ANSWER TO PUBLIC CONSULTATION

Elia answer to CREG public consultation regarding its draft decision (B)2947 proposing amendment of the T&C BRP

Elia

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Content

Table of Contents

Executive summary

Over the last few months, various exchanges have taken place between Elia and CREG concerning CREG's wish to move elements relating to the Imbalance Tariff from the Balancing Rules and the Tariff Proposal to the T&C BRP. As from the beginning of these exchanges, Elia indicated to be ready to transfer provisions currently contained in the Balancing Rules to the T&C BRP, as long as this transfer was:

1. Done in a proper and consistent way (i.e. after a sound legal analysis and while foreseeing the adaptation of other documents, such as the Tariff Proposal, where needed)
2. Coordinated with the next changes of the T&C BRP in order to limit the impact on the different parties involved in the revision process and to ensure consistency with the upcoming evolutions of the Imbalance Tariff that are required in the context of Belgium's connection to the EU balancing platforms

Following these exchanges, CREG decided to initiate a revision of the T&C BRP on its own (hence independently from the next foreseen changes in the T&C BRP). In this revision, on top of describing elements relating to the current Imbalance Tariff calculation in the T&C BRP, CREG also took the opportunity to:

1. Describe the evolution of the Imbalance Tariff calculation for a situation where Belgium would be connected to Picasso but not yet to Mari. In this description, CREG proposes to abolish the cap, floor and dead band that were present in the version of the Balancing Rules linked to the connection to Picasso as approved recently by CREG in its decision (B)2433 of July 2022, and supported by all the market parties during the Working Group Balancing of May 5th. A full description and justification of these cap, floor and dead band as presented during the Working Group Balancing on May 5th 2023 are available publicly on the Working Group Balancing Website[1];
2. Explicitly specify that no additional imbalance price component is applied to the imbalance price component due to activation of balancing energy from frequency restauration reserves (FRR).

Elia repeats that it is not opposed to the transfer of some Imbalance Tariff components from the Balancing Rules to the T&C BRP. It does therefore not have any comment on the mere transfer of these existing components as such. However, the current situation (i.e. CREG's revision of the T&C BRP describing a situation after Picasso and before Mari whereas there is a huge uncertainty related to the sequence of connection to the EU balancing platforms, entry into force of CREG's revision of the T&C BRP conditioned by the revision of the Tariff Proposal – or the Balancing Rules – of which the revision is anyway coupled to other changes) clearly demonstrates that the approach advocated by Elia in its exchanges with CREG (i.e. coordinating the transfer with the next changes of the T&C BRP) is more efficient and robust as it would implement the various legal changes in a more coordinated manner that is less dependent of the technical implementation sequence. Therefore, Elia regrets the approach followed by CREG.

However, Elia has deep concerns about the other modifications initiated by CREG in its revision of the T&C BRP (i.e. the abolishing of the cap, floor and dead band from the Imbalance Tariff calculation present in the version of the Balancing Rules linked to the connection to Picasso as approved by CREG in July 2022, and supported by all the market

[1] The slides 15-26 of this meeting can be found on Elia's website via the following link : **https://www.elia.be/-/media/project/elia/elia-site/users-group/ug/wg-balancing/2022/20220505/20220505_wg-balancing_slides_sent.pdf** The Minutes of these meeting can be accessed through : **https://www.elia.be/-/media/project/elia/elia-site/users-group/ug/wg-balancing/2022/20220505/20220505_wg-balancing-mom_en.pdf**

parties during the Working Group Balancing of May 5th, and the specification that no additional component applies to the main imbalance price component). Elia will share these concerns in this answer to CREG's public consultation.

Elia is nevertheless strongly aware of the need to develop an evolution of the Imbalance Tariff calculation, carried by all stakeholders, which ensures secure, efficient and reliable system operation and which is robust for the connection to the EU balancing platforms, whatever the sequence followed by Belgium for its connection to these platforms. Elia does not believe that CREG's proposal is fit for purpose and therefore makes some constructive recommendations to CREG to adapt parts of its proposal, allowing to clarify certain ambiguities and to break the deadlock of the current situation.

Suggestion to remove the articles describing the Imbalance Tariff evolution after the connection to Picasso (articles 29.2.2, 29.3.2 and 29.6.2) from CREG's proposal

As mentioned above, Elia is highly concerned about CREG's intention to abolish the cap, floor and dead band from the description of the Imbalance Tariff calculation after connection to Picasso, and hence about the consequence of the application of these articles 29.2.2, 29.3.2 and 29.6.2 (should they ever be applied). Elia structures its concerns regarding these articles according to five different aspects:

1. CREG's proposal going against warnings from TSO and international experts regarding grid security, and modifying a proposal supported by the whole market
2. CREG's proposal unfit as it jeopardizes the security, efficiency and reliability of the grid
3. CREG's proposal based on the CBMP to reflect the so-called "real-time value of energy" does not hold after joining both Mari & Picasso
4. Both CREG's new proposal and Elia's proposal validated in July 2022 deviate from conditions in Art 55(4) of EBGL and Art.9 of ISH for justified purposes. Elia's proposal is however deemed closer to reach the objectives pursued by EBGL.
5. CREG's proposal lacks a clear implementation plan

Finally, Elia draws CREG's attention on the fact that, according to the current EU balancing roadmap for the connection of Belgium to Picasso and Mari, these articles 29.2.2, 29.3.2 and 29.6.2 will never be applied (since Belgium is now expected to connect to Mari before Picasso). Elia therefore makes the pragmatic recommendation to simply remove these articles from CREG's proposal.

Each of these aspects is detailed in the following paragraphs.

CREG's proposal going against warnings from TSO and international experts regarding grid security, and modifying a proposal supported by the whole market

In articles 29.2.2 and 29.3.2, CREG describes the evolution of the Imbalance Tariff calculation for a situation where Belgium would be connected to Picasso but not yet to Mari. In this description, CREG proposes to abolish the cap,

floor and dead band that were present in the version of the Balancing Rules linked to the connection to Picasso as approved by CREG in July 2022.

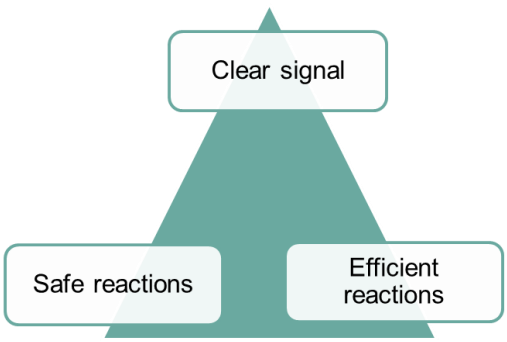
First of all, Elia would like to remind CREG that Elia's proposal, as approved by CREG in July 2022, was established after in depth discussions with all market parties and was **supported by all the market parties** during the Working Group Balancing of May 5th 2022. Besides, Elia also reminds that the purpose of the cap and floor is to **safeguard the grid stability which is jeopardized by the use of the weighted aFRR CBMP as Imbalance Tariff, as also recognized by international expert opinions** included in the annex of this answer.

Elia therefore **wonders why CREG would take the initiative of adapting a calculation methodology that is unanimously supported** by the market **without even taking the time to first test and build experience** with this calculation methodology, and **this despite warnings from the TSO** (whose main mission is to guarantee grid security) and **from international experts** that the **proposed adaptation threatens the grid stability**.

According to Elia the only reasonable approach is to **connect to the EU platforms with a safe Imbalance Tariff calculation methodology** (which is by the way already supported by all market parties) and, afterwards, to periodically assess, upon return of experience (both with respect to the economics of the tariff as well as the system security aspects of it), if further evolutions are deemed appropriate.

CREG's proposal unfit as it jeopardizes the security, efficiency and reliability of the grid

According to Elia, the Imbalance Tariff – in a reactive balancing model – should provide a **clear** incentive to the market to perform implicit reactions that are **safe** and **efficient** for the system.



Elia believes that CREG's proposal, as described in articles 29.2.2 and 29.3.2, jeopardizes all those 3 criteria, and hence the quality of the Imbalance Tariff and of the balancing model in Belgium.

a. <u>CREG's proposal threatens grid security</u> 

As already largely discussed before, **CREG's proposal threatens grid security** by increasing the risk of real-time congestions in the grid and by incentivizing important System Imbalances that can go beyond the dimensioned FRR and hence deteriorate the ACE quality and increase the FRR needs in Belgium. Note that **these concerns are shared by international experts** whose opinions are included in the annex of this answer.

> "We analyze what we understand to be the approach favored by CREG and highlight three major risks resulting from this design. These are (i) an increase in the capacity costs of reserves, (ii) **perverse incentives BRPs, which threaten system security in Belgium and cause overload in network elements**, and (iii) no stable equilibrium of the Belgian system imbalance."
>
> *Anselm Eicke, Lion Hirth and Ingmar Schlecht - Neon*

> "The analysis in this note regarding the use of 'Picasso-CBMPs' as reference for the Imbalance Price has revealed several concerns […]. In terms of system security, stability, and robustness: the volatile flow patterns caused by the inadequate pricing should be managed by decoupling of CBMPs between price zones. But this is ineffective in practice […] It is fair to say that this **is downright unacceptable in terms of system security** and contrary to sound system design principles in general."
>
> *Frank Vandenberghe - Onoma*

Elia is happy to read that CREG acknowledges the risk of real-time congestions created by its proposal. In its draft proposal, CREG suggests three measures to mitigate this risk. Those measures mainly rely on manual actions from the grid operator. In this sense, Elia observes that the regulator asks Elia operators to implement/activate operational measures in the form of manually activated actions (in an unclear framework) to cover up for design flaws in its own proposal for the calculation of the Imbalance Tariff (i.e. the fact that the formula proposed by CREG threatens grid security). Elia cannot agree with this way of working, especially since this design flaw can easily be solved at source by design improvements, for instance by the introduction of cap and floor, as suggested by Elia in its proposal that was validated by CREG in July 2022. **When it comes to grid security/stability, Elia indeed strongly believes that it is its mission, as a TSO, to implement all the measures that naturally and automatically prevent undesirable events in real-time**. Relying on manual actions from the grid operator to maintain grid security when it is jeopardized on a regular basis (possibly multiple times a day) by an inadequate design of the Imbalance Tariff is, according to Elia, not a responsible way to operate the grid. Besides, Elia explains in section 1.1.1 of this document the reasons why none of the measures proposed by CREG offers a realistic, efficient and robust way to mitigate the risk of creating real-time congestions.

As regards to the impact of CREG's proposal on the ACE quality and on the volumes of FRR to be contracted in Belgium, Elia regrets that CREG still does not acknowledge this risk, given the potential impact of such increase on tariff payers. This indicates a shortcoming in the reasoning of CREG as Elia illustrates in section 1.1.2. As CREG does not acknowledge this risk, it also does not suggest any mitigation measure for this risk. Elia reminds that here again, the introduction of cap and floor, as suggested in Elia's proposal, allows to solve the problem at source.

b. <u>CREG's proposal can stimulate implicit reaction with perverse effect on the European dispatch</u>

Even though CREG has always claimed that the objective of its proposal was to encourage an efficient dispatch of the European resources, Elia explains in section 1.3 how CREG's proposal does not always stimulate implicit reactions that are efficient for the European System. Elia indeed illustrates, through concrete examples, that due to the very different mFRR activation strategies within the EU countries, and to some specific features of the Picasso algorithm, CREG's proposal can actually encourage the de-optimization of European dispatch and other perverse effects, such as the saturation of the European aFRR resources.

Even though Elia always recognized that its proposal does not, in all situations, encourage implicit reaction to *further* optimize the European dispatch, it, at least, never stimulates reactions that *de-optimize* it, thanks to the presence of cap and floor.

c. <u>The aFRR CBMP does not reflect the real-time value of energy and makes the price signal highly discontinuous and very difficult to understand</u> 

CREG's proposal is entirely based on the aFRR cross-border marginal price (CBMP)[2], without any price intervention. This might, at first sight, seem to constitute a clear, and easy to read price signal. However, as described in Whereas (7) of Methodology for pricing balancing energy and cross-zonal capacity used for the exchange for balancing energy or operating the imbalance netting process, this aFRR CBMP values the specific aFRR product properties, which is totally justified when it is used to remunerate the BSP for the aFRR balancing energy they deliver. Integrating these specific aFRR product properties in the Imbalance Tariff construction is however much less justified since it can deteriorate the quality of the price signal and make it very difficult to read. As illustrated in section 1.3.1, and as confirmed by the expert opinion included in the annex of this answer[3], the aFRR product specificities introduce important discontinuities in the balancing merit order. For instance, the fact that only a very limited subset of assets are able to deliver aFRR makes it totally possible that assets that are in the money – and hence should have been dispatched at full capacity in DA/ID – are reserved by the TSO (with a high opportunity cost), which prevents them from trading all their energy on the spot markets, or, the other way around, that assets, that are totally out of the money in the spot markets are required to start up to secure aFRR resources. As a consequence, the price offered by these aFRR resources – that are reserved by the TSO – can largely deviate from the spot price reflecting the market equilibrium. When the aFRR CBMP is used as Imbalance Tariff, it makes the price signal jumping from the spot price reflecting the market equilibrium to a much lower (in case the aFRR assets were in the money), or a much higher (in case the aFRR assets were out of the money) price signal as soon as 1MW aFRR is activated, to then come back to a price signal which is closer to the market equilibrium when the System Imbalance grows/becomes more structural and hence when the TSO starts activating mFRR. These discontinuities in the balancing merit order already exist today but are further exacerbated by the connection to the EU aFRR platform due to the specificities of the aFRR standard balancing product (f.i. the technical price cap set at 15k€) and of the Activation Optimization Function (f.i. the absence of counter-activations)[4]. For these reasons, Elia believes that the aFRR CBMP can hardly reflect the local real-time value of energy and makes the imbalance price signal very difficult to understand, would this imbalance price be exclusively based on the aFRR CBMP. On the contrary, it should hence be as much as possible disregarded in the construction of the Imbalance Tariff.

The dead band introduced by Elia in its proposal aims at limiting the impact of these aFRR non-convexities on the Imbalance Tariff. Elia is willing to continue improving its proposal to get closer to the legal objectives of article 3.1 b) and of Whereas (17) of the EBGL, by, for instance, working on an extended, but also more sophisticated dead band.

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[2] The aFRR CBMP is calculated at each clearing (i.e. every 4 seconds) by the AOF – activation optimization function – of the aFRR platform, based on the selected aFRR balancing energy bids. It is a single marginal price used across all areas among which there is no congestion and valuing the specific aFRR product properties.

[3] "*due to constraints on aFRR, we have distorted the merit order and hence, introduced a non-convexity in the cost function representing the balancing merit order […]* ***In the presence of non-convexities, the application of uniform pricing may lead to solutions that are far away from the social welfare optimum****. The application of uniform imbalance pricing by considering that the CBMPs represent the real-time value of energy, in presence of these non-convexities, is an example in case*" *– Frank Vandenberghe, Onoma*

[4] These peculiarities are further detailed the note "Imbalance Pricing after Picasso" from Frank Vandenberghe – Onoma, attached to this answer (source [1])

CREG's proposal based on the CBMP to reflect the so-called "real-time value of energy" does not hold after joining Mari & Picasso

Elia finds it very difficult to assess the quality of the Imbalance Tariff design proposed by CREG in articles 29.2.2 and 29.3.2 without knowing its vision concerning the evolution of the Imbalance Tariff after the connection to both EU balancing platforms. Indeed, according to Elia, the vision for the evolution of the Imbalance Tariff in the context of EU balancing integration should first be defined in a general way, with clear objectives and principles in mind. This vision should then be broken down in several designs and implementation steps depending on the sequence for the connection of Belgium to the EU balancing platforms. This logical approach does not seem to be the one that CREG has followed to come up with its proposal or, at least, if it is the case, CREG has not shared its general vision so far. Elia can only regret this approach.

One element which is very clear and extensively repeated in CREG's proposal though, is the fact that the Imbalance Tariff should be based on the CBMPs of the EU platforms with no price intervention, because these CBMPs best reflect the real-time value of energy. Despite the absence of additional information regarding CREG's vision, Elia nonetheless shares some concerns about the efficiency and robustness of CREG's intent to use the CBMP of the EU platforms with no price intervention.

To understand Elia's concern, it is important to be aware that Mari and Picasso are two separate platforms that work independently from each other based on the mFRR and aFRR demands they respectively receive from each country. As a consequence, it is very likely that situations will occur for which Picasso and Mari will be regulating in opposite directions, possibly leading to extremely different clearing prices (CBMP) on both platforms. These situations can notably (but not exclusively) stem from the absence of harmonization of mFRR activation strategies at European level, which results in very different uses of aFRR and mFRR products from country to country.

Based on this observation, Elia wonders which one of both CBMP (Picasso or MARI) will be considered by CREG as reflecting the real-time value of energy, and hence how CREG intends to use and/or combine these CBMPs (which possibly provide opposite financial incentives) to calculate the Belgian Imbalance Tariff after the connection to both European platforms. Elia investigates several possibilities in section 1.4 of this document (i.e. use of aFRR CBMP, use of mFRR CBMP, combination of aFRR CBMP and mFRR CBMP, or even active trading operations from the TSO to make these aFRR and mFRR CBMPs converge) and comes to the conclusion that CREG's declared objective to use the CBMP without price intervention can hardly efficiently (and even safely) be extended to a situation where Belgium is connected to both Mari and Picasso.

There again, the introduction of caps and floors in the Imbalance Tariff calculation allows to solve the most important issues created by the use of CBMPs as the main basis for the Imbalance Tariff (as illustrated in section 1.5), making Elia's proposal as validated in July 2022 easily extendable and robust for a connection to both EU balancing platforms.

Besides, Elia is willing to continue improving its proposal and could, for instance, consider to exclusively use the mFRR CBMP as main element for the construction of the Imbalance Tariff (hence getting rid of the aFRR CBMP non-convexities), which – combined with some 'price interventions' as the introduction of caps/floors and of more extended and sophisticated deads band – could, in Elia's opinion, constitute a safe and an efficient evolution of the Imbalance Tariff calculation for when Belgium is connected to both platforms. Once again, Elia repeats its willingness to collaborate with CREG and market parties to reflect upon further evolutions.

Despite similar level of compliancy with the conditions in Art 55(4) of EBGL and Art.9 of ISH, Elia's proposal is closer to reach the objectives pursued by EBGL

In articles 29.2.2, 29.3.2 of its reviewed T&C BRP, CREG is proposing an Imbalance Tariff calculation that deviates from the conditions mentioned in article 55(4) of EBGL and article 9 of ISH in order better fulfill the legal objectives pursued by article 3.1 b) of the EBGL. Elia thus observes that the CREG's proposal contains legal deviations from the very specific conditions mentioned in these documents that are very similar as the ones that can be found in Elia's proposal in the Balancing Rules that were validated in July 2022.

More specifically, Elia agrees with CREG on the necessity to meet the legal objectives of article 3.1 b) and Whereas (17) of the EBGL[5]. However, Elia does not agree with the fact that CREG's proposal reaches these objectives. Indeed, as explained hereinafter in section 1.3.1, Elia does not believe that the aFRR cross-border marginal price (CBMP), on which CREG's proposal entirely relies, properly reflects the real-time value of energy in all situations. Elia therefore questions the arguments used by CREG to justify the deviations of its proposal from the applicable legislation. Elia believes that its proposal, as described in the Balancing Rules that were validated in July 2022, is closer to reach these objectives and it repeats its willingness to continue working and improving this proposal in the future, keeping these objectives in mind. Elia further illustrates this statement later section 1.5.

CREG's proposal lacks a clear implementation plan

Elia believes that CREG should further clarify the conditions for the entry into force of articles 29.2.2 and 29.3.2 of its T&C BRP proposal. CREG seems indeed to believe that Belgium could connect to Picasso (way) sooner than to Mari. If this is the case, the chance also exists that the entry into force of the version of the T&C BRP reviewed by the CREG occurs after the connection to Picasso. In this case, the Imbalance Tariff calculation described in the Balancing Rules, as validated by CREG on July 19th 2022 would enter into force at the connection to Picasso and would be applicable until the entry into force of the new version of the T&C BRP. In order to be able to prepare the transition from the Imbalance Tariff calculation described in the Balancing rules to the one described in the T&C BRP, CREG and Elia would need to agree on a specific date for the entry into force of the T&C BRP. This needs to be specified in the implementation plan of these T&C BRP.

Moreover, CREG should also specify how it intends to involve VREG in the validation of the T&C BRP before the entry into force of the reviewed document.

[5] Stating that: "*To make balancing markets and the overall energy system fit for the integration of increasing shares of variable renewables, imbalance prices should reflect the real-time value of energy*."

As, based on latest planning, adhesion to Mari platform precedes Picasso, CREG's proposal will likely never apply. Elia therefore suggests removing articles 29.2.2, 29.3.2 and 29.6.2 from its proposal and rather working with all the market parties on a formula which is robust for the connection to the two platforms in whatever sequence.

