Incentive on Prequalification, Control, and Penalties – aFRR/mFRR

1st Workshop

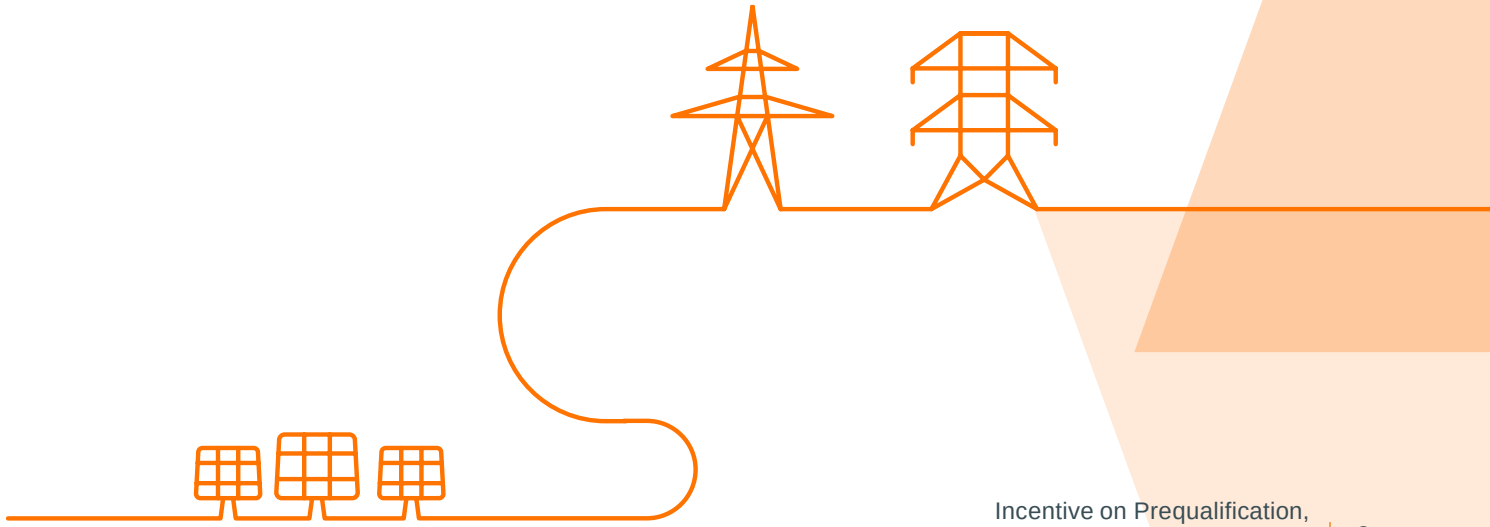
08/05/2023 | Loup Vanderlinden

Agenda

- **9:00 – 10:30 Onboarding & Prequalification**
  i. Design AS IS
  ii. Stakeholders Feedback
  iii. New Design Proposal

