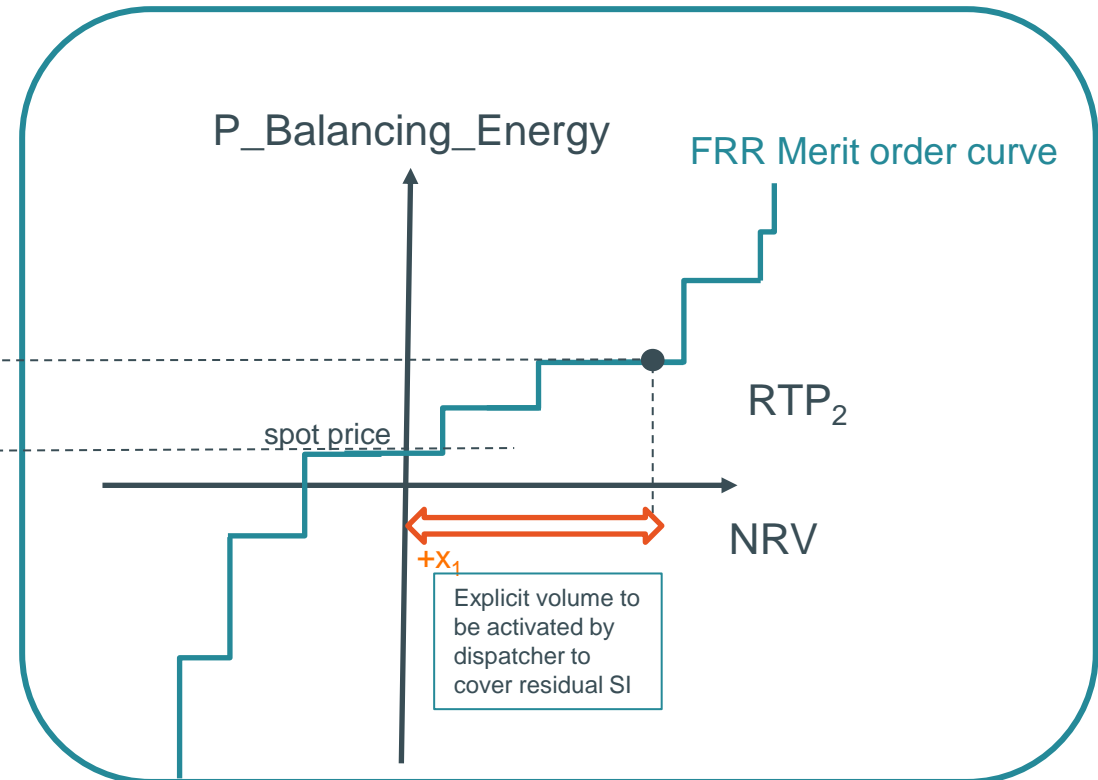
Simplified example assuming a purely local balancing market under copper-plate conditions