Even though Elia acknowledges the uncertainty surrounding the connection to the EU balancing platforms, it made clear during the last Working Group Balancing meetings (of 27th October 2022, 9th December 2022) that, following CREG's decision to extend the derogation for the connection to Picasso, Belgium will most likely connect to the EU mFRR platform before the EU aFRR platform (note that this information should be further confirmed during the Working Group Balancing of February 2nd 2023). **This would make articles 29.2.2, 29.3.2 and 29.6.2 of CREG's proposal irrelevant since these articles describe the calculation of the Imbalance Tariff and System Imbalance that would be applicable after the connection to Picasso, but before the connection to Mari, which is a situation that would then simply never exist.**

Besides, even in the unlikely scenario where Belgium would connect to Picasso first, it would then in any case be very quickly followed by the connection to Mari (considering the legal deadline for the connection to Mari). Yet, as explained before and detailed in section 1.4 of this document, Elia is strongly convinced that CREG's philosophy regarding the calculation of the Imbalance Tariff for Picasso hardly be extended efficiently (and even less safely) to a situation where Belgium is connected to both Mari and Picasso. This means that in this (unlikely) scenario, articles 29.2.2 and 29.3.2 of CREG's proposal would be applicable for a very limited period of time before having to evolve towards something completely different (at least in terms of philosophy).

Elia therefore believes that it would be more efficient, and less confusing, to remove these articles 29.2.2, 29.3.2 and 29.6.2 from the reviewed T&C BRP. This would allow to directly submit a robust formula for the calculation of the Imbalance Tariff, compatible with both Mari and Picasso, discussed with all the stakeholders and providing certainty and visibility to market parties. Elia intends to submit such a robust formula anyway in the framework of the next T&C BRP revision (for a.o. preparing the connection to MARI), which will start immediately after CREG's decision on its own T&C BRP revision.
Furthermore, as detailled in the previous paragraphs, the biggest concerns and the largest parts of the comments that Elia formulates about CREG's proposal are related to these three articles, that will most likely never be applicable. Elia would hardly understand the intention and the message provided, would CREG decide to still maintain these three articles in its proposal under these circumstances.

Elia therefore urges CREG to remove these three articles from its reviewed version of the T&C BRP so that Elia and CREG can concentrate all their efforts in discussing and developing, in collaboration with the market parties, an evolution of the Imbalance Tariff calculation which is robust for the connection to the EU balancing platforms, whatever the sequence followed by Belgium for its connection to these platforms. Elia intends to initiate such a discussion anyway as soon as CREG takes a decision on its own revision of the T&C BRP, in order to be able to submit a robust formula, discussed with the market, in the next T&C BRP revision (aiming a.o. at preparing the connection to Mari).

Proposal to either reformulate or remove the articles describing the additional component (articles 29.4 and 29.5)

Should articles 29.2.2, 29.3.2 and 29.6.2 be removed from CREG's proposal, as suggested by Elia in the previous section, the main remaining comment of Elia would concern articles 29.4 and 29.5 of CREG's proposal. These articles describe the additional price component applied to the imbalance price component resulting from the activation of the balancing FRR energy and state that "no such additional component applies". In its draft decision, CREG argues that the additional component "alpha" actually remains applicable in the context of the present Tariff Proposal approved by CREG and that, as a consequence, the T&C BRP cannot contain any additional component in order to avoid applying a double additional component to BRPs. Elia does not understand this statement. Indeed, the current Tariff Proposal does not refer to any other document (neither the Balancing Rules, nor another document) for the description of the additional component applicable to the main component of the Imbalance Tariff (i.e. to the MIP or MDP). In Elia's opinion, the content of the articles 29.4 and 29.5 of the T&C BRP is never referred to in the Tariff Proposal and therefore does not have any legal value – from a tariff perspective – anyway, which excludes any risk to apply a "double additional component" in Belgium.

Even if, with the explanation provided by CREG in its draft decision, it becomes clearer that CREG intends to keep the alpha in the Imbalance Tariff (which is definitively a positive[6] evolution compared with previous CREG's positioning), Elia believes that the paragraphs 29.4 and 29.5 of the reviewed T&C BRP only create confusion without adding any value to the proposal.

According to Elia, paragraphs 29.4 and 29.5 of CREG's proposal should hence either repeat, in a pure informative way, that the alpha component – as described in the Tariff Proposal – is applicable in Belgium (this way, the BRPs can get an overview of the methodology for the calculation of the Imbalance Tariff in one single document being their contract), or simply be removed, in order to avoid creating any confusion/discussion about the value of the additional component applicable to Belgian BRPs. Elia invites CREG to adapt its proposal accordingly.

Conclusion

[6] As reminded by Elia in annex 2 of its letter from December 16th 2022, the alpha component is indeed deemed as a crucial element of the Belgian balancing model, which cannot be removed without prior sound analysis.

CREG's revision of the T&C BRP aims at:

1. Transferring the description of some components of the Imbalance Tariff from the Balancing Rules to the T&C BRP
2. Removing the cap, floor and dead band from the currently validated Imbalance Tariff calculation for the connection to Picasso
3. Specifying that no additional component applies to the main component of the Imbalance Tariff

Elia is not opposed to the mere transfer of existing components of the Imbalance Tariff from the Balancing Rules to the T&C BRP, provided that it is done in a proper and robust way.

Elia has however strong concerns regarding the removal of the cap, floor and dead band from the Imbalance Tariff calculation for the connection to Picasso since it jeopardizes the security, efficiency and reliability of the grid. Besides, after removal of cap, floor and dead band, CREG's proposal does not hold for a situation where Belgium is connected to both EU balancing platforms. Finally, the situation described in CREG's proposal (Belgium connected to Picasso but not yet to Mari) has very little chance to materialize following CREG's decision to extend the prolongation of the derogation to Picasso. For all these reasons, Elia recommends to CREG to remove the description of the Imbalance Tariff calculation for a situation where Belgium is connected to Picasso but not to Mari (articles 29.2.2, 29.3.2 and 29.6.2) from its proposal, so that all the parties can rather concentrate their efforts on the discussion Elia will initiate anyway as soon as CREG has taken its decision on its own revision of the T&C BRP, in order to develop an Imbalance Tariff formula which is robust for the connection to both EU balancing platforms and that can be integrated in the next revision of the T&C BRP (aiming a.o. at preparing the connection to Mari).

Regarding the additional component, Elia understands that CREG intends to keep the alpha in the Imbalance Tariff (which Elia fully supports) but does not agree with CREG that it should be stated in the articles 29.4 and 29.5 of the T&C BRP that "no additional component applies" in order to avoid applying a double additional component to the Belgian BRPs. Elia believes that these articles of the reviewed T&C BRP only create confusion without adding any value to the proposal and therefore urges CREG to either remove them, or to clarify them by explicitly repeating in these paragraphs that the alpha component – as described in the Tariff Proposal - is applicable in Belgium.

Answer to public consultation

First of all, Elia wishes to make it clear that its answer to CREG public consultation does not, in any way, call into question the relevance or the scope of the appeal that Elia has initiated against the procedure as currently conducted by CREG. On the contrary, Elia would like to emphasize that this answer is addressed to CREG with all reservations and does not constitute an acquiescence from Elia with regard to the validity of the approach followed by CREG.

With this important reservation in mind, Elia would like to share its concerns regarding two modifications proposed by CREG in its revision of the T&C BRP. Elia indeed notes that, in addition to transferring provisions currently contained in the Balancing Rules to the T&C BRP, CREG's proposal also aims at:

1. Describing the evolution of the Imbalance Tariff calculation for a situation where Belgium would be connected to Picasso but not yet to Mari. In this description, CREG proposes to abolish the cap, floor and dead band that were present in the version of the Balancing Rules linked to the connection to Picasso as approved by CREG in July 2022,
2. And, on the other hand, at explicitly specifying that no additional imbalance price component is applied to the imbalance price component due to activation of balancing energy from frequency restauration reserves

Elia does not understand the reasons why CREG proposes these modifications in the T&C and has deep concerns regarding the impact of these changes on the security, efficiency and clarity of the Belgian balancing model.

In the following sections, Elia will detail its concerns regarding these intentions from CREG and invites CREG to be pragmatic and reasonable and make perform some adaptations in its proposal.

Finally, Elia also notices some inconsistencies in the way some specific adaptations of the T&C BRP were proposed by CREG. Elia will also draw CREG's attention to these technical inconsistencies and invite CREG to correct them.

1. About the description of the evolution of the Imbalance Tariff calculation for a situation where Belgium would be connected to Picasso but not yet to Mari

In its proposal, and more specifically in the articles 29.2.2 and 29.3.2 therein, CREG suggests to compute the main component of the Imbalance Tariff ("Imbalance price component due to activation of balancing energy from frequency restauration reserves") as follow for a situation where Belgium is connected to Picasso, but not yet to Mari :

- MIP = MAX (mFRR component, aFRR component) when the Belgian System Imbalance is negative
  Where :
  - mFRR component is the marginal price of the mFRR energy bid activated by Elia in the upward direction
  - aFRR component is the average of the 225 cross-border marginal prices (CBMPs) calculated by Picasso (for the uncongested area to which Belgium belongs) during the Imbalance Settlement Period (i.e. the quarter-hour), weighted by the absolute value of the Belgian aFRR Satisfied Demand

- MDP = MIN (mFRR component, aFRR component) when the Belgian System Imbalance is positive
  Where:
  - mFRR component is the marginal price of the mFRR energy bid activated by Elia in the downward direction
  - aFRR component is calculated in the exact same way as when the System Imbalance is negative

In other words, when transferring the provisions of the Balancing Rules to the T&C BRP, CREG removed the cap (applying when the Belgian System Imbalance is positive) and floor (applying when the Belgian System Imbalance is negative) that were present in the version of the Balancing Rules for the connection to Picasso, as validated by CREG in July 2022. Besides, it also removed the 'dead band' concept that allows to make a distinction between the main component applying in case of small Belgian System Imbalance and the one applying in case of larger Belgian System Imbalance. An extended description (and justification) of these caps, floors and dead band can be found on the Working Group Balancing Website[7];

First of all, Elia would like to remind CREG that Elia's proposal, as approved by CREG in July 2022, was established after in-depth discussions with all market parties and was **supported by all the market parties** during the Working Group Balancing of May 5th 2022. Besides, Elia also reminds that the purpose of the cap and floor is to **safeguard the grid stability which would be jeopardized if only the weighted aFRR CBMP would be used as Imbalance Tariff, as also recognized by international expert opinions** included in [1] and [2]. Elia therefore **wonders why CREG took the initiative of adapting a calculation methodology that is unanimously supported** by the market **without even taking the time to first test and build experience** with this calculation methodology, and **this despite multiple warnings from the TSO** (whose main mission is to guarantee grid security), which are now also expressed by **international experts,** that the **proposed adaptation threatens the grid stability**.

According to Elia, given the lack of experience with the European platforms, the only reasonable way forward is to connect to the EU platforms prudently, using the more "safeguarded" Imbalance Tariff calculation methodology that is supported by all the market parties. Afterwards, further evolutions could be assessed periodically upon real-life experience and feedback, considering the market functioning, economics of the tariff as well as the system security aspects of it. Elia therefore strongly questions the drastic approach followed by CREG when abolishing the cap/floor (and dead band) of the approved Imbalance Tariff proposal for Picasso.

In the following sections, Elia will share its concerns regarding the removal of these cap, floor and dead band. It will then also analyze the objective pursued by CREG when abolishing these safeguards and assess the validity of CREG's justification. After that, it will assess how and to which extent the objective announced by CREG to justify the removal of these safeguards could remain valid for a situation where Belgium is connected to both Picasso and Mari, and hence exposed to two possibly very different (if not totally opposed) cross-border marginal prices. Elia will also analyze how and to which extent all its concerns regarding CREG's proposal are solved by maintaining the cap/floor and dead band in the Imbalance Tariff calculation. Elia will then analyze the legal basis used by CREG to justify its proposal and it will finally share some comments on the implementation plan foreseen by CREG for the entry into force of these articles 29.2.2, 29.3.2 and 29.6.2 describing the situation after Picasso. Elia will end this chapter by inviting CREG to make some concrete adaptations to its proposal.

[7] See slides 15 to 26 of **https://www.elia.be/-/media/project/elia/elia-site/users-group/ug/wg-balancing/2022/20220505/20220505_wg-balancing_slides_sent.pdf**

1.1 About the removal of the cap/floor

The main purposes of the cap and floor introduced by Elia in its proposal for the calculation of Imbalance Tariff as validated in July 2022 are to preserve grid security and to avoid increased reservation costs reflected in grid tariffs. By removing these cap and floor, CREG's proposal therefore jeopardizes grid security and creates a risk of increased costs for the consumers. Elia will explain again these risks in the following sections (when not already acknowledged by CREG) and assess the measures proposed by CREG to mitigate some of these risks.

1.1.1 Stressed electrical grid due to more congestions in real-time

One **major concern raised by CREG's proposal** is the **risk to stress the electrical grid** and, more specifically, to **create real-time congestions in the Elia grid or in the grid of neighboring countries** when the BRPs are incentivized to aggravate the Belgian System Imbalance in an uncontrolled way. Using aFRR CBMP as imbalance price without any safeguard may indeed imply that Belgian BRPs voluntarily create a (say: largely negative) System Imbalance, upon incentives created by (say: large downward) aFRR activations in other countries. Such "transfer of imbalances" are not limited by any cross-zonal capacity management scheme, hence could lead to potentially severe grid congestion.

In its decision (B)2433 CREG eventually acknowledges the existence of this risk and suggests measures to mitigate it[8]. These mitigation measures are the following ones:

- Direct activation of mFRR when ELIA observes a risk for the grid security
- Publication of available ATCs in real-time
- Implementation of a "return to schedule" mechanism when a risk of congestion is detected on the cross-border lines

First of all, Elia welcomes the fact that CREG now also acknowledges the existence of this risk, which has been explained multiple times by Elia and which was also identified by international experts, as illustrated in chapter 8 of [1] and chapter 2.2 of [2]. Elia once again insists on the different temporalities between the aFRR CBMP (calculated every 4 seconds) and the Imbalance Tariff (calculated on a 15-minutes basis), which is crucial for understanding this risk. CREG indeed suggests using the weighted average aFRR CBMP as Imbalance Tariff when no mFRR is activated, which means that the impact on the Imbalance Tariff of a sudden change in aFRR CBMP when the system reaches its security limits might be rather limited, depending on the moment when this change occurs during the ISP and on the magnitude of this change. Due to these different temporalities, it is not unlikely at all that the Imbalance Tariff keeps

[8] decision (B)2433 CREG : « Une critique qui pourrait être faite sur l'exemple ci-dessus est que l'impact du changement du cross-border marginal price sur le prix de déséquilibre est progressif. Néanmoins, la CREG remarque qu'ELIA a une alternative à sa disposition. En effet, si ELIA observait un risque opérationnel, elle pourrait activer du mFRR avec activation directe. Dans ce cas, une offre du merit order (dans la direction du déséquilibre en Belgique) serait activée. Cela aurait pour impact de changer instantanément le prix de déséquilibre, ce qui donnerait un incitant direct aux BRPs d'arrêter leur réaction.
La CREG observe que (comme demandé par FEBEG) pour faciliter la réaction des BRPs, ELIA pourrait publier les ATCs disponibles en temps réels.
La CREG remarque que FEBEG considérait qu'ELIA avait les outils à sa disposition pour demander à un BRP de revenir à son plan de production (return-to-schedule/ICAROS). ELIA a répondu qu'elle ne voyait pas de lien entre le CRI et les congestions sur les lignes transfrontalières. La CREG est d'accord avec l'observation d'ELIA qu'il peut y avoir une congestion transfrontalière même si le CRI est bas dans toutes les zones électriques belges. Néanmoins, la CREG s'interroge sur la possibilité pour ELIA d'implémenter un mécanisme de « return to schedule » qui s'appliquerait lorsqu'ELIA observe un risque de congestion sur ses lignes transfrontalières. »

providing BRPs with an incentive to aggravate the Belgian System Imbalance even when the borders are already saturated.

Secondly, Elia strongly disagrees with the principle of the CREG proposal to mitigate a flaw in the proposed design of the Imbalance Tariff (i.e. the fact that the formula proposed by CREG threatens grid security) by relying on additional manual actions from the Elia grid operators, whereas this design flaw can easily be solved at source by design improvements. When it comes to grid security/stability, Elia indeed strongly believes that it is its mission, as a TSO, to implement all possible incentives that naturally and automatically prevent undesirable events in real-time. In Elia's opinion, manual actions from the grid operator in real-time should only be considered as a last resort action for the rare situations that cannot be anticipated/avoided. Relying on the grid operator to maintain grid security when it is jeopardized on a regular basis (possibly multiple times a day) by an inadequate design of the Imbalance Tariff is, according to Elia, not a judicious nor a professional way to operate the grid.

On top of that, Elia would like to express additional concerns regarding the mitigation measures proposed by CREG:

1.1.1.1 Direct activation of mFRR when ELIA observes a risk for the grid security

As explained by CREG, this mitigation measure aims at activating in real-time "Direct Activated mFRR" when a risk of congestion is detected, this in order to make the Imbalance Tariff immediately switch towards a value that no longer incentivizes the BRP to aggravate the System Imbalance of the Belgian zone[9].

First of all, Elia would like to remind that, considering the way ATCs are calculated, it is not only cross-zonal lines that can be overloaded when there is no residual available transmission capacity: every Critical Network Element can be subject to congestion, be it located in Elia grid, be it a cross-zonal line, or be it an element of the grid of neighboring countries. It is therefore quite difficult for Elia to follow and observe the risk created for the grid security in real-time, since the congestion can even occur in a grid on which Elia does not have any view in real-time.

Besides, making the link between a network element that threatens to become overloaded and an inadequate Imbalance Tariff (in order to make sure that the activation of mFRR will solve the issue) is far from being easy in real-time, especially when the Imbalance Tariff is influenced by parameters that evolve every 4 seconds and when the transmission capacities available in real-time continuously evolve on each of the Belgian borders.

It is also questionable to require Elia to activate, on purpose, possibly much more expensive mFRR flexibility in order to solve an issue created by an inadequate Imbalance Tariff design. In its draft decision, CREG states that the activation

[9] Décision (B)2433 : « Néanmoins, la CREG remarque qu'ELIA a une alternative à sa disposition. En effet, si ELIA observait un risque opérationnel, elle pourrait activer du mFRR avec activation directe. Dans ce cas, une offre du merit order (dans la direction du déséquilibre en Belgique) serait activée. Cela aurait pour impact de changer instantanément le prix de déséquilibre, ce qui donnerait un incitant direct aux BRPs d'arrêter leur réaction. »
Projet de décision 2497 : « Dans le cas où les BRP, en raison d'un prix de déséquilibre faible, créent ou aggravent un déséquilibre négatif dans le bloc LFC d'Elia, Elia peut à tout moment supprimer cette cause en activant une offre d'énergie d'équilibrage mFRR dans le sens positif. Étant donné que le prix de déséquilibre dans une direction négative du déséquilibre système est déterminé par le prix maximal des activations de l'énergie d'équilibrage positive, le prix de déséquilibre correspondra au prix de l'activation des offres d'énergie d'équilibrage mFRR positives. Le raisonnement est similaire lorsque les BRP créent ou aggravent un déséquilibre positif dans le bloc LFC d'Elia. »

of the least expensive mFRR bid creates the same incentive as the one created by the application of the cap/floor[10]. This might be true (depending on the exact definition of the cap/floor and of the VoAA used to define these cap/floor) when Belgium is not yet connected to Mari. Elia would however like to draw CREG's attention on the fact that, once connected to Mari, the CBMP DA to which Elia is exposed in case of direct mFRR activation could constitute a very strong incentive for the BRPs to come back to their equilibrium.
Let us for instance suppose that Belgian BRPs are initially short but exposed to a very low Imbalance Tariff because Picasso is activating in the downward direction (Elia's aFRR demand is fully netted). The Belgian BRPs are then incentivized to become even shorter. At that moment, Elia identifies that a grid element threatens to saturate and activates mFRR in the upward direction through the direct activation process of Mari. Suppose further that, at that moment, Mari was already strongly activated in the upward direction (following the scheduled activation process) due to a major incident in a neighboring country, implying that Mari clears at high prices (despite Picasso clearing at low prices - which relates to different FRR activation strategies). The first mFRR bid accessible to Belgium in direct activation can then be very expensive. If this direct activation mFRR price is used to compose the Imbalance Tariff, the Belgian BRPs become strongly incentivized to balance the Belgian zone, contradicting the previous signal that initial imbalance of the Belgian zone was deemed acceptable because it resulted in an aFRR demand that was fully netted in Picasso. Besides, this creates possibly important activation costs to the Belgian consumer (through the BRPs) that only result from the inappropriate financial incentive provided to the BRPs by the Imbalance Tariff calculation as proposed by CREG, since, on the contrary, the initial situation was rather beneficial for the Belgian consumer (the energy shortage in Belgium was sourced at very low, if not negative, price).