- **10:30 – 10:45 15’ BREAK**

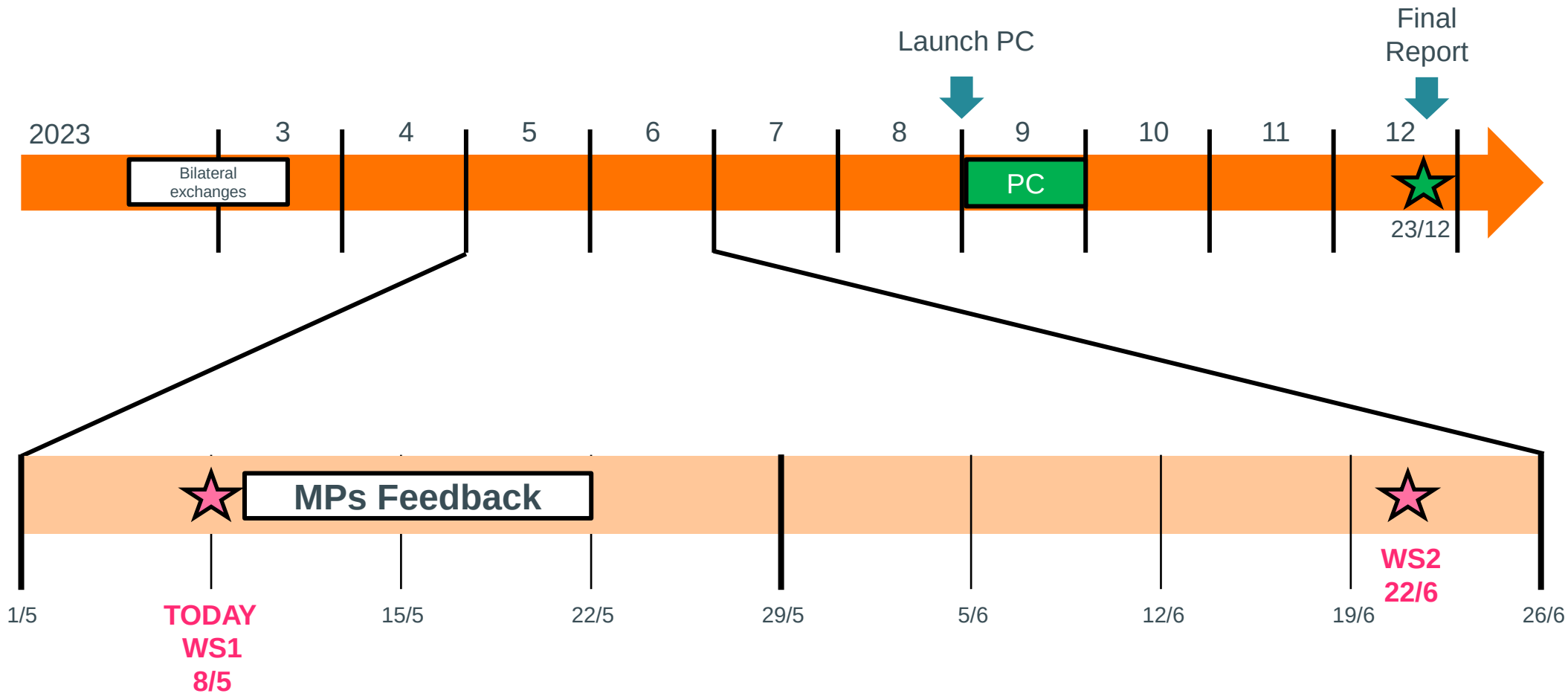
- **10:45 – 12:00 Control & Penalties**
  i. Design AS IS
  ii. Stakeholder Feedback
  iii. New Design Proposal



Small Precisions Before Starting

- This incentive concerns the prequalification process, controls, and penalties linked to the aFRR and mFRR services (FCR out of scope)
- The activation control mFRR is out of scope, as return on experience following connection to MARI is needed
- Unless stated otherwise, covered points in this workshop apply for aFRR **&** mFRR