Simplify 2.0



Deduction of mFRR volume and Imbalance

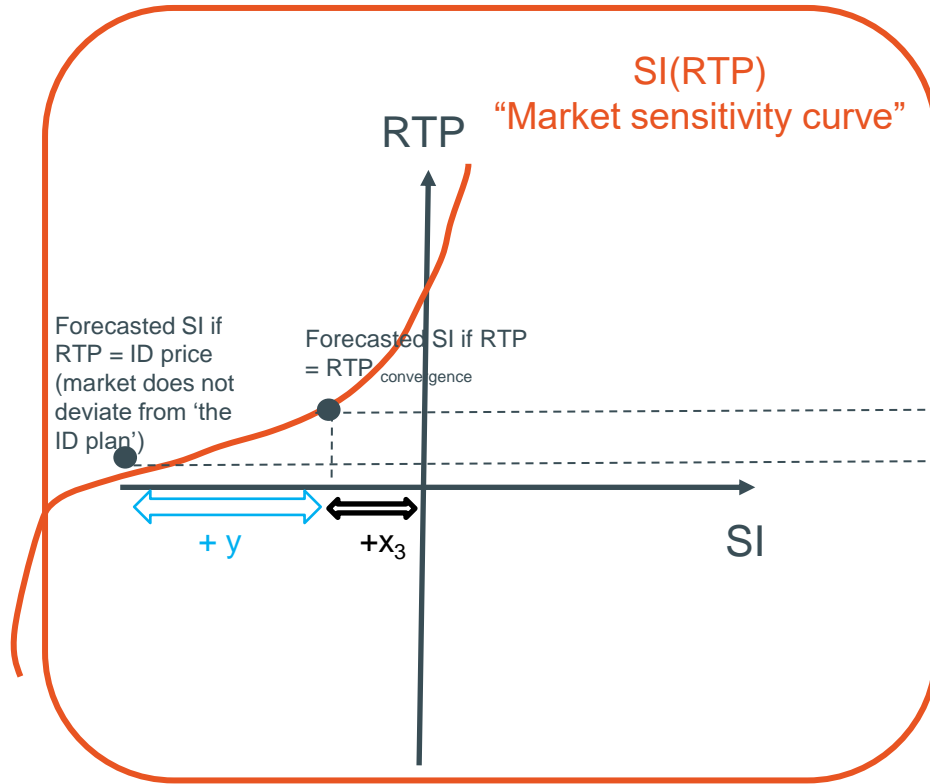
Price (before connection to EU platforms)



Example of Smart Balancing Controller convergence...

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

Simplify 2.0



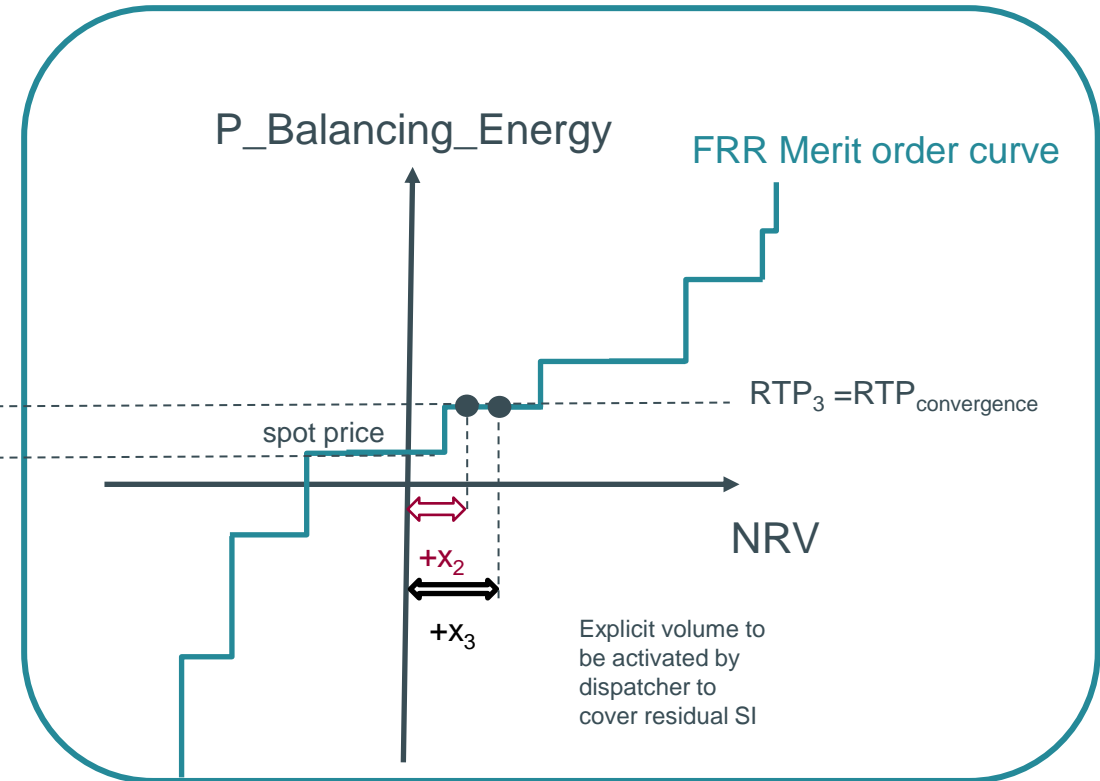
Output of Simplify 2.0

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

Deduction of mFRR volume and Imbalance

Price (before connection to EU platforms)