Besides, when considering this mitigation measure, one should also remind the specific profile of direct mFRR activations. These are designed to last until the end of the next quarter-hour. This means that in order to correct the Imbalance Tariff of qh 0, due to an inappropriate Imbalance Tariff design, CREG would require Elia to activate mFRR not only during qh 0, but also during qh 1, without even leaving the opportunity to the market to correct the situation by themselves.

Furthermore, introducing a link between the Belgian mFRR activation strategy and the grid congestion management is certainly not a way to ensure European harmonization for the use of mFRR and aFRR products, or to ensure the consistency between aFRR and mFRR activations in Picasso and Mari. We could even easily imagine that Elia would be strongly questioned for the mFRR activations it performs to manage real-time congestions, be it by the Belgian market (because it could be interpreted as a direct intervention of Elia in the Imbalance Tariff for congestion management purposes) or by neighboring countries (because it could be deemed as an inappropriate use of EU mFRR resources). This would then potentially trigger complex discussions on the application of such process.

Finally, depending on the evolution of the Imbalance Tariff calculation after the connection to Mari, the activation of mFRR (even through the direct activation process) might not have an immediate (i.e. within qh 0) impact on the Imbalance Tariff. For instance, if the formula suggested by CREG is simply extended to the mFRR component, which would hence be calculated as the weighted average of all the Mari (scheduled and direct) CBMPs of the considered quarter-hour, then an mFRR direct activation does not necessarily provide an incentive to BRPs to immediately stop their

[10] L'activation de l'offre d'énergie d'équilibrage mFRR la moins chère seulement génère un même incitant que celui visé par l'application d'une limite inférieure (supérieure), et ce sans limiter l'efficacité du fonctionnement des marchés de l'énergie d'équilibrage européens, en ce compris la compensation des déséquilibres

problematic implicit reaction, or the TSO should already activate a very important volume of mFRR through the direct activation process to reach the desired effect. Let us for instance suppose that the Belgian BRPs are initially very short but exposed to a very low Imbalance Tariff because both our aFRR and mFRR (Scheduled Activations) demands in the upward direction are netted on Picasso and Mari (resulting in very low, or even negative aFRR and mFRR SA CBMP). At the moment we activate mFRR through the direct activation process, if the mFRR component is calculated as the weighted average or the mFRR SA CBMP and the mFRR DA CBMP, it can require the activation of an important volume of mFRR in direct activation to make this component switch to a price signal that stops the problematic implicit reaction of the BRPs.

For all these reasons, Elia does not consider this mitigation measure as a realistic, robust or efficient way to avoid the consequences of the possibly counter-productive incentives provided by the Imbalance Tariff as proposed by CREG. Rather, Elia remains convinced that caps/floors based on the Value of Avoided Activation (i.e. the price of the first available bid in the netted direction) are more appropriate measures to mitigate the acknowledged risks.

1.1.1.2 Publication of available ATCs in real-time

Publications and transparency are considered by Elia as a key success factor of its reactive balancing model, so Elia is certainly willing to continue improving its publications as far as it can help BRPs to appropriately react.

Elia however has a few concerns regarding the publication of available ATCs in real-time as a way to prevent real-time congestions created by the implicit reaction of Belgian BRPs:

- ATCs are already published today on the ENTSO-e Transparency platform but these are the ATCs before the optimization by the European balancing platforms. These values are fixed values for each MTU, while the remaining ATCs after the optimization performed by Mari and Picasso evolve every 4 seconds. Those remaining ATCs are not provided by the European tools, as they are not relevant to the market when BRPs are expected to support the local system imbalance. Elia could calculate these remaining ATCs based on the information retrieved on the ENTSO-e Transparency platform and provided by MARI and Picasso, and then publish these on its website. However, the related requirements, specifically for Elia's needs, would be much more stringent than those imposed to centralized tools for all TSOs (for example, according to the ENTSO-E Manual of Procedure v3r3 approved by the NRAs, the 4'' CBMPs have to be published no later than one hour after the end of the ISP). In any case, this publication would definitely come with a delay of several minutes and will not be able to follow the 4'' based evolution of the ATCs within the quarter-hour.

- As mentioned before, Elia wants to be and remain as transparent as possible towards its stakeholders. However, Elia also believes that it is its mission to make the price signals it sends as "self-sufficient" and 'user-friendly" as possible to the market to steer the implicit/reactive balancing reactions in Belgium, and thereby avoid that the BRPs *are obliged* to look at lots of different publications to efficiently calibrate their implicit reactions. We indeed believe that this could discourage some smaller BRPs (with less means/resources to follow the market publications) to efficiently help the system. Elia therefore believes that the correct use of additional near-to-real-time info by BRPs (such as the quick evolution of available ATCs on each border) should not be considered as a pre-requisite for the BRPs to appropriately and safely react to the Imbalance Tariff. Next to the publication of additional information in a transparent way, Elia hence believes that it is its role to make sure that the price signals sent to the BRPs provide at all times the adequate incentives to appropriately and safely steer their reactions.

- Besides, even if all BRPs had the necessary means and resources to look at lots of different publications to calibrate their implicit reaction and even if Elia could manage to publish the residual ATCs very close to real-time, it would not yet be guaranteed that these BRPs would indeed pay attention to the additional information put at their disposal. If, considering the Imbalance Tariff construction (and especially the fact that it results in an average of different parameters on a 15 minutes basis), BRPs have sufficient certainty that their implicit reaction will remain beneficial even when there is no transmission capacity available on some borders, they don't receive any strong incentive to quickly limit their implicit reaction. In this regard, the risks for the BRPs and for the TSO are of a different nature : from the BRP's perspective, risks are financial and can be considered as acceptable if, on average, their reaction to the Imbalance Tariff is beneficial, whereas from the TSO perspective, the risk is operational and immediate making each inappropriate reaction from BRPs simply unacceptable.

1.1.1.3 Implementation of a "return to schedule" mechanism when a risk of congestion is detected on the cross-border lines

Here again, Elia would like to remind that the risk of congestion created by inappropriate implicit reactions in Belgium can be located on any Critical Network Element in neighboring countries (and not only on cross-border lines). Elia does not have any real-time view on the load of foreign Critical Network Elements. Elia can then hardly make the link between implicit reaction on some units in Belgium and congestions created in neighboring grids.

Besides, even if this link could be made, it would probably be impossible for the grid operator to identify, in real-time, which unit(s), deviating from its (their) schedule, is (are) causing the congestion and would hence be forced to require a "return to schedule" to all the units of the Belgian control area that are above (resp. under) their last valid schedule. Here also, the final dispatch after the reactions of BRPs to the Imbalance Tariff proposal of CREG and then the activation of the mitigation measure by Elia once a congestion risk is identified, would end up being less efficient than the dispatch that would have been reached with an Imbalance Tariff implementing cap and floor. Let's suppose a situation where Belgian BRPs are initially long in Belgium (due to an excess of wind) but exposed to a high Imbalance Tariff (because Belgian aFRR demand is fully netted in Picasso) incentivizing them to become even longer. This encourages some production units to further increase their injection in Belgium. The Elia grid operator detects a congestion risk on a cross-border line and decides to require a return to schedule to all the production units of the Belgian zone. This means that the wind parks are obliged to come back to the schedules they had communicated to Elia 45 minutes before real-time (since these parks are coordinable in the downward direction), whereas, in Elia's proposal as validated by CREG in July 2022, the surplus of wind energy would have been tolerated since it was fully netted in Picasso and hence helpful for neighboring countries. The application of this mitigation measure as proposed by CREG could hence de-optimize the EU dispatch compared to the situation that would be tolerated in Elia's proposal.

Elia would also like to insist that the "return to schedule" mechanism that allows the management of internal congestions could not be simply used to manage cross-border congestions. The existing "return to schedule" mechanism is indeed based on the CRI level in the Belgian electrical zones and is activated in case of CRI medium or high. When it comes to cross-border congestions, it is perfectly possible that a congestion occurs while the CRI of all the Belgian electrical zones is low. For this reason, a specific "return to schedule" mechanism, with its own set of rules, should be developed in close collaboration with market parties to implement CREG's mitigation measure.

1.1.1.4 International coordination of risk mitigation actions

Finally, the proposal from CREG does not elaborate on how to coordinate these mitigation measures between European countries in case several control areas encourage their BRPs to aggravate their local conditions in order to help neighboring countries. Let's suppose that Belgium and the Netherlands apply CREG's proposal and, by doing so, regularly create real-time congestions on the surrounding grid. Would it be acceptable for Belgian customers that Elia would be very reactive and would very quickly activate mFRR in direct activation or request its units to return to their schedule, whereas the congestion is jointly caused by BRPs in BE and in NL? And in a situation where the main cause of the congestion is created by the implicit reaction of NL BRPs and not by the reaction of the BE BRPs, would it be efficient that Elia activates these mitigation measures? How are the BE and NL grid operators supposed to precisely identify the cause of the congestion in real-time, in order to appropriate the most efficient mitigation measure in one or both of these countries?

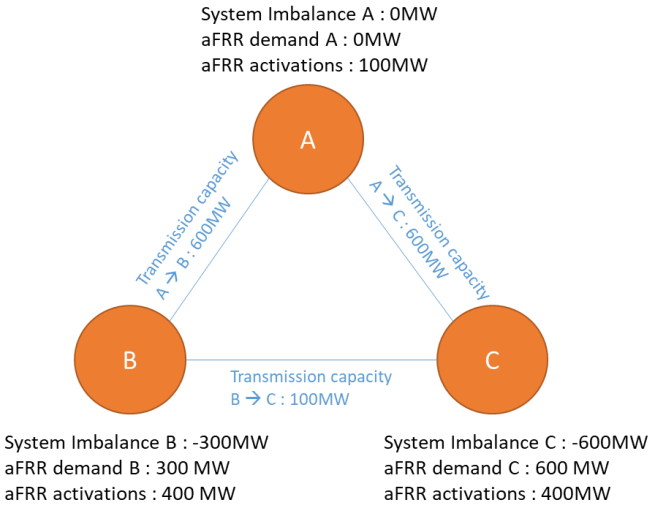
1.1.2 Increased reservation costs

As communicated before, Elia is concerned that CREG's proposal, by incentivizing the Belgian BRPs to aggravate the local System Imbalance in order to help solving issues in neighboring countries, will increase the volume of balancing capacity to be contracted by Elia, and consequently the reservation costs that are reflected in the grid charges of the Belgian consumer. Elia regrets that CREG does not seem to take its concern into consideration given the potential impact on Belgian consumers.

In its decision (B)2433, CREG states that the aggravation of the Belgian System Imbalance does not lead to the increase of FRR reserves in Belgium[11]. In its justification, CREG explains that, at that moment, the imbalance is created by resources available in the system that compensate the imbalances of the different control areas. Elia repeats again that it agrees with CREG that, as long as the imbalance created on purpose in Belgium is fully netted, a mechanism could in principle be found so that this system imbalance does not impact the dimensioning of the Belgian reserves (such a methodology nonetheless remains to be defined and agreed). Elia's concern is however that netting opportunities can be lost from one moment to the next, in a very unpredictable way. At that moment, the (possibly very large) imbalances created on purpose in Belgium are of course to be considered by the FRR dimensioning algorithm. CREG seems to negate this possibility to lose netting opportunities in a very fast and unforeseeable way in its reasoning, which is the reason why CREG concludes that its proposal cannot increase the reservation costs in Belgium.

It is however difficult to deny this possibility to lose netting opportunities from one moment to the next. Let's illustrate this possibility with an example:

[11] decision (B)2433: "L'aggravation des déséquilibres dans le bloc RFP n'entraîne pas une augmentation des coûts d'équilibrage tant que l'augmentation du déséquilibre compense un déséquilibre dans un autre bloc RFP. En effet, il n'est pas nécessaire d'augmenter les réserves pour la FRR dans un bloc RFP : le déséquilibre est causé par des ressources disponibles présentes dans le système qui compensent les déséquilibres dans les deux blocs RFP ».

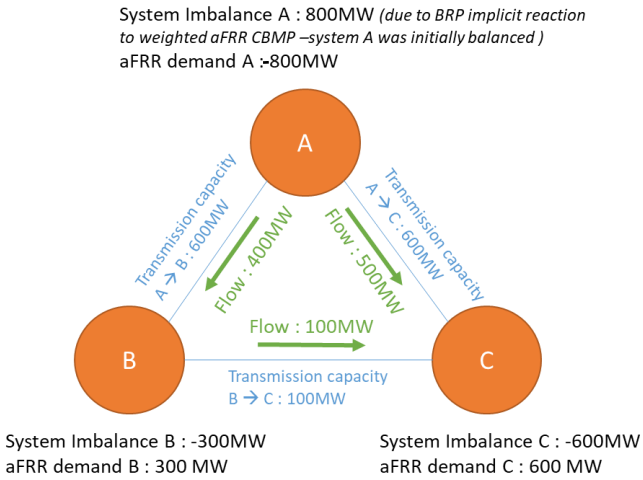


Total SI	Total aFRR demand	Total aFRR activations	Total mFRR demand	Total mFRR activations
- 900 MW	900MW	900MW: • 100 MW in zone A • 400 MW in zone B • 400 MW in zone C	0 MW	/

In this example, control area A is initially close to be balanced. Control areas B and C have, together, a total system imbalance of -900MW. In the initial situation, we suppose all the three control areas exclusively use aFRR to balance their zone, resulting in a total aFRR demand of 900MW in the upward direction and in a high aFRR CBMP. The activations of aFRR are spread throughout the three zones and the resulting flows do not create any congestion: control areas A, B and C therefore belong to the same uncongested area.

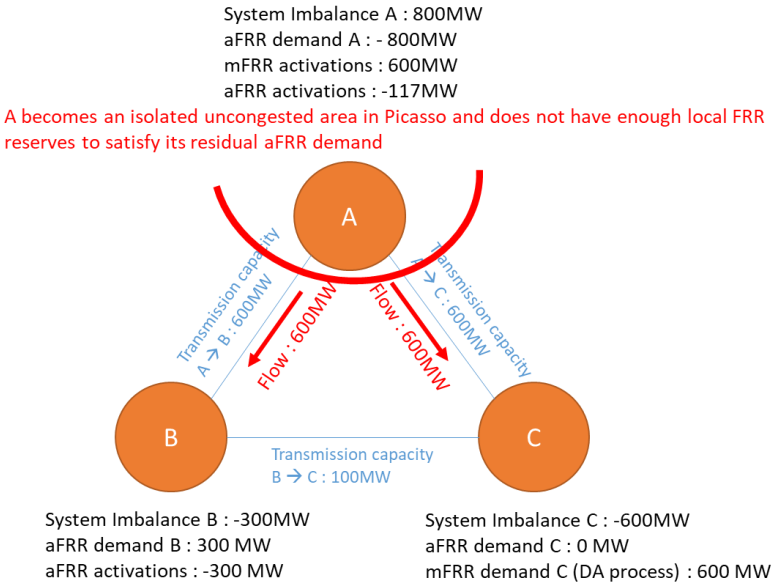
The BRPs of control area A are exposed to the high aFRR CBMP of the uncongested area to which it belongs. If Control area A applies the Imbalance Tariff calculation proposed by CREG, it therefore provides an incentive to its BRPs to aggravate the system imbalance of its zone by becoming long in order to help the neighboring control areas. Control area A therefore sees its System Imbalance deteriorating. Let's suppose that the system imbalance of A evolves from 0 MW to a value of 800MW. This implicit reaction reduces the total System Imbalance of the uncongested area to -100MW and reduces the total residual aFRR activation to 100MW in this uncongested control area (in the example, we suppose that the cheapest aFRR bids are located in control area A). As a consequence, the aFRR CBMP is reduced to a lower value.

This implicit reaction from BRPs of control area A does not cause any issue, since this System Imbalance is fully netted and creates flows that respect the grid constraints:



Total SI	Total aFRR demand	Total aFRR activations	Total mFRR demand	Total mFRR activations
- 100 MW	100MW	100MW in zone A	0 MW	/

However, at a given moment, control area C decides to require the activation of mFRR in the upward direction through the direct activation process of MARI, in accordance with its mFRR activation strategy that does not allow large imbalances over a long period of time (even if this imbalance is partially netted). Control area C requests 600MW to MARI, hence reducing its aFRR demand to 0MW. As from that moment, the aFRR demand of control area A is no longer netted and aFRR activations in the downward direction are required to satisfy the aFRR demand that has been created on purpose in control area A to help neighboring control areas. The cheapest upward mFRR bids are located in control area A and the cheapest downward aFRR bids are activated in control area B up to the saturation of the borders. Control area A is then decoupled from the initial uncongested area and can only rely on its own FRR means to cover its unsatisfied aFRR demand. If these FRR means are not available, the ACE of control area A will be impacted. Besides, at that moment, the System Imbalance of control area A is no longer netted and this System Imbalance should therefore be considered in the dynamic dimensioning of FRR reserves of control area A, possibly increasing the FRR balancing capacity to be contracted for this country in the future.



Total SI	Total aFRR demand	Total aFRR activations	Total mFRR demand	Total mFRR activations
- 100 MW	-500MW	-417 MW: • -300MW in zone B • -117MW in zone A	600 MW	600 MW in zone A

One could reply that the aFRR CBMP starts incentivizing the BRPs to reduce the imbalance of control area A as soon as it is no longer fully netted and that the issue in control area A is hence naturally solved. This reasoning is unfortunately not true since CREG's proposal usesthe *weighted average CBMP over the whole quarter-hour* as imbalance price, which means that the imbalance price can remain a strong incentive for BRPs of control area A to take long open positions even if these positions are not netted until the end of the quarter-hour.

Losing netting opportunities can happen anytime, and on a very regular basis. Besides, the moment it happens is very difficult to anticipate since it depends on events happening in (decisions made by) other countries, as illustrated in the example above. If Belgian BRPs are encouraged to create imbalances in Belgium in an uncontrolled way (f.i. up to values exceeding the locally available reserves), this is expected to have consequences on the ACE quality of Belgium and on the FRR volumes to be contracted.

It is also to be noted that this particular impact of CREG's proposal on reserve requirements is shared by international experts and explained in chapter 2.1 of [2].

1.2 About the removal of the dead band

In its proposal, CREG abolishes the concept of the "dead band" that was present in the version of the Balancing Rules linked to the connection to Picasso, as validated by CREG in July 2022. The purpose of this dead band proposed by Elia is to send the most "neutral" price signal as possible to BRPs when the Belgian system is close to be balanced. The benefit of this concept is threefold:

1. First of all, the dead band is considered by Elia as a necessary measure in the current version of the Balancing Rules linked to the connection to Picasso, because it allows smoothing some discontinuities introduced by the application of the cap and floor, that occur when the system is close to be balanced
2. Secondly, it is a way to reduce the entry barrier for renewables which, given their forecast errors, usually contribute to the imbalance of the system
3. Last but not least, it decreases the impact of aFRR CBMP (which, as demonstrated in section 1.3.1, does not always represent the value of energy in real-time) on the imbalance price.

1.2.1 Discontinuities in the Imbalance Tariff formation

When removing the dead band, the Imbalance Tariff described in the validated version of the Balancing Rules linked to the connection to Picasso implies possible large spreads between the Imbalance Tariff applicable in case the Belgian System Imbalance is positive and the Imbalance Tariff applicable in case the Belgian System Imbalance is negative. The Imbalance Tariff could indeed switch from an "as neutral as possible price" (i.e. the cap or the floor, equal to the price of the first FRR bid available in Belgium in one direction), to a more "extreme price" (equal to the weighted CBMP of the Picasso platform activating – possibly very expensive - aFRR in the other direction), and this even for very small changes in the Belgian System Imbalance. In order to stabilize the price signal when the Belgian system is closed to be balanced and avoid large Imbalance Tariff oscillations for each change in the sign of the Belgian System Imbalance, it was suggested to introduce the concept of the "dead band" and to provide a "neutral price" signal to the BRPs as long as the Belgian System Imbalance remains in a range for which significant implicit reactions from BRPs is not useful.

Considering a mindset where no cap and floor are used (as it is the case in CREG's proposal), Elia understands that CREG considers the need for a dead band as less important for this specific purpose of keeping a smooth price signal when the SI of the Belgian zone changes direction[12]. However, the dead band also has other virtues, as explained in the following sections and should therefore be maintained.

1.2.2 Entry barrier for RES

Another driver for the introduction of the dead band in the Imbalance Tariff formation is to ensure that the Imbalance Tariff is not unreasonably punitive in situations where Belgian BRPs correctly performed their job to balance the system. With the connection to Picasso, the Imbalance Tariff, as proposed by CREG in its reviewed version of the T&C BRP, can indeed jump to an extreme weighted average aFRR CBMP as soon as the Belgian aFRR demand is nonzero (and this even for very small Belgian System Imbalances). As a consequence, BRPs having renewables in their portfolio might face high imbalance prices in case the forecast error contributes to the System Imbalance of the uncongested area (which is very likely, especially in situations where the aFRR CBMP is extreme), even when the balance of the BE system can be close to zero thanks to efficient reactive balancing principle. This can introduce a barrier for renewables to enter the Belgian market, which is undesirable and against the principle of the European legislation. For this reason, Elia believes that it is important to maintain the dead band, and this even in CREG's proposal where no cap/floor apply. This vision is shared by international experts and further explained in chapter 8 of [1].

