WG Balancing of 24th September 2020

Teleconference

24/09/2020

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 Skype 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

1. 13:30 – 13:40 - Introduction and Validation of minutes of 08/05/2020
2. 13:40 – 14:10 - Scarcity Pricing
3. 14:10 – 14:55 - Day Ahead Balance Obligation

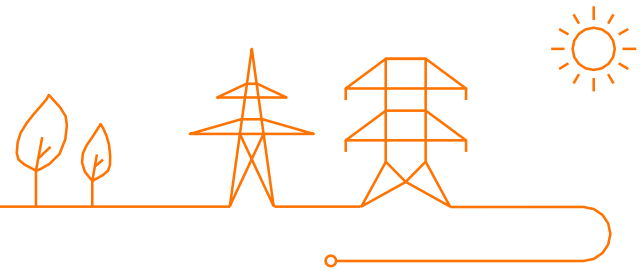
Coffee Break (15 min)

4. 15:10 – 15:40 - aFRR Dimensioning
5. 15:40 – 15:55 - Proposal for modification of the LFC Means
6. 15:55 – 16:05 - Liquidity and price of Balancing products
7. 16:05 – 16:20 - new aFRR design: Go-live status
8. AOB

- RT DGO Allocation
- workshop of iCAROS on the 7th of October
- Study PAB/PAC
- Feedback on Consultation ToE DA/ID

Break

16:45 – 18:00 Workshop on Smart Testing



Announcement

Minutes of Meeting

WG Balancing

- No comments from stakeholders were received.
- The MoM of 19th of June 2020 are approved and will shortly be available on the Elia website.

Workshop Scarcity Pricing

- No comments from stakeholders were received.
- The MoM of 2nd of July 2020 are approved and will shortly be available on the Elia website.

Scarcity Pricing

Presented by Glenn Plancke

Context – Scope of scarcity pricing incentive 2020

Elia is incentivized by CREG in 2020 to study the implementation of scarcity pricing mechanisms for Belgium, and in particular to:

1. Critically analyze a **proposal by UCL CORE** regarding the implementation of scarcity pricing for Belgium (https://www.creg.be/sites/default/files/assets/Publications/Notes/Z1986Annex.pdf)

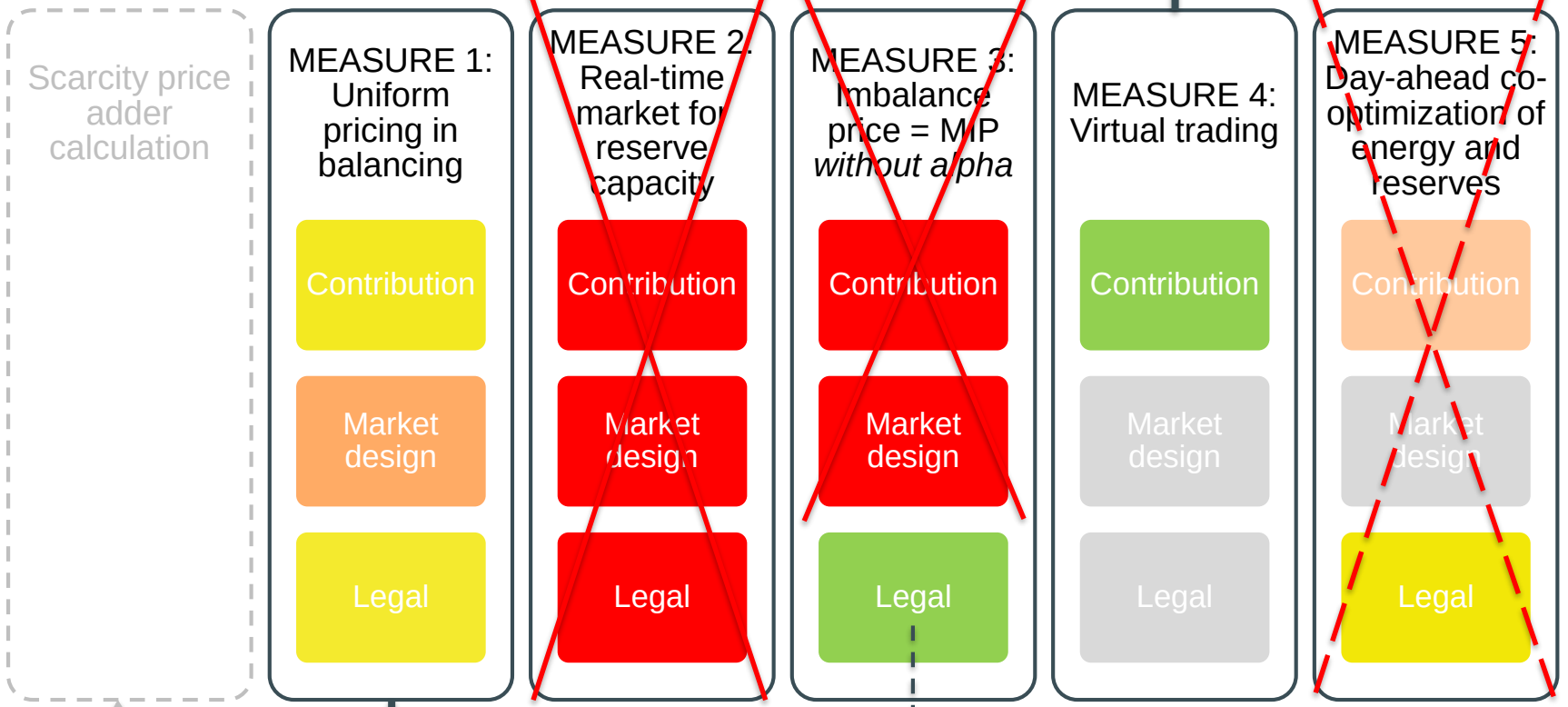
→ **Scarcity pricing Workshop 2/7**

2. Formulate **alternative proposals** for the implementation of scarcity pricing for Belgium (if more advantageous or better feasibility)
3. Draft an **implementation plan** for the possible implementation of scarcity pricing by the end of 2021

Focus of today

A preliminary report, incorporating these three elements, will be launched for public consultation on 30/9.
A final report is due by the end of 2020.

Context – Starting point after Scarcity pricing workshop 2/7



Elia's alternative proposal

Elia's alternative proposal consists of the **introduction of a scarcity component – also referred to as omega (Ω) component – in the imbalance price calculation**, in accordance with Art. 9(6)(a) of ACER's decision of 15 July 2020 on the Imbalance Settlement Harmonization methodology.

		System Imbalance	
		Positive	*Negative or zero*
Imbalance of the balance responsible party	*Positive*	MDP – α	MIP + max.(α;Ω)
	Negative		

The proposed scarcity component has the following main features:

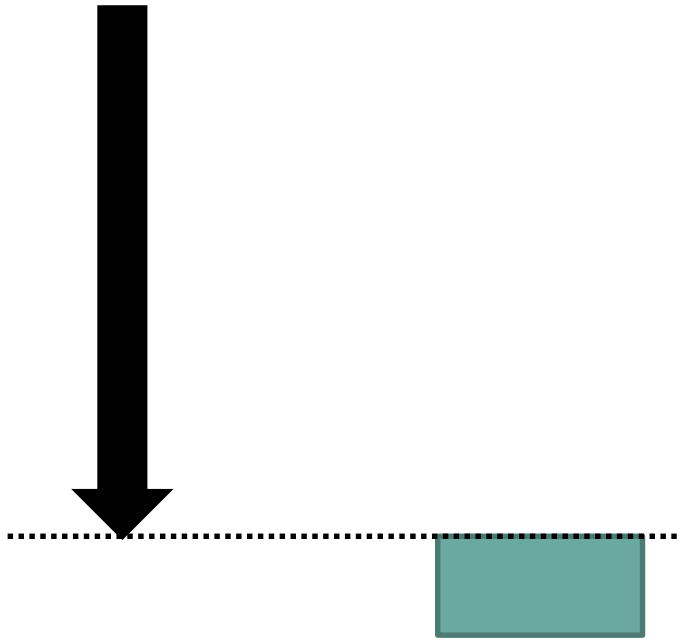
- ✓ Applicable on BRPs
- ✓ In addition to alpha, as both serve a different purpose:
  - **Alpha** incentivizes against long and persisting system imbalances (both positive and negative)
  - **Omega** incentivizes to ensure sufficient capacity is available when the system approaches scarcity and available margins become tight
- ✓ Only during negative to zero system imbalances, in order not to obstruct appropriate balancing incentives
- ✓ Only during structural capacity shortages, ensured by the methodology to calculate omega (cf. next slides)

Calculation of Omega (Conceptual)

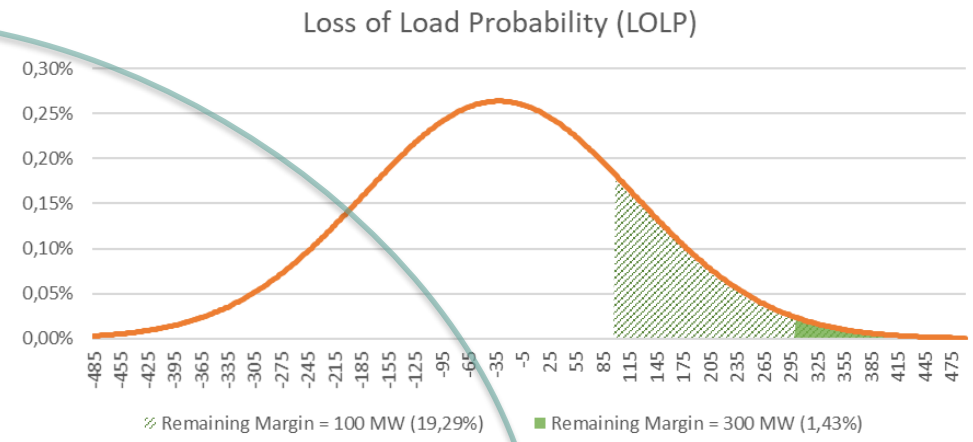
Available upward regulation capacity + System Imbalance = Remaining Margin (RM)

PICASSO MARI

- Inter-TSO
- mFRR (free & contracted)
- aFRR



LOLP function
based on historic SI data



Omega = LOLP(RM) * (VOLL – MIP)

Calculation of Omega (Full picture)

Delaying/filtering effect, i.e. omega only applies when it is different from zero two ISPs in a row

$$\Omega_{ISP(t)} = \begin{cases} 0 \; if \; \Omega_{ISP(t-1)} = 0 \; €/MWh \\ 0 \; if \; MIP_{ISP(t)} \geq VOLL \\ \frac{T_1}{T_1 + T_2} * \left[\left(VOLL - MIP_{ISP(t)} \right) * LOLP_{T_1} \left(RemainingMargin_{ISP(t)}^{T_1} \right) \right] + \\ \frac{T_2}{T_1 + T_2} * \left[\left(VOLL - MIP_{ISP(t)} \right) * LOLP_{T_1+T_2} \left(RemainingMargin_{ISP(t)}^{T_1+T_2} \right) \right] \; otherwise \end{cases}$$

In case MIP would be able to reach a price level that is higher than VOLL used in the omega formula:

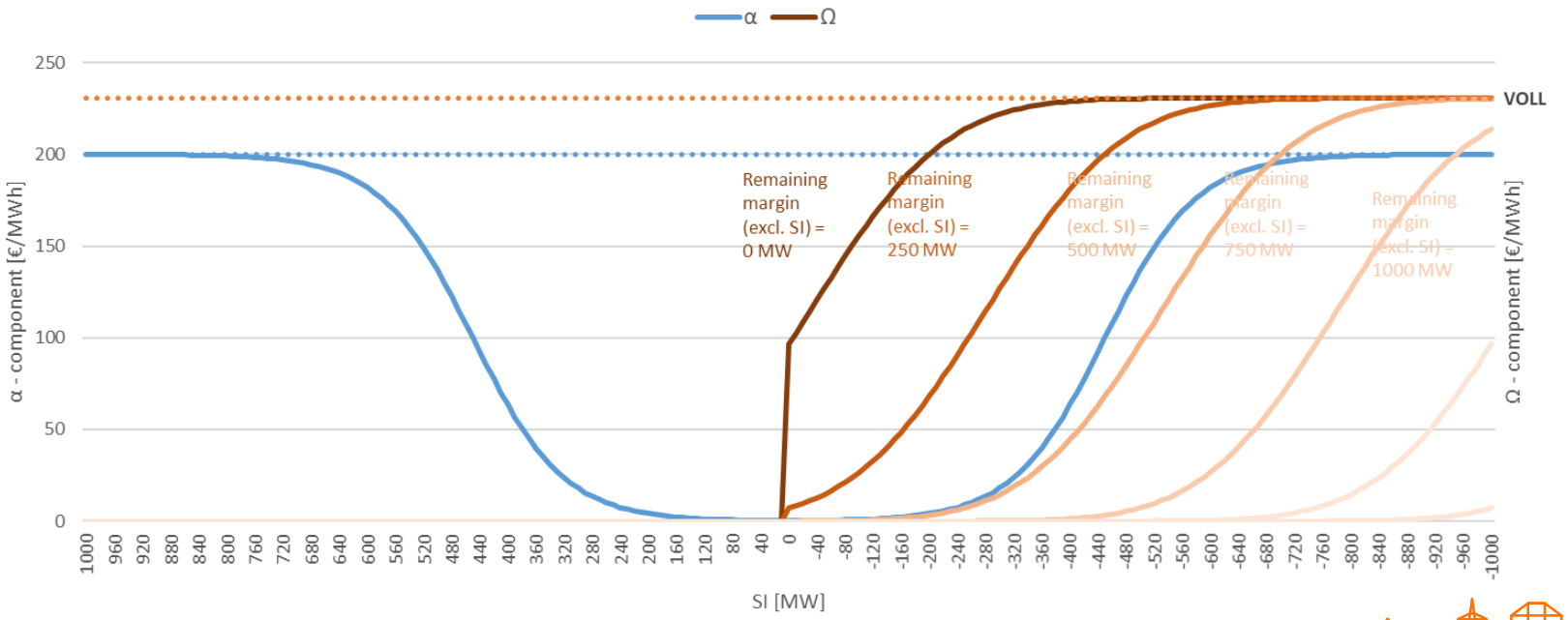
- Omega should not correct imbalance price downwards
- Morover, omega has no role to play when imbalance price rises above average VOLL by itself

In fact, omega is calculated as an average of two calculated LOLP esimations (in line with the CORE study):

- LOLP (T1) considers a shortage of fast (full activation in 7,5 minutes) upward regulation capacity
- LOLP (T1+T2) considers a shortage of slow (full activation in 15 minutes) upward regulation capacity

Alpha & Omega

- **Alpha** depends solely on the **System Imbalance** ↔ **Omega** depends on the **Remaining margin** (of which the System Imbalance is only one component)
- **Alpha** can rise to a maximum level of **200 €/MWh** ↔ **Omega** can rise to VOLL
- **Alpha** applies during **negative and positive SI** ↔ **Omega** only applies during **negative SI**



Feasibility vs. Desirability

The alternative scarcity pricing proposal is in the first place a **feasible** proposal, starting from the UCL CORE proposal and taking into account the prevailing market design and boundaries set by the legal context. However, Elia would like to pose some **open questions regarding the general desirability** of such – or by extension any – scarcity pricing mechanism for Belgium:

1. Most fundamentally, is there actually a problem to solve for which scarcity pricing is the solution?
    - More accurate, scarcity reflective real-time prices?
    - Investment incentives for flexible capacity?

2. Secondly, insofar as there is a problem that needs to be solved, does this justify the additional complexity that comes with a scarcity pricing mechanism?

3. Thirdly, to what extent does the introduction of scarcity pricing raise market entry barriers?

Implementation plan

- Three general implementation tracks have been identified:
  - **Regulatory implementation track** to evolve the necessary regulatory documents (e.g. tariff proposal, T&C BRP, balancing rules)
  - **Future-proofing track** to ensure that the calculation of omega accurately takes into account the available upward regulation capacity, especially in a European context with European balancing platforms MARI & PICASSO
  - **IT implementation track** that comprises the necessary IT developments to effectively calculate and apply omega

- In conclusion, **Elia deems it important to wait until after the go-live of the European balancing platforms PICASSO (foreseen in Q1 '22) & MARI (foreseen in Q2 '22) for a go-live of the scarcity component (i.e. Q4 '22)**, instead of pursuing a go-live by the end of '21, which appears unfeasible anyway. This would have the following advantages:
  - Only one calculation methodology is to be included in the regulatory documents (instead of the current one and an adapted one for when PICASSO & MARI go-live)
  - Stability of the calculation of the scarcity component is ensured, not requiring a change in the calculation shortly after the go-live;
  - A go-live during or just after summer can be targeted, providing a softer entrance of the scarcity component, at a moment in the year that is believed to be less scarcity-sensitive.