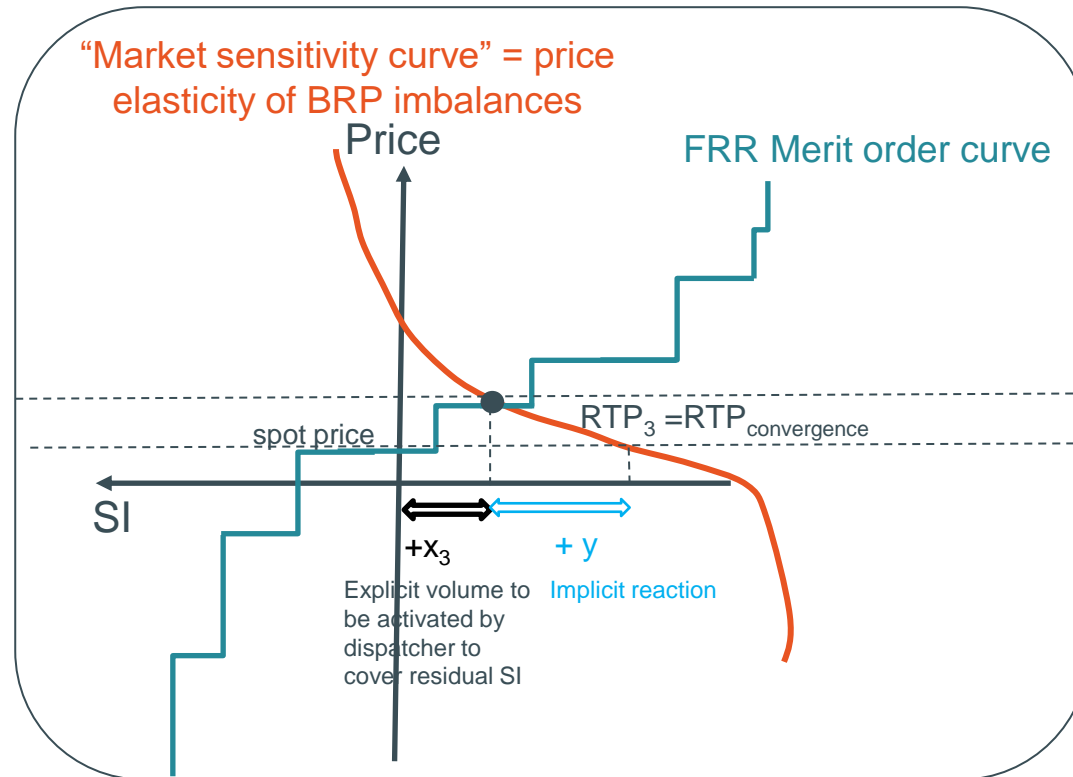


Market engineer activating mFRR bids while being able to consider the impact of the bid activation on the resulting imbalance