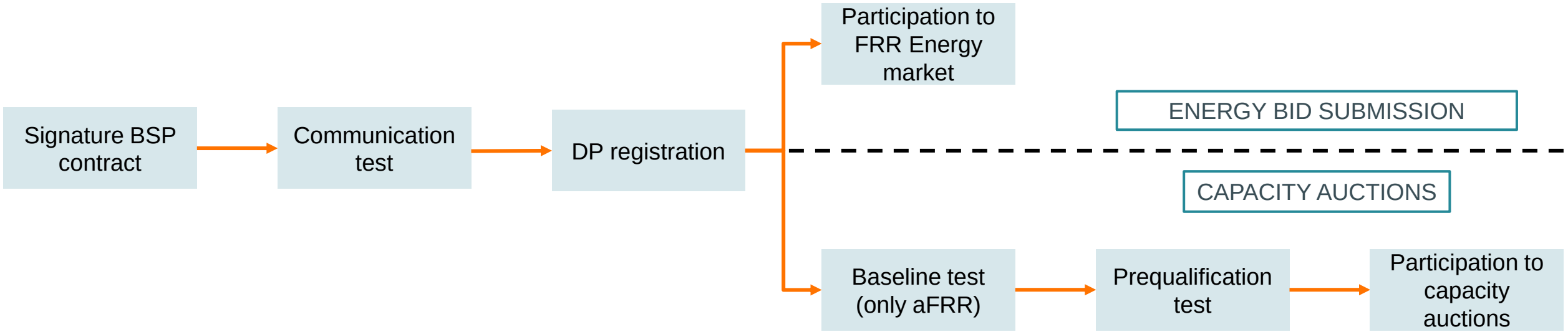
Incentive Roadmap



ONBOARDING & PREQUALIFICATION

DESIGN AS IS

High-level Onboarding Process



Delivery Point registration requires:
- Grid User declaration
- Proof of Transfer of Energy regime
- Proper measurement equipment
- Energy Management Strategy (if applicable)

High-Level Prequalification Test Timeline

BSP sends PQ test request to ELIA → BSP & ELIA agree on a 24h time window (10 WDs* max after request) → Prequalification test → ELIA sends BSP the PQ test results (10 WDs max after test) → At least 5 WDs before new prequalified volume can be offered in the capacity market

Goals of the PQ Test

⇒ BSP must succeed a PQ test to increase the max volume it can offer in capacity auctions

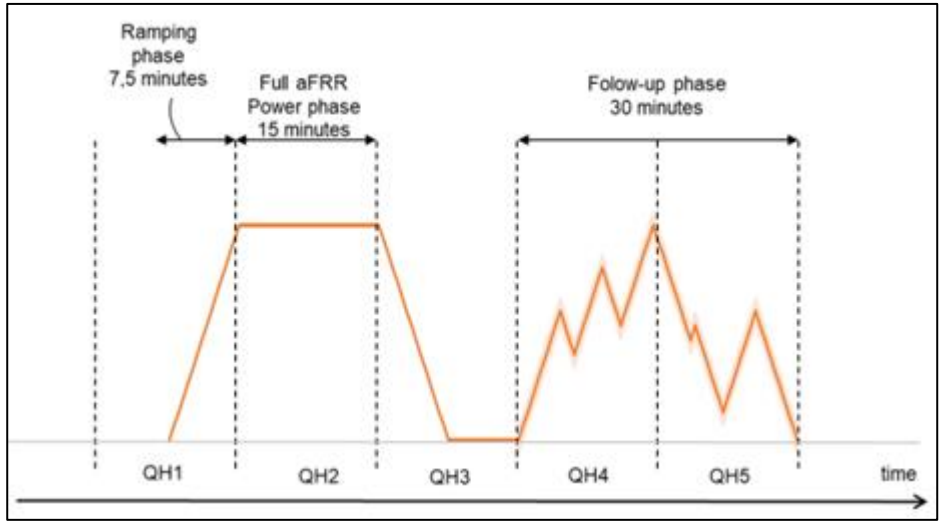
Verify that the BSP can:

i. Deliver the volume it wishes to offer *at least once* before participating to capacity auctions
ii. Ramp up and ramp down to the max volume
iii. For aFRR, follow the 4s signal
iv. For mFRR, go from max power to zero and then back to max power again (within 1 hour)