Next steps

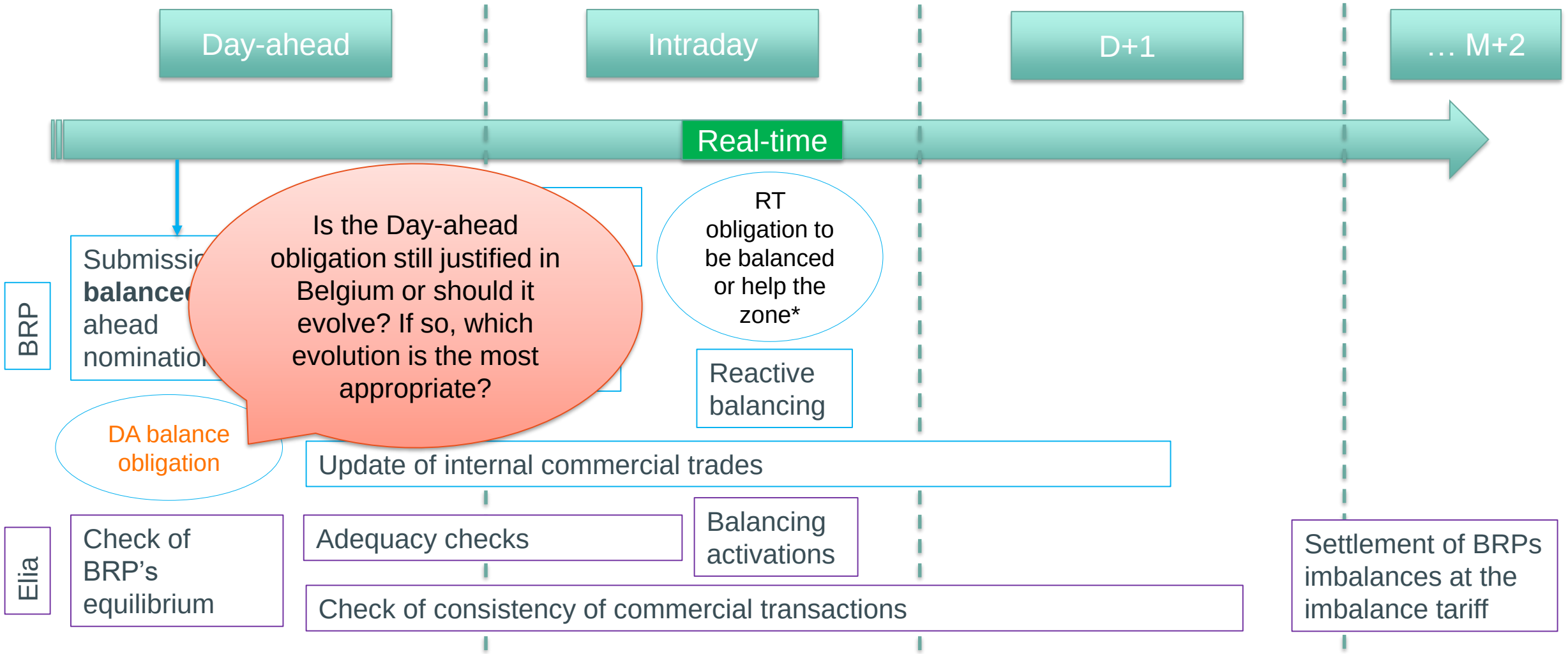
- **Preliminary report** will launch for public consultation next week, on 1/10 at the latest

- **Consultation report** and **final report** will be submitted by the end of the year

Day Ahead Balance Obligation

Presented by Caroline Bosschaerts

What is this study about?

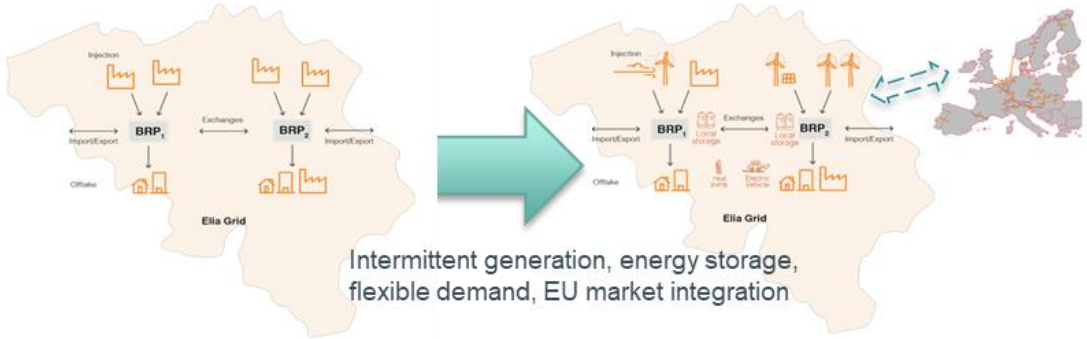


* Deviations from equilibrium are only allowed under strict conditions: the BRP has to be able to come back instantaneously to a balanced situation at any moment

Why this study?

Why re-assessing if the Day-ahead balance obligation is still relevant?

- It was **introduced in the first Federal Grid Code of 2002** and hence in the first Belgian BRP contract, **but in the meantime, the European energy mix and markets have been evolving dramatically** (with a growing share of intermittent energy sources, new technologies such as demand response, creation of organized ID markets that are becoming more and more liquid, etc.) and **large changes regularly happen between the forecasts available in Day-ahead and the Real-time situation.**



The Day-ahead balance obligation was moreover **removed from the last version of the FCG** (of 29th April 2019)

- Art 18, §7.d of **Electricity Balancing Guidelines** by default, does not foresee any Day-ahead balance obligation, but allows the TSO to introduce such an obligation in its Terms & Conditions BRP **when it is deemed relevant**.

entsoe

Art. 18, § 7.d: "Each connecting TSO may include the following elements in the proposal for the terms and conditions for balancing service providers or in the terms and conditions for balance responsible parties: [....] specific requirements with regard to the position of balance responsible parties submitted after the day-ahead market timeframe to ensure that the sum of their internal and external commercial trade schedules equals the sum of the physical generation and consumption schedules, taking into account electrical losses compensation, where relevant."

A three-steps approach was followed in this study

The study was split in **three main phases**:

- A **prospection work** was conducted - through **literature review**, **benchmark** with other TSO's and stakeholder's **interview** - to get a better understanding of the balancing scheme currently implemented in Belgium, and of the mechanisms used in other neighboring or more distant countries;
- Based on the conclusion of the prospection work, the relevance of the current Day-ahead obligation was assessed. The **feasibility and risk/opportunities of several possible evolutions**[1] of the Day-ahead balance obligation were then analyzed. These evolutions were **compared** and a **clear recommendation was made**, supported by a **cost-based analysis**;
- Finally, an **implementation plan** was prepared, in order to allow a **smooth and safe implementation** of the recommendation.

[1] e.g. going from keeping a balance obligation in Day-ahead, while improving some of its aspects, to removing any kind of balance obligation before Real-time

The lessons learned during the prospection work showed that the current obligation is questionable and that evolutions are needed

- Other countries, sometimes with balancing systems that are very similar to ours, **function well without any kind of Day-ahead balance obligation**

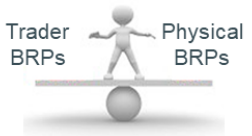
- The Elia operational processes depending on the Day-ahead nominations (adequacy checks, congestion forecasts) have been soundly analyzed and **do not need balanced nominations** to work properly

- It could **jeopardize the quality of the information** communicated to Elia in Day-ahead:

  The BRPs are discouraged from transparently communicating a forecasted disequilibria, e.g. in case of tense situations

- The current Day-ahead obligation introduces a **non-level playing field** between Physical BRPs (who could possibly circumvent the obligation) and Traders (for which a strict monitoring applies)

  It is this non-level playing field which encouraged TenneT NL to remove their DA obligation in 2019

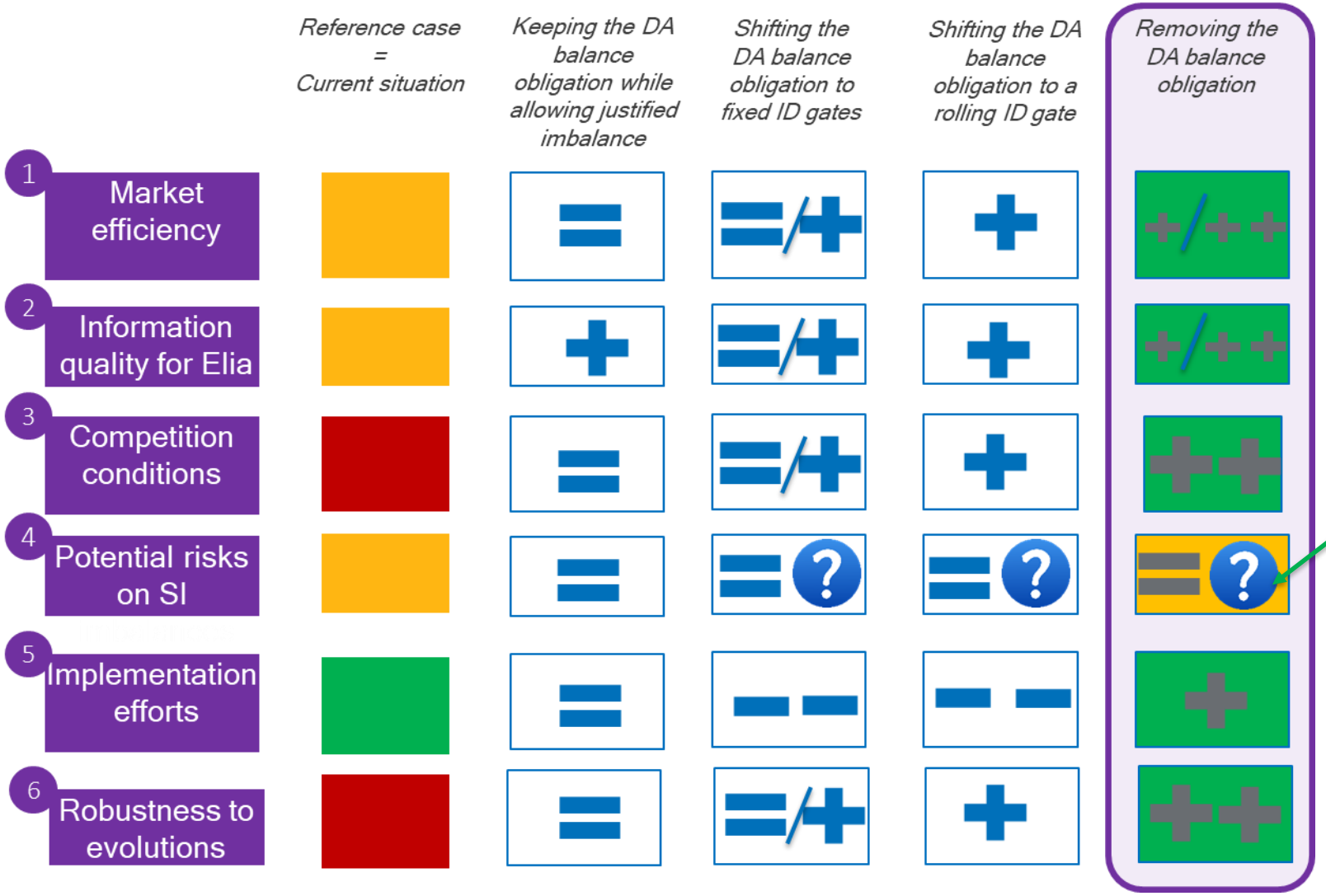


- It puts up **barriers to possible spot market improvements** (price convergence between DA and ID markets, higher market liquidity, reduction of possible exercise of market power)

- Several Belgian and foreign experiences show that a **strong imbalance tariff is much more powerful** than a formal Day-ahead balance obligation, and is **even self-sufficient**, to prevent real-time imbalances:

  E.g. Large real-time imbalances were observed in Germany when the imbalance tariff was impaired, and this despite the existence of a day-ahead balance obligation

The comparison of possible DA balance obligation evolutions show that the suppression of the DA balance obligation outperforms all the other options



The risk on SI is considered as **very unlikely** by Elia. BRPs should indeed be (financially, through the strong imbalance tariff) discouraged from taking risky open positions in DA, and massive 'wrong bets' in case of tense situations (that could therefore not be corrected before the real-time) are not to be expected

Elia recommends to progressively remove the DA balance obligation

Elia **recommends to remove the DA balance obligation**, while keeping the DA nomination process and the RT formal balance obligation unchanged **in a first stage.**

Elia **analyzed the risks** linked to the relaxation of the DA balance obligation and believes that the risk of higher SI is very unlikely. In order to confirm this assumption and make sure the relaxation of the DA balance obligation has no effect on the Belgian SI, **two measures** are proposed :

- A **progressive** relaxation of the DA balance obligation

* Threshold depending on the BRP "size" (calculated based on the maximum of the daily average of "offtakes + sales" over a 12-months period)

- The **publication**, on Elia's website, **of new indicators** depicting the **total (i.e. aggregated) open position** taken by the BRPs at the **end of the DAM**. By comparing their position against the global position of the market, BRPs could evaluate how easy it will be to find counterparties to balance their position before real-time, or how interesting it can be to bid or offer additional supply/demand in the Intraday market.

This evolution **opens the way to other adaptations** and can be regarded **as a first step towards further simplification of the balancing process.**

Implementation plan

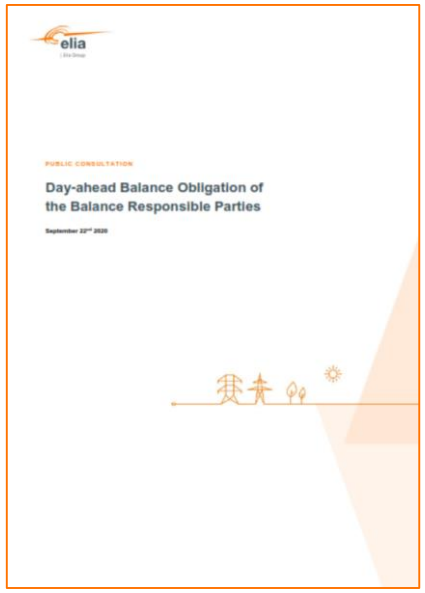
The implementation of the phased relaxation of the Day-ahead balance obligation requires:

- Some **IT developments** and/or **process adaptations** at both **Elia and BRPs side**
- Small **modifications** of the **T&C BRP**
- To foresee a **sufficiently long period of observation and evaluation** before making the **final decision to evolve towards a full removal of this obligation**, to maintain its partial relaxation, or to revert back to a situation where a strict Day-ahead balance obligation apply

A **consistent** and **realistic implementation timeline** will be prepared, taking into account these constraints, as well as the other projects and initiatives that are ongoing or planned by Elia. This will be communicated by December 23 at the latest.

Elia can however **announce her intention to start working on this project in 2021**, even though the contractual stream would not start before April 2021

Organization of public consultation



- A first **report of this study** is available on Elia's website
- The report is structured in 4 main parts:
  - A description of the current approach to balance the Belgian control area;
  - An evaluation of the relevance of Day-ahead balance obligation, based on an analysis of the legal framework, interviews with market parties active in Belgium, a benchmark with neighbouring countries, an in-depth literature review of "virtual bidding" mechanism in force in some US markets as well as an analysis of the Elia operational processes relying on the Day-ahead nominations;
  - An assessment and comparison of the different possible evolutions of the Day-Ahead balance obligation, resulting in a clear recommendation supported by a CBA;
  - A description of the necessary steps for the implementation of Elia's recommendation.
- The document is consulted from **Tuesday 22nd September 2020 to Tuesday 20th October 2020**
- All comments and suggestions can be provided via the **online form** available on Elia's website
- The stakeholders' feedback will facilitate the finalization of the study which will be published by **23rd December 2020**

Back-up slides

Benchmark with other TSOs

	RTE	TenneT	50 Hertz
Balance obligation	No	No	Yes, in DA and 15' before RT
Reactive balancing	No	Yes	Allowed but not encouraged
Imbalance tariff	Dual price system, based on weighted average prices of BAL activations	Dual price system, based on marginal prices of BAL activations	Computed at national level and based on weighted average prices of BAL activations
Invoicing	Monthly (end of month M)	Weekly (within 10 WD)	Monthly (beginning of month M+1)
Collaterals	Take the DA open position of the BRPs into account	Based on the highest daily transaction volumes and consumption	Based on maximum sales, production and consumption declared ex-ante