...Towards RT equilibrium

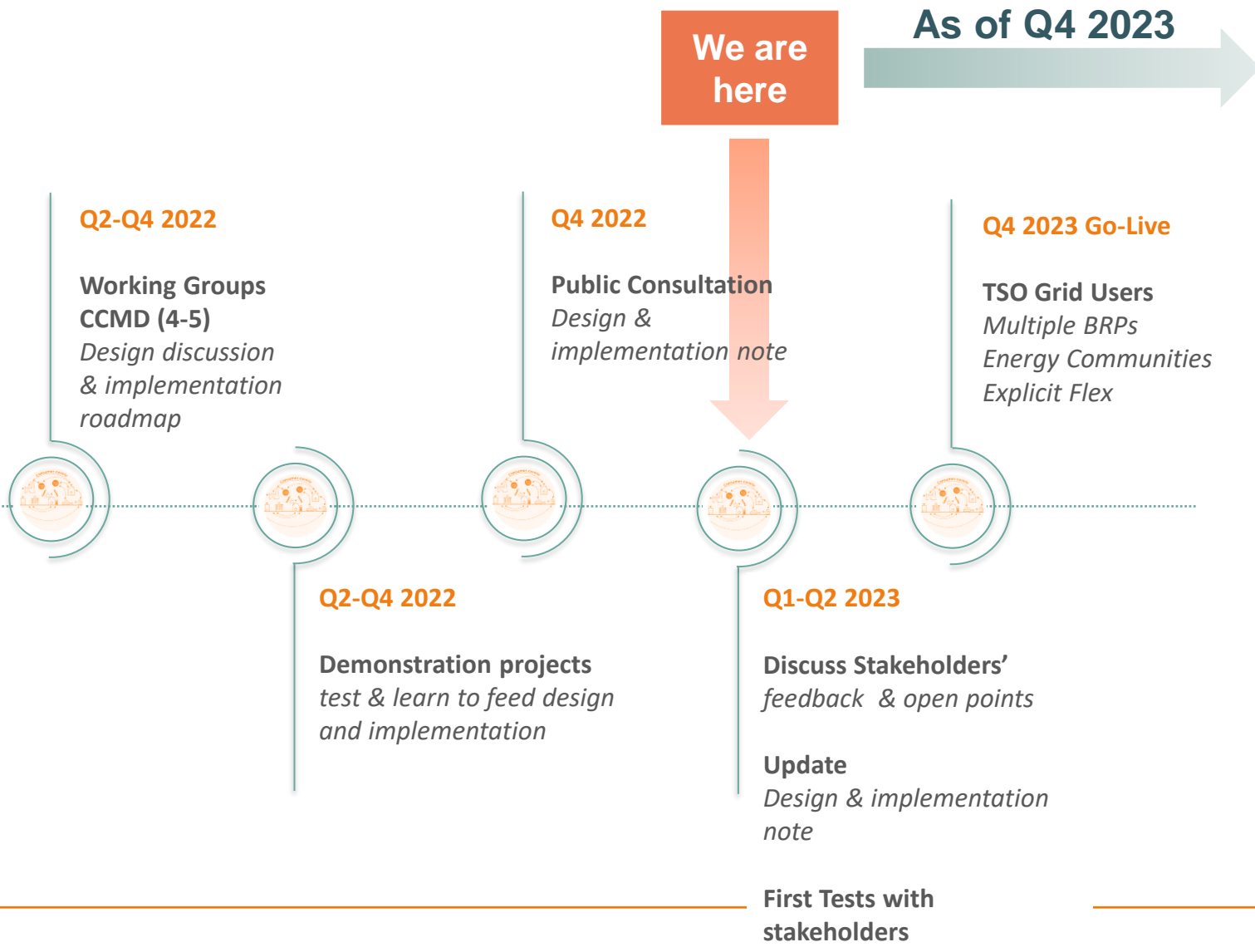
Simplified example assuming a purely local balancing market under copper-plate conditions