[12] Note that discontinuity in the Imbalance Tariff formation also exists in CREG's proposal (but to a lesser extent) since the Imbalance Tariff can jump from a neutral price signal in case the Belgian System is perfectly balanced (no FRR activation) to an extreme weighted average aFRR CBMP as soon as aFRR is activated

1.2.3 Imbalance Tariff not representing the real-time value of energy

Finally, as it will be touched upon in sections 1.3.1 and as largely explained in [1], Elia believes that the aFRR CBMP can, by no means, be considered as a good indicator of the real-time value of the energy. To avoid polluting the Imbalance Tariff (which, according to EBGL, should represent the real-time value of the energy in the best possible way) with all the non-convexities introduced by aFRR prices, Elia believes it might be worth investigating the possibility, in the future (and when legally allowed), to consider Imbalance Tariff calculations that don't take these aFRR prices into account.

Awaiting further reflections with all stakeholders, the concept of the dead band can be seen as an intermediate and pragmatic solution before a more sophisticated and extended solution is put in place (for instance a progressive deviation from a "neutral price" when the system is balanced to mFRR price at the end of the aFRR band). To this regard, Elia believes that the dead band presents strong benefits for the representativeness of the Imbalance Tariff (as required by EBGL) and is strongly concerned that it is abolished in CREG's proposal. This belief is also shared in chapter 8 of [1].

1.3 About the objective pursued by CREG's proposal (in articles 29.2.2 and 29.3.2)

In its different decisions, CREG extensively repeats that the weighted average aFRR CBMP reflects in the most accurate way the real-time value of energy[13] and should hence be used as Imbalance Tariff as required by whereas (17) of EBGL[14]. Besides, CREG states that the use of the weighted average aFRR CBMP aims at enhancing the efficiency of balancing[15]. Those two statements are questioned by Elia in the following sections.

1.3.1 About the ability of aFRR CBMP to always reflect the real-time value of energy

Elia has several reasons to believe that the aFRR CBMPs do not always reflect the "real-time value of energy" of the control area. These reasons are mainly related to the fact that:

- Only a subset of all available assets in the system is technically capable and willing to participate to aFRR. The aFRR reservation mechanisms enable to secure the required volume of aFRR capacity by either compensating for the opportunity cost (in case the aFRR-capable assets are in the money) or for the spinning cost of the assets (in case the aFRR-capable assets are out of the money). As a result, the marginal costs of the contracted aFRR assets are often not directly aligned with the system marginal cost. The proportion of available assets in the system that is able to provide mFRR is substantially larger, making it less likely that mFRR capacity is secured on assets with important opportunity costs, or that are out of the money and need to run

[13] decision B2433 : « la moyenne pondérée des prix marginaux transfrontaliers résultant de la sélection d'offres de produits d'énergie d'équilibrage aFRR standard pour compenser ces déséquilibres instantanés reflète le plus précisément la valeur de l'énergie en temps réel »

[14] Whereas (17) states that : "To make balancing markets and the overall energy system fit for the integration of increasing shares of variable renewables, imbalance prices should reflect the real-time value of energy."

[15] article 3 of reviewed T&C BRP : "Because BRPs are exposed to an imbalance price through the imbalance settlement that reflects the cross-border marginal prices of the European aFRR platform, the efficiency of balancing and of the European and national balancing markets will be enhanced. Efficient balancing, defined in Article 2 of the SOGL as "all actions and processes, on all timelines, by which Transmission System Operators (TSOs) permanently ensure that system frequency remains stable within a predetermined range", will be enhanced by allowing BRPs to avoid the use of more expensive FRR and RR reserves abroad through the use of lower-cost balancing resources available to the BRP in Elia's LFC Block, insofar as imbalance netting is possible;"

with the sole objective of being able to provide mFRR. As a consequence, aFRR product often creates substantial discontinuities in the balancing merit order (as illustrated in Figure 1 for the case of aFRR marginal costs lower than the system and mFRR marginal costs). Note that these discontinuities are already observed in today's merit order, even though aFRR balancing energy is still remunerated in a pay-as bid mechanism, and can hence only be exacerbated with the connection to Picasso and the evolution to a pay-as-cleared remuneration mechanism.

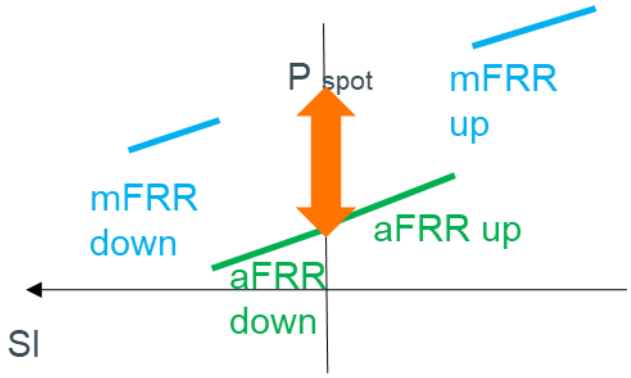


Figure 1: Illustration of the possible discontinuities introduced by aFRR in the balancing merit order

It is difficult to justify that the energy, valorized at P_{spot} at the end of the intraday market would see its value suddenly jumping to a way lower aFRR price as soon as aFRR is activated and then coming back to a level closer to P_{spot} at the moment the dispatcher manually activates mFRR.

- The Picasso algorithm does – by design – not allow "counter-activations" of aFRR energy. This means that Picasso is not allowed to match aFRR upward bids with aFRR downward bids, even though these bids are price compatible (i.e. even if the price of an aFRR upward bid is priced below an aFRR downward bids). However, as stated above, only a subset of assets are able to provide aFRR services. The aFRR marginal operating cost thus also depends on the generation mix, which is different per LFC block (i.e. per country). As a result, aFRR marginal operating costs can be different across LFC blocks, as illustrated on Figure 2. As a result, the CBMP in case of upward aFRR activation in an uncongested area may be lower than the CBMP in case of downward aFRR activations in the same uncongested area. This is illustrated in Figure 2 for a case where the aFRR marginal costs are lower in Belgium than in Germany.

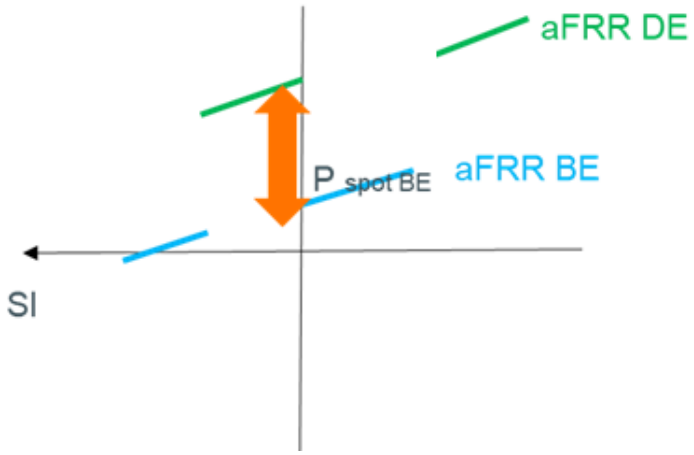


Figure 2 : Illustration of the possible discontinuities in the aFRR CMOL due to the avoidance of counter activation in the Picasso Activation Optimization Function

It is difficult to justify that the energy, valorized at $P_{spot, BE}$ at the end of the Intraday market in Belgium, would see its value suddenly jumping to a much higher aFRR price (close to the aFRR marginal costs in DE) as

soon as aFRR is activated in the downward direction in the uncongested area (irrespective of the sign the of Belgian system imbalance), because Picasso does not allow counter activations.Besides, we will see in section 1.3.3 that, if used as Imbalance Tariff, this aFRR price incentivizes an inappropriate use of the European aFRR reserves.

A more detailed explanation of the reasons why aFRR CBMP cannot be considered as a good indicator of the real time value of energy can be found in [1].

1.3.2 De-optimization of European dispatch

When Elia does not activate mFRR in Belgium (which is the case for around 80% of the Imbalance Settlement Periods), the Imbalance Tariff proposed by CREG usually[16] provides a financial incentive to Belgian BRPs to reduce the activations of aFRR energy bids requested by Picasso in the uncongested area to which Belgium belongs. For instance, if the CBMP calculated by Picasso remains quite constant and close to 5k€/MWh during the whole Imbalance Settlement Period (as a consequence of a short uncongested area), the main component of the Belgian Imbalance Tariff would be 5k€/MWh, whatever the direction of the Belgian System Imbalance during this quarter-hour. If this situation occurs when the Belgian System Imbalance is positive, Belgian BRPs are incentivized to further increase (i.e. aggravate) the Belgian System Imbalance in order to reduce the aFRR volumes selected by Picasso in the uncongested area. This is consistent with CREG's announced objective to enhance the efficiency of balancing.

Elia would agree with CREG that -in fine- this is an honorable goal (provided that it is achieved in a controlled way, without jeopardizing the grid security, efficiency and reliability – see paragraphs 1.1.1 and 1.1.2). Nevertheless, given different mFRR activation strategies across European countries, Elia does not believe that the objective pursued by CREG will be reached.

Let us illustrate this concern with the following example:

- Country A (e.g. Germany) has a very large stack of available aFRR resources, and is known for using almost exlusively aFRR energy to balance its area: it only activates mFRR in case of extreme system imbalances (when the large aFRR stack is nearly exhausted – irrespective of the energy prices available in the aFRR or mFRR stack). In Country A, it is legally not allowed to deviate from scheduled positions (i.e. implicit balancing is not allowed).
- Country B (e.g. Belgium) has implemented a reactive balancing model and activates mFRR to free up the (relatively limited) locally available aFRR reserves when a long-lasting System Imbalance is observed. Country B implemented CREG's proposal for the calculation of its Imbalance Tariff.

➢ Suppose a situation that starts with an excess of wind in country A and its neighboring countries (we consider here a case without congestion). Most of these countries are quite long because they had not anticipated so much wind. Some offshore wind parks are even stopped in country A, offering upward mFRR energy bids at low price and ready to start up if required. Country A requests aFRR in the downward direction, whereas neighboring countries request mFRR in the downward direction to balance their system (due to different activation strategies).

[16] This is not the case when aFRR bids could have been selected by the Picasso Activation Optimization Function (AOF) due to reverse pricing in the CMOL, but were not selected due to the avoidance of counter activation in Picasso. We will come back on this specific case in section 1.3.3

- Let us now imagine that country A suddenly undergoes a forced outage of an important production unit, causing its control area to become short. In total, the uncongested area nevertheless remains long.

- Given that the FRR activation strategy of Country A primarily relies on aFRR, it requests an important amount of aFRR energy in the upward direction to Picasso.

- Since neighboring countries, which remain long due to excess of wind energy, mostly rely on mFRR activations in the downward direction to balance their control area, the global aFRR demand of the uncongested area is not netted and becomes positive: Picasso activates in the upward direction and makes the aFRR Cross Border Marginal Price (CBMP) very positive.

- If, at that moment, Country B does not activate mFRR downward energy, its Imbalance Tariff is equal to this very positive aFRR CBMP and provides incentives to its BRPs to become even longer, possibly by activating quite expensive (and possibly polluting) units and this even if the global uncongested area is already too long.

- As a consequence of the implicit reaction of Country B, the global aFRR activations in the uncongested area is reduced and the large aFRR stack of country A is freed up. Therefore country A does not activate its cheap and not polluting available mFRR means (i.e. the wind offshore parks that could be started by a mFRR activation in country A).

This example shows that, it cannot be demonstrated that CREG's proposal helps optimizing the European dispatch of the uncongested area in all situations. On the contrary, in our previous example, the CREG proposal implemented in country B aggravates the System Imbalance of the uncongested area and contributes to the de-optimization of the European dispatch.

1.3.3 Saturation of European aFRR reserves

As explained above, CREG's proposal for the calculation of the Imbalance Tariff usually provides incentives to BRPs to reduce the aFRR energy activations in the uncongested area.

This comes with one exception: due to the avoidance of counter activation[17] in the Picasso Activation Optimization Function (AOF), CREG's proposal can also provide incentives to BRPs to increase the aFRR energy activations in the uncongested area, hence hogging the European aFRR resources that are then no longer available in case of unexpected balancing event.

As an example[18], we consider three different control areas with very different technical structures of aFRR resources. In control area A, gas-fired assets have been reserved to offer aFRR services (e.g. gas assets are close to the marginal cost in the uncongested area). In control area B, only lignite-fired assets are available to offer aFRR services (e.g. there are no gas assets available in control area B, and hydro assets are more profitably scheduled to deliver energy given

[17] which means that, in each uncongested area, there will be either only upward or only downward bids selected for activation within an optimization cycle (even if, in theory, additional bids could be selected in order to match aFRR upward bids with aFRR downward bids when they are price compatible - i.e. when an aFRR upward bid is priced below an aFRR downward bids).
[18] Note that this example is further explained in Chapter 4 (example 1) of the note "Imbalance Pricing after Picasso" from Frank Vandenberghe – Onoma, attached to this answer (source [1])

the gas-based market prices). Control area C is dominated by hydro power assets which are therefore the only assets able to deliver aFRR services. Therefore, the local merit orders for aFRR are fundamentally different from one control area to the other (irrespective of the fact that the area formed by control areas A, B & C is uncongested).

Given these local aFRR merit orders (represented in the left part of Figure 3), Picasso will build two distinct CMOL: 1 for upward and 1 for downward (as represented in the right part of Figure 3). The absence of counter-activations in Picasso implies that the cheaper upward aFRR bids are not matched with the more expensive downward aFRR bids (despite the absence of congestion and the fact that they are price compatible).

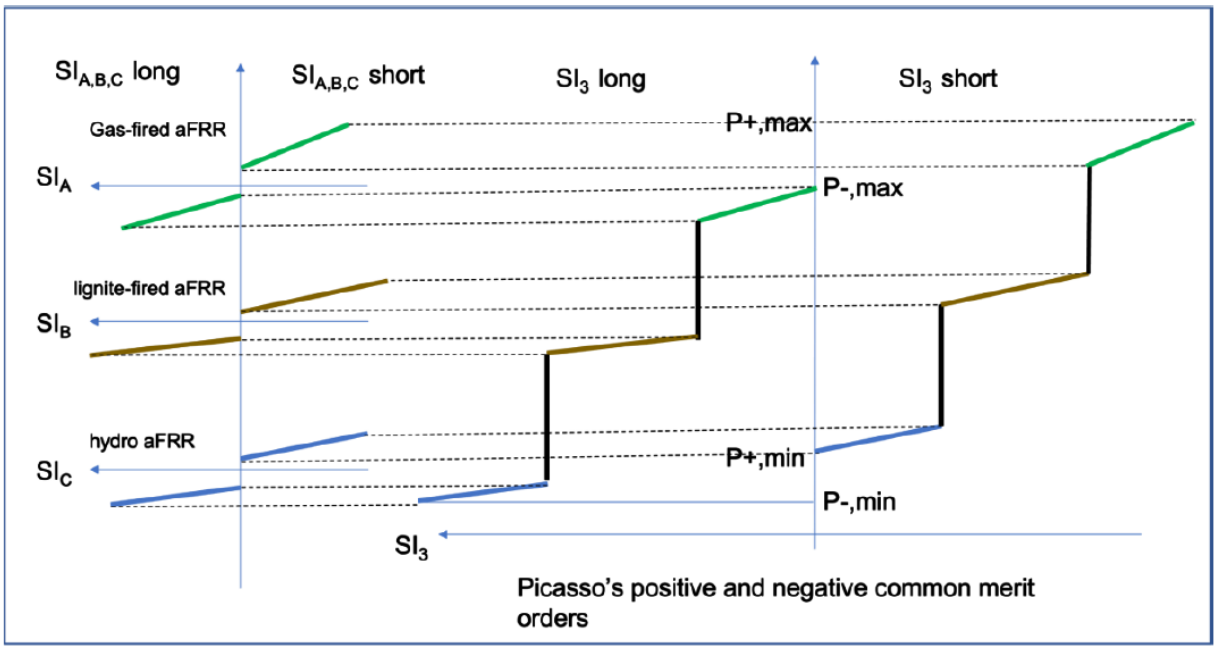


Figure 3 : Picasso Local and Common merit orders, figure extracted from source [1]

Let us suppose that the uncongested area formed by control areas A, B and C is a little bit short, resulting in a small positive aFRR demand. For the sake of simplicity, let's also consider that none of these control areas is activating mFRR at that moment. In the absence of aFRR counter activations, only the first cheap hydro aFRR bids in the upward direction will be selected by the Picasso AOF, resulting in a low CBMP :

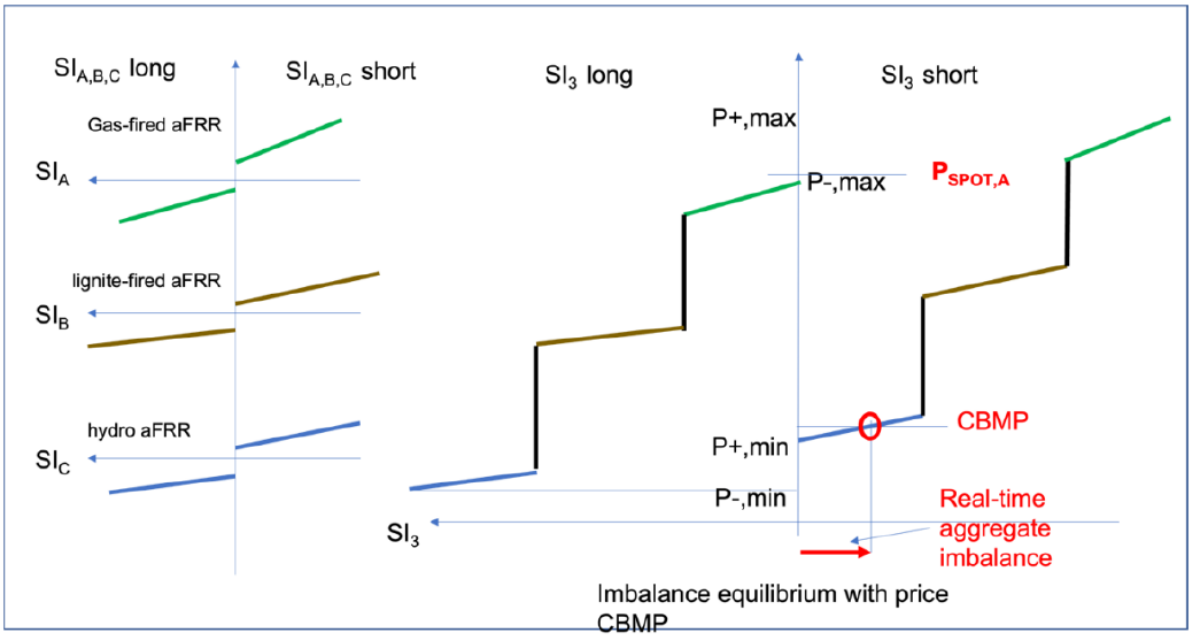


Figure 4 : Picasso clearing price, figure extracted from source [1]

If control area A implements CREG's proposal to calculate the Imbalance Tariff, BRPs of control area A are exposed to an Imbalance Tariff which is way lower than the local spot price of this area ($P_{spot, A}$ on Figure 4), causing them to react to this price. As a result, BRPs in control area A are incentivized to ramp-down injections (ramp-up consumption), again causing the aggravation of the System Imbalance of the uncongested area. The implicit reaction encouraged by CREG proposal this time increases the aFRR activations in the uncongested area. From a pure economic perspective, this operation (i.e. ramp-down of expensive production units in control area A replaced by additional aFRR activations in control areas C and B) might seem efficient at first sight. However, the result of this operation is that the European units able (and remunerated as reserves) to provide aFRR energy substitute spot-activated resources that are not able to provide aFRR energy in the upward direction. As a result, European aFRR resources are monopolized even before any unexpected significant balancing event occurs and are no longer available to ensure the security of the grid in case of incident.

In this example, CREG's proposal helps "optimizing" the European dispatch from a pure economic perspective, which might seem to be a wise objective at first sight. However Elia believes that the CREG proposal ignores the fact that ensuring the availability of European aFRR reserves is key to manage grid security in case of incident (hence the reservation of this aFRR flexibility upon capacity fees).

1.4 About the incompatibility of CREG's objective with a situation where Belgium is connected to both EU balancing platforms

This discussion about the objective pursued by CREG's proposal in terms of Imbalance Tariff becomes even more relevant in a context where Belgium is connected to both Picasso and Mari European platforms. Elia observes that the CREG proposal does not contain a vision concerning the evolution of the Imbalance Tariff after the connection to both platforms. Indeed, according to Elia, the vision for the evolution of the Imbalance Tariff in the context of EU balancing integration should first be defined in a general way, with clear objectives and principles. This vision should then be

broken down into several designs and implementation steps depending on the sequence for the connection of Belgium to the EU balancing platforms.