Virtual bidding – in-depth study based on CAISO and PJM cases

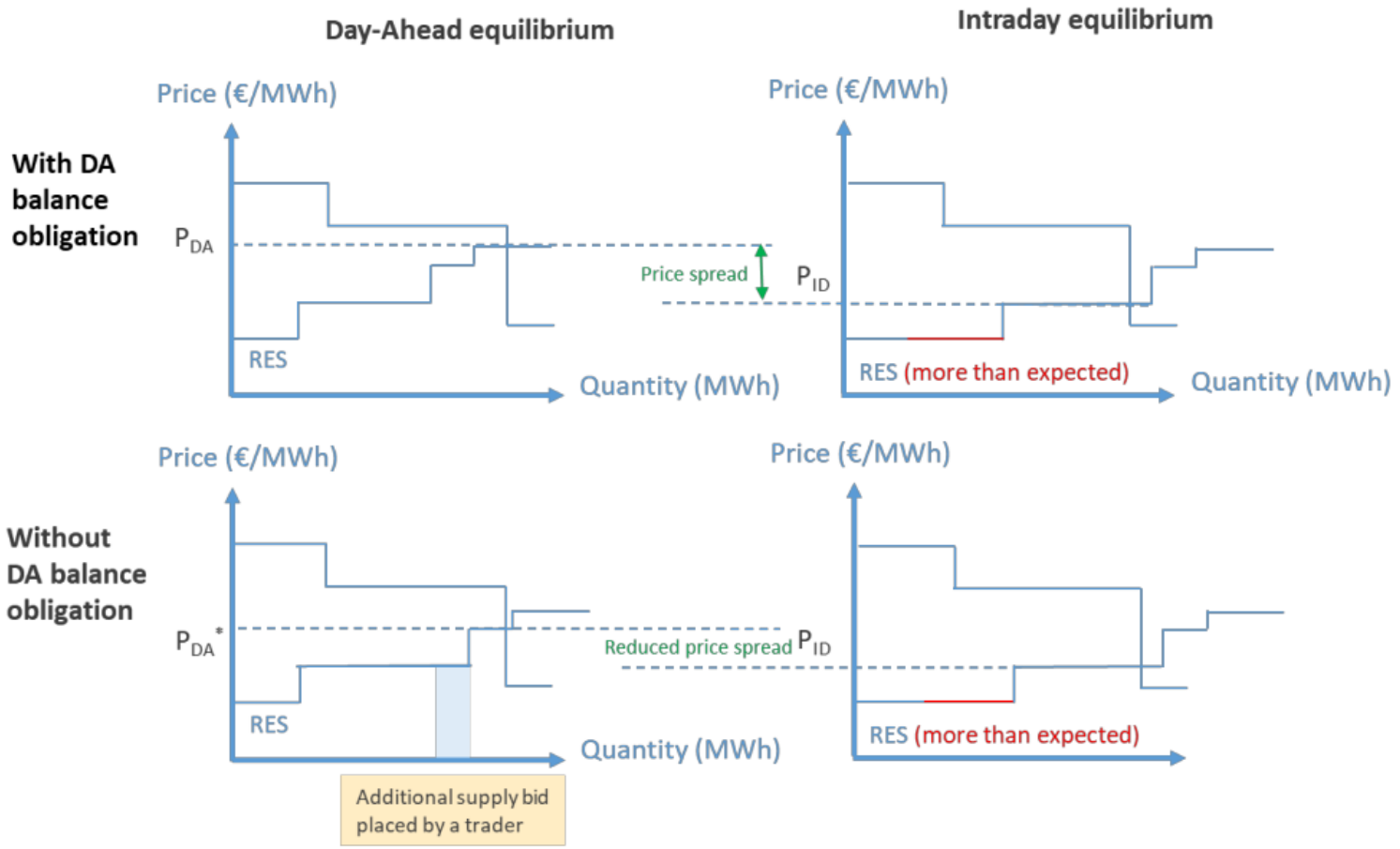
- **What is virtual bidding?** Virtual bidding is a concept introduced in the US which can be compared to the removal of ***all*** (i.e. DA and RT) formal balance obligations of BRPs
- **Benefits of virtual bidding?** Free arbitrage between real-time markets and preceding markets demonstrated the following benefits ***in the context of US electricity markets:***
  - ***Price convergence between DA and RT markets (DA prices converge to expected RT prices) and increased market liquidity***
  - ***Reduction of market power (the risk that large market parties try to influence market price is mitigated by allowing other market participants to virtually bid and compensate the 'manipulation')***
  - ***More efficient Day-ahead unit commitment***
- **Risks of virtual bidding?** Some risks are specific to US market design (risk of price manipulation from holders of FTR – *financial transmission rights*, risk of 'parasitic profits' due to differences between the DA and RT market clearing algorithms), others would also be applicable in Europe (potential risks on system imbalances in case of 'wrong bets', especially in tense situations)
- **How are potential risks on system imbalance limited in the US?**
  - ***A RUC (residual unit commitment) process was introduced to ensure there is sufficient on-line capacity to meet the ISO load forecast***
  - ***The RT price is a strong incentive to avoid too risky positions***
  - ***Some ISO considered a phased approach by progressively increasing position limits when introducing VB***
  - ***Financial guarantee (collaterals) defines the allowed volume of virtual transactions***

Virtual bidding – what's in it for us?

- **Can we reap the same benefits as in the US?** Relaxing the DA Balancing Obligation, without removing the RT formal balancing obligation, would still enable to catch a part of the VB benefits:
  - Price convergence between DA and ID markets and higher maket liquidity;
  - More representative physical Day-ahead schedules;
  - Reduction of the possible exercise of market power in the DAM.
- **Are we exposed to the same risks as in the US?** Maintaining the RT formal balancing obligation somehow limits the potential risks on system imbalances since all the BRP traders should strive to be balanced at the gate closure of the intraday market ("bets" on the RT position of the zone are as such not allowed).
- **Can we transpose the US risk mitigation measures to the EU system?**
  - ***Adequacy checks (equivalent to the American RUC) are already actively performed in Belgium***
  - ***The imbalance tariff (equivalent to the RT price) is deemed as a strong financial incentive in Belgium***
  - ***A phased approach could be considered for the relaxation of the DA balance obligation in Belgium (by progressively increasing DA allowed open positions)***

How can the removal of the DA balance obligation remove barrier to a better price convergence between DA and ID markets?

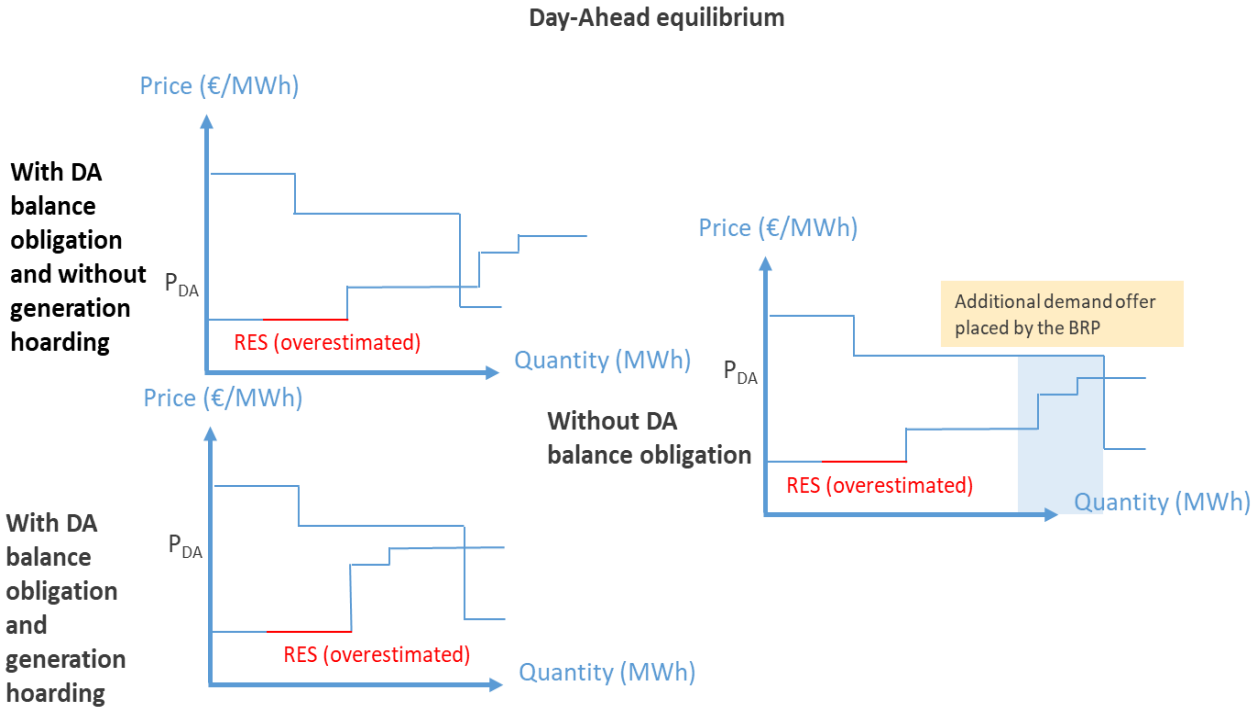
Example
A Trader BRP estimating that ID prices will be lower than DA prices due to higher RES might want to sell energy in DA because he knows he will be able to buy it at better prices in ID. This will contribute to decrease DA prices and increase ID prices, and help prices to converge if this anticipation turns out to be right.



How can the removal of the DA balance obligation remove barrier to a higher market liquidity?

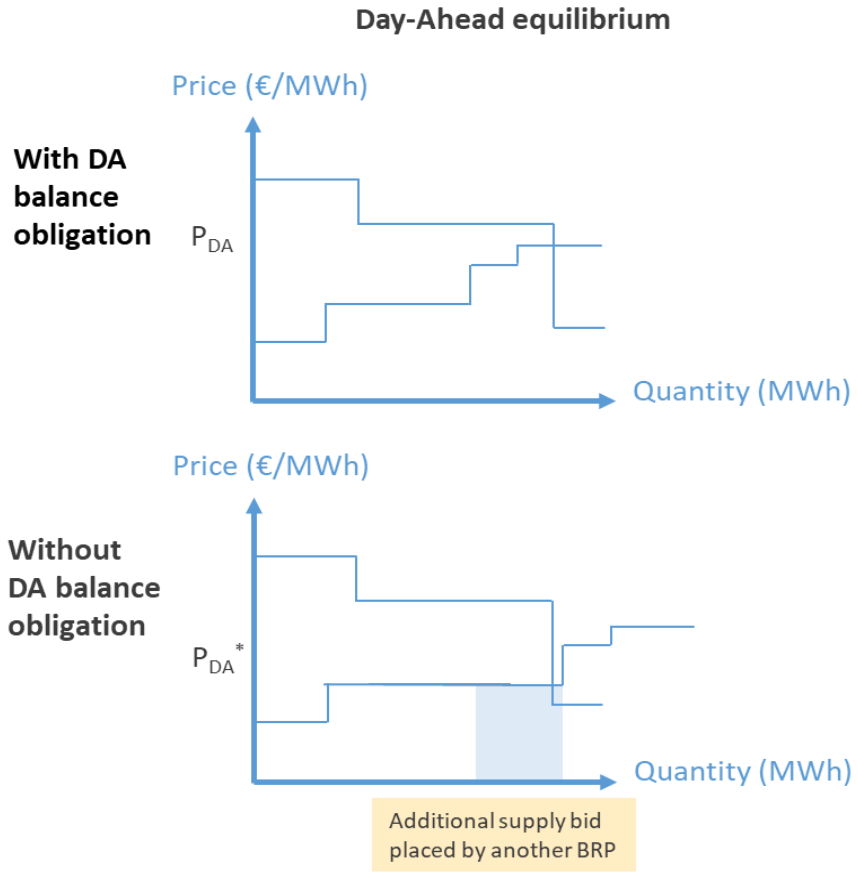
Where the cross-border capacity might moreover be more limited

Example
A producer expects higher prices in ID than in DA due to lower RES than forecasted. Instead of voluntarily hoarding his generation capacity to the ID timeframe (e.g. by overbidding and pricing itself out of the DAM), he can, if DA open positions are allowed, place an additional demand bid, hence allowing the DA price to converge towards a price better reflecting the next day conditions, and making a profitable "virtual" transaction.



How can the removal of the DA balance obligation help reduce the possible exercise of market power by large participants?

Example
A large producer voluntarily hoards part of his generation capacity to the ID timeframe in order to increase DA prices and get a higher inframarginal rent on its other units. If DA open positions are allowed, other BRPs (e.g. BRPs with lot of load to cover) might decide to compensate the strategy of the producer.



How can the removal of the DA balance obligation help improve the quality of the Day-ahead signal?

The conclusion of the three previous slides **suggest that the relevance of the Day-ahead price signal can only be improved by the relaxation of the Day-ahead balance obligation** since:

- The Day-ahead price might tend to converge towards the prices expected for the next day, hence better reflecting the Real-time conditions;
- The DAM liquidity can only be increased by the relaxation of the Day-ahead balance obligation;
- Any tentative to exercise power market is discouraged since the manipulative strategy might be compensated by other actors.

Description of the criteria used for the comparison of possible evolutions

1 Market efficiency	The business case and US Virtual Trading experience show that the current Day-ahead balance obligation prevents some market efficiency improvements, such as greater price convergence between DAM and RTM or higher market liquidity.
2 Information quality for Elia	At any moment, Elia needs the best vision of generation schedules and balancing offers to conduct adequacy checks and congestion studies. To this end, Elia needs reliable information from DA to RT. The interviews with market parties highlighted some limitations of the current system to this end.
3 Competition conditions	Changes related to the relaxation of balance obligation could entail impacts on existing market participants but also modify the competitive landscape.
4 Potential risk of System Imbalances	The potential risks for system security in case of massive wrong anticipation of the Intraday conditions should be assessed when Day-ahead open positions are (implicitly or explicitly) allowed.
5 Implementation efforts	• In some options, Elia and BRPs will need to adapt their processes and tools. • New processes and/or mitigation measures could be necessary and require changes.
6 Robustness to evolutions	The relevance of balancing the system in DA will decrease with the growing importance of forecast errors, and will thus be less and less important as the production and demand become more volatile, and as the importance of the Intraday timeframe grows.

Evaluation of the AS-IS situation

	Analysis	Assessment of current situation
1 Market efficiency	The DA Balancing Obligation prevents BRPs from making explicit arbitrages between DA and ID/real-time and the associated benefits (improvement of price signal reliability and back-propagation of prices, market liquidity) are not reaped, at least not fully (implicit arbitrages are possible).	Changes would be needed to reduce or withdraw the current limitations
2 Information quality for Elia	Information delivered by Physical BRPs can be of poor quality when nominations are adapted artificially to meet the balance obligation whereas balancing is impossible (in tense situations) or implicit arbitrage is done.	Whereas the DA Balance Obligation aims at ensuring that Elia has a good vision in DA, distortions can occur.
3 Competition conditions	There is no level playing field between Physical BRPs and Trader BRPs, as the DA Balance Obligation is perfectly enforceable only for the latter. Furthermore, this reinforces the market power or large Physical BRPs.	Changes are needed to avoid discrimination: this is the rationale that led to changes in the Netherlands.
4 Potential risk of System imbalances	The DA Balance Obligation is considered by some market parties as a safeguard to avoid large system imbalances in real-time. However, its enforceability is limited: implicit arbitrage is already possible for physical BRPs through tweaked forecasts. Moreover, the key balancing incentive for BRPs turns out to be the design of the imbalance tariff.	The safeguard role of the formal DA Balance Obligation can be questioned as its enforceability is limited. It is however not deemed as a key incentive for BRPs to reach the balance in RT.
5 Implementation efforts	The current situation seems to fit both Elia's and large physical BRPs' DA processes and tools. For small physical BRPs, it can however be considered as a large burden.	No particular issue as processes and tools are already set up, even though they are heavy.
6 Robustness to evolutions	The DA Balance Obligation captures the majority of supply-demand issues today, but more and more adjustements occur due to forecast errors between DA and RT (mainly load and RES, in Belgium and neighbouring countries).	The DA Balance Obligation will be less and less relevant as the volatility of production and demand increases.

Keeping the DA balance obligation while allowing justified imbalance

	Analysis	Assessment
1 Market efficiency	Market efficiency would not be greater than today, i.e. limited to potential market efficiency benefits which are partially obtained today through implicit arbitrages between DA and ID by physical BRPs.	=
2 Information quality for Elia	Allowing justified imbalances (in tense situations) would improve the quality of nominations sent by BRPs and thus improve the quality of DA information for Elia.	+
3 Competition conditions	No change.	=
4 Potential risk of System imbalances	No change: it will remain impossible to monitor if the nominations are a real best estimate or if the forecasts are tweaked to hide voluntary open positions of physical BRPs.	=
5 Implementation efforts	No change.	=
6 Robustness to evolutions	No change.	=

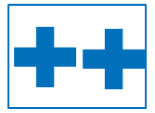
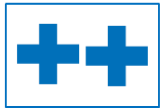
Shifting the DA balance obligation to fixed Intraday gates

	Analysis	Assessment
1 Market efficiency	Allowing arbitrages between DA and ID would improve market efficiency up to the point in ID where the balance obligation is shifted (i.e. trades arbitraging between DA and ID would be possible until the fixed gate closure times). This should contribute to foster the ID liquidity.	
2 Information quality for Elia	ID nominations with a more accurate view of forecasts than today would be received by Elia. Moreover, the BRPs would no longer be incentivized to artificially balance their nominations in Day-ahead, hence improving the quality of DA information for Elia.	
3 Competition conditions	The level playing field would be improved between Traders and Physical BRPs by increasing trading opportunities for Traders. However, this would only be valid up until the fixed ID gates.	
4 Potential risk of System imbalances	Explicit arbitrage between DA and ID would be allowed for all BRPs. In case of massive wrong anticipation of the ID conditions and poor liquidity of the ID market, BRPs might not manage to come back to equilibrium before RT. However, the ID/RT balance obligations, and, above all, the imbalance tariff should discourage the BRPs to take risky positions in tense situations, hence limiting this risk.	
5 Implementation efforts	Heavy efforts in terms of staff (the ID nomination process would require shift work, both at Elia and at BRPs side).	
6 Robustness to evolutions	Better suited to increased RES penetration, but adaptations would probably be necessary over time: as RES penetration increases, security issues will not necessarily occur at peak load hours anymore.	