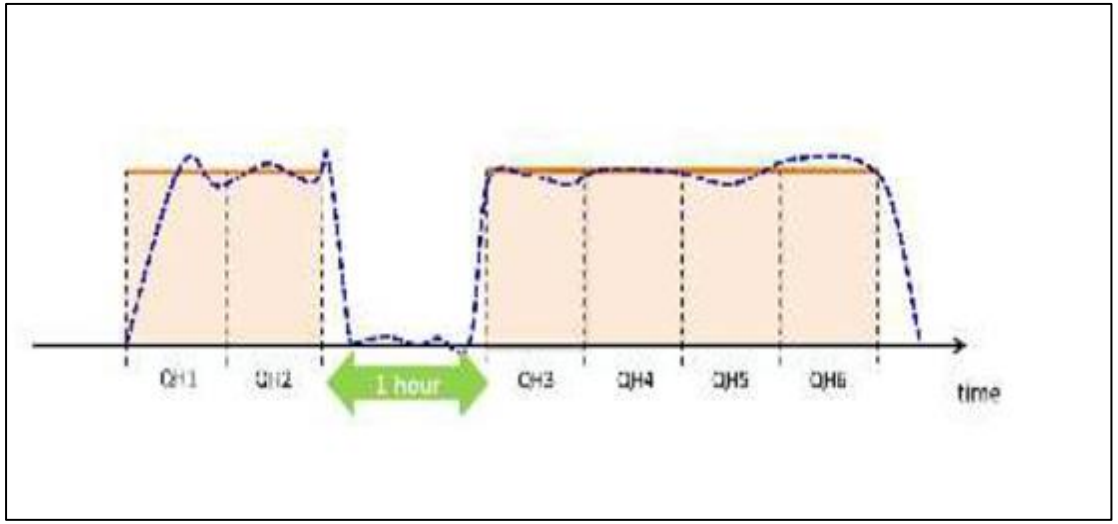
* WD = Working Day

PQ Test Specifications

- PQ test is **not** remunerated
- An energy bid for prequalification is submitted for **24h** the day of the test
- DP_{SU} are tested in accordance with operating mode
- For DP_{PG}, the PQ test can be performed per DP (individually) or by Providing Group
- The activation profile to follow depends on the type of product (aFRR up/down/combined, mFRR standard,…)
- A DP can only participate in one PQ test (Up, Down, or combined)



PQ test for aFRR Up



PQ test for mFRR Standard

Modalities in Case of a Pool Modification

- **Addition of new DP(s)**: a PQ test must be performed to increase the max volume to offer in capacity auctions
  - For DP_{PG}, the BSP may:
    - ✓ Perform a new PQ test on the overall Pool
    - ✓ Perform a PQ test on one or several Delivery Points, for example consisting only of new DP_{PG}
  - For DP_{SU}, a PQ test per operating mode must be performed
- **Removal of DP(s)**: a PQ test is not mandatory to remove a DP from a Pool (however BSP can do a new PQ test on the complete Pool, if preferred). The max volume that can be offered in capacity auctions is adapted accordingly.
- **DP switch from one BSP to another**: DP registration must be completed by the new BSP before performance of a PQ test on the transferred DP. However, metering requirements, EMS,… can already be sent prior to the transfer.

STAKEHOLDERS FEEDBACK

Stakeholders have shared mainly 3 concerns on PQ Test

✓ No concerns were received on the onboarding process

1. **Increase competition by facilitating BSP switch**
   i. Some MPs are concerned with the general lead time of the BSP switch
   ii. Some MPs consider a new PQ test as unnecessary
2. **Facilitate PQ process for industrial processes and intermittent RES that struggle at being available for 24h**
   i. There are industrials able to offer their flexibility but only 8h/day 5 days/week, e.g.
   ii. For wind farms, e.g., max volume that can be offered as aFRR may vary a lot in 24h
   iii. A battery prequalifying the complete volume between maximum injection and maximum offtake cannot do so as it would lead to a depletion of the energy reservoir (to maintain the baseline at the required level waiting for the start of the test)
3. **A DP can only be part of one PQ test**
   i. If the BSP wants to prequalify upward & downward power (not necessarily symmetric), it has to do a symmetric test

NEW DESIGN PROPOSAL

Philosophy behind new Prequalification design

Two main takeaways:

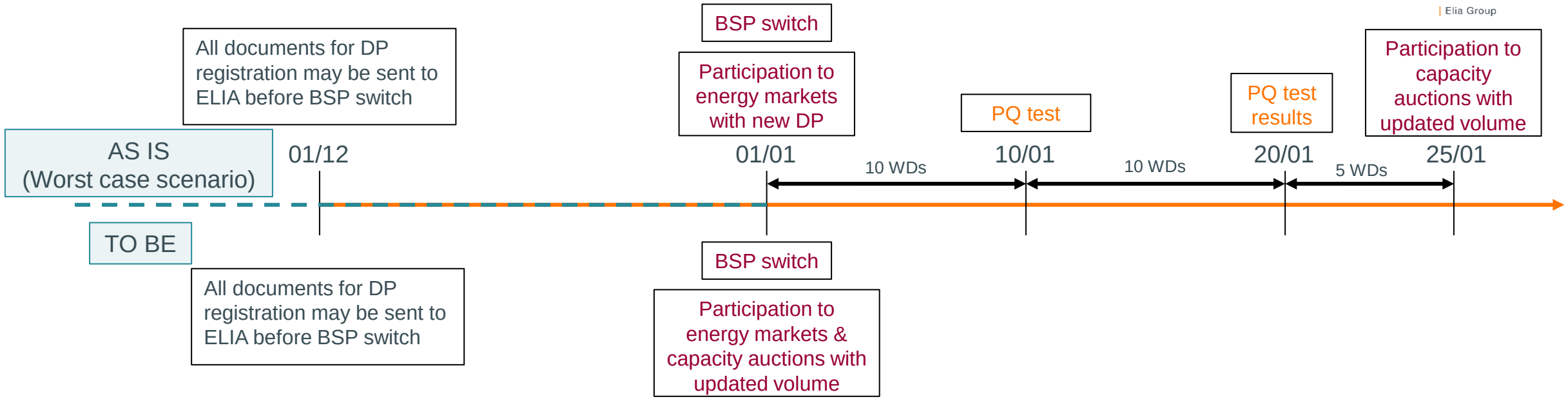
1. The **ownership** of the **prequalified volume** will shift from the BSP to the **Grid User**

> *Empower the Grid User to go on the market and valorize its flexibility*

2. Amend the prequalification process to **lower barriers** to the participation of **new and existing technologies** to capacity auctions

> *BSP benefits from a relaxation of conditions regarding the (permanent) availability of its DPs during prequalification, however BSP should use this relaxation in a responsible way in the capacity auctions: misuse of this freedom will lead to penalties in activation and availability control*