As explained in section 1.3, one element which is very clear and extensively brought forward in CREG's proposal, is the fact that the Imbalance Tariff should reflect the CBMP of the EU platforms with no price intervention, because these CBMPs best reflect the real-time value of energy. Despite the absence of additional information regarding CREG's vision for the evolution of the Imbalance Tariff after connection to both platforms, Elia nonetheless shares some first considerations and concerns about the efficiency and robustness of CREG's intention to use the CBMP of the EU platforms with no price intervention.

To understand Elia's concern, it is important to be aware that Mari and Picasso are two separate platforms that work independently from each other based on the mFRR and aFRR demands they respectively receive from each country. As a consequence, it is very likely that situations will occur for which Picasso and Mari will be regulating in opposite directions, possibly leading to extremely different clearing prices (CBMP) on both platforms. These situations notable (but not exclusively) stem from different usages of aFRR and mFRR products from country to country. If we consider our example from section 1.3.2 and suppose that the countries of our example are connected to both Picasso and Mari platforms, we would end up with Mari massively regulating in the downward direction and Picasso activating in the upward direction. In such situation, the spread between the Mari and Picasso CBMPs could be very important.

Based on this observation, Elia wonders which one of both CBMP (Picasso or MARI) will be considered by CREG as reflecting the real-time value of energy, and hence how CREG intends to use and/or combine these CBMPs (which possibly provide opposite financial incentives) to calculate the Belgian Imbalance Tariff after the connection to both European platforms. Elia methodically investigated several options and comes to the conclusion that CREG's declared objective to use the CBMP without price intervention cannot be efficiently (and even less safely) extended to a situation where Belgium is connected to both Mari and Picasso:

1. <u>Using only the CBMP from Picasso :</u>
   We already identified some shortcomings for this option in sections 1.3.1 to 1.3.3. Besides, the complete avoidance of mFRR activation price in the construction of the Imbalance Tariff would be highly questionable, considering the fact that mFRR is intrinsically closer to the "market standard" given its 15 minutes activation time step.

2. <u>Using only the CBMP from Mari :</u>
   This option can be seen as more realistic, and boils down to consider aFRR as a "technical product" that does not directly affect BRPs (similarly as for FCR).

   However, if the use of aFRR CBMP in CREG's proposal for the Imbalance Tariff calculation after Picasso is simply transposed to the use of mFRR CBMP, the Imbalance Tariff would be undefined as long as Belgium does not send a mFRR demand to Mari (which is expected to happen around 80% of the time). To avoid that the BRPs "freewheel" during 80% of the time, Elia would strongly recommend considering a "price intervention" similar to the dead band concept. This could for example be implemented by means of an extended and more sophisticated dead band, where the price would progressively deviate from a "neutral" price signal when the system is fully balanced to the price of mFRR that is accessible to Belgium when the imbalance reaches the limits of the usual "aFRR band". We would therewith avoid the impacts of all the aFRR non-convexities mentioned in [1] on the Imbalance Tariff. Besides, it could make sense to consider that the price of the mFRR

balancing energy would best reflect the price for the settlement of BRPs real-time positions, since both are settled on similar time horizons (15 minutes basis). The objective function of the Imbalance Tariff would then incentivize BRPs to reduce the overall mFRR activations of the uncongested area (in all cases since counter activations are allowed in Mari).

Once again, Elia could agree with this objective provided that it is achieved in a controlled way, without jeopardizing the grid security, efficiency and reliability – see paragraphs 1.1.1 and 1.1.2.

However, when considering this option, one should not forget the different temporalities of Mari and Picasso, and the automatic character of aFRR regulation. Let us illustrate again our concern with a short example. Let us suppose that for qh0, the clearing price of Mari (in scheduled activation) is very negative, whereas the clearing prices of Picasso remain very positive throughout the quarter-hour. As explained before, this is perfectly possible due to the very different activation strategies applied in European countries.
If the Belgian Imbalance Tariff is equal to the very negative mFRR CBMP (which are published prior to the start of the qh given the scheduled activations), BRPs are incentivized as from the beginning of qh0 to become shorter. They would hence start creating an important negative System Imbalance over the course of the quarter-hour.

For the next quarter qh1, Elia will be able to cover efficiently any such large system imbalance through the next scheduled activation process of Mari (provided that its demand effectively remains fully netted in Mari). However, within the current qh0, the large system imbalance created by the BRPs can only be covered by automatically requested very expensive aFRR energy, or by manual activation of mFRR through the direct activation process of Mari.

In the former case (i.e. if the short system imbalance is covered by aFRR in an automated way), ELIA would be resolving an (unnecessary high) short system imbalance with expensive aFRR, resulting in a possibly highly negative balancing margin (given that the expensive aFRR does not influence the imbalance price) which will ultimately be socialized.

In the latter case (i.e. if the TSO activates mFRR through the direct activation process of MARI within qh0) the energy would be sourced, at best, at a price a little bit higher than the spot market equilibrium price (given that netting between TSO demands is not possible for direct activations).

In both cases, this situation would negatively affect the Belgian consumer (Elia could possibly pay high activation costs – that are passed on the Belgian consumers through the grid charges (ie. Tariffs for access) or through the BRPs - during qh0 to help reduce European mFRR activations during next qh) and be inefficient (we could monopolize aFRR resources during qh0 to help reduce European mFRR activations during next qh).

Note that, once again, the issue with this proposal comes from the fact that BRPs are allowed to aggravate the Belgian System Imbalance to help reducing the European mFRR activations. If, thanks to the introduction of a cap and a floor, BRPs are allowed to keep an existing imbalance but not to aggravate it, this option seems to fulfill all the criteria of a good Imbalance Tariff (provided the implementation of a sophisticated dead band, as mentioned above).

3. Trying to combine the CBMPs from both platforms:

   In this case, a logic objective function of the Imbalance Tariff would be to reduce the System Imbalance of the uncongested area. This would probably require to define the Imbalance Tariff as :

   - Imbalance Tariff = MAX (mFRR CBMP, aFRR CBMP)[19] when the System Imbalance **of the European uncongested area** is negative
   - Imbalance Tariff = MIN (mFRR CBMP, aFRR CBMP) when the System Imbalance **of the European uncongested area** is positive

   Here again, Elia could agree with this objective provided that it is achieved in a controlled way, without jeopardizing the grid security, efficiency and reliability – see paragraphs 1.1.1 and 1.1.2.

   However, this option also presents several shortcomings and implementation difficulties:

- This methodology for the calculation of the Imbalance Tariff implies to define and calculate one (average) direction of the System Imbalance of the European uncongested area during the Imbalance Settlement Period, which is far from trivial. First of all, Belgium does not necessarily belong to one uncongested area for the whole quarter-hour. It possibly belongs to different uncongested areas for each mFRR and aFRR market clearing (so possibly to 225 different uncongested areas only for aFRR). Secondly, Picasso and MARI platforms have neither been designed to output the direction of the uncongested area to which Belgium belongs, nor to provide any information afferent to the system imbalances of its connected LFC blocks/areas. In practice, we could deduct the direction of the uncongested area to which Belgium belongs from the CBMP that we receive from the platforms. However, we wouldn't know the volumes of the aFRR/mFRR demands of this uncongested area for the given market clearing. Besides, at the moment, MARI and Picasso platforms don't give access to the MOLs of the specific uncongested area which is applicable for the given market clearing, so it is not possible to deduce the aFRR/mFRR demand from the CBMP either. Further, in no case Picasso and MARI platforms can provide information regarding the Replacement Reserves (TERRE) or FRR demands applicable to local products, which will also form the system imbalances of several LFC blocks adjacent to Belgium.

- From the above, it is clearly difficult – given the currently anticipated European balancing design - to calculate an average direction of (all) the uncongested area(s) to which Belgium belonged over the whole quarter-hour. Not to speak about the possibility for the BRPs to forecast this average direction in order to know to which Imbalance Tariff they will be exposed.

- Besides, the same shortcomings as for options 1 and 2 are applicable, respectively when the Imbalance Tariff is set by the aFRR component and when it is set by the mFRR component, and when Mari and Picasso are regulating in opposite directions.

In short, Elia does not see how CREG's announced objective could be efficiently extended to a situation where Belgium is connected to both European balancing platforms given different uses of aFRR and mFRR at European level (and

[19] In practice, there is much more than one mFRR CBMP and one aFRR CBMP for each Imbalance Settlement Period, so the mFRR and aFRR components of this formula could be based on marginal or average values of these CBMPs. For the sake of simplicity, we will not discuss these choices in this answer.

hence as long as regulations of Mari and Picasso remain totally de-correlated). Elia therefore believes that a general long term vision plays a crucial role in this discussion and is missing in the CREG proposal.

Finally, one could say that Elia, as a TSO, could make the link between Mari and Picasso platforms and ensure the correlation between Mari and Picasso regulations. For instance, if Germany relies exclusively on activating aFRR first, regardless of the potentially high Picasso CBMP at a moment when Mari is regulating in the downward direction with a negative CBMP, Elia could decide to request more upward mFRR energy than needed to cover its local System Imbalance[20], in order to create, on purpose, an excess of energy in the Belgian control area. The aFRR controller would then automatically request downward aFRR energy to Picasso. This way, the upward mFRR energy would be "bought" by Elia at a negative price and "sold" back to Picasso as aFRR energy at a high price. This arbitrage between aFRR and mFRR market is supposed to make the mFRR and aFRR CBMPs converge, hence ensuring more consistencies/correlation between the aFRR and mFRR activations. Elia however believes that such action is not the role of a TSO and not an option to create a link between Mari and Picasso[21].

1.5 How and to which extent are Elia's concerns about CREG's proposal solved by maintaining the cap/floor and dead band in the proposal?

By ensuring that Belgian BRPs receive a neutral price signal (i.e. an Imbalance Tariff close to spot market price) when the (weighted average) aFRR CBMP would have provided an incentive to BRPs to aggravate the local System Imbalance, the cap and floor solve most of the previously mentioned concerns.

First of all, as explained by Elia when submitting its proposal for amendment of the Balancing Rules in May 2022, the cap and floor are to be considered as mitigation measures for all the imperfect and, from a system security perspective, sometimes dangerous financial incentives provided by aFRR CBMPs (as explained in sections 1.1.1 and 1.1.2). In Elia's opinion, instead of using ineffective patches to mitigate the risks created by inappropriate price signals resulting from the weighted aFRR CBMP, the only viable way is to directly address the root cause of the problem in the design of the Imbalance Tariff by making the price signal as neutral as possible when the weighted aFRR CBMP provides dangerous and/or inefficient incentives to BRPs.

With cap and floor in place, the Imbalance Tariff never provides incentives to BRPs to de-optimize the dispatch of the European uncongested area. Either it provides incentives to BRPs to reduce their imbalances (and mostly help this European area), or it does not incentivize any action at all from the BRP, but, contrary to CREG's proposal (as illustrated in section 1.3.2, it never provides incentives to BRPs to create imbalances that worsen the European imbalance situation.

[20] For the sake of clarity, we are not speaking here of the choice that Elia makes between aFRR and mFRR to cover its own system imbalance (according to its own mFRR activation strategy, which *might* take economic consideration into account to a certain extent), but of a real trading action where Elia would buy much more than what it needs to cover its own system imbalance on one platform to make profit on the other one

[21] Note that the EU platforms are an important step towards integration of the markets, but that everyone was aware as from the beginning that this would not be a full harmonization and that the differences between TSOs would need to be taken into account to make it work. This lack of harmonization should hence not be underestimated by CREG

Besides, with cap and floor applied, the Imbalance Tariff will never incentivize BRPs to create, on purpose, imbalances in the Belgian control area resulting in the substitution of market/spot activated resources by European aFRR flexibility. Elia believes that the CREG's proposal, on the contrary, can create this kind of incentives, as illustrated in section 1.3.3.

Furthermore, since the cap and floor apply on both the aFRR and mFRR components of the Imbalance Tariff, they offer a robust solution for the situation when Belgium is connected to both Mari and Picasso. Indeed, it is only when both aFRR and mFRR are available and used at a more advantageous price than the flexibility that could be implicitly stimulated in Belgium, that an imbalance is tolerated in the Belgian control area. In all other situations, BRPs are incentivized to reduce their imbalances. This way, the Imbalance Tariff avoids providing inefficient incentives to BRPs when Picasso and Mari are regulating in opposite directions (as described in section 1.4).

Finally, as regards the added value of the dead band, it is obvious that it helps reducing entry barrier for RES, as described in section 1.2.2. Besides, as already stated in section 1.4**Error! Reference source not found.**, an extended and somehow more sophisticated dead band would also clearly bring a solution for the concerns mentioned in 1.2.3. since it would possibly allow not to use aFRR activation prices at all in the construction of the Imbalance Tariff. Elia would welcome to continue discussing these longer-term evolutions of the Imbalance Tariff with CREG and the market parties. However, on the shorter term and considering the legal constraints imposed by the EBGL and the Imbalance Settlement Harmonization, Elia understands CREG's position to take the aFRR activations into account in the Imbalance Tariff formation but repeats that it then needs to come with mitigation measures to ensure efficient and secure operation of the system.

1.6 About the legal basis used by CREG to justify its proposal (in articles 29.2.2 and 29.3.2)

As explained in its decision of July 19th 2022[22], the weighted aFRR CBMP which is used in CREG's proposal to calculate the Imbalance Tariff after the connection to the EU aFRR platform, does not guarantee the respect of the condition mentioned in article 55(4) of EBGL and article 9 of ISH. In this decision, CREG explains[23] that the use of the weighted aFRR CBMP does however, in its opinion, better fulfill the legal objectives pursued by article 3.1 b) of the EBGL than when the condition mentioned in article 55(4) of EBGL and article 9 of ISH are met.
Elia thus observes that the CREG's proposal contains legal deviations from the very specific conditions mentioned in these documents that are very similar as the ones that can be found in Elia's proposal in the Balancing Rules that were validated in July 2022.

[22] Décision (B)2433 : « Elia propose de calculer ce prix comme la moyenne des prix transfrontaliers marginaux pondérés par la *satisfied aFRR balancing energy demand*, conformément à l'article 3(8)(c) de l'aFRR IF d'Elia.
La CREG constate que cette méthode de calcul ne garantit pas nécessairement que la conditionnalité de l'article 55(4) de l'EBGL soit remplie ».
[23] « Par conséquent, la CREG est d'avis que la méthode de calcul proposée par Elia pour renforcer l'efficacité de l'équilibrage conformément à l'article 3.1 b) de l'EBGL répond mieux aux objectifs légaux que lorsque la conditionnalité de l'article 55(4) de l'EBGL et de l'article 9 de l'ISH est respectée ».

More specifically, Elia agrees with CREG on the necessity to meet the legal objectives of article 3.1 b) and Whereas (17) of the EBGL[24]. However, Elia does not agree with the fact that CREG's proposal reaches these objectives. Indeed, as explained in section 1.2.3, Elia does not believe that the aFRR CBMP properly reflects the real-time value of energy in all situations. Elia believes that the Elia's proposal, as described in the Balancing Rules that were validated in July 2022, is closer to reach these objectives (as for instance illustrated in section **Error! Reference source not found.**) and repeats its willingness to continue working and improving this proposal in the future, keeping these objectives in mind (for instance by introducing an extended and more sophisticated dead band to get rid of the non-convexities of the aFRR CBMP).

1.7 About the implementation plan for the entry into force of articles 29.2.2 and 29.3.2

In its draft decision, CREG explains that, in its view, the entry into force of the reviewed T&C BRP should be conditioned by a modification of the Tariff Proposal. Indeed, the current Tariff Proposal refers to the Balancing Rules for the description of the MIP and MDP components of the Imbalance Tariff, and not to the T&C BRP. CREG therefore explains that Elia should submit a new version of the Tariff Proposal referring to the T&C BRP for the description of the MIP and MDP to allow the entry into force of the new version of the T&C BRP. CREG however also leaves the possibility to Elia to amend the Balancing Rules in order to introduce a reference to the T&C BRP for the description of the MIP and MDP components of the Imbalance Tariff (and to clear them accordingly).

When explaining the modifications proposed in the T&C BRP, CREG also explains that, given the uncertainty considering the date for the participation to the EU aFRR platform, its revision of the T&C BRP contains the description of the Imbalance Tariff calculation before any connection to EU balancing platforms on the one hand, and after the connection to the aFRR connection platform (but before the connection to the mFRR connection platform) on the other hand.

First of all, Elia does not feel comfortable with the way the implementation plan is currently formulated. According to Elia, CREG should make a distinction when listing the conditions for the entry into force of all the articles related to the Imbalance Tariff and System Imbalance calculations without any participation to EU balancing platforms on the one hand (i.e. articles 29.2.1, 29.3.1 and 29.6.1) and for the entry into force of all the articles related to the situations with a participation to EU aFRR platform (but without a participation to mFRR EU platform) on the other hand (i.e. articles 29.2.2, 29.3.2 and 29.6.2). The articles related to the situation without any participation to EU balancing platforms can enter into force as soon as the Tariff Proposal and/or the Balancing Rules are adapted as explained by CREG in its draft decision, provided that we are not yet connected to any EU balancing platform at that moment. The articles related to the situations with a participation to EU aFRR platform (but without a participation to mFRR EU platform) can only enter into force if the following conditions are met:

1. the Tariff Proposal and/or the Balancing Rules should be adapted as explained by CREG in its decision;
2. we are connected to Picasso and not yet to Mari;
3. all the modifications in Elia's tools to implement the modification in the Imbalance Tariff calculation, as well as in the related publications, are executed.

[24] Stating that: "To make balancing markets and the overall energy system fit for the integration of increasing shares of variable renewables, imbalance prices should reflect the real-time value of energy."

Condition 3 is of special importance if the entry into force of these reviewed T&C BRP occurs after the connection to Picasso (which is deemed unlikely but not impossible considering the uncertainties regarding the date for participation to the platforms, as acknowledged by CREG in its draft decision). In that case, the current validated version of the Balancing Rules, with the Imbalance Tariff calculation as proposed by Elia and validated by CREG in its decision of July 19th 2022, would enter into force and be applicable until the reviewed version of the T&C BRP enters into force. Elia should hence make sure that all the IT tools are adapted for the entry into force of the T&C BRP. The exact date for this entry into force should therefore be agreed upon in advance. This needs to be described in the implementation plan. If, on the contrary, the T&C BRP enter into force before the connection to EU aFRR platform, then it would be clear for Elia that CREG's proposal for the calculation of the Imbalance Tariff after Picasso would need to be implemented in the IT Tools as from the go-live for the connection to Picasso. Elia invites CREG to clarify this aspect in its implementation plan.

Besides, regarding the 2nd condition described above, Elia would like to remind CREG that, following the decision of the CREG to extend the derogation for the connection to the aFRR Platform, Elia communicated, during the Working Group Balancing meetings of October 27th and December 9th 2022, that, according to the last estimation, the connection of Belgium to the EU mFRR Platform would probably occur before the connection of Belgium to the EU aFRR Platform. This should be further confirmed in the updated EU balancing roadmap that will be communicated during the Working Group Balancing of February 2nd 2023. In this case, articles 29.2.2, 29.3.2 and 29.6.2 become irrelevant since the situation described in these paragraphs (connection to Picasso but not to Mari) will then never apply.

Besides, even in the (unlikely) situation where Belgium would connect to Picasso first, it would be very quickly followed by the connection to Mari anyway (considering the legal deadline for the connection to Mari). Yet, as explained in section 1.4, Elia believes that CREG's philosophy regarding the calculation of the Imbalance Tariff for Picasso cannot be efficiently (and even less safely) extended to a situation where Belgium is connected to both Mari and Picasso. This means that, in this (unlikely) scenario, articles 29.2.2 and 29.3.2 of CREG's proposal would be applicable for a very limited period of time before having to evolve fundamentally (at least in terms of philosophy).

Elia therefore believes that it would be more efficient and less confusing to remove these articles from the reviewed T&C BRP.

Finally, Elia is wondering how the CREG foresees the validation of the T&C BRP by the VREG prior to the entry into force of this T&C BRP.

1.8 Elia's concrete way forward

As explained in the previous section, the situation described in articles 29.2.2, 29.3.2 and 29.6.2 of CREG's proposal is very unlikely to apply and, if it does, only for a very limited period of time (in order to respect the legal deadlines for the connection to EU balancing platforms).

Besides, Elia would like to draw CREG's attention on the fact that the largest part of the comments it has expressed against CREG's proposal are related to these 3 articles.

Elia therefore urges CREG to remove these three articles from its reviewed version of the T&C BRP so that Elia and CREG can rather concentrate all their efforts in discussing and developing, in collaboration with the market parties, an evolution of the Imbalance Tariff calculation which is robust, efficient and safe for the connection to both EU balancing platforms, whatever the sequence of connection to these platforms. Elia will have to initiate such discussion anyway as soon as CREG takes a decision on its own revision of the T&C BRP, in order to be able to submit a robust formula, discussed with the market, in the next T&C BRP revision (aiming a.o. at preparing the connection to Mari).