Shifting the DA balance obligation to a rolling Intraday gate

		Analysis	Assessment
1	Market efficiency	Allowing arbitrages between DA and ID would improve market efficiency up to the point in ID where the balance obligation is shifted (i.e. trades arbitraging between DA and ID would be possible until the rolling ID gate, which leaves even more trading opportunities than with the fixed ID gate system).	
2	Information quality for Elia	ID nominations with a more accurate view of forecasts than today would be received just in time for Elia to react when needed. Moreover, the BRPs would no longer be incentivized to artificially balance their nominations in Day-ahead, hence improving the quality of DA information for Elia.	
3	Competition conditions	The level playing field would be improved between Traders and Physical BRPs by increasing trading opportunities for Traders up until the rolling ID gate (which leaves more trading opportunities than with the fixed ID gate system)	
4	Potential risk of System imbalances	Explicit arbitrage between DA and ID would be allowed for all BRPs. In case of massive wrong anticipation of the ID conditions and poor liquidity of the ID market, BRPs might not manage to come back to equilibrium before RT. However, the ID/RT balance obligations, and, above all, the imbalance tariff should discourage the BRPs to take risky positions in tense situations, hence limiting this risk.	
5	Implementation efforts	Heavy efforts in terms of staff (the ID nomination process would require shift work, both at Elia and at BRPs side). Some BRPs have also mentioned high implementation efforts for the rolling ID gate.	
6	Robustness to evolutions	Better suited to increased RES penetration, even though large forecast errors 4 hours before real-time (i.e. at the moment of the ID balance obligation) are not excluded.	

Removing the DA balance obligation

	Analysis	Assessment
1 Market efficiency	Arbitrages between DA and intraday would be fully possible. This should contribute to foster the intraday market liquidity and improve the reliability of price signals through a better convergence between DA and ID prices.	
2 Information quality for Elia	The BRPs would no longer be incentivized to artificially balance their nominations in Day-ahead, hence improving the quality of DA information for Elia.	
3 Competition conditions	The level playing field would be much improved between pure traders and physical BRPs as both would have the opportunity to make arbitrages between DA and ID.	
4 Potential risk of System imbalances	Explicit arbitrage between DA and ID would be allowed for all BRPs. In case of massive wrong anticipation of the ID conditions and poor liquidity of the ID market, BRPs might not manage to come back to equilibrium before RT. However, the RT balance obligation, and, above all, the imbalance tariff should discourage the BRPs to take risky positions in tense situations, hence limiting this risk.	
5 Implementation efforts	Processes would be simplified as no more balancing check for each BRP would apply before RT. Limited IT costs would be incurred.	
6 Robustness to evolutions	Good robustness to increased RES penetration.	

aFRR Dimensioning

Presented by Kristof De Vos

1. **Introduction : re-cap of Part 1 of the study**

2. Results of the public consultation
3. Results of the proof of concept
4. Recommendations and implementation plan

WG 8/5

RECAP PART 1

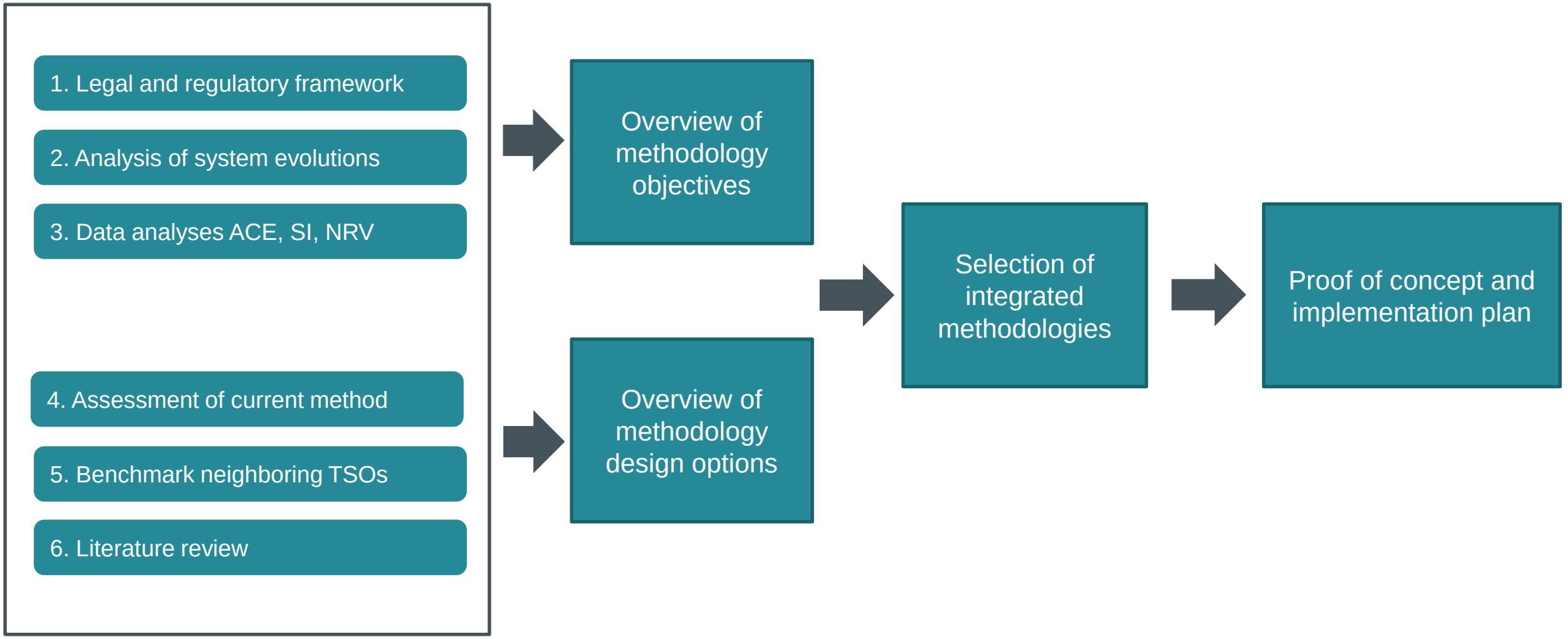
Objectives of aFRR dimensioning methodology

Due to the absence of clear legal requirements on aFRR dimensioning, a trade-off has to be found between minimum FRCE-thresholds and Elia's responsibilities to fairly contribute to system stability

- **Meet the L1 & L2 criteria in line with SOGL Article 128 and shall endeavor to restore the ACE / FRCE (ACE = 0) within 15 minutes in line with SOGL Article 152(9)**
  - Temporary deviations are netted or resolved by FCR
  - The L1 & L2 criteria are minimum thresholds which are legally imposed which are largely met by most TSOs (including Belgium)
- **Cover FRCE and LFC block imbalance variations within 5.0 – 7.5 minutes (FAT of aFRR)**
  - Note that forced outages are typically covered by FCR and mFRR (after 15 minutes)
- **Consistent with a daily procurement of 4 hour aFRR product** (daily dimensioning with 4-hour resolution)
- **Robust towards future system evolutions** (2nd wave of offshore wind power, further balancing market integration)
- **Avoid disruptive aFRR volumes upon introduction of a new methodology**

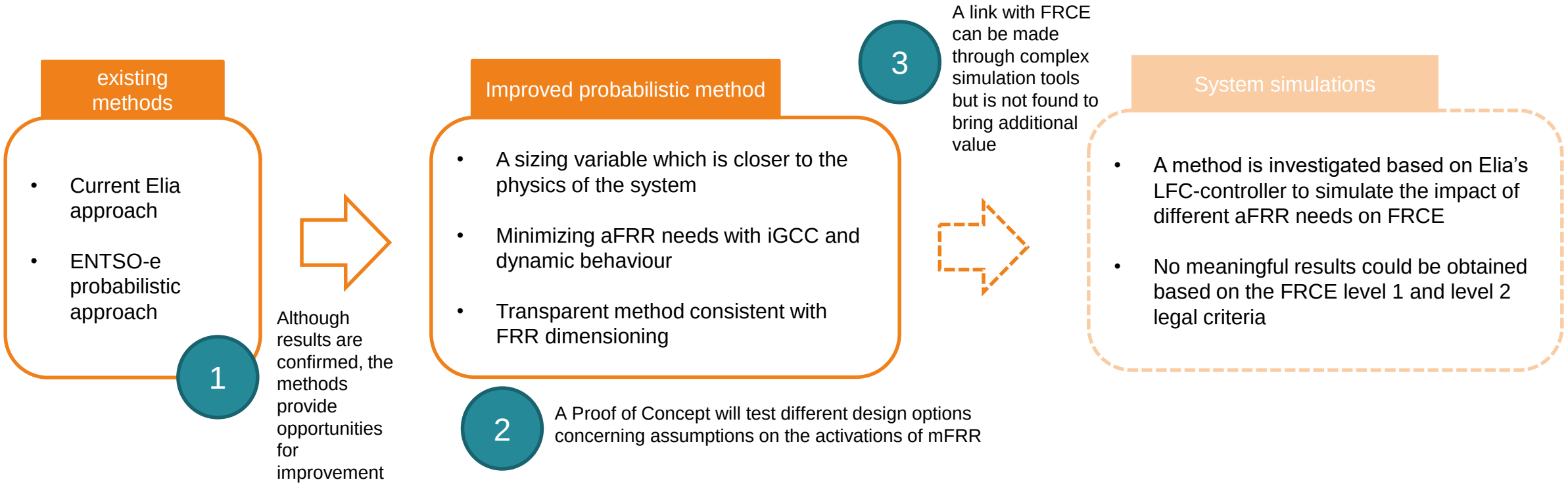
RECAP Part 1

Approach followed to find a new aFRR dimensioning methodology



RECAP Part 1
Conclusions

Based on desktop research (literature, benchmark, analyses), a list of possible methodology design options is composed. Elia proposes to further investigate an improved probabilistic method in a proof of concept.



The proof of concept analyzed the results between 2020 and 2028. Stakeholders were welcomed to provide their suggestions and feedback for the PoC in a public consultation. A planning for implementation shall be drafted when the PoC presents positive results.

WG 8/5

RECAP Part 1

Recommendations for the Proof of Concept

- **An improved probabilistic method based on historic 5' (or even 1') average LFC block imbalances aligned with the FRR dimensioning method seems to be a good trade off between complexity and accuracy, improving the current method in an evolutive way**
  - The LFC block imbalances will be corrected with simulated 'optimal' or 'dispatch based' mFRR activations
  - The LFC block imbalances will exclude periods with forced outages of thermal units

- **Despite that the imbalance netting potential is not guaranteed, iGCC plays an important role in the FRCE-quality and the activation of aFRR. Elia therefore proposes to correct the LFC block imbalances with (part of) the activated iGCC.**

- **It is proposed to use a 99% reliability level, aligned with other dimensioning processes. This high reliability level is justified by taking into account iGCC and mFRR activations.**

- **A dynamic potential is discovered and needs to be further investigated in the Proof of Concept. The dynamic sizing process can be aligned and integrated in the FRR dimensioning process.**

1. Introduction : re-cap of Part 1 of the study

2. **Results of the public consultation**

3. Results of the proof of concept
4. Recommendations and implementation plan

Overview of the public consultation

- **Elia consulted its recommended methodology to be tested in a PoC between June 2 and July 2, 2020 :**
  - The consultation was based on an extensive report justifying the recommendations of Elia
  - A summary of the report was presented in the WG BALANCING of May 8, 2020

- **Three non-confidential answers have been received from the stakeholders :**
  - Belgian Offshore Platform (BOP)
  - FEBEG
  - FEBELIEC

- **A consultation report, and all answers of the public consultation, will be published on the website of Elia on 30/9, together with the publication of the full report**

Answers from the public consultation

Summary of comments of BOP

- **BOP is convinced that dynamic dimensioning is a step in the right direction**

- **BOP observes that Elia is minimalistic in the dimensioning and procurement of the aFRR needs, the benchmark with neighbors shows that:**
  - Elia dimensions and procures relatively low aFRR volumes
  - Reliability level of 99% is at the low end of the range

- **BOP urges that the residual forecasting risk relating to storm events is to be included in the data processing of the dynamic dimensioning method (if not already the case) and that the reliability has to be set higher than the 99% percentile in case the residual forecasting risk relating to storm events is not fully covered.**

Elia agrees with this observation but until now it was able to achieve an acceptable FRCE quality

Storm events not be excluded from the probabilistic method (as it is also not excluded in the FRR dimensioning) as it is based on all historical observations (except for forced outages of power plants and Nemo Link).

They can impact the reserve needs during high wind conditions (but as occurrence is low, the impact on dimensioning remains small)

In a dynamic approach, FRR needs are increased in higher risk periods. For exceptional events, specific measures are put in place to avoid high FRCE during uncovered storm risks.

Answers from the public consultation

Summary comments of FEBEG

- **FEBEG endorses the probabilistic method, the 5' (or even 1') sizing variable resolution and removing forced outages**

- **Although FEBEG underwrites the use of simulated activated aFRR as sizing variable, it opposes against the oracle-based method as this would minimize the aFRR needs under a false pretext**
  - If the dispatch-based method does not result in satisfactory results, Febeg proposes to keep the current sizing variable (SI variations)
  - It proposes to integrate the current sizing variable (based on imbalance variations) in the PoC

- **FEBEG supports taking into account IGCC volumes but considers the full historic volumes too optimistic in view of the non-guaranteed nature. It would therefore welcome option of simulated IGCC (allowing sensitivities on future assumptions)**

- **FEBEG upholds a dynamic approach to the aFRR dimensioning but thinks modulating on daily basis might not be useful and risks giving the market an unnecessarily fluctuating indication. It thinks a weekly dynamic would probably be sufficient**

- **FEBEG endorses a high reliability level (the choice of 99% seems arbitrary and should be better justified) and proposes that this is to be further tested In the PoC**

As explained, the oracle-based methods have some advantages over the dispatch-based and are therefore not excluded from the PoC

Although the simulated aFRR methods are found to align better with the objectives aFRR, Elia investigates an improved version of the current sizing variable (i.e. 5' imbalance variations with iGCC) as a benchmark in the PoC

The appropriateness of using simulated instead of historic iGCC values is investigated in the PoC.

Note that a dynamic approach would in any case take into account evolutions in the availability of iGCC

Elia will investigate as an option the dynamic potential with only time features in the PoC. This could facilitate a weekly dimensioning instead of a daily dimensioning

Based on the arguments given in part 1 of the report, no sensitivities on the reliability are conducted,.

Answers from the public consultation

Summary comments of FEBELIEC

- Encourages Elia on providing correct balancing market price signals and incentives for BRPs to balance positions (and to take this into account in the dimensioning)
- Requests utmost caution towards the possibility of eliminating or relaxing the obligation for BRPs to nominate a balanced portfolio in day-ahead (cf. specific incentive study)

The investigated dynamic dimensioning should adapt the reserve needs to market performance, take into account market evolutions and avoid over-dimensioning

Nevertheless, it is not sure to which extent existing incentives will impact LFC block imbalances within the 15'

- Requests utmost caution towards over-dimensioning in long-term exercises
- Welcomes the positive effect of dimensioning closer to real-time
- Stresses that BRPs should cover intermittent generation and TSOs should only cover residual imbalances

- States that iGCC and PICASSO should be taken into account in the dimensioning exercise
  - ➢ CZC should be re-calculated in each time frame (which shall result in more CZC in the balancing time frame)

iGCC (netting) will be taken into account

The effect of PICASSO is considered out of scope (aFRR means)

EBGL foresees that by end 2022, all TSOs of a CCR shall develop a methodology for CZC calculation within the balancing timeframe