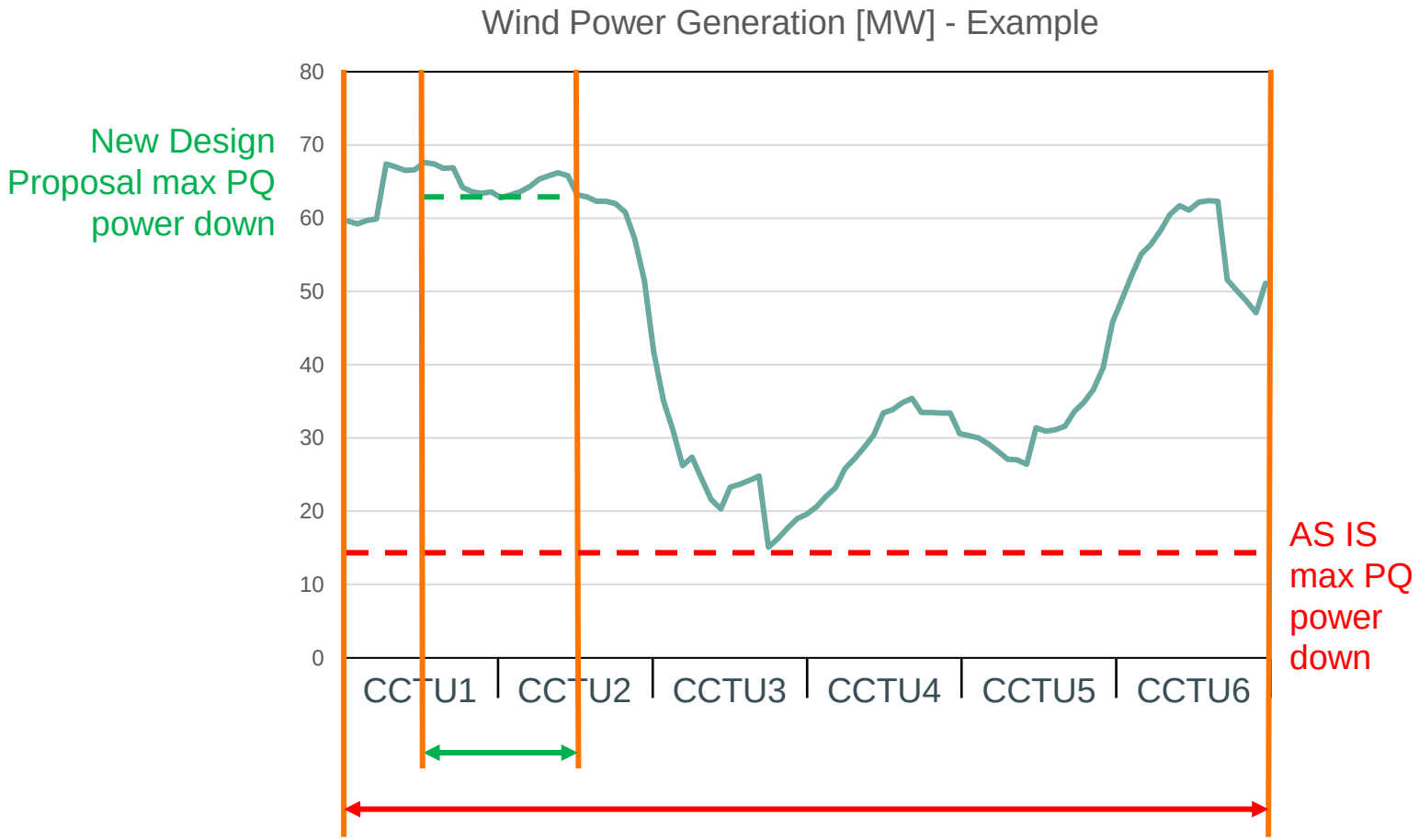
ELIA's Proposal to Facilitate BSP Switch



- Any DP not prequalified needs to do a PQ test in order to update the max prequalified power that the BSP can offer in capacity auctions
- Link the prequalified volume to the DP ⇒ volume 'ownership' to the Grid User ⇒ GU can offer its flexibility means to any BSP (reduction of 'lock-in' effect)
- In case of PQ test done via synthetic profile ⇒ volume 'ownership' to the BSP
- In case of **BSP switch**:
  - DP_{SU} & DP_{PG} prequalified individually: new BSP can immediately use prequalified volume in capacity auctions
    - If the transferred DP is not or incorrectly used for activation ⇒ reduction of the PQ volume*
  - DP_{PG} prequalified with a synthetic profile: new BSP must perform a PQ test with this DP before participating to capacity auctions

* Modalities still to be defined

ELIA's Proposal to Reduce the PQ Time Window



ELIA proposes to reduce the current 24h time window to a **4h time window** (not necessarily a given CCTU), with the possibility for the BSP to notify ELIA shortly before if it commits to the PQ test

⇒ Result of the PQ test will be valid for all CCTUs, regardless of the agreed 4h block

⇒ Critical to lower barrier for all technologies

⇒ BSPs are expected to consider the available volume in their capacity and energy bidding strategies: if they don't, they will be penalized via availability tests and/or activation control