2. About the additional imbalance price component applied to the imbalance price component due to activation of balancing energy from frequency restauration reserves

In its draft decision, CREG explains that the new revision of the T&C BRP does not remove the additional component "alpha" of the Imbalance Tariff. It argues that the additional component "alpha" remains applicable in the context of the present "Tariff Proposal" approved by CREG and that, as a consequence, the T&C BRP cannot contain any additional component in order to avoid applying a double additional component to BRPs. Therefore, in its description of the proposed revision of the T&C BRP, CREG introduces a description of the "Additional imbalance price component to the imbalance price component due to activation of balancing energy from frequency restauration reserves" where it states that "No additional imbalance price component is applied".

Even if, with the explanation provided by CREG in its draft decision, it becomes clearer that CREG intends to keep the alpha in the Imbalance Tariff (which Elia believes to be a positive evolution compared to previous CREG's positioning), Elia believes that the paragraphs 29.4 and 29.5 of the reviewed T&C BRP create confusion without adding value to the proposal. Elia indeed does not understand CREG's statement that "the T&C BRP cannot contain any additional component in order to avoid applying a double additional component to BRPs". Indeed, the current Tariff Proposal only refers to other documents (i.e. the Balancing Rules) for the description of the MIP and MDP component. It does not refer to any other document (neither the Balancing Rules, nor another document) for the description of the additional component. If the Tariff Proposal does not refer, directly or indirectly (via the Balancing Rules) to the T&C BRP for the description of additional component, what is the added value and the objective pursued by CREG when adding the paragraphs 29.4 and 29.5 in the T&C BRP? The content of these paragraphs is never referred to in the Tariff Proposal and therefore does not have any legal value (from a tariff perspective) anyway.

According to Elia, paragraphs 29.4 and 29.5 of CREG's proposal should either repeat, in a pure informative way, that the alpha component is applicable in Belgium, or simply be removed, in order to avoid creating any confusion/discussion about the value of the additional component applicable to Belgian BRPs.

3. Other specific comments

Finally, Elia also noticed some inconsistencies in the way some specific adaptations of the T&C BRP are proposed by CREG. Elia would like to draw CREG's attention to these technical inconsistencies in the following paragraphs and invites CREG to correct them.

First of all, Elia would like to draw CREG's attention to the fact that not all the changes it proposed in the T&C BRP that are annexed to its draft decision are mentioned in Chapter 3.1 of its draft proposal. Elia has mostly based its review on the modifications mentioned in Chapter 3.1 of CREG's draft proposal since it assumed it would serve as a basis for the final version of the T&C BRP that CREG will make available after its decision. When specific comments are made on the text of the T&C BRP attached to CREG's draft decision, it is done in the English version of the document. Besides, as mentioned in previous exchanges with CREG, it is difficult to ensure the full consistency of the T&C BRP without knowing how other related documents (Balancing rules, Tariff Proposal) will evolve. Elia therefore wants to highlight that its feedback might not be comprehensive and that -once having the complete overview of changes in all documents- it will ensure the full consistency in the next revision of the T&C BRP it will initiate (a.o. in the framework of the preparation of the connection to Mari) as soon as CREG has taken its decision on its own revision of the T&C BRP.

- §1 and §29.1 : In §29.1 CREG states that "The Imbalance Price is calculated per imbalance price settlement period as the sum of the imbalance price component due to the activation of balancing energy from frequency restauration reserves and imbalance netting, and the additional imbalance price component.". However, in §1, it defines the "Imbalance Price" as "As defined in the European EBGL". According to Elia's understanding of the EBGL, the "Imbalance Price, as defined in the European EBGL" is to be interpreted as the whole Imbalance Tariff (i.e. the one used for the settlement of imbalance, including all the additional components) and hence including the alpha in Belgium. CREG should remove this inconsistency: either it should define the Imbalance Price in another way in §1, or it should describe the alpha in §29.4 and §29.5, as suggested in section 2.
- §29.1 : numbering issue:
    - "The imbalance price component due to the activation of balancing energy from frequency restauration reserves and imbalance netting is calculated using the stipulations in accordance with Article 29.3 in the event that the direction of system imbalance is negative during the imbalance price settlement period, and using the stipulations in accordance with Article 29.4 in the event that the direction of system imbalance is positive during the imbalance price settlement period." : this text should rather refer to Article 29.2 when the SI is negative and 29.3 when it is positive
    - "The additional imbalance price component is calculated using the stipulations in accordance with Article 29.5 of this BRP Contract in the event that the direction of system imbalance is negative, and using the stipulations in accordance with Article 29.6 of this BRP Contract in the event that the direction of system imbalance is positive." : this text should rather refer to Article 29.4 when the SI is negative and 29.5 when it is positive
    - "The direction of system imbalance shall be determined in accordance with Article 29.7 of this BRP Contract" : this text should rather refer to Article 29.6
- §29.2.2: CREG defines the CBMP as follows "the aFRR Satisfied Demand, as defined in Section I:1 of this BRP Contract, of the Optimisation Cycle OC during the relevant imbalance settlement period "ISP", expressed in €/MWh." : there seems to be a mix up in the definitions of CBMP and of aFRR SD.
- §29.2.2 : "The imbalance price component due to the activation of balancing energy from frequency restauration reserves and imbalance netting in case of a negative system imbalance corresponds to the maximum

between the respective prices of the various balancing resources for regulation, as described in the following paragraph of Article 29.3 of this BRP Contract, used by Elia, during the imbalance settlement period:" : the text should rather refer to Article 29.2

- §29.3.1 : "The imbalance price component due to the activation of balancing energy from frequency restauration reserves and imbalance netting in case of a positive system imbalance corresponds to the minimum between the respective prices of the various balancing resources for regulation, as described in the following paragraph of Article 29.4.1 of this BRP Contract, used by Elia, during the imbalance settlement period:" : this text should rather refer to Article 29.3.1
- §29.3.2 : "The imbalance price component due to the activation of balancing energy from frequency restauration reserves and imbalance netting in case of positive system imbalance corresponds to the minimum between the respective prices of the various balancing resources for regulation, as described in the following paragraph of Article 29.4 of this BRP Contract, used by Elia, during the imbalance settlement period::" : the text should rather refer to Article 29.3
- §29.3.2: CREG defines the CBMP as follows "the aFRR Satisfied Demand, as defined in Section I:1 of this BRP Contract, of the Optimisation Cycle OC during the relevant imbalance settlement period "ISP", expressed in €/MWh." : there seems to be a mix up in the definitions of CBMP and of aFRR SD.
- Section XIV : regulating imbalances : numbering issue (2 articles 29)
- In chapter 3.1 of the draft decision : « Le prix du déséquilibre est calculé par période de compensation du prix du déséquilibre comme étant la somme de la composante du prix de déséquilibre due à l'activation de l'énergie d'équilibrage des réserves de restauration de fréquence et de la compensation des déséquilibres, et de la composante supplémentaire du prix du déséquilibre ». The rest of the text always refers to « composant additionnel de prix de déséquilibre » instead of "composante supplémentaire du prix du déséquilibre ». Consistency should be ensured.
- In chapter 3.1 of the draft decision : « Les offres d'énergie d'équilibrage activées dans le cadre du redispatching ne sont pas incluses dans le calcul de la composante du prix du déséquilibre due à l'activation de l'énergie d'équilibrage provenant des réserves de restauration de fréquence et de la compensation du déséquilibre et n'ont donc aucun impact direct sur le Prix d'équilibre. ». There seems to be a mix up between « Prix d'équilibre » and « Prix de déséquilibre ».
- In chapter 3.1 of the draft decision : « La composante du prix de déséquilibre due à l'activation de l'énergie d'équilibrage des réserves de restauration de fréquence et de la compensation des déséquilibres dans le cas où le déséquilibre du système est négatif correspond au maximum entre les prix respectifs des différents moyens d'équilibrage pour le règlement, comme décrit à l'alinéa suivant de l'article 3.1.2.2 de ce contrat BRP, utilisé par Elia, pendant la période de règlement du déséquilibre » : the text should rather refer to article 29.2.2
- In chapter 3.1 of the draft decision :

$$\frac{\sum_{CC\ ISP=qh}\left(abs(aFRR\ SD_{OC,ISP}) * \ CBMP_{OC,ISP}\ \right)}{\sum_{CC\ ISP=qh}\left(abs(aFRR\ SD_{OC,ISP}\ )\ \right)}$$

CC should be replaced by OC in the formula

- In chapter 3.1 of the draft decision « Le composant du prix de déséquilibre résultant de l'activation de l'énergie d'équilibrage des réserves de restauration de la fréquence et de la compensation des déséquilibres en cas de déséquilibre du système positif correspond au minimum entre les prix respectifs des différents moyens d'équilibrage pour le règlement, comme décrit à l'alinéa suivant de l'article 3.1.2.3 de ce contrat

BRP, utilisé par Elia, pendant la période de règlement du déséquilibre: » : the text should rather refer to article 29.3.2

Sources

[1] “Imbalance Pricing after Picasso” from Frank Vandenberghe – Onoma
[2] “CREG’s proposal for the calculation of the imbalance settlement price” from Anselm Eicke, Lion Hirth and Ingmar Schlecht – Neon

Annex

Annex 1 – “Imbalance Pricing after Picasso” from Frank Vandenberghe – Onoma

Annex 2 - “CREG’s proposal for the calculation of the imbalance settlement price” from Anselm Eicke, Lion Hirth and Ingmar Schlecht - Neon

Imbalance Pricing after Picasso

Reasoned opinion at Elia's request

to	Elia Market Development Team
from	Frank Vandenberghe, Onoma
date	16/11/2022
abstract	Analysis of Elia's proposal for Imbalance Pricing dd 13/5/2022. See sections 8 and 9 for concrete proposal and conclusion
annex	Picasso publication: AFRR & IN OPTIMISATION MATHEMATICAL DESCRIPTION FOR PUBLICATION dd 01.04.2022 (from ENTSO-E web site)

This note is written at request from Elia Transmission Belgium (Elia).
Nevertheless, it merely reflects the personal view of the author.
Onoma and the author do not assume any liability for direct or indirect consequences of this opinion.

Table of Contents

1. Intro and scope

The impact of the implementation of PICASSO on Elia's Imbalance Price (IP) is subject of a proposal on Balancing Rules sent by Elia to the CREG on 13 May 2022. On 19 July 2022, the CREG has taken decision (B)2433 on this proposal, approving the proposal but requesting from Elia some essential changes to the articles 16 and 17 of the proposal, respectively on the impact of PICASSO on the Marginal Incremental Price (MIP) and Marginal Decremental Price (MDP). Moreover, the concerned modified IP mechanism should, according to the CREG, be part of the Terms and Conditions of the BRP contract, after public consultation.

The sole scope of this note is to bring an opinion on this discussion regarding the determination of MIP and MDP from a viewpoint of electricity market design principles.

2. Guiding principle and criterion

Point (17) of the "Whereas" of the Electricity Balancing Guideline (EBGL) reads:

(17) The general objective of imbalance settlement is to ensure that balance responsible parties support the system's balance in an efficient way and to incentivise market participants in keeping and/or helping to restore the system balance. This Regulation defines rules on imbalance settlement, ensuring that it is made in a non-discriminatory, fair, objective and transparent basis. To make balancing markets and the overall energy system fit for the integration of increasing shares of variable renewables, imbalance prices should reflect the real-time value of energy.

This clause links the concept of 'real-time value of energy' directly with the integration of renewables and with the general objective of imbalance settlement. It is formalized in Art 44.1 (b) of EGBL and indeed, it is a crucial issue that will be given much attention in this note. This point is also mentioned in point 2 of the CREG decision:

Om balanceringsmarkten en het energiesysteem in zijn geheel klaar te maken voor de integratie van steeds meer variabele hernieuwbare energie, moet de prijs van onbalansen een weergave zijn van de realtimewaarde van energie.

This approach requires some clarification on the definition of 'real-time value of energy' and on the link between '*expected* value of energy', guiding the positions of market parties in the spot markets and *'real-time* value of energy', reflected in the imbalance prices.

3. Relation between Spot and Imbalance Price

With spot market is meant in this note: the Day Ahead Market (DAM), followed by the Single Intra Day Coupling (SIDC) and the local ID market until its closure. Hence, the spot price, ideally, is based on a representative sample of the last SIDC trades. It must be recognized that in the Belgian control area, the intra day market might suffer from lack of liquidity and/or representativity for the pricing of energy at this moment. If this is the case, a criterion could be developed that allows to rely upon the DAM price as spot price for the given hour.

This section summarizes some key assumptions which are specific for today's EU spot and balancing markets, without going into the discussion of the pros and cons of the underlying market design choices. I mention these as *factual findings* for the EU market model AS IS, because they underpin the approach used in this note:

1. spot and balancing markets are two different markets, each with physical delivery and separate price setting.

2. The spot market is fully two-sided and explicit: no kWh can be traded on the spot market without an explicit price bid matching a buyer and a seller.
    - This means that demand side flexibility (short term price elasticity of demand) is fully internalized in the spot markets. Compared with most US markets, it is an often-underestimated feature. In most of the latter, day ahead trades are a forward hedge on the real time market, which is based on an ex-ante estimated, or observed load, mostly without explicit demand bidding. Developing market-based demand flex is a hard battle in these markets.
    - For the time being, this feature of EU markets has not always been fully recognized because prices have mostly been too low to incite large quantities of demand flex (at least most of the time). The present unfortunate events shed another light on this.
    - The algorithm for the Day-Ahead market optimizes welfare. For this to make sense, it is crucial that all available resources (both on demand and supply side) which are relevant in the market *as expected* in Day Ahead, are considered for setting the price.
3. The imbalance market has an essential and increasingly important implicit component, meaning that anyone can create a buy or sell transaction by simply connecting or disconnecting loads or injections, without underlying explicit bid or offer.
    - Whether there is consensus on this or not, it is unavoidable in a market paradigm where "load follows generation". Imagine a market party with 100.000 EV chargers and 100.000 actively managed heat pumps in his portfolio. In his DAM and SIDC positions he will have optimized the portfolio *as expected.* For the deviations occurring in the balancing time frame (both volume or price deviations), he might have few interests in explicitly bidding, rather he will continuously evaluate the state of his portfolio and perform opportunistic reactions on the IP.
    - BSP's single assets with significant contribution to the IP price discovery (mostly power plant) are in Belgium obliged to explicitly bid in their flexibility.
4. For the implicit component to contribute to the balancing market equilibrium, it is essential that the price formation of the balancing market evolves in function of real time imbalance measuring during the Imbalance Setting Period (ISP). If it were set ante-ISP, the implicit reaction could not be factored in the balancing market equilibrium price. Market analysts could see this as an opportunity for gaming.
5. Point 1. does not imply an absence of link between spot and balancing prices. Indeed, market parties base their spot position on their *expectations* for the real time and they base their *implicit balancing positions* on *observations* in (or very close to) real time. Ideally, spot and imbalance prices are very close if the observed system state is very close to the system state as expected by the spot market.
6. **Hence, back-propagation between the *expected* IP and cleared spot price is desired and occurs in practice. On the contrary, back-propagation between *observed* IP and spot price makes no sense at all.** Balancing prices may significantly deviate from spot

prices each time the *expectations* underlying the clearing of the spot market need adjustments for *real-time observations*.[1]

7. Flexibility, both at generation as at demand side, is much higher in the spot timeframe than in balancing: power plants in balancing have costly constraints on ramping, start/stop, thermal transients, wear and tear, etc that can be avoided in spot planning, fleets of heat pumps and EV chargers and industrial load are best optimised based on the day ahead forecasts, etc.
8. The consequence of point 7. is that the balancing market has less resiliency than spot and has higher price volatility. In view of this volatility, risk averse market parties will settle their expected position on the spot market[2]. Arbitrage between spot and balancing market positioning will avoid that systematic price differences between spot price and *expected value of imbalance price* appear. This concurs with point 6.
9. The balancing market is an adjustment market affecting *in principle a limited range of resources.* If this were not the case, the spot price would not represent the expected value of the commodity and the welfare optimization of the DAM algorithm would have no sense. This confirms the fact that in each price zone, imbalance prices and spot prices are not completely independent, although the differences might indeed be large. This dependency is at the core of the discussion of this note.
10. aFRR is an 'always ON' service to the balancing market subject to specific technical requirements, which limit its capacity range and the spectrum of resources best fit to deliver the service. aFRR should normally address essentially the seconds-based stochastic ripple in imbalances ("suivre la dentelle") with relatively little impact on the value of the commodity. By definition, a platform like Picasso, limited to the aFRR segment, cannot fulfil the ambitions set out in EBGL for a single balancing platform encompassing all balancing activities in general.
11. The volumes of reserved aFRR capacity in the Belgian system are limited (typically 1 % of peak demand)[3]. Due to the technical requirements and constraints, the marginal aFRR unit (either in BE or generally in the system) may or may not correspond with the marginal resources representing "the real-time value of energy in the zone".

At this point, it might remain unclear to which extent the above statements are relevant for the discussion at hand. For this, it is useful to have a closer look at the Picasso algorithm.

4. The Picasso algorithm

Let's have a look into the peculiarities of the Picasso algorithm and the legal base of its operational aspects, article 147 of SOGL. Indeed, both the CREG and the FEBEG comments start from the assumption that the CBMPs correctly reflect the real-time value of energy in the Elia control area, hence give a "correct" imbalance price (IP). According to this view,

[1] In a Gaussian probabilistic world (which is an oversimplification since we have fat tails) one could see the spot price and balancing prices for a given moment as two different bell curves with the same μ (same expected value) but largely different σ (different observed values).

[2] This effect might be compounded by adding a sign-of-System-Imbalance dependent incentive to the Imbalance Price, but this is a subject for the enduring EU-solution referred to at the end of this note.

[3] It is not clear whether the accession to the aFRR platform will lead to a significant change of these volumes in Belgium. In the context of an uncongested and larger balancing area, the volumes might significantly increase, but the order of magnitude as a percentage of peak load of the larger area remains.

"Belgian peculiarities" in the form of dead band, cap or pricing in the IP setting are to be avoided.

The Picasso description used in this note is joined in annex. It is downloaded from the ENTSO-E website in July 2022.

A first element is that Picasso is a model with bilateral ATC capacities between LFC areas, for which the flows are not calculated in a flow-based model. The flow-based model is merely used for monitoring and not for the platform clearing. Indeed, Picasso uses in principle the remaining capacities from the Intra-Day clearing. Since export-import positions in balancing are in principle de-correlated from import-export positions in spot, it is possible that the Picasso flow model considers a given area as "uncongested area", while the zones might have largely different spot prices. This may lead, via the application of Picasso uncongested CBMPs, to the "import" of prices for which the question raises: are such prices representative for the real-time value of energy in each zone? This question will be addressed further in this note.

Second, and maybe more important for the case in point, is the fact that the "flows" in Picasso are not physical flows. Indeed, in each Optimization Cycle (OC = 4seconds), "*the sum of flows in or out a given LFC area (the aFRR area interchange) must be equal to the difference between the selected bids and the satisfied demand in the area*[4]*".* At the timescales of the algorithm, this makes a world of difference. A selected bid has a full activation time (FAT) of typically 7,5 minutes (112,5 optimization cycles). If we add the delays caused by the integral action of the controllers[5], the physical flow in the network is delayed by up to 200 OCs compared with the "conventional" flow concept used in the algorithm. Article 147 4(a) of SOGL sheds light on the real meaning of these flows:

> "TSOs shall implement the frequency restoration power interchange between LFC areas of the same synchronous area through one of the following actions:
>
> (a) defining an active power flow over a virtual tie-line which shall be part of the FRCE calculation where FRR activation is automated;"

Where a virtual tie-line is defined in Article 3(66) of SOGL:

> 'Virtual tie-line' means an additional input of the controllers of the involved LFC areas that has the same effect as a measuring value of a physical interconnector and allows exchange of electric energy between the respective areas;'

The conclusion from combining SOGL with the algorithm description is clear: the "transmission" lines in Picasso are virtual concepts that allow the FRCE-setpoints of the LFC controllers to be corrected by interchange of balancing energy. The ATC (or net profile) values in both directions of these lines are nothing more than the upper and lower limits imposed on these FRCE setpoint corrections. **There is absolutely no certainty (rather the contrary) that the point where the CBMP prices decouple between zones, correspond with the point where the physical flows reach the limits set by the algorithm.** It is mentioned several times in the algorithm description that, indeed, the "flows" are not physical flows.

[4] First sentence of section 2.5 of the algorithm description.

[5] Art 145 4(b) of SOGL. The integral behaviour is indeed needed to bring the static frequency error to zero and to avoid unstable power swings between FCR and aFRR.

Multiple other comments and questions could be raised regarding the congestion management concept of the algorithm. One example is the fact that the treatment of contra-intuitive flows in Picasso, according to its description, does not follow the improvements that recently have been made to Euphemia in this respect. Therefore, the general conclusion remains that "congestion" in Picasso is a completely different concept from the grid-congestion determining the price differences in the spot markets. As will made clear further in the note, this contributes to the fact that CBMPs may not represent the real-time value of energy in the concerned zones.