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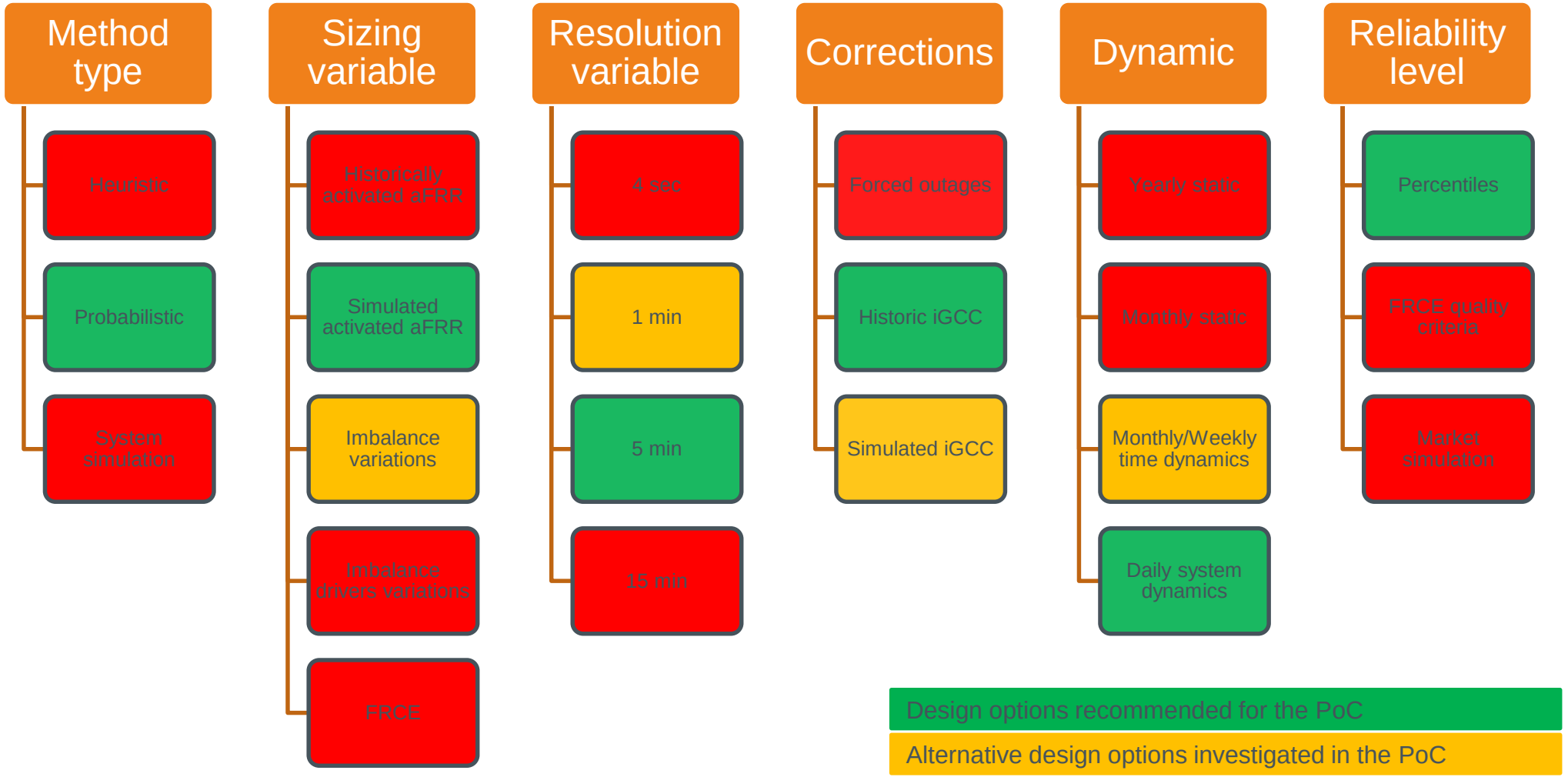
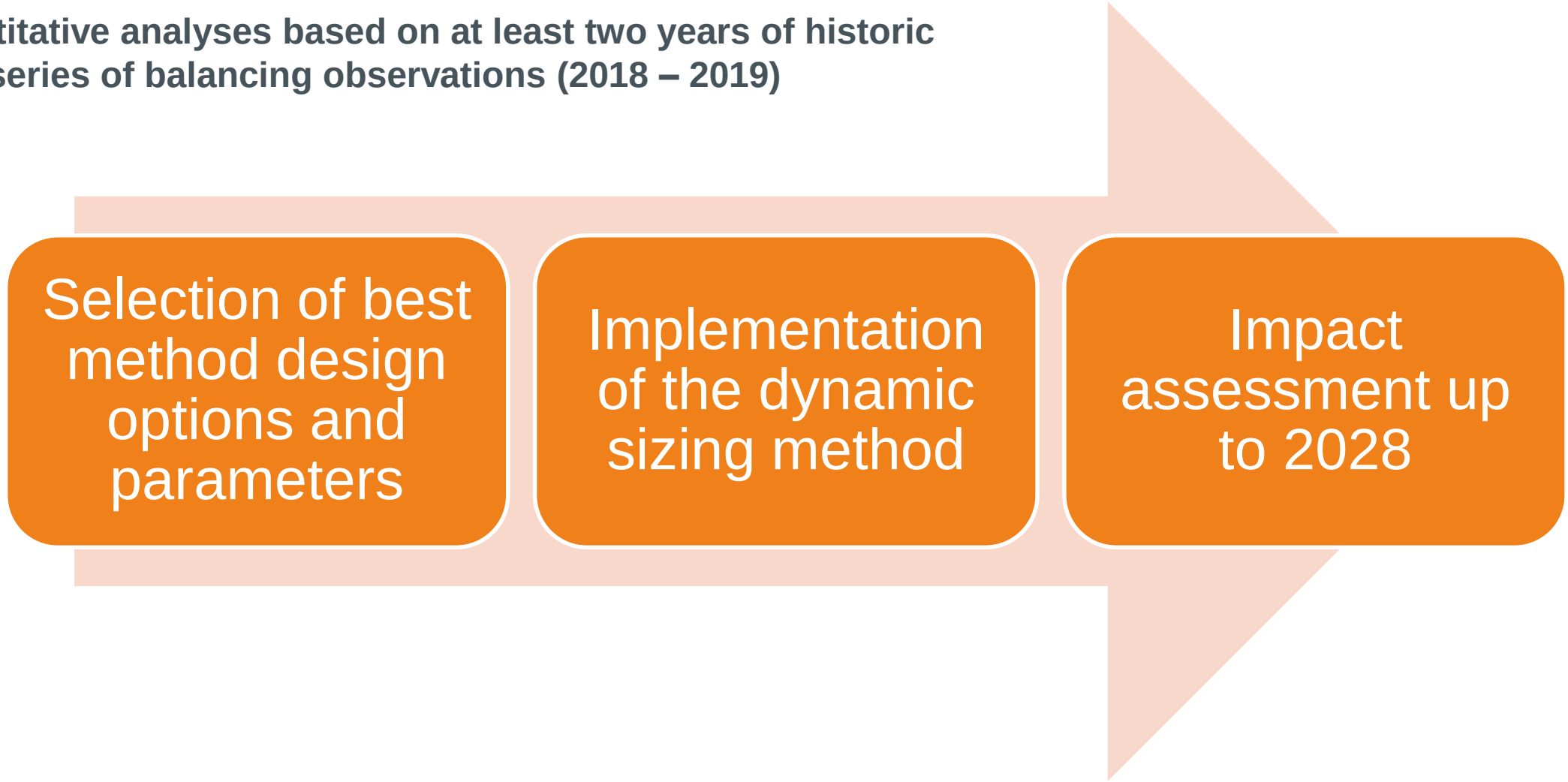
Putting forward an improved probabilistic method



Proof of Concept : an in depth investigation of the improved probabilistic methods

Quantitative analyses based on at least two years of historic time series of balancing observations (2018 – 2019)



Selected methodology for the Proof of Concept

A method was put forward where the aFRR needs are dimensioned to cover 99% of simulated aFRR activations based on historic LFC block imbalances, iGCC and mFRR activations.

Simulated aFRR activations$_t$ = SI_t - $IGCC_t$ - $Simulated\ mFRR\ activations_t$

Calculations are conducted on historically observed one minute LFC block imbalances filtered to remove periods with forced outages. Do we	**As in real-time operations, simulated aFRR activations shall take into account the activated iGCC capacity. Will this be based on**	**mFRR activations are simulated based on the observed LFC block imbalances for the corresponding periods. Is this simulation based on**
adapt sizing resolution towards 5 minutes by means of averaging the 1 minute data,	the observed historic activated volume of iGCC during the same periods,	realistic operational dispatch decisions (referred to as the rule-based method),
or maintain the original resolution of the data, i.e. 1 minute resolution ?	or simulated activated volumes of IGCC based on e.g. Monte Carlo calculations ?	or a perfect foresight (referred to as the oracle-based method) which can serve as a minimum threshold, independent of dispatch decisions ?

+

Benchmarked with an improved version of the current methodology:
Maintaining the current sizing variable (but with iGCC and 5' resolution)

Two methods are put forward by Elia to determine the mFRR simulations, and are compared to a benchmark method

A. aFRR simulations with oracle-based mFRR activations

- Time series of simulated aFRR activations based on historic LFC block imbalances, iGCC and perfect forecast mFRR activations as if the LFC block imbalances are perfectly known in advance

B. aFRR simulations with dispatch-based mFRR activations

- Time series of simulated aFRR activations based on historic LFC block imbalances, iGCC and dispatch-based mFRR activations based on a previous LFC block imbalances via pre-defined rules

C. Improved current method : SI variations

- An update of the current methodology based on LFC block imbalance (SI) variations, increasing the resolution to 5' and taking into account iGCC

Dispatch-based mFRR:

If $avg_{t-1;t-r;}$ (SI) > T
$mFRR_t = avg_{t-1;t-r}$(SI)
Else 0

T = activation threshold [MW]
r = lead time (number of 5' periods)

Oracle-based mFRR

$mFRR_{t;t+2} = avg_{t;t+2}$ (SI) with t = 1,4,7,…

SI variations

$varSI_{t;t-1} = (SI\text{-}iGCC)_t - (SI\text{-}iGCC)_{t-1}$

Recommended use of oracle-based method

$$\text{Simulated aFRR activations}_t = SI_t - IGCC_t - \textit{Simulated mFRR activations}_t$$

Method	Static Result (Up / Down)	Pro	Con	Sensitivities	
5' Simulated aFRR with dispatch-based mFRR	252 / 238 MW	• The approach remains closest to real mFRR dispatch operations	• Intertwines dispatch and dimensioning discussions (e.g. parameters reducing the aFRR needs are not necessarily realistic in practice, or vice versa) • Higher complexity and less robust as contains several parameters which are to be calibrated • Elevated aFRR needs compared to results of the current method (providing acceptable FRCE quality)	• Several sensitivities on the activation threshold and activation lead time increase the aFRR needs • A method based on forecasted SI was tested but no substantial aFRR needs reductions are found	
5' Simulated aFRR with oracle based mFRR	151 / 145 MW	• 'Prefect world' calculation, independent of real dispatch operations • Robust and low complexity as no parameters to calibrate (robust and transparent) • Confirming the aFRR needs found with the current aFRR method obtaining an acceptable FRCE quality	• Minimizes aFRR needs under 'perfect world' assumptions : BUT can be justified as : • Combines with a reliability level of 99,0% • Combined with a dynamic approach adapting to risks • Elevated cost of aFRR compared to mFRR • Will attain the same FRCE quality as today	N.A.	
5' SI-Variations	235 / 226 MW	• Accepted for a long time as current method • Simple and intuitive	• Proxy for aFRR activations (no link with mFRR, and variations do not fully explain aFRR activations) • Elevated aFRR needs compared to results of the current method (providing acceptable aFRR needs)	• Increasing resolution to 1' could further reduce the aFRR needs but this is would further diverge the dimensioning from the real aFRR activations.	

Recommended use of a 5’ resolution

$$\text{Simulated aFRR activations}_t = SI_t - IGCC_t - \text{Simulated mFRR activations}_t$$

- **Quantitative analysis shows that deviation from the full activation time of aFRR will result in an over- or under-dimensioning of the aFRR needs**
  - A resolution higher than 5 minutes (e.g. 1 minute) will increase the aFRR needs without that this additional capacity can contribute to solving the highest LFC block imbalances
  - In contrast, a resolution lower than 5 minutes (e.g. 15 minutes) will reduce the aFRR needs without adequately covering inter-qh variations (which is an objective aFRR)
- **Elia proposes to continue with a 5’ method aligned with the future FAT (foreseen by 2022)**

	Up and downward aFRR (MW) for a 99% percentile			
Granularity of the sizing variable	1 minute		5 minutes	
	UP	**DOWN**	**UP**	**DOWN**
Rule-based mFRR	**284**	**270**	**252**	**238**
Oracle mFRR on SI	189	192	151	145
SI variations	128	132	235	226

For a method based on LFC block imbalance variations, the variability will go down with a higher 1’ resolution as the delta between two periods becomes smaller, but the aFRR needs will not be dimensioned to cover lower resolution variations such as 5’ variations

Recommended use of historic iGCC values

$$\text{Simulated aFRR activations}_t = SI_t - IGCC_t - Simulated\ mFRR\ activations_t$$

- In real-time operations, **the iGCC is activated before aFRR** and has a substantial impact on the aFRR activations, and despite the uncertainty on its availability, it was decided to take it into account in the aFRR dimensioning methodology
  - Most straightforward option is to take into account historical values as we are using a statistical relevant dataset (2 years) and a dynamic approach will adapt its behaviour to new evolutions.
- The netting potential is very difficult to predict. A simulated iGCC would therefore only make sense when the observed distribution of historic netting potential is to be modified to for instance cap or boost the contribution of IGCC. As this is not necessary (see above-mentioned reasons), this option is not further pursued in this study.

Note that the simulated mFRR activations do not take into account iGCC. Due to the uncertainty on the netting potential, the dispatcher can only rely on the LFC block imbalances to decide upon the activation of mFRR.

Investigating a dynamic aFRR dimensioning method

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

Features

The machine learning methodologies rely on the following features :	
5' Renewable generation and load forecasts	The day-ahead forecast (in MW) of onshore / offshore wind power, solar and total load (where needed interpolated from 15' resolution data)
5' Renewable generation and load forecast variations	The gradients (in MW) of solar, onshore / offshore wind power, and total load calculated as the difference between two quarter-hour day-ahead predictions
5' Scheduled leaps	The difference between the hourly averaged predicted residual load (total load minus renewable generation) and the 15' values. Also the absolute value of the scheduled leaps is included as separate feature
15' Weather predictions	The day-ahead predicted temperature (in °C) and solar irradiation (where needed interpolated from 5' resolution data)
Time features	Month of year, day of week and hour of day (in h)

Dependent variable

To predict one sizing variable representing the aFRR needs :	
5' aFRR simulations	Based on averaging 1' LFC block imbalances and iGCC activations

Machine learning **best practices are followed**

- Data gathering, cleaning, transformations
- Set up appropriate learning environment
- Correlation study
- Simple and complex methods selection
- Justified performance indicators

Model selection : a qualitative pre-selection

Accuracy	Complexity	Interpretability

(L)ow, (M)edium, (H)igh

★ *Selected for the PoC*

Less sophisticated methods

Linear regression ★

Accuracy	Complexity	Interpretability
M	L	H

- The most widely used model, can be adapted to almost any modelling task (benchmarking)
- Provides information on the strength of the relations
- Less performant if relations are non-linear

Nearest neighbours

Accuracy	Complexity	Interpretability
M	L	M

- Simple, effective with a fast training phase
- Limited ability to understand relations between features and outcome

Decision tree ★

Accuracy	Complexity	Interpretability
M	L	H

- Simple, efficient and performant for many types of problems
- More comprehensive (interpretation) as close to human decision process.
- Sensitive for over- and under-fitting, or training data evolutions

Naïve-Bayes

Accuracy	Complexity	Interpretability
M	L	H

- Less suitable for regression problems (but tehnically possible)
- Naive-bayes are very often outperformed by decision trees.

K-Means

Accuracy	Complexity	Interpretability
M	M	H

- Simple and very flexibility (popular clustering algorithm)
- Performance varies largely on the problem

More sophisticated methods

Random forest ★

Accuracy	Complexity	Interpretability
H	M	M

- High performance in general, versatile and averse to overfitting.
- Less interpretable as the decision trees

Support vector machines

Accuracy	Complexity	Interpretability
H	H	L

- High accuracy
- Complex parametrization and slow to train (particularly with large dataset)
- Difficult (if not impossible) to interpret

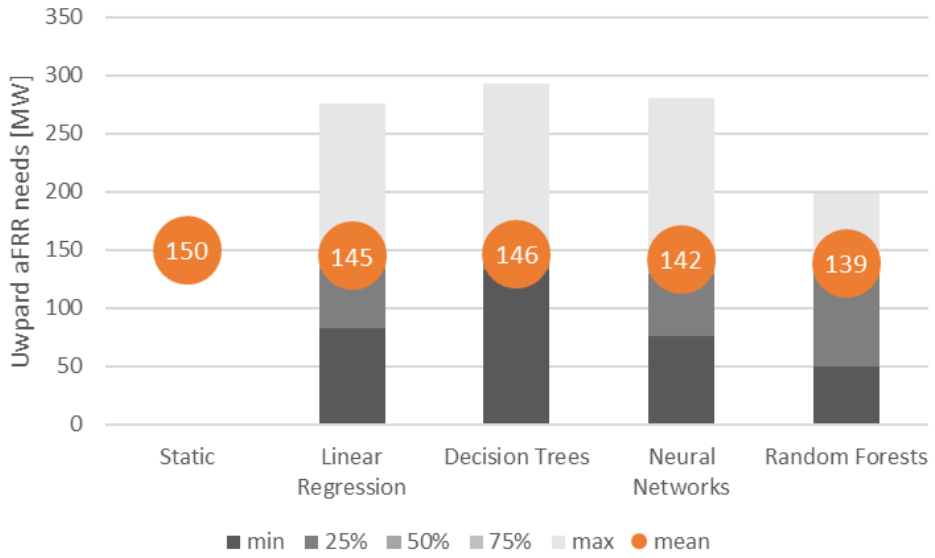
Neural networks ★

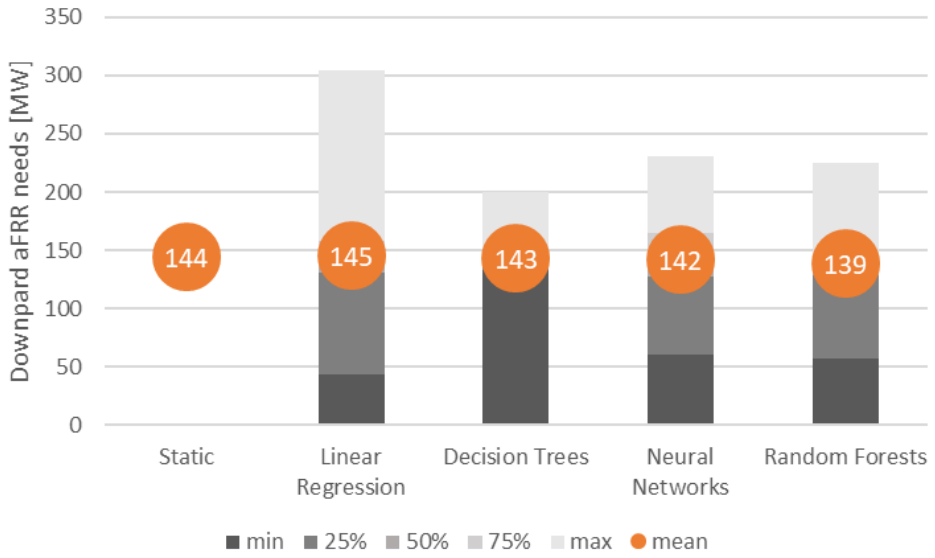
Accuracy	Complexity	Interpretability
H	M	L

- Better capable of modelling complex patterns
- Computationally intensive and slow to train
- Difficult (if not impossible) to interpret