RT equilibrium



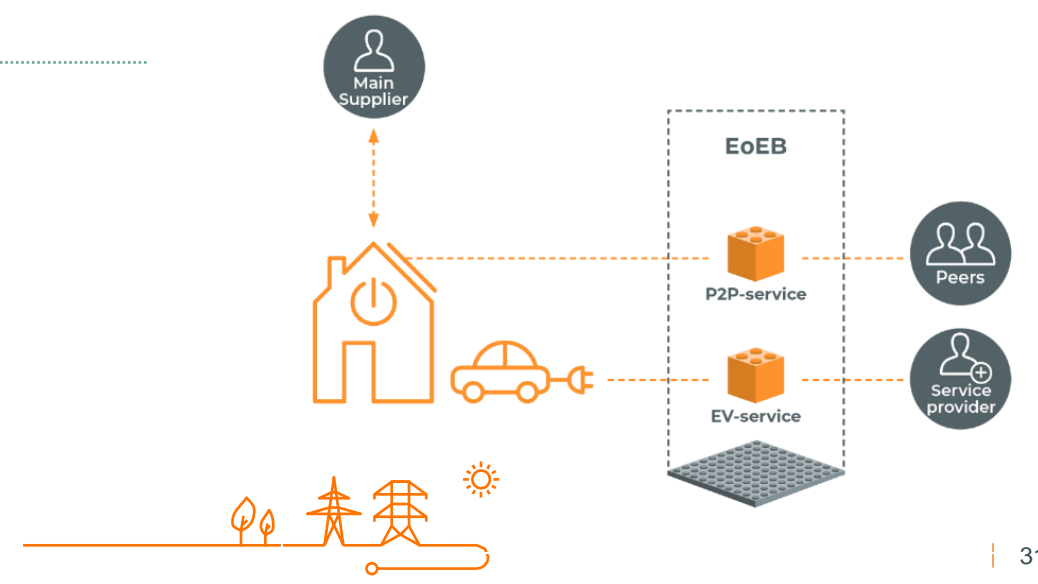
E-Law Update Status & Way forward

Roadmap CCMD Services for TSO Grid Users



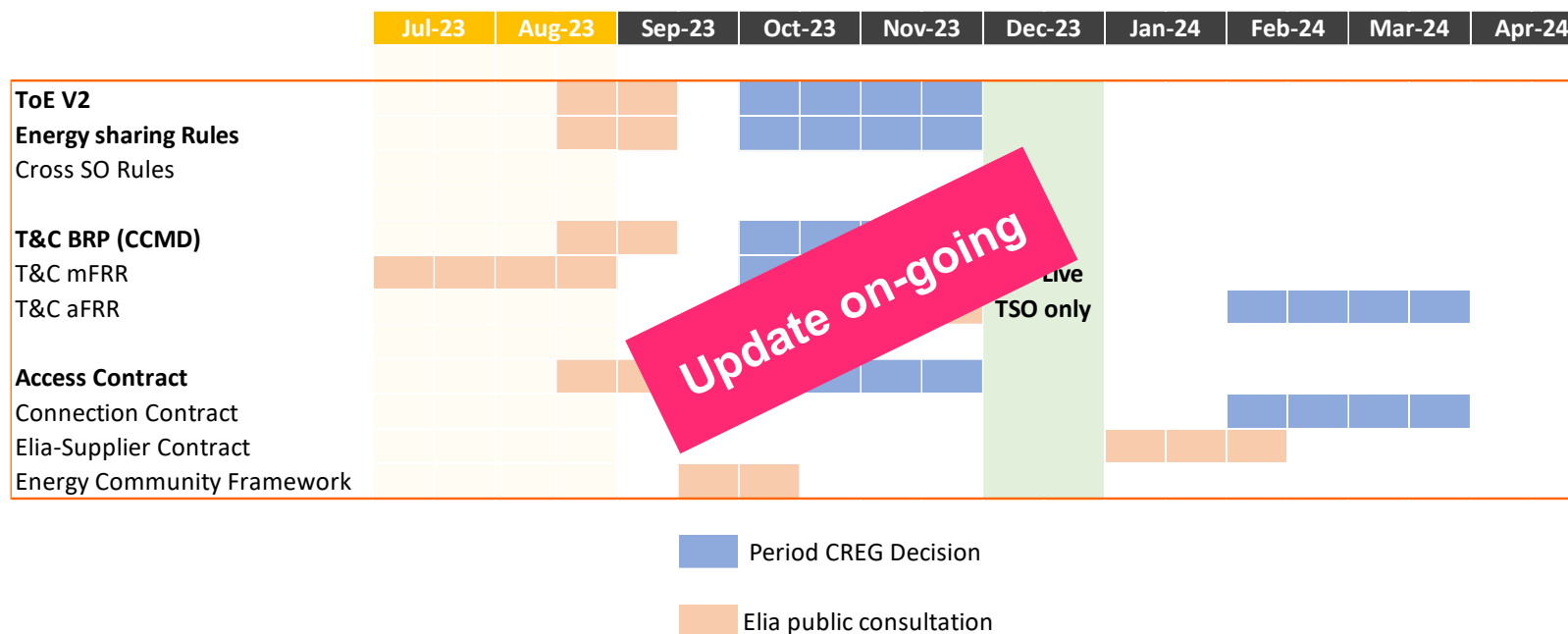
CCMD Services for TSO Grid Users

- Build an **energy community** (share your energy)
- Contract **different BRPs** behind an access point
- Apply **individual correction** in balancing Services (Explicit Flexibility)