Nevertheless, this doesn't prevent that CBMPs remain an acceptable basis for inter-TSO settlement of the costs of the technical activity of cross-border exchange of control energy, and for the remuneration of specific aFRR-BSP services.

A third characteristic feature of the Picasso algorithm is that it is a multi-objective optimization. The aFRR control optimization algorithm aims to maximize simultaneously not less than 6 different objectives with non-zero weighting factor, with an unclear choice of these weights! Again, this is not a market clearing algorithm, but a tool for technical-operational cooperation between TSOs. Euphemia and all US-type market clearing mechanisms are of the single-objective type, either maximizing social welfare (EU) or minimizing system costs (US), while all other considerations are added as constraints and prices, or price differences result as shadow costs of these (bid or grid) constraints. Nothing of this with Picasso. If we revert to a 'simple' clearing as cut-off on a local or common merit order list, we are back at a single-objective mechanism, which consists in minimizing the cost of activation under the constraint that balancing demand is satisfied.

Fourth, and fundamental is the fact that TSOs have chosen **not to allow counter-activations of aFRR.** The underlying logic and what this means in practice for the CBMPs is discussed more in detail in example 1 below.

As a intermediate conclusion on these findings, it is fair to state that they invalidate the approach used by the CREG in the example in points 21 to 26 of the decision (B)2433. But more fundamentally, that there are serious grounds to question the validity of CBMP prices as valid "imbalance market" prices reflecting the real-time value of energy.

Example 1: three Areas

Let's assume three different control areas. In each of them, the technical structure of aFRR resources is rather different. We simplify to make the example visual: area A has mainly gas-fired aFRR resources, area B mainly lignite fired and area C mainly hydro-based aFRR. The procurement of aFRR is assumed to be competitive, hence the prices are close to marginal cost. We further assume that the aFRR domain is uncongested.

In figure 1, the aFRR CMOL is built, starting from the three individual areas. The attentive reader could object that it is not the economically optimal CMOL. Indeed, from a pure unconstrained cost-minimization point of view, it would be advantageous to put both green strokes (positive and negative control in the expensive aFRR area) in the right half plane and both blue strokes (positive and negative control in the cheaper aFRR area) in the left half plane, with the brown ones in-between, as is done in figure 2. This would make use of the

profitable (but not allowed) counter-activation between the more expensive downward gas resources, counter-activated by cheaper upward hydro.

Nevertheless, the absence of counter-activation has been regulatory accepted and is not a design flaw. It allows the imbalance market to serve its objective in the design setting discussed in section 3 above: managing deviations observed after the closing of the spot market. In case of zero deviations, aFRR control margins remain fully available in each zone in both directions. The application of counter-activation according to figure 2 would also mean that, most of the time, control actions are concentrated in zone B, with zones A and B having mostly saturated aFRR, intervening only in plus (gas - green segments) or in minus (hydro - blue segments) for large aggregated system imbalance SI_3. This is not compatible with the need to keep always the aFRR actions decentralized over all control areas, with maximum availability in both directions.

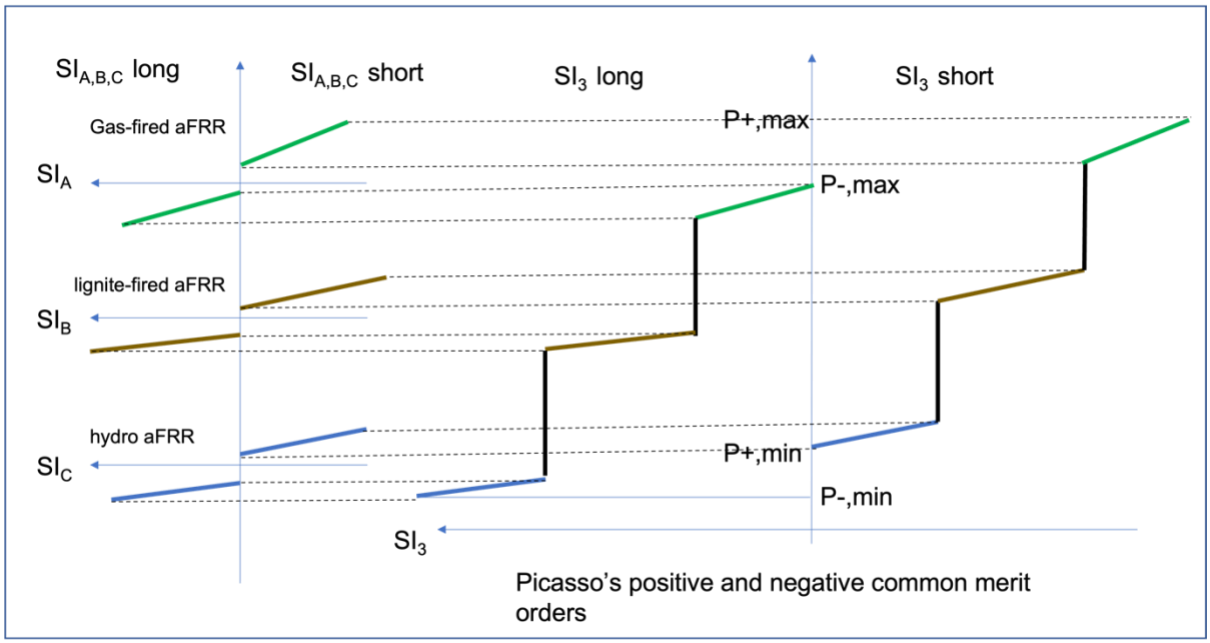


Figure 1 - Picasso Local and Common merit orders

This is mentioned as follows in section 5. of the algorithm description:

> 'In the current PICASSO design with full avoidance of counter-activations, bids can only be selected either in upward direction or downward direction but never in both directions within an uncongested region and within one MTU'.

One could also read this in another way: in any uncongested[6] region, imbalance netting can be performed until all remaining imbalances (to be managed after netting) are in the same direction. If positive, the left half plane CMOL of figure 1 is applied, if negative the right half plane CMOL is applied to the aggregate imbalance SI_3 and all aFRR control contributions of the individual areas are in the same direction.

[6] as explained before, in Picasso, 'uncongested region' refers merely to the aFRR framework, meaning that setpoints corrections of the LFC controllers remain between the agreed limits. This is not directly related with the limits of the physical flows in the system.

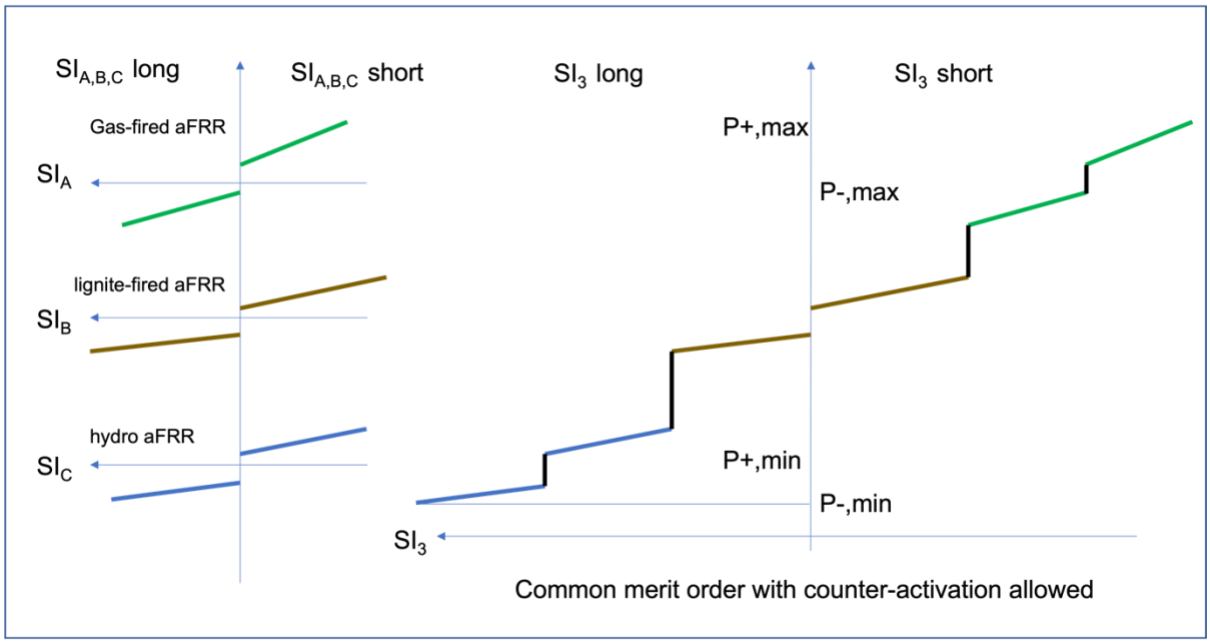


Figure 2 - CMOL with counter-activation

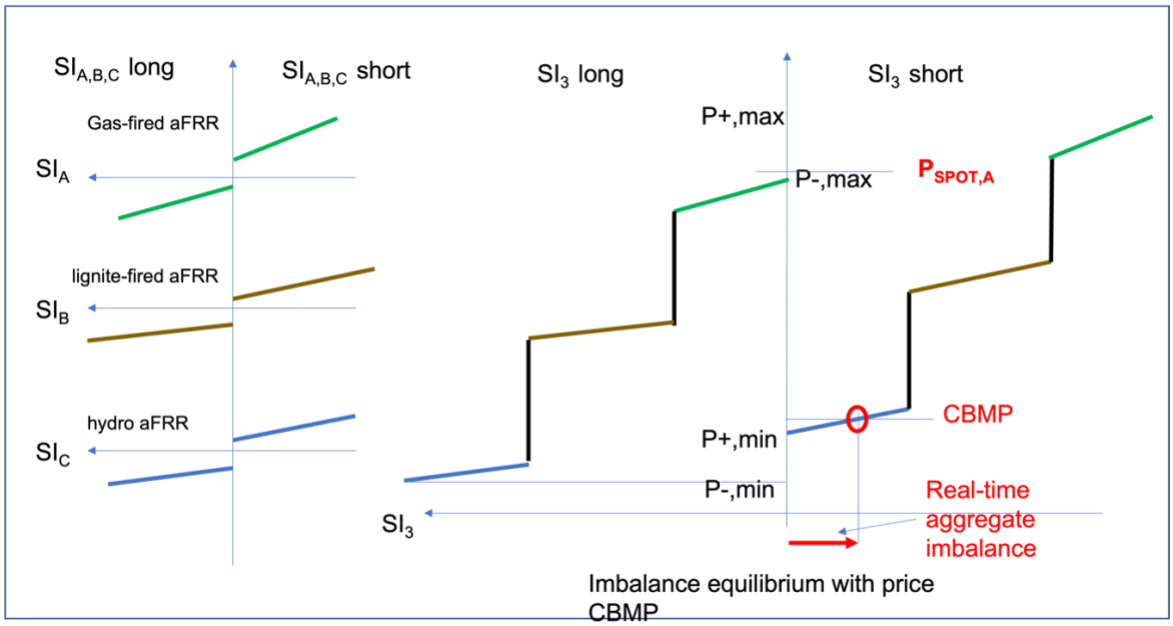


Figure 3 - Picasso market equilibrium

The red circle on Figure 3 represents an imbalance market equilibrium for a relatively small, short aggregate position SI_3 after netting. This figure represents the situation as intended by the cross-area optimization of aFRR with Picasso under the discussed constraints: the remaining SI_3 is controlled in the most effective way by the cheapest aFRR resource. For area A, this corresponds with the local resources being activated in accordance with the shown Spot price, much higher than CBMP. What would happen if we would wrongly consider CBMP as the correct Imbalance Price for the zone A? BRPs in zone A would massively ramp-down injections (ramp-up load), causing the red circle shooting up on the CMOL. The intended equilibrium will be totally instable: depending on the congestion parameter setting of the aFRR framework, either CBMP prices would decouple or the uncongested CBMP would

rapidly increase. Both outcomes are economically inefficient since they deviate from the intended optimum. Moreover, they are downright unacceptable in terms of system security, since it will cause uncontrolled flows and unintended import balance, whose amplitude is solely determined by the price elasticity of the BRP reaction on the IP decrease and might amount to a multiple of the "Picasso" ATC capacities.

The reader might object against the fact that the red circle on figure 3 effectively represents an economic optimum. Indeed, from a pure cost-accounting point of view, additional gains could be obtained by ramping down expensive resources in A from their original spot position, to be compensated by the cheaper aFRR around the red circle. **It cannot be stressed enough that this is a wrong assumption:** The high spot price in A is co-determined by the system-wide flow patterns governing the spot clearing. On the other hand, the fact that cheaper aFRR control energy can possibly be imported in A, hence "bypassing" these constraints, results from the fact that a separate 'aFRR' level congestion framework has been set up for Picasso, not representative for the real-time value of energy in A. Against this backdrop, it should be kept in mind that the essential objective of reserves (including aFRR) is to ensure that N-1 incidents like a sudden 1000 MW trip can always and immediately be managed. Saturating aFRR by substituting spot-activated resources does not fit with this objective.

For zone A in this example, the CBMP is nothing more than the price of a specific service delivered under a very specific setting. It does not reflect the real-time value of energy in the zone: if this aFRR capacity was given to the spot market and replaced by other aFRR control resources in zone C, what would be the impact on spot and CBMP prices in zone A?

Consequently, the red circle of figure 4 represents a constrained economic optimum, subject to the constraints and market design principles as set out in sections 3 and 4 of this paper.

- As regards the market design (section 3.): one may indeed regret that the EU market design has no general co-optimization of spot and reserve markets but forcing such co-optimization as would be the case with CBMPs in this example, is simply not compatible with this design AS IS and is detrimental for security of supply.
- As regards the Picasso algorithm (section 4.): the rationale for the prohibition of counter-activations between aFRR resources has been explained. It would really be surprising that counter-activations between spot and aFRR resources pass smoothly without any concern: saturating reserved aFRR capacities by substituting resources that are activated by the spot market?

To maintain the correct incentives for the BRPs, which is to activate their resources in accordance with the spot market outcome - adjusted in case for IPs or CBMPs reflecting the real-time value of energy - the application of a price floor if the local SI is short, is indeed an adequate and necessary measure. By symmetry follows the reasoning for the price cap if the local SI is long.

For this example, it is interesting to check what would happen in zone A with a small, long SI_3 >0. The high CBMP then represents the real-time value of energy in the zone[7] and the BRP

[7] Since this paper is about aFRR-determined pricing, we have assumed here that there is no mFRR activated, setting the IP, in line with the real-time value of energy in the zone.

implicit reaction in zone A is at a level playing field with the BSP activations through the CBMP. Contrary to the previous case, where the system was kept within acceptable status by cyclically pushing it to its ATC limits (which are unreliable as shown in the algorithm description), the implicit reaction of BRPs is to go short, hence to diminish the activation of reserves, instead of pushing them to either the ATC or the saturation limits. In other words, a 'correct' CBMP, which is a CBMP that represents the real-time value of energy in the zone, acts as a stabilizer and can be considered as a means to co-optimize spot and imbalance markets.

Finally, the argument developed here sheds another light on the discussion as to whether the Belgian BRP should be incentivized to 'help the system' at global (uncongested region) or local level. Since the global SI is already short in figure 3, there is no point in incentivising the Belgian BRPs to *worsen, not help* the system by massively going short as reaction to the lower CBMP.

5. The case of renewables

The clause in 'Whereas (17)' of EBGL, mentioned at the beginning of this note and in point 2 of the CREG decision, establishes a link between the notion of "real-time value of energy" and the integration of variable renewables. Let's discuss this with example 2.

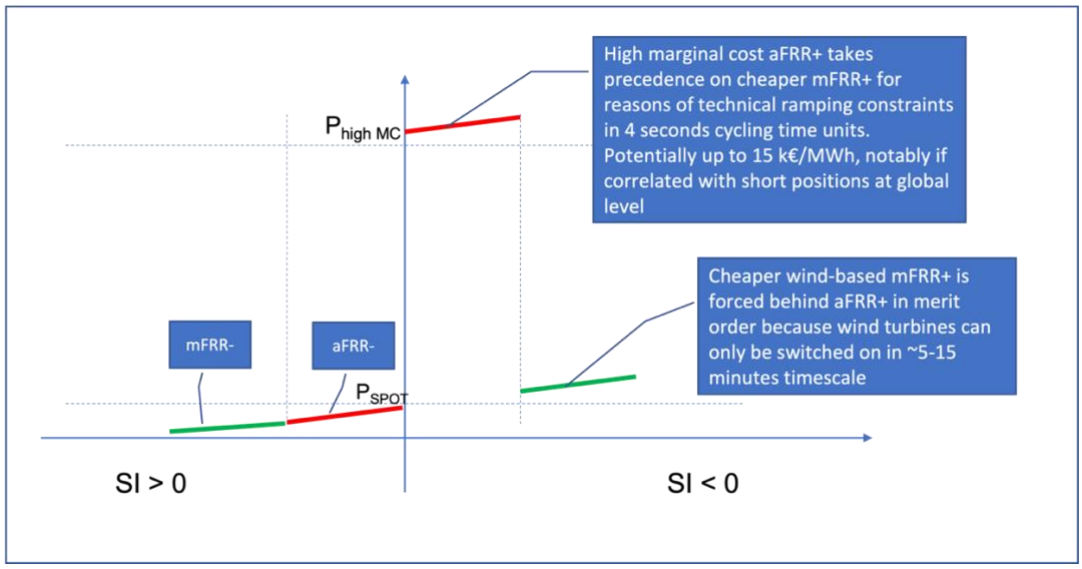
Example 2: WIND

Assume that the spot market has cleared with an expectation of excess RES in the Elia control area. Due to the excess, some strings of wind turbines are not cleared active by the spot market and are available as positive mFRR. Negative mFRR is delivered by curtailment of additional wind turbines.

Concerning aFRR, negative aFRR (after netting with neighbours) is delivered by (close to) zero marginal cost renewables since the neighbouring areas are in a similar position. As regards positive aFRR (after Imbalance Netting), this is delivered by high-marginal cost resources since - at least for the time being - it is not usual practice to operate renewables with a baseline de facto implying a partial RES curtailment.

Figure 4 'MOL with excess wind[8]' below shows the corresponding balancing merit order as seen from the Belgian system.

[8] We do not specify here whether SI is at global or local level: as explained in example 1, in an uncongested Picasso region, the direction of aFRR activation is in all areas the same as the global SI after imbalance netting.



Do we have a "real-time value of energy" that oscillates between P_{SPOT} and $P_{high\ MC}$, for small oscillations of SI around zero, which occur naturally and are not an indication that the real-time system status deviates from the expectations at spot clearing?[9] Market parties will have optimized their daily schedules in function of the spot price, hence will have maximized their charging of EVs, running of heat pumps and airco, etc, during this moment. The high aFRR+ balancing prices now incentivize not to follow this planning and create value by going long if SI< -1MW. The incentive is to ramp up generation resources and to switch off demand with willingness to pay between P_{SPOT} and $P_{high\ MC}$, while an array of available wind turbines is offline. Why would one destroy the correct spot-incentive for reason of the constraint on aFRR+? Moreover, over-reactions of market parties might cause increased and unjustified price swings during subsequent ISPs, totally blurring the view on what is the "correct" reaction. Not to speak about the security and congestion issues.

Without doubt, we must rule out the $P_{high\ MC}$ component as indicator of the real-time value of energy. In other words, the $P_{high\ MC}$ - CBMP is not the correct reference for the Imbalance Price.

The flawed view that these CBMP's reflect the real-time value of energy as reference for the IP creates an entry barrier for variable renewable based portfolios. Indeed, RES portfolio imbalances are relatively well correlated with system imbalances. If deficit injections relative to the forecasts are charged up to very high prices while excess is remunerated at close to zero value, this is a heavy burden on their business plans and undermines the value of the RES-based PPAs.

The Dead Band proposed by Elia to limit excessive price excursions around SI=0 is indeed an effective way to mitigate this detrimental effect. This measure is a necessary complement to the application of the cap and floor: the price for SI>0 has no upper limit, while the price for SI<0 is capped.

[9] This does not mean that any discontinuity in Imbalance Price between SI<0 and SI>0 is to be avoided. The question is only: what is the optimal level of such 'INC/DEC price gap' to avoid gaming and undue recourse to the balancing market?

Finally, it is to be noted that the argument above for the Dead Band is completely different from the presumed Elia position in the CREG decision, which reads in point 68:

> 'Het doel van de dead band is om te vermijden dat de onbalansprijs het signaal aan de BRPs geeft om het Europees elektriciteitssysteem te helpen balanceren wanneer de onbalans in het LFC Blok van Elia zeer laag is.'

6. aFRR and non-convexity

A look at figures 1, 3 and 4 above reveals one interesting feature: due to constraints on aFRR, we have distorted the merit order and hence, introduced a non-convexity in the cost function representing the balancing merit order[10].