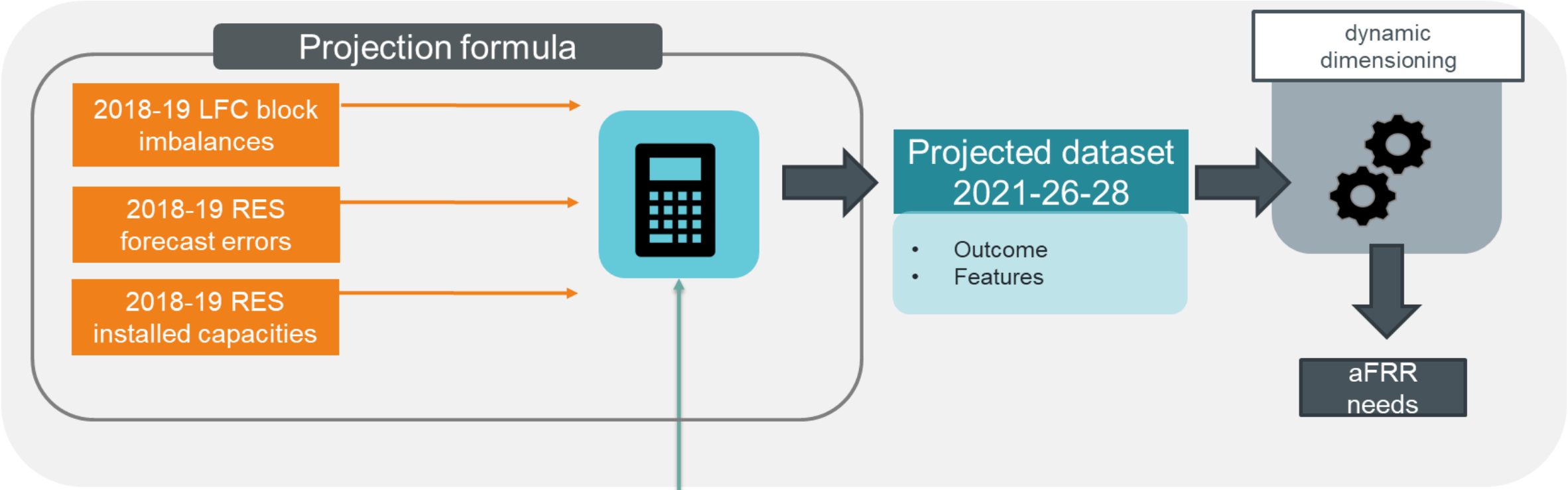
Results of a dynamic aFRR needs

- Over the test set, a random forests algorithm allows to reduce the **aFRR needs from 150 MW or 144 MW for up- and downward aFRR needs to 139 MW in both directions**. This equals an average reduction of 6%.
  - A methodology only using time features, facilitating a weekly dimensioning would only achieve a reduction of 3%
  - Note that there is a relative large spread between the minimum and the maximum aFRR needs
- The neural networks perform only slightly worse than the random forests. Although some incremental improvements are probably possible through further calibration of the method, the neural networks method is discarded as it is more complex and less interpretable.





Methodology to conduct projections towards 2028



offshore integration study

Parameters

- Ability of BRP to balance new RES (%/newly installed RES)
- Prediction accuracy RES scenario (%/year)
- SI yearly improvement (%/year)

Scenarios

Reference case

1%/y forecast improvement
1%/y SI improvement
35% BRP balancing (50% for offshore)

Absolute Worst Case

0%/y forecast improvement
0%/y SI improvement
0% BRP balancing

aFRR needs towards 2028

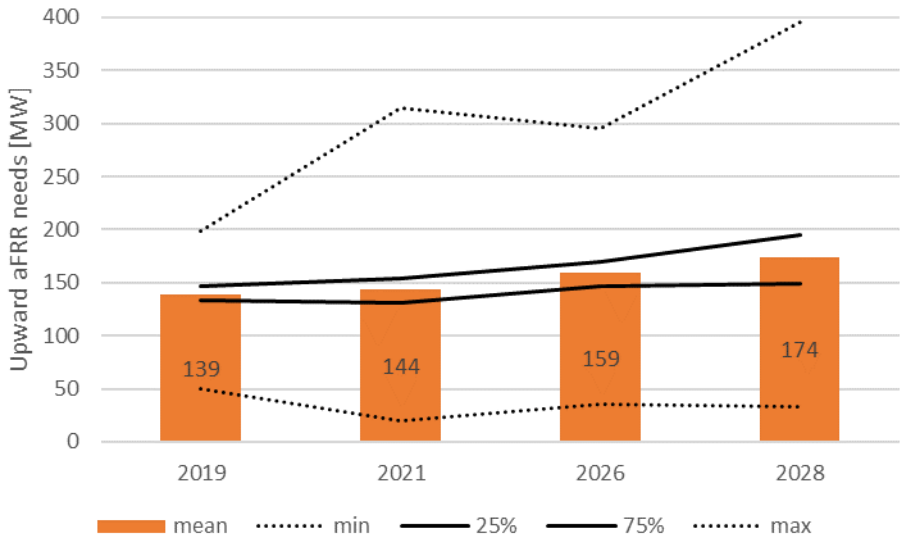
Max aFRR needs
It is assumed that future market improvements do not impact the LFC block imbalances within the imbalance settlement period

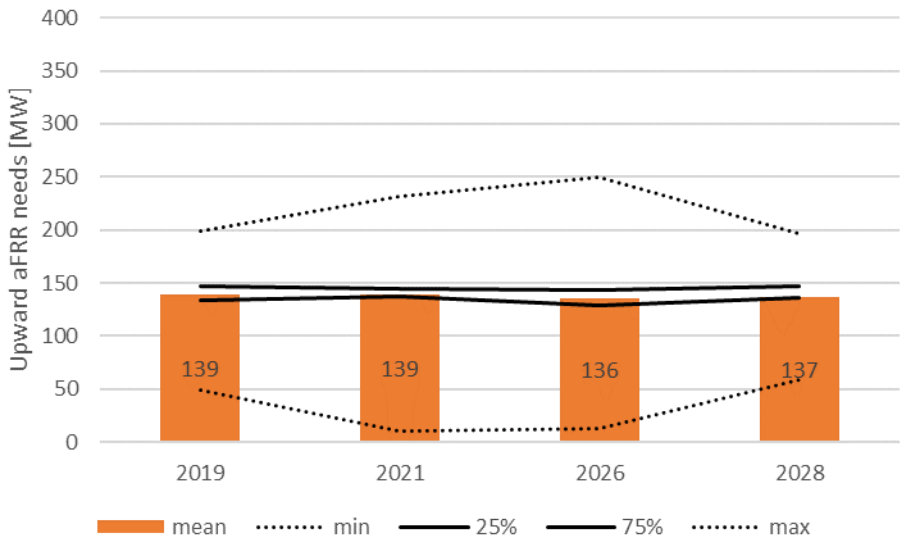
How will LFC block imbalances evolve within 15 minutes?

BRPs have the obligation and incentive to balance their portfolio over the imbalance settlement period of 15', but not within.

Two extreme scenarios have been made to test the sensitivity

Realistic aFRR needs
It is assumed that market performance improvements fully translate to the LFC block imbalances within the imbalance settlement period





- In a worst case scenario where market performance improvements do not translate to the intra-qh resolution, aFRR needs can gradually increase towards 174 MW in 2028. In a best case, such increases can be entirely mitigated.
- The impact of outliers on the large min-max spread and potential mitigation measures will be further assessed towards implementation

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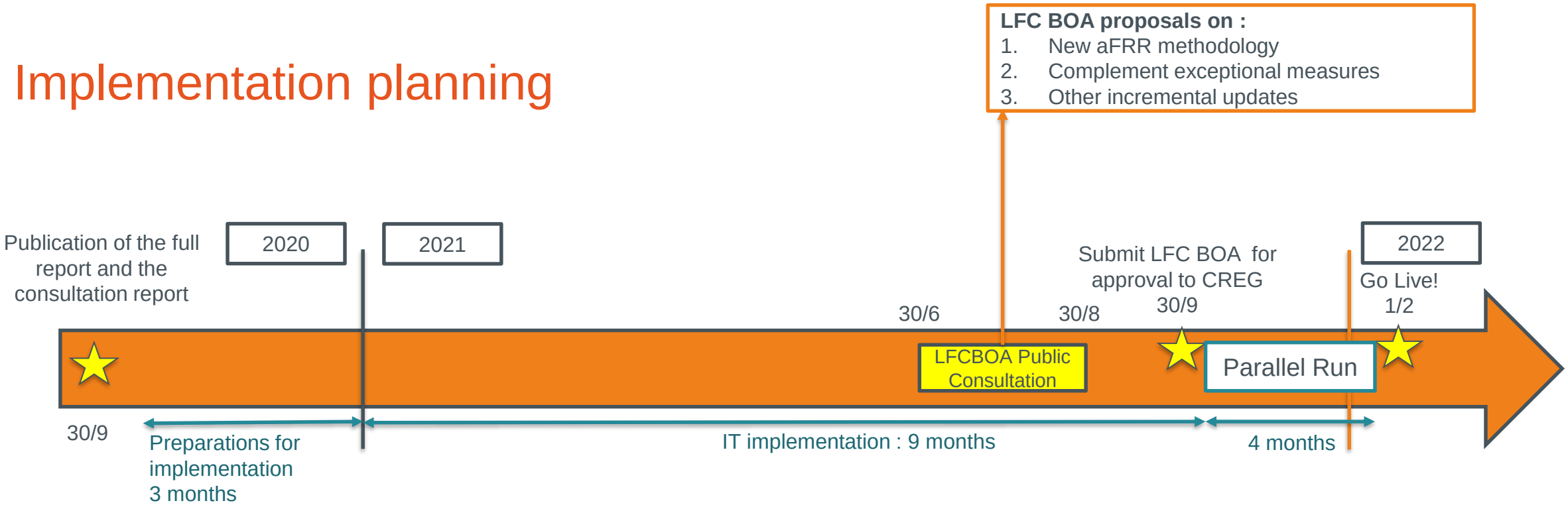
Final recommendations

- **Elia recommends to implement the simulated aFRR method based on covering 99% of simulated aFRR activations, taking into account iGCC and mFRR activations, with an periodic ex post check if the FRCE target parameters are respected. The proposed method shall be based on :**
  - Oracle-based mFRR activations
  - A 5' resolution
  - Taking into account historic iGCC activations

- **Elia recommends a daily dynamic dimensioning of the aFRR needs :**
  - Based on a random forest machine learning algorithm (achieving a reduction of the average aFRR needs of around 6%, at : 139 MW.
  - Such method would result in an average aFRR needs which is expected to increase to 178 MW towards 2028 in a worst case, but can remain stable when expected market improvements also translate within the 15' imbalance settlement period

- **The method will respect the FRCE target parameters and performance will be periodically re-assessed to trigger methodologic modifications**

Implementation planning



- **The final methodology shall be subject to public consultation and regulatory approval (planning under discussion)**
- **Elia foresees an IT development time of one year, complemented with 4 months of parallel run :**
  - 3 months preparations to calibrate machine learning methods, develop system requirements, implementation strategy
  - 9 months for the IT developments
  - 4 months parallel run (published on the website) to allow market players to grasp the aFRR needs variations

➔**Go-live is currently foreseen on 1/2/2022, provided the proposed methodology is supported and the LFCBOA is timely approved**

Proposal for Modification of LFC Means

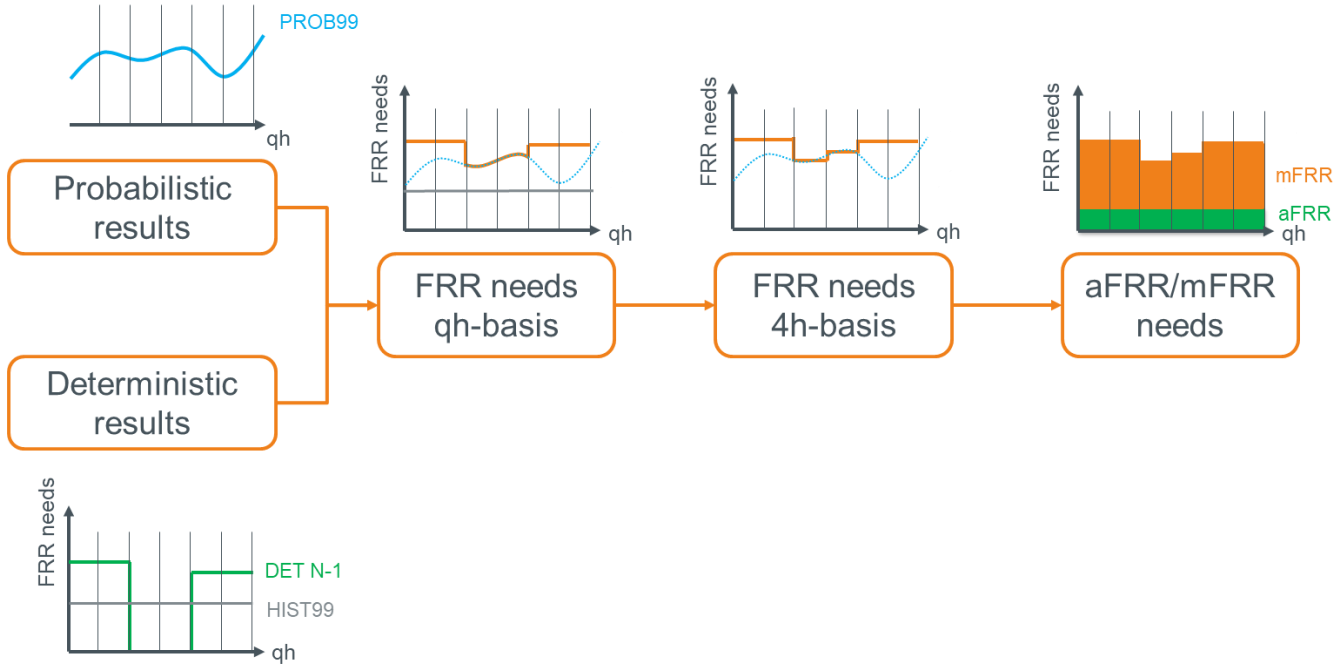
Presented by Kristof De Vos

Dynamic dimensioning of the FRR needs

Specified in the LFC block operational agreement

- FRR reserve capacity is determined based on a probabilistic methodology in line with Article 157(2)b of the SOGL covering 99.0% of the LFC block imbalance risks

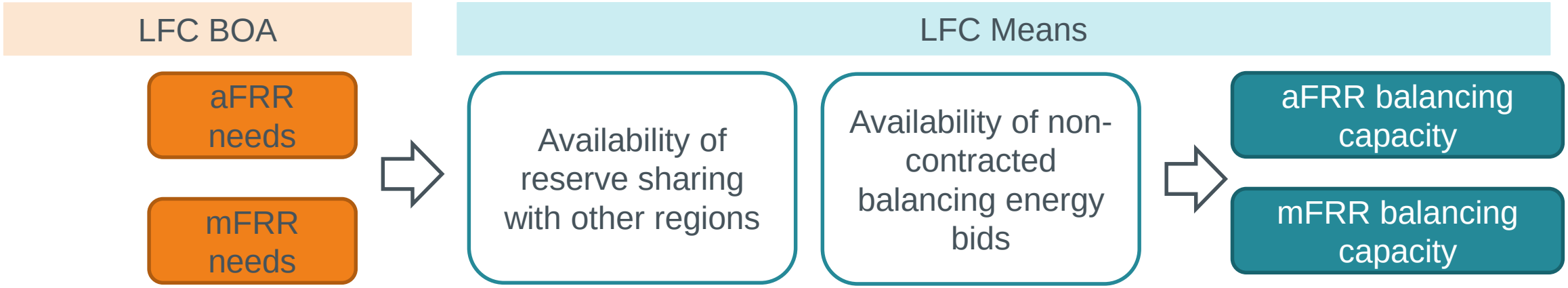
- It takes into account two deterministic thresholds :
  - Always larger as the dimensioning incident in line with Article 157(2)e and Article 157(2)f
  - Always covering 99.0% of historic LFC block imbalances in line with Article 157(2)h and Article 157(2)i



The required positive and negative reserve capacity on FRR is calculated by Elia each day before 7 AM for every period of 4 hours of the next day

Determining the FRR means

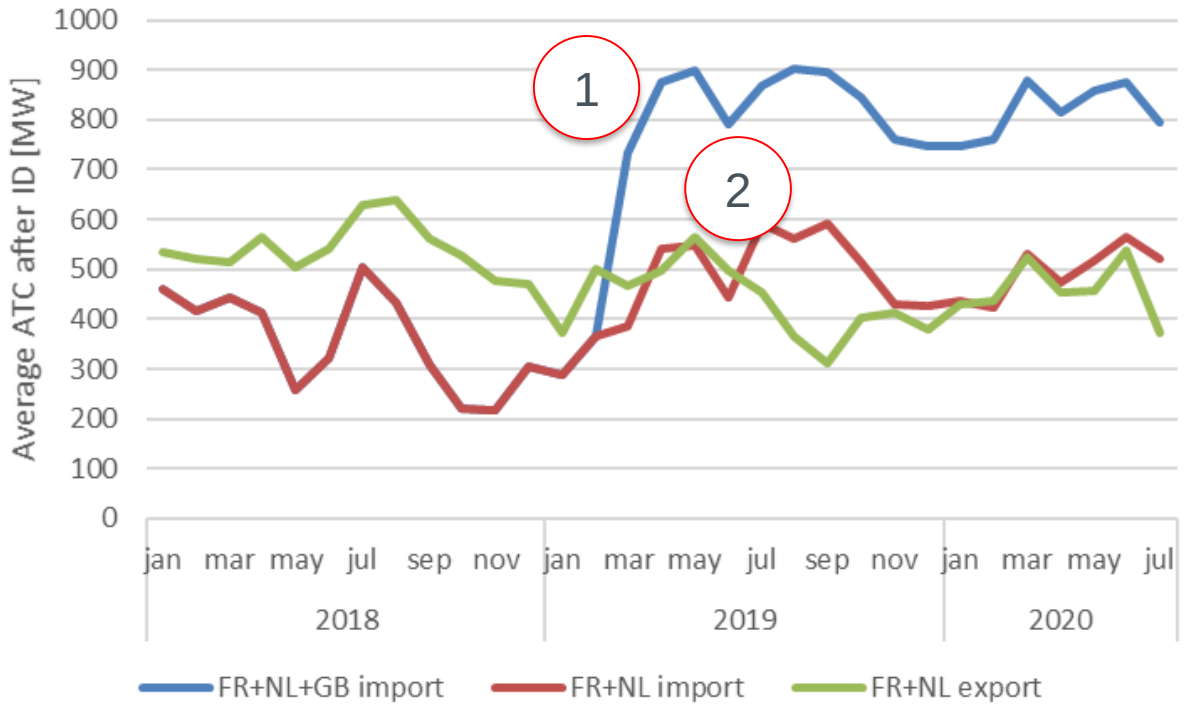
Specified in the LFC Means



- In line with Article 32 of the EBGL, Elia determines the optimal provision of reserve capacity taking into account sharing of reserves, the volumes of non-contracted balancing energy bids and the procurement of balancing capacity.