Way forward for the Go-Live TSO

Planning for public consultation to be updated



...While waiting for full regulated framework, Elia invites all interested parties to contact their KAM as Elia intends to work under the framework “**Letter of Intent**” signed by all parties involved



UsersGroup resolution – Recommendation to accelerate the development of flexibility

Opportunity for recommendation to accelerate the development of flexibility

Slide as presented in the Plenary meeting of the Elia Users' Group of Wednesday, September 13th



For discussion: opportunity for recommendation endorsed by Users Group

Goal of such recommendation would be to accelerate the development of flexibility to support the next steps in the energy transition by removing important barriers

Such recommendation could a.o. take following points into consideration:

1. Importance to foster participation of flexible assets, like electric vehicles, heat pumps, batteries, solar panels, ... in the market to facilitate the further integration of renewable energy (and e.g. cope with issues of incompressibility)
2. Need for newly installed flexible assets to be 'flex ready' (as of a certain date), i.e. technically capable to react on market-based signals (e.g. enable reaction of PV installations to negative market prices).
3. Need implement the CCMD market design that enable flexible assets to participate in the markets and to valorize their flexibility in an easy way
4. **Other relevant points?**



Opportunity for recommendation to accelerate the development of flexibility

- Goal of such recommendation:
 - ✓ Accelerate the development of flexibility by removing important barriers to support the energy transition
 - ✓ ?
 - Key points:
 - ✓ Foster participation of flexible assets in the market
 - ✓ Flex readiness for new assets
 - ✓ Take out barriers for a participation in the market
 - *What kind of evolutions do we bring forward?*
- Based on the input and discussion Elia will propose a concrete recommendation that will be send to all members for feedback.

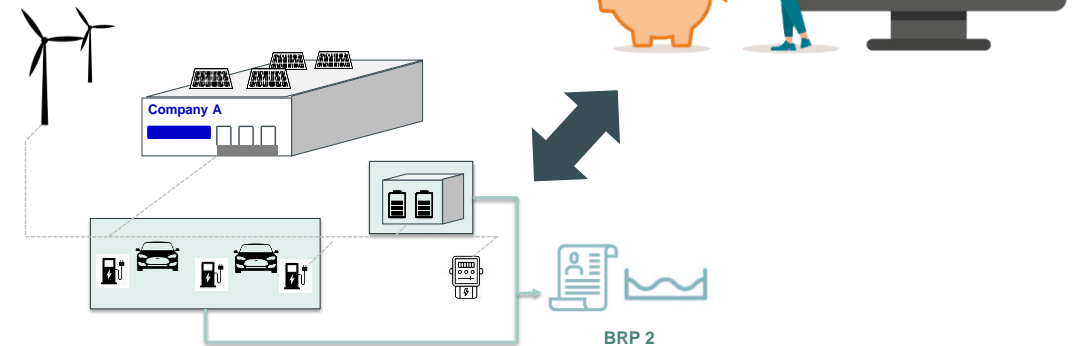


Any Other Business – Direct Access to Markets

New service: direct access to market

*Built on **Multiple BRPs** and **Real-Time Price** for a **full optimization on market prices***

- ✓ **reducing complexity** to access the DA/ID markets
- ✓ **Propagate the real-time price** for a full economical optimization of a flexible asset over all time horizons
- ✓ **lower financial and infrastructure requirements** to accommodate smaller portfolios, or even asset level



**Design note
publication 20th of
October**

Thank you for your participation

Next Working Group CCMD: 14th of November @9h30