It is certainly not the intention here to go into theoretical considerations. Nevertheless, as regards the problem here, it is fair to make following statement, supported by the numerous literatures on non-convexity in electricity markets:

> **In the presence of non-convexities, the application of *uniform pricing* may lead to solutions that are far away from the social welfare optimum.**

The application of uniform imbalance pricing by considering that the CBMPs represent the real-time value of energy, in presence of these non-convexities, is an example in case. In both examples, we have shown how their application leads to deviations from the welfare optimum.

The textbook solution to the problem is to remunerate the non-convexity by 'side letters', to disregard this payment for determining the uniform price setting in the IP.
For the cases shown in the examples above, this would mean that the low-cost hydro aFRR of figure 3 and the high cost aFRR+ of figure 4 are remunerated by the BSP contract, without direct impact on the IP[11].

Against this backdrop, the Cap, Floor and Dead Band proposed by Elia are a necessary measure to mitigate the detrimental effects (on system security and economic efficiency) of uniform (CBMP-based) pricing in the presence of strong non-convexities.

7. Legal and Regulatory Framework

This note is drafted as a technical-economic approach with market design principles. Of course, any solution should also be embedded in the legal and regulatory framework. As a starter for further legal analysis, some findings, or questions:

- EBGL is the main legal base:
  - As mentioned in section 2. the main objective (recital (17)) is clear and is fully in line with the view developed in this note.
  - The guiding principles are listed in article 44 of EBGL. The crucial point is the common understanding of the meaning of "real-time value of energy",

[10] convexity, simplified: any point on a straight line connecting two points which are situated above the cost curve is also situated above the cost curve.
[11] this does not exclude a priori that the corresponding cost is socialized via an additional component of the IP, depending on regulatory choices in accordance with EBGL

mentioned in 44.1.(b). This note has developed a reasoned opinion on this point as support for the proposed IP mechanism.
    - The only quantitative rule on IP in EGBL is a set of upper and lower price limits defined by article 55.
    - The concrete application of the limits of article 55 may in some cases lead to difficulties and conflicts with the main objective and guiding principles. This is recognized by the CREG in point 68 of the decision as follows:

> 'Bijgevolg is de CREG van mening dat de berekeningswijze voorgesteld door Elia de efficiëntie van balancering, conform artikel 3.1 b), van de EBGL beter tegemoetkomt aan de wettelijke doelstellingen dan wanneer de randvoorwaarde in artikel 55(4) EB GL en in artikel 9 van de ISH gerespecteerd wordt.'

The reference to article 3.1 b) (on economic efficiency of balancing) as an argument for (relatively small and justified) deviations from art 55(4) is also perfectly in line with the developments made in this note.

- ISH, the implementation methodology decided by ACER is a level below EBGL in the legal hierarchy.
    - This should allow for deviations when ISH is in contradiction with the objective and principles of EBGL, as also recognized in abovementioned CREG quotation. This is particularly relevant for ISH article 9.3b) imposing Picasso CBMPs as a basis for Imbalance prices, with the entry "where applicable".

8. Back to Elia's Imbalance Price proposal

The main points of disagreement concern the application of the IP Price Cap when the local SI is long, a Price Floor when short and a Dead Band on the IP for small, long, and short local SI positions.

In this note three different approaches for the discussion have been used and all converge to the same conclusion that Elia's proposed measures are effectively needed. These approaches are:

1. the link between spot and balancing market: if large differences occur between imbalance and spot prices, they must be justified by 'market-wise significant' differences in the system state (either globally or locally) between the expectations at the moment of spot market closure and real time;
2. the evaluation of the real-time value of energy as indicator for the correct incentives for market parties to (dis)activate demand or generation resources in the direction that stabilizes the system at a level playing field for marginal BRP resources against the imbalance price;
3. the strong non-convexities caused by the specific character of aFRR services.

On the Cap and Floor

In example 1, it was proven that importing a very low CBMP as IP **is a destabilizing factor for system security, with potentially huge implications**. Even if it would be advantageous from a pure cost accounting perspective, it cannot be justified to sacrifice reserve margins whose essential purpose is to face N-1 security incidents.

The counterargument, holding that the congestion management embedded in Picasso will lead to a decoupling of prices to restore system security, does not hold against the analysis of the algorithm, done in section 4. Anyhow, even if it were valid (quod non) it would be awkward to advocate an imbalance market that relies on security limits. Moreover, the functioning of these security limits is not adequate because of the different temporalities between CBMP price setting and 15' IP price setting.

Faced with such risks and pricing design flaws, Elia's proposal to impose a price floor when local imbalance is short (and a price cap when long), **is fully justified**. The non-convexity approach shows that **the Cap and Floor are not about imposing a constraint on an economic rationale: they are a necessary correction of the flawed uniform imbalance pricing in presence of strong non-convexities.**

On the absence of Cap and Floor in the other direction

When looking at figures 1 and 3, one could question whether the extremely low prices that occur when the local SI is long, also deserve an upwards protection. Indeed, assuming that the local value of energy and spot price in A are gas-based, why would it be justified that a small, long imbalance leads to hydro-based, extremely low Imbalance Prices?
The answer here is implicit market reaction. If we have unjustified, extremely low Imbalance Prices, the local system will swiftly turn into a short position. This will trigger the price floor.
Hence, even in the cases when the extremely low prices of figure 1 are not justified, their effect will be counter-acted by the BRPs' reaction.

On the Dead Band

With example 2, the Dead Band was advocated in a context of RES integration.
But the necessity to dampen large IP excursions caused by 'infinitesimally' small local SI sign changes is also valid in general terms. It was also shown that it is not about a 'refusal' for the Belgian BRPs of helping the global system.
Market parties observing local |SI| below 100 MW will simply disregard those price signals for the upward or downward ramping of their generation and demand resources, being conscious of the purely 'noisy' character of those price signals. But meanwhile, Belgian BRPs pay for it and new entrants with renewable-based portfolios **experience a huge cost of RES balancing** and see the **market value of PPAs significantly downgraded.**

The response to this is not to abolish the Dead Band, rather to increase its range to cover as much as possible the full range of aFRR control in Belgium. Concretely, this would mean the Dead Band to be increased to +/- 100-150 MW instead of the rather symbolic value of +/- 25 MW in Elia's negotiated proposal.

9. Summary and Conclusion

The analysis in this note regarding the use of 'Picasso-CBMPs' as reference for the Imbalance Price has revealed several concerns, of which the main ones are:

- The disconnect between the congestion concept for the aFRR-induced flows and the 'grid'-level congestion determining the bulk flows in the system and hence the spot

market value of energy. Indeed, 'flows' in Picasso are not physical flows and are not flow-based.

- Various strong non-convexities caused by the specific nature and constraints of the aFRR services, as implemented by Picasso. It is well-known in electricity market design that uniform prices derived from a merit order list do not deliver optimal welfare solutions in such cases. The examples of this note have confirmed the importance of this effect, leading to an unduly high IP volatility, with large deviations from what is the "real-time value of energy" in the concerned areas.

The consequences of these findings are mainly:

- In terms of system security, stability, and robustness: the volatile flow patterns caused by the inadequate pricing should be managed by decoupling of CBMPs between price zones. But this is ineffective in practice:
    - because of the disconnect mentioned above: the Picasso 'flow' signals triggering such decoupling are not usable as indicators for the bulk physical state of the system;
    - given the time delays between CBMP setting and quarter-hourly Imbalance Prices.

  It is fair to say that this is **downright unacceptable in terms of system security** and contrary to sound system design principles in general.
- In economic terms, unconstrained application of CBMPs as Imbalance prices would in some cases destabilize the system and use reserves for other purposes than their main objective (being available to face incidents), depending on the question whether the CBMP correctly reflects the real-time value of energy in the concerned zone (example 1). It would also create an additional and unjustified cost for BRPs, especially for balancing of renewables (cfr example 2). This is an **effective market entry barrier for any RES-based portfolio.**

Hence, there is no economic nor technical rationale to introduce an Imbalance Price tariff based on CBMPs at the moment of the implementation of the mechanism in the Elia control area.

Elia proposes a Dead Band, a Cap and Floor to mitigate the detrimental effects of such flawed CBMP approach. In the previous section, the arguments underpinning these measures are found to be in good coherence with the findings earlier in the note. For the Elia control area, being relatively small and strongly interconnected, **it is strongly advised not to join the Picasso project without these minimal precautions.**

It is recommended to continue the reflection on an enduring solution for the EU imbalance market and its pricing. This will also require a readiness to evolve the regulatory framework or, at least, to interpret the existing clauses against the background of their main objective, (recital 'Whereas (17)') and high-level principles set out in Articles 3.1b) and 44, especially 44.1(b) of EBGL, as introduced in section 7 of this note.

neon neue energieökonomik

SHORT STUDY

CREG's proposal for the calculation of the imbalance settlement price

25 October 2022

Short study on behalf of Elia

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1 Introduction

Background. Belgium intends to connect to the pan-European platform Picasso that coordinates the activation of automatic Frequency Restoration Reserves (aFRR) across borders. It avoids a counter-activation of reserves and allows the deployment of the cheapest reserves in the interconnected area (if cross border network capacities are sufficient). In this context, Belgium will evolve to an internationally connected aFRR market with pay-as-cleared pricing rule, also known as marginal pricing. The increasing European integration of markets for balancing reserves gives rise to the question how the imbalance pricing formula can be adjusted to these changes. The Belgian balancing philosophy encourages implicit balancing, i.e., balancing responsible parties (BRPs) are incentivized to take a position that reduces the system imbalance. Therefore, the incentives for BRPs resulting from the imbalance pricing methodology are even more important than in other countries.

Scope of the analysis. We analyze what we understand to be CREG's proposal for Belgium's new imbalance pricing methodology after connecting to PICASSO. The aim of the proposed methodology is to provide economic incentives for Belgian balancing responsible parties to reduce the imbalance of the interconnected load frequency control (LFC) area when sufficient interconnector capacity is available. While we share this objective of economic efficiency, we highlight three serious shortcomings of the proposal, which threaten system security in Belgium and increase the cost of balancing reserve procurement. We therefore recommend to carefully revise the proposal accordingly or to consider alternative pricing methodologies.

Our understanding of CREG's position. We understand that the Belgian regulator CREG aims at determining the imbalance price as maximum or the minimum of two price components: the mFRR price component and the aFRR price component. When the Belgian control area is, on average, short over the imbalance settlement period the maximum of the two components is applied, and, vice versa, the minimum when the Belgian control area is, on average, long. CREG does not envisage further price adjustments. This is how the two components are determined:

- The mFRR price component is defined as the marginal activation price of the activated mFRR in Belgium, until Belgium implements the mFRR platform MARI.
- The aFRR price component is calculated as volume-weighted average of the cross-border marginal price (CBMP). Each imbalance settlement period lasts 15 minutes and consists of 225 four-second periods in which a CBMP is defined. If the interlinked LFCs are non-congested, the CBMP reflects the marginal activation cost of positive aFRR when the LFC areas are (on average) undersupplied, and the marginal activation costs of negative aFRR when they are oversupplied. In the case of cross-border congestion, the CBMP reflects the price of the marginal aFRR energy bid activated in Belgium, i.e., it is no longer uniform across the entire LFC.

2 Evaluation of CREG's imbalance pricing methodology

Incentives to aggravate the local imbalance. A crucial consequence of the above introduced pricing approach is that Belgian BRPs regularly have a financial incentive to increase the Belgian system imbalance. This is usually the case when the system imbalance of the rest of the interconnected area exceeds the Belgian imbalance in the opposing direction. Take the case when the Belgian system imbalance is short, and the average imbalance of the interconnected area is long: to compensate the overall surplus of electricity, negative reserves are activated. The marginal cost of negative reserves, which equal the CBMP, is low or even negative. Hence, the imbalance price incentivizes Belgian BRPs to take a short position, which reduces the oversupply, but also aggravates the system imbalance in Belgium. If sufficient interconnector capacity is available and we ignore the possibility of contingencies, these incentives will be economically efficient because Belgian BRPs reduce the system-wide oversupply. A positive side effect is that this creates a cash flow into Belgium via the imbalance netting.

Consequences. However, if not handled with care, such incentives to aggravate the local imbalance also results in three distinct consequences that we deem problematic. First, it would increase the Belgium reserve requirement. Second, the different time-resolution of CBMP and imbalance price may incentivize BRPs to stress the Belgian system even when interconnector capacities are fully used. Third, it could lead to an oscillation in the Belgian system imbalance. In the following, we discuss these concerns one by one.

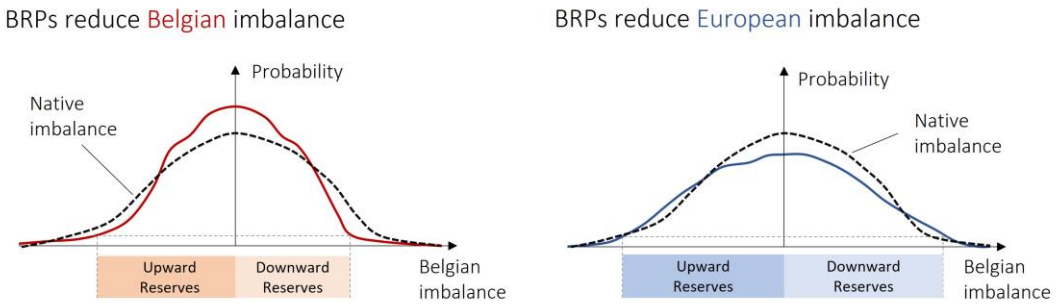
2.1 Inflated reserve requirements

Issue. In the current system, Belgian BRPs have an incentive to reduce the system imbalance in Belgium. If CREG's new imbalance price calculation methodology is implemented, Belgian BRPs would sometimes aggravate the Belgian imbalance while reducing the system imbalance in the LFC areas interconnected via PICASSO. Consequently, the distribution of the Belgian system imbalance becomes broader, i.e., there are moments with higher (absolute) imbalances in Belgium.

Example.

Figure *1* illustrates the possible evolution of the system imbalance before (left) and after (right) the possible change in the imbalance pricing methodology. Both charts show illustratively the probability distribution of the system imbalance. The dotted line shows the native imbalance that does not include any response from market parties to the imbalance price, i.e., it arises for example from forecast errors, outages of generators or network infrastructure. If the settlement prices reflect the Belgian system situation, parties' response will reduce the system imbalance (left). That is not necessarily the case anymore if the imbalance price is determined by the European system imbalance, because that might differ from the Belgian one (right).

Figure 1: Schematic representation of how the imbalance pricing methodology affects the demand for balancing reserves



Implications. The higher imbalances in Belgium can usually be compensated by the netting of imbalances with neighboring LFC areas (or by reserves in other countries). However, netting opportunities may sometimes be unavailable, e.g., when ATCs are used by a direct activation in MARI. Other risks are failures in network elements or of the netting platform. To maintain system security in Belgium also in these moments, the dynamic dimensioning algorithm would increase the procurement of national reserves. The expenses for the procurement of reserves are allocated via grid charges. Thus, a higher need for reserves increases the costs for Belgian consumers.

Relevance. To emphasize the effect of incentives for implicit balancing for other countries on reserve reservation, note that Belgium currently contracts 117 MW of aFRR. This is far below the possible levels of imbalance netting: the cross-border flows alone with Germany exceed levels of 800 MW. Hence, if the netting opportunity disappears in the wrong moment, Belgium remains with local imbalance incentivized by the imbalance price, which it cannot resolve.

Mitigation measures. To avoid an increase in the reserve requirement, Belgian BRPs should not be incentivized to further stress the Belgian system when the local imbalance exceeds certain threshold values.

2.2 Perverse incentives due to 15 min resolution of price

Issue. The CBMP is calculated every four seconds and reflects the activation costs of aFRR reserves. If BRPs were exposed to it, the economic incentives for implicit balancing would generally reduce the aFRR activation in the relevant system: the relevant system is the interconnected area without network constraints, and Belgium in the case of constraints.[1] This does not hold for the imbalance price, which is uniform throughout the imbalance settlement period of 15 minutes. It may provide perverse incentives for BRPs, i.e., incentives to stress the Belgian system while the more granular CBMP already provides an incentive to support it.

[1] Note that non-convexities might deteriorate the economic efficiency of the price signal. They result for example from the fact that the counter-activation of reserves is not allowed in Picasso. A further challenge is the non-harmonized use of mFRR reserves in Europe. As defined in the introduction, the CBMP provides no incentive to reduce the use of mFRR.

Example. We revisit the previously introduced example with a short Belgian system and a long interconnected area to demonstrate how such perverse incentives may arise. When sufficient interconnector capacity is available, the CBMP is small or even negative. Belgian BRPs have an incentive to take a short position and thus further aggravate the system imbalance in Belgium to reduce the overall (European) imbalance. This is economically efficient. However, when the interconnector capacity reaches its limits, the CBMP jumps from a low cross-border price to a higher national price, which reflects the local activation of reserves. Yet, the average of the CBMPs within the imbalance settlement period can remain low, which would result in a perverse incentive. The average price may not reflect the new system status when the network constraint arises late in the imbalance settlement period, or when the initial low cross-border price is much more extreme than the national price used when the interconnector reaches its limits (e.g., due to different BSP bidding behavior in the different control area).

Mitigation measures. Theoretically, no perverse incentives would arise if the imbalance settlement period had the same temporal resolution as the CBMP (i.e., 4 seconds). Yet, it is very unlikely that the temporal resolution of the imbalance settlement period will be shortened any time soon, least to a 4-second resolution. An alternative is to suppress the incentives for implicit balancing when they severely stress the Belgian system imbalance or when critical network elements are almost congested (e.g., when the available transfer capacity falls below a predefined share of the net transfer capacity).

Implications. These perverse incentives are problematic because they challenge the system stability in Belgium and may cause uncontrolled network flows (in Belgium as well as in other countries). How problematic the incentives for stressing the Belgian system imbalance are depends on how quickly BRPs respond to price incentives. The impact of perverse incentives becomes more problematic with an increasing flexibility of BRPs. In the context of the ongoing digitalization and smart devices, which increase the price response of BRPs, incentives for stressing the system balance should be avoided whenever possible. The fact that implicit balancing is only incentivized in some European countries may be a further barrier: Belgian BRPs unidirectionally support other systems at the cost of sometimes stressing the Belgian imbalance. This non-reciprocity may be perceived as unfair.

2.3 No stable equilibrium of imbalance and imbalance price

Issue. A further problem is the discontinuity in the CBMP when interconnectors become congested. If the interconnected area is long and Belgium is short and then the interconnector becomes congested, the CBMP can jump dramatically within seconds. This is essentially because there are two discrete pricing regimes with very distinct prices and BRPs can hardly predict this discontinuity. Due to the high uncertainty about where the discontinuity occurs and the large difference in CBMP in the two regimes, there is no stable equilibrium of system imbalance and imbalance price, which is required for implicit balancing.

Example. Consider the previous example but extended over multiple imbalance settlement periods. In the first imbalance settlement period, the Belgium system is short, but the overall interconnected area is long. Belgian BRPs are hence incentivized to take a short position,

which usually increases physical cross-border flows into Belgium. As soon as the interconnector capacity is fully used, the CBMP becomes national. Yet, as described in the previous section, the imbalance price may remain negative within the imbalance settlement period and continues to provide incentives for a short position. In the next imbalance settlement period, the undersupply in Belgium leads to a high (national) CBMP and imbalance price. Incentivize BRPs to take a long position, which, in turn relaxes the cross-border flows, until the Belgian border becomes uncongested again and the CBMP reflects the cross-border oversupply and hence jumps to low or even a negative value again. If the threshold when the interconnector capacity is congested is impossible to predict, this oscillation can continue.

Mitigation measures. Transparency about the current and future ATC is key to allow BRPs to avoid imbalances resulting from foreseeable non-availability of interconnector capacities. However, this cannot solve the issues resulting from unforeseen non-availability of interconnectors, e.g., due to direct activation of mFRR or a sudden change in aFRR demand in neighboring countries.

Implications. Most imbalance pricing methodologies feature discontinuities in the imbalance price. In the analyzed methodology, the discontinuity is particularly problematic because the moment when the imbalance price signal will switch is almost impossible to predict for BRPs. It depends among others on the moment when LFC areas are decoupled in Picasso, which in turn depends on the 4 second-based evolution of aFRR demands of every single area and on the interconnector capacities utilized by SIDC and MARI. With the hardly predictable discontinuity in the imbalance price, the BRPs will face strong difficulties to engage in implicit balancing.

3 Conclusion

Summary. The connection to the European platform for balancing energy activation requires a revision of the Belgian imbalance pricing methodology. We analyze what we understand to be the approach favored by CREG and highlight three major risks resulting from this design. These are (i) an increase in the capacity costs of reserves, (ii) perverse incentives BRPs, which threaten system security in Belgium and cause overload in network elements, and (iii) no stable equilibrium of the Belgian system imbalance.

Recommendations. The risks resulting from CREG's proposal should be addressed before connecting to EU balancing platforms to avoid disadvantages for Belgian electricity consumers. One possible mitigation option is to introduce floors and caps to the imbalance price such that Belgian BRPs have no incentive to stress the national system balance when it is already significantly imbalanced (i.e., it exceeds the locally available reserves) or when the resulting line flows stress critical network elements.