- In the current LFC Means, approved by the CREG, Elia justifies that it :
  - Procures the full aFRR balancing capacity
  - Procures no downward mFRR balancing capacity, sufficiently covered with sharing and non-contracted bids
  - Procures upward mFRR balancing capacity, after taking into account 50 MW of sharing

Increased sharing availability trough available ATC ID provides opportunities to reduce balancing capacity



An analysis of the available cross-border capacity for sharing is calculated on the available ATC after ID per border with a cap of 350 MW per border (standard contractual values)

- As from the 'go live' of Nemo Link, remaining import ATC after ID increases substantially :

1 Following the export position of Nemo Link and a decrease of the energy market's ratio import - export position with FR+NL

2 The latter also causes a decrease of the remaining export ATC after ID

- An analysis of the P99-percentile justifies an increase of the sharing capacity accounted in the upward dimensioning (cf. next slides).

Revision of sharing accounted in the LFC Means

Increase upward mFRR sharing accounted from 50 MW to 250 MW

- **mFRR sharing agreements : a total capacity of 1050 MW up- and down**
  - 350 MW sharing agreement with RTE
  - 350 MW ‘contrat d’assistance’ with TENNET
  - 350 MW sharing agreement with NGESO

  + New sharing agreement with ALEGRrO (350 MW) is foreseen to be operational as from end-2020 / begin-2021

- **The LFC BOA specifies absolute FRR sharing limit which can be accounted in the dimensioning following Article 157 of the SOGL**
  - 312 MW for upward FRR (is the limit of 30% of N-1, currently 1039 MW)
  - 547 MW for downward FRR (DET N-1 minus HIST99), but only when Nemo Link is scheduled in export or undecided (no sharing opportunities otherwise)

- **The mFRR sharing which is accounted in the LFC Means takes into account operational constraints (such as the network limitations after ATC ID)**
  - New analysis based on the available ATC after the last Intra-day gate between July 2019 to June 2020 shows that 250 MW of cross-border reserve capacity was available during at least 99.0% of the time.

LFC Means

Maximum shared mFRR that can be considered close to guaranteed is determined at:

- mFRR+ : 50 MW
- mFRR- : 350 MW

New proposal

Maximum shared mFRR that can be considered close to guaranteed is determined at:

- mFRR+ : 250 MW
- mFRR- : 350 MW

Impact on the mFRR balancing capacity

- **Considering no significant evolutions in the non-contracted balancing energy bids impacting the contribution in the up- or downward FRR means, the upward mFRR balancing capacity is reduced with 200 MW**

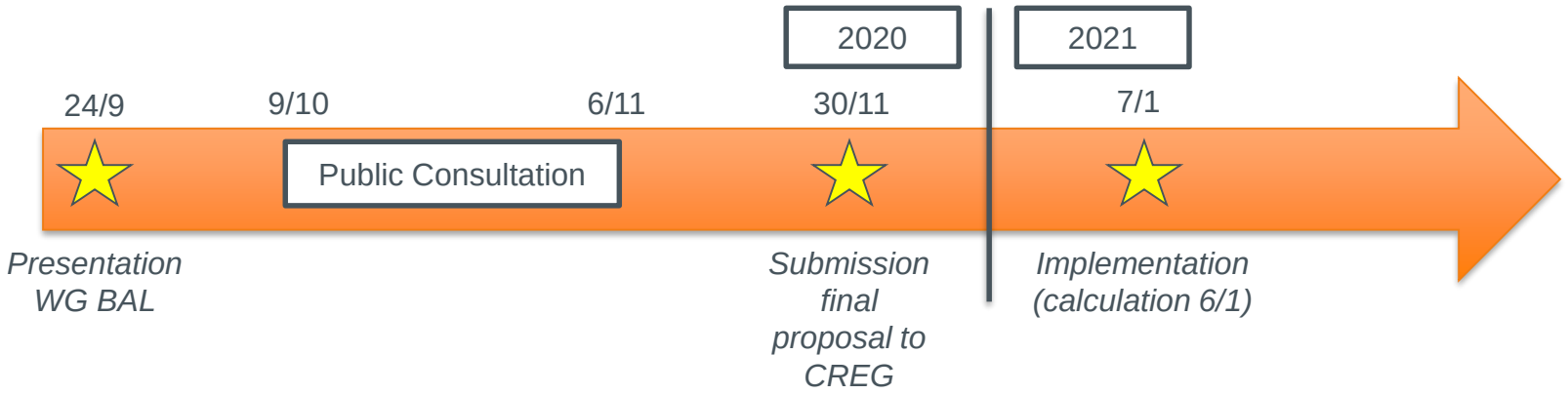
- **Note that the FRR needs are currently around the dimensioning incident (around 1040 MW)**
  - Current mFRR needs remain around 895 MW (before subtracting 50 MW of sharing)
  - Minimum threshold mFRR standard is kept at 640 MW (current LFC Means)

  ➔Remaining volume mFRR flex + mFRR std will therefore vary around 5 MW

- **Note that an analysis on the market liquidity of mFRR products has been foreseen in Q1 2021, allowing to decide on the full phase out or not of the mFRR flex product (cfr. previous communications)**

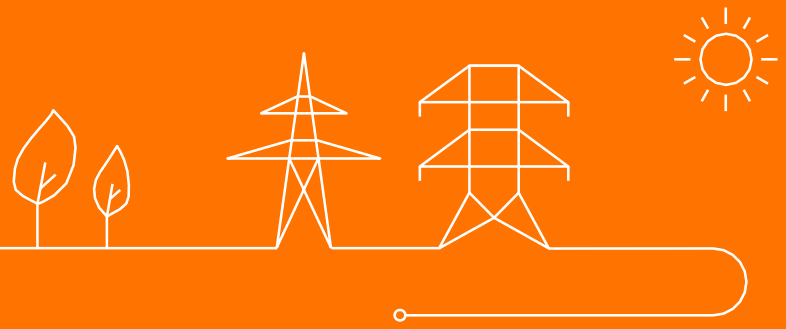
Planning LFC Means v.2

- **In order to take into account the benefits of increased mFRR sharing opportunities as soon as possible, Elia proposes to adapt the LFC Means as soon as possible:**
  - Elia foresees to start the public consultation on October 9
  - Elia foresees an implementation on January 7, 2021 (calculations adapted on January 6)

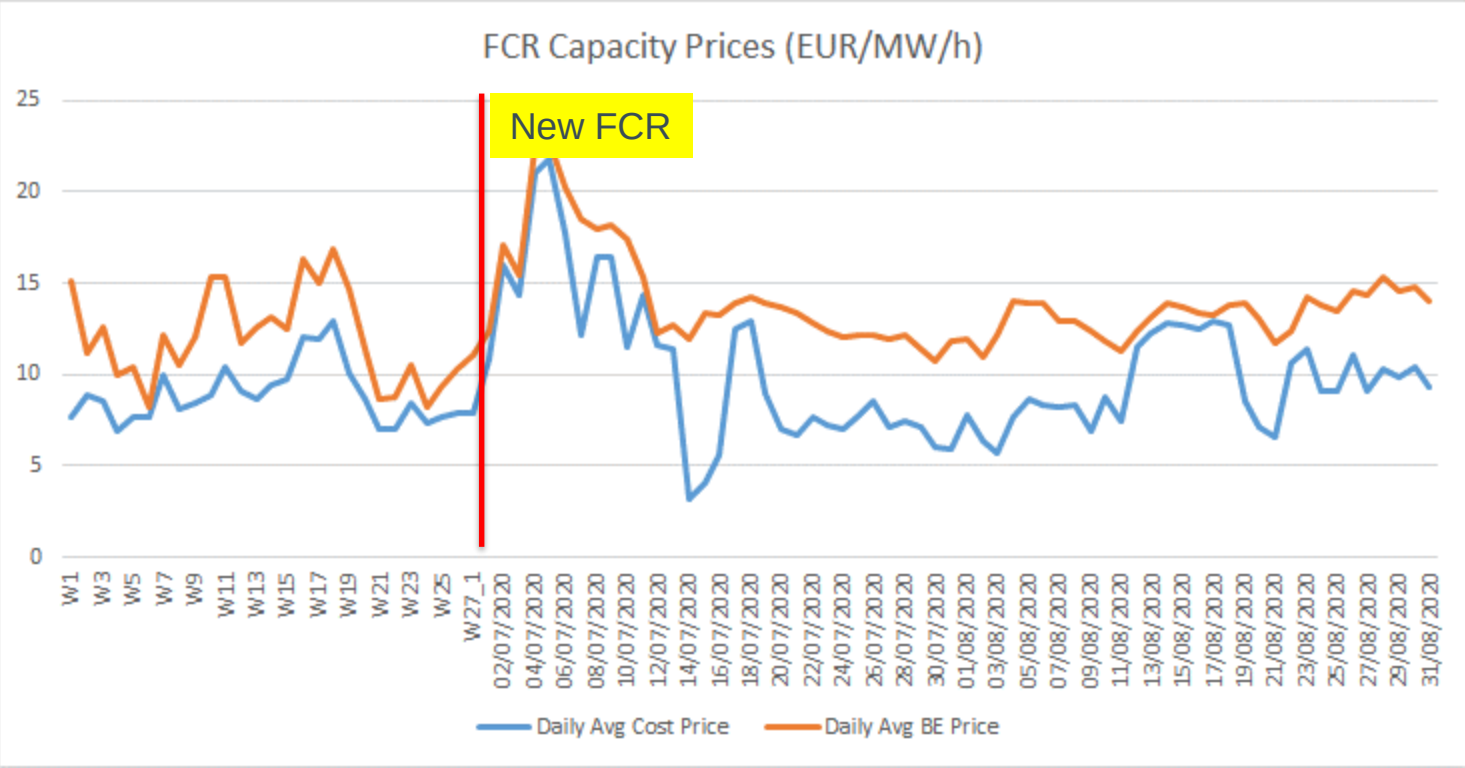


Liquidity and Price of Balancing Products

Presented by Amandine Leroux



FCR Capacity Prices



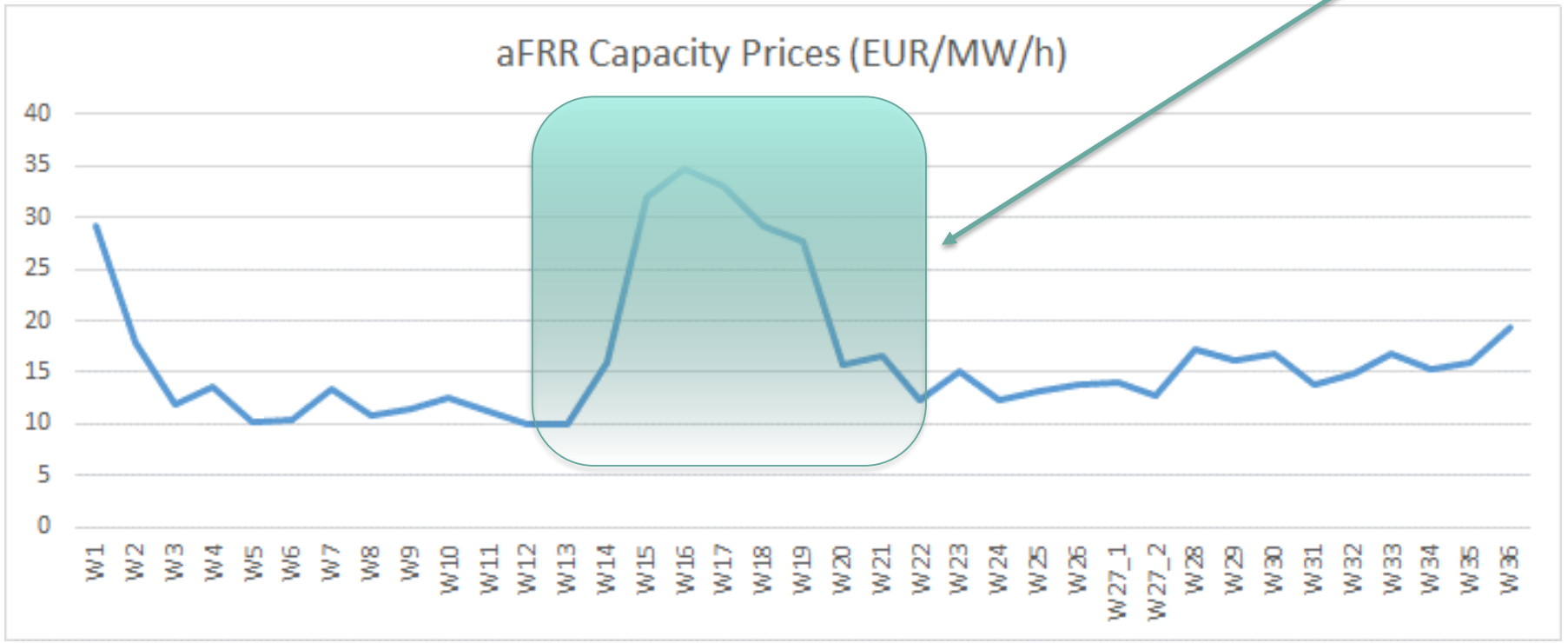
BSP Contract FCR started on July 2020

After two weeks of high volatility, FCR prices are back to prior levels

FCR prices back to prior levels after two weeks volatility begin July (new FCR)

aFRR Capacity Prices

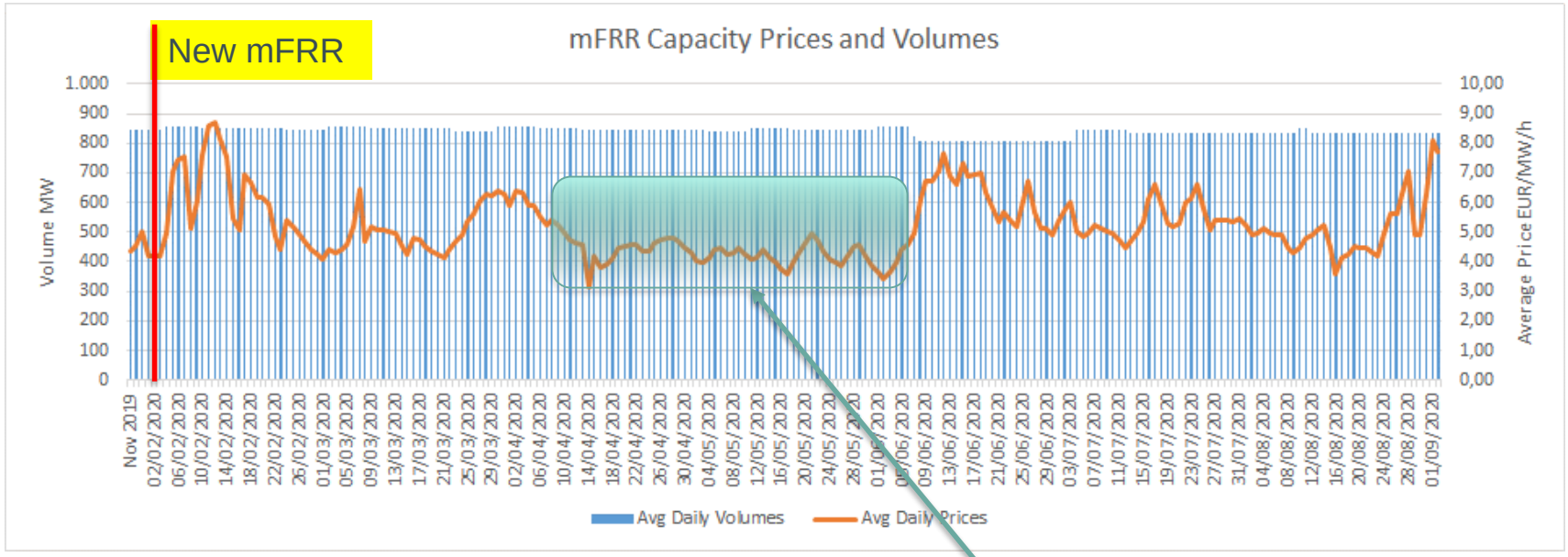
COVID impact

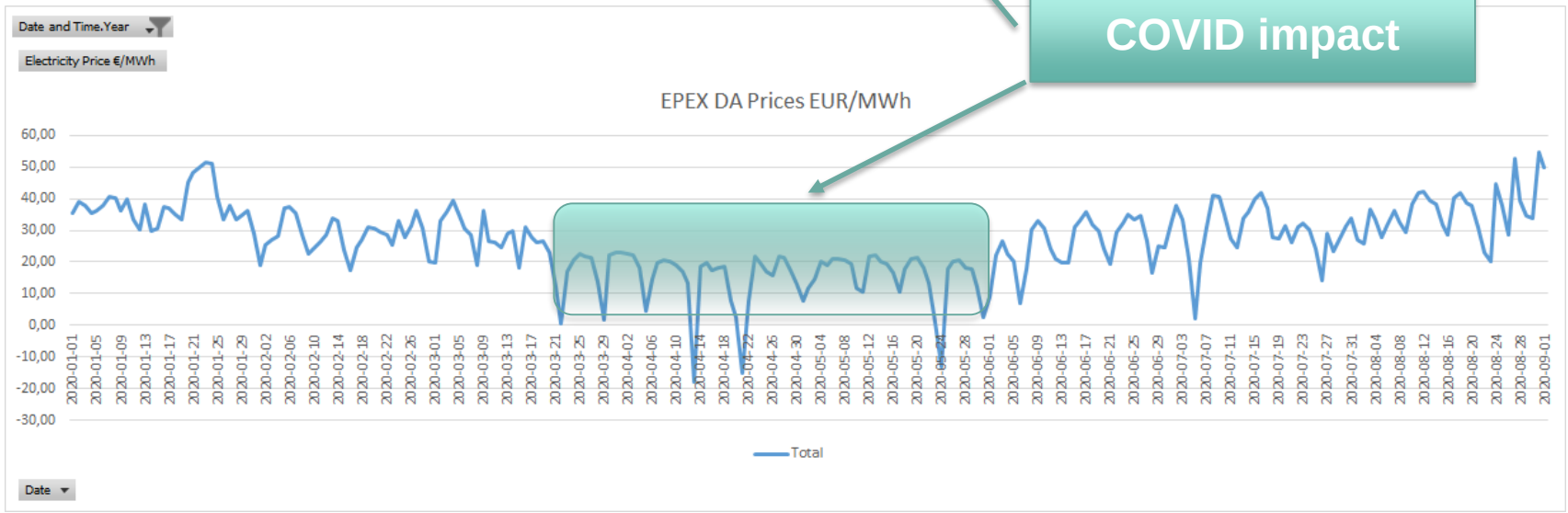


aFRR prices back to prior levels after some weeks with low electricity prices (Covid impact)

aFRR exclusively provided by CCGTs units out of the money with low electricity prices

mFRR Capacity Prices





COVID impact

After two months of low electricity prices due to Covid-19 crisis, electricity prices start to rebound as of June.

Same trend of electricity prices observed on mFRR prices

mFRR prices follow trend of electricity prices rebound

Wrap-up of capacity auctions

- After two weeks of high volatility following the launch of the BSP Contract FCR, prices are back to prior levels.
- aFRR prices are back to prior levels after some weeks of high prices due to Covid-19 crisis (low electricity price generating must runs in gas units providing service)
- mFRR prices strongly correlated to electricity prices, after two months of low electricity prices due to Covid-19 crisis, they start to rebound following trend of electricity price and some maintenances.

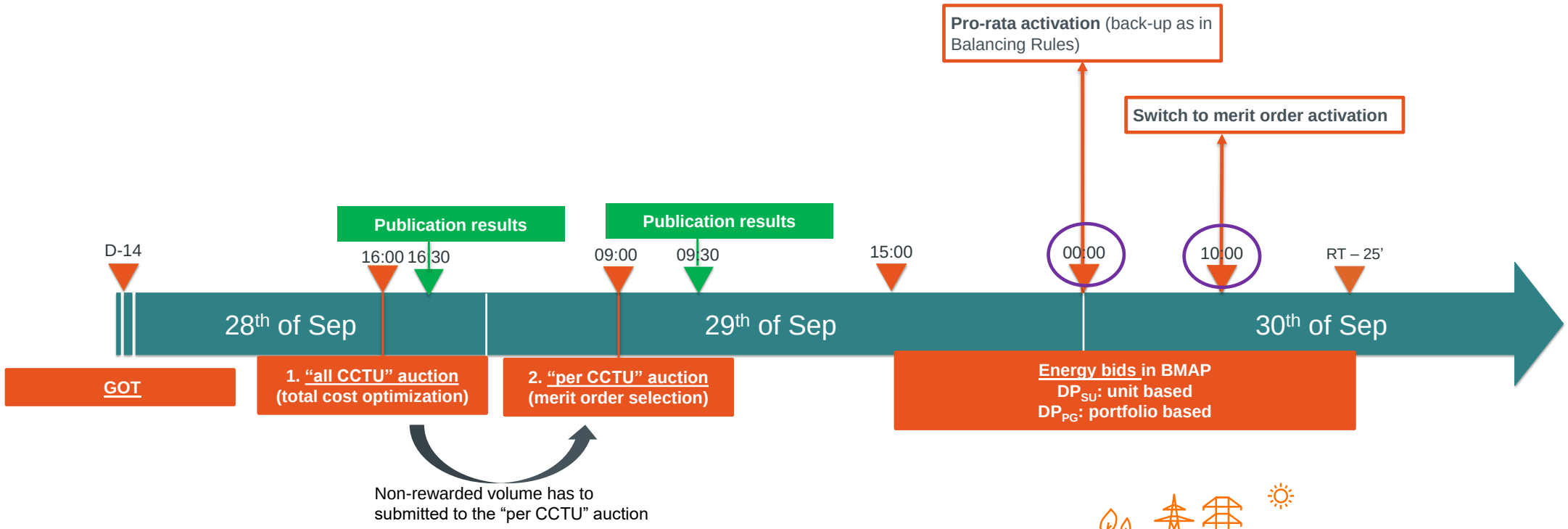
New aFRR Design: Go-Live Status

Presented by Amandine Leroux

aFRR 2020 – Go Live on 28/09

Planning Go-live

28/09/2020 @16:00	1st all-CCTU auction - 135 MW (total cost)
29/09/2020 @9:00	1st per-CCTU auction - 10 MW (merit order)
30/09/2020 @10:00	Merit order activation of aFRR Energy Bids



AOB

AOB – RT DGO Allocation

Presented by Arno Motté

RT DGO Allocation: Market Survey

- Publication of RT estimation of DGO allocation volumes to the BRP
- Developed for **discretionary objective 2019**
- Live as of **1st of January 2020** and available on request (KAM)
- **Market survey** will be launched in **W40**
  - Directed at BRPs with DGO positions
  - Topics:
    - Use of the service
    - Possible optimizations (methodology, variables, …)
    - Format

Your feedback in the survey is greatly appreciated!

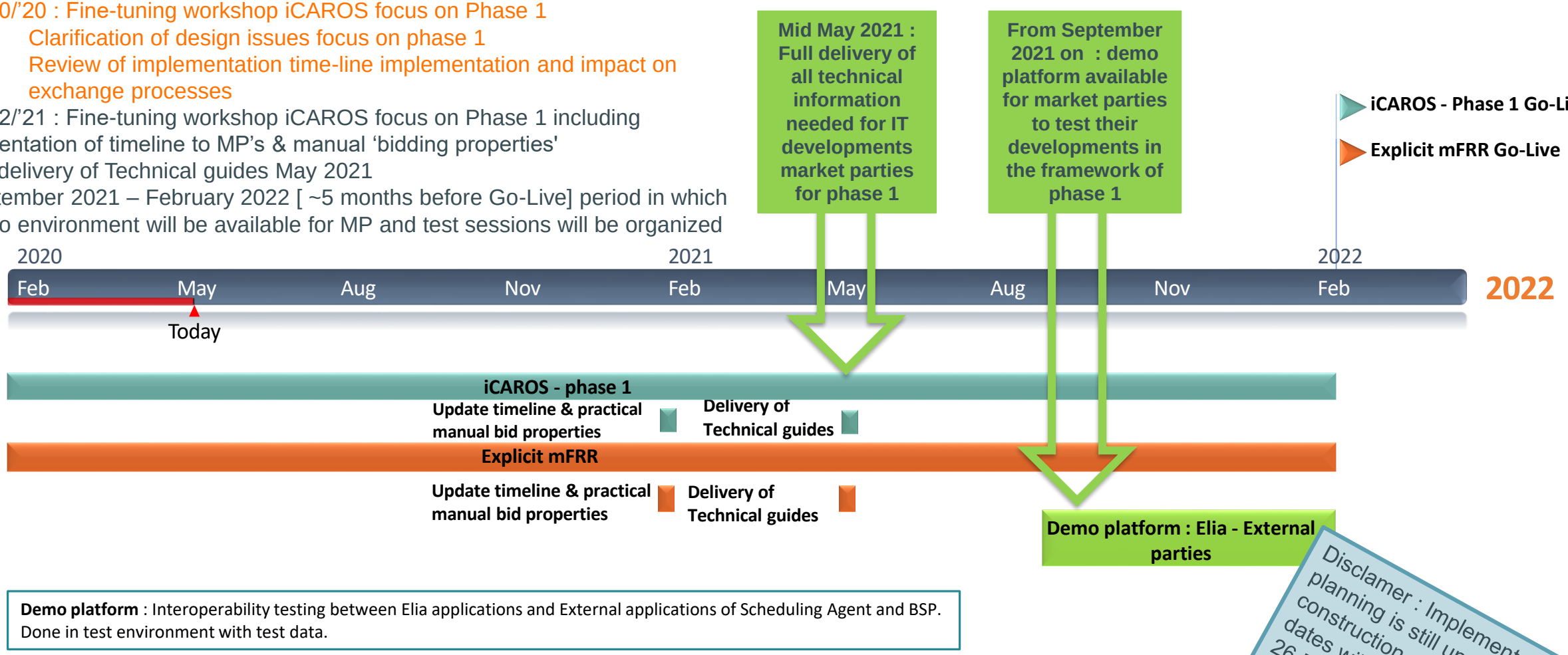
AOB – Update on iCAROS

Presented by Viviane Illegems

Progress report : Implementation project iCaros ('Integrated Coordination of Assets for Redispatching and Operational Security')

Next steps

1. 07/10/'20 : Fine-tuning workshop iCAROS focus on Phase 1
   - Clarification of design issues focus on phase 1
   - Review of implementation time-line implementation and impact on exchange processes
2. 26/02/'21 : Fine-tuning workshop iCAROS focus on Phase 1 including presentation of timeline to MP's & manual 'bidding properties'
3. Full delivery of Technical guides May 2021
4. September 2021 – February 2022 [~5 months before Go-Live] period in which demo environment will be available for MP and test sessions will be organized

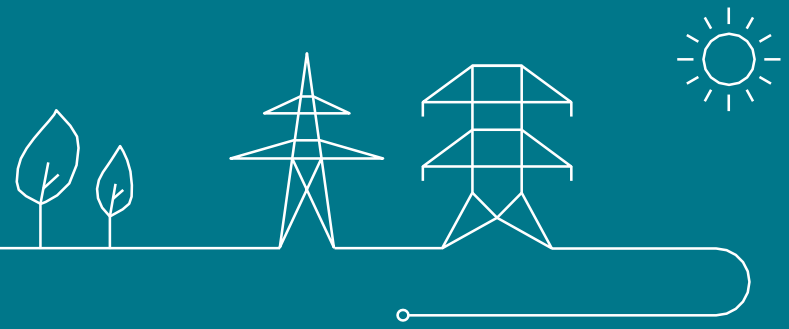


Demo platform : Interoperability testing between Elia applications and External applications of Scheduling Agent and BSP. Done in test environment with test data.

Disclamer : Implementation planning is still under construction. Detailed target dates will be final confirmed 26 February 2021.

AOB - Study PAB/PAC

Presented by Sofie van den Wayenberg



Stakeholder consultation of study: From 1/9 until 1/10/2020

Elia performed a **study on "Paid-as-cleared vs. paid-as-bid remuneration for aFRR & mFRR capacity"** and published the preliminary study report for public consultation.

Consultation webpage: open until 1 October 2020
https://www.elia.be/en/public-consultation/20200901_public-consultation-on-the-study-on-pay-as-bid-vs-pay-as-cleared

- Elia requests stakeholder feedback on the study in general and specifically regarding the following:
  - Importance of this topic in the design of the balancing products. Level of priority vis-à-vis other upcoming design changes.
  - Assessment of current market readiness for aFRR capacity and for mFRR capacity
  - If change to paid-as-cleared remuneration: feedback on the specific designs proposed for aFRR and mFRR
  - Insight in possible workload on stakeholder side and preparedness to work on implementation, including indication of timing (before, at the same time as, or later than the PICASSO/MARI projects)?
- Elia has also organized a workshop on this study on 15 September 2020.

The slides are available online:
https://www.elia.be/-/media/project/elia/elia-site/ug/workshop/20200915_pac-frr-capacity-workshop-slides.pdf

Theory on Paid-as-cleared versus Paid-as-bid

& Impact on Belgian FRR capacity designs

Paid-as-cleared (PAC): remuneration at clearing price	Paid-as-bid (PAB): remuneration at bid price
Requires less knowledge Fair remuneration: equal pay for satisfying same requirements Attracts competition	Safer for the buyer in terms of total costs in case of insufficient competition.

Total procurement costs: non-conclusive as depending on final market equilibrium and positive as well as negative effects in both remuneration schemes.
However, the higher the level of competition, the more the total costs in either mechanism will be minimized and converge.
(In perfect competition, both mechanisms lead to the same market result.)

A shift from paid-as-bid to paid-as-cleared in an increasingly liquid and competitive market for an homogenous product should, however, result in a decrease of procurement costs.

Paid-as-cleared remuneration scheme seems justified in cases of
- Homogeneous products
- Markets with players of heterogeneous sizes with different access to information
- Markets with sufficiently low entry barriers

Paid-as-bid remuneration scheme seems justified in cases of
- Heterogeneous products
- Markets with limited competition
- Markets with significant entry barriers

Introduction of paid-as-cleared is technically feasible, yet advised preconditions in terms of design are
- the procured services are highly homogenous
- the services are selected based on a firm merit order (preferably of divisible bids)

Concretely for Belgian FRR designs

aFRR: if PAC, then only for “per CCTU” auction (in day-ahead)

mFRR: if PAC, then different clearing for mFRR Std and mFRR Flex (~ current PAC for mFRR energy)

Preliminary conclusion of the study

- **Paid-as-cleared: interesting design, if favorable circumstances**
  - Current aFRR/mFRR capacity markets: still high level of market concentration and development of new FRR capacity in response to a new design takes time
  - Paid-as-cleared design expected to support market development, however, the transitory period (before such advantages become apparent) with increased procurement costs is expected to be relatively long.
- **mFRR**: Longer period of analysis needed: re-assess market readiness in Q2 2021
- **aFRR**: First experience needed with new design and achievement of target of 'minimum liquidity': re-assess market readiness 6 months after phase-out of "all CCTU" auction.

⇒ Ongoing public consultation: request feedback of stakeholders on study in general and specific views on priority of this design change (vis-à-vis other design changes in the coming years) and feasibility of implementation at BSP side.

⇒ Stakeholder feedback used to determine a more concrete implementation plan, integrated in the new balancing roadmap.

⇒ Final report in December 2020.

AOB - Feedback on Consultation ToE DA/ID

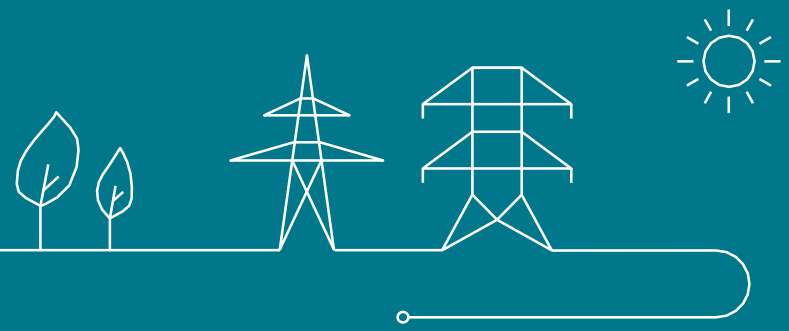
Presented by James Matthys-Donnadieu

ToE DA/ID

- Elia performed a study related to the extension of the ToE mechanism to the DA/ID markets in 2019
- An updated and consolidated design note has been consulted between 1/7/2020 and 31/8/2020
- Different stakeholders (FEBEG, Febeliec and CBS) provided feedback on this consolidated design note
- A detailed overview of the feedback received and Elia's response will be published online and will be distributed to all WG BAL members
- The public formal consultation of the ToE rules, T&C BRP & FSP$_{DA/ID}$ contract is planned to start in October 2020

- The go-live planned for April 2021
- In case of additional questions or remarks, please contact Kris Poncelet (kris.Poncelet@Elia.be)

AOB - next WG Balancing



Next WG Balancing

Dates :

- WG Balancing – 28/10 @ 14:00 – TBC
- WG Balancing – 25/11 @ 14:00 - TBC