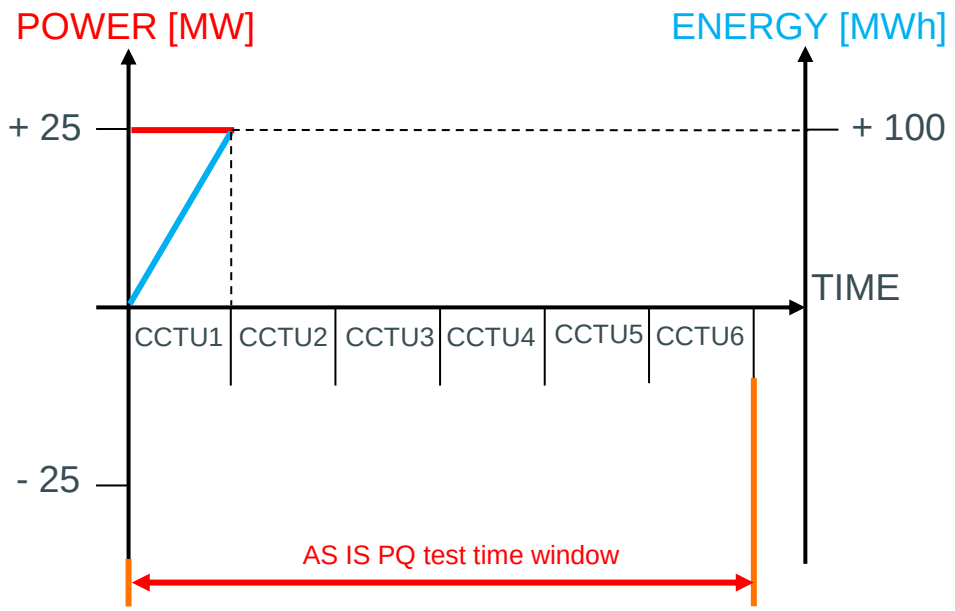
AS IS time window

New Design Proposal time window

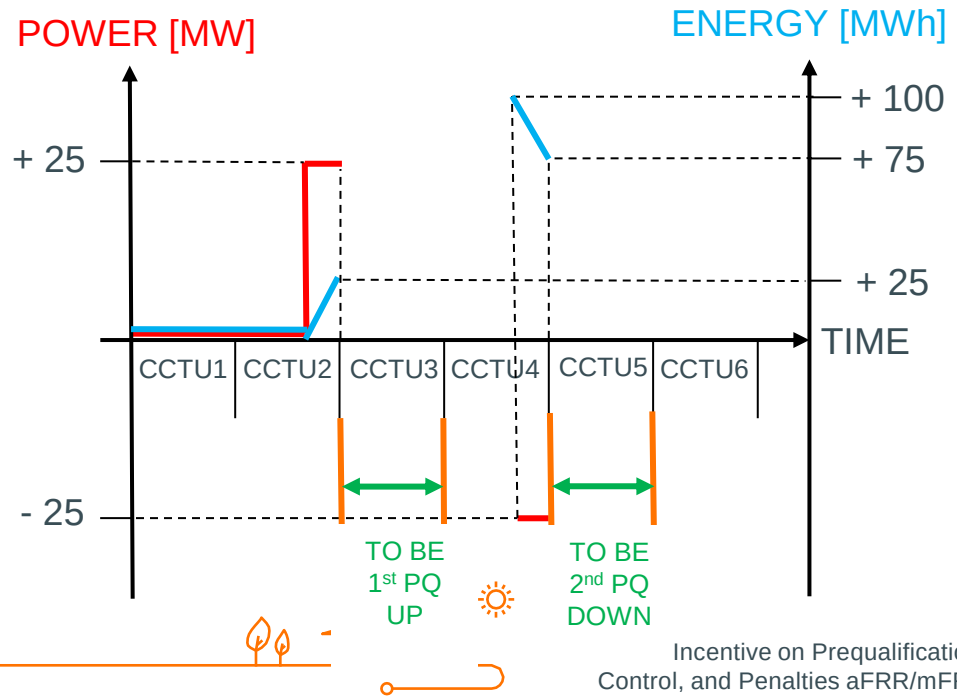
ELIA's Proposal to allow asymmetric PQ Tests

- Consider a 25 MW / 100 MWh battery willing to prequalify 50 MW aFRR Up & 25 MW aFRR Down
- AS IS design: impossible to prequalify asymmetrically, and the 24h time window of the PQ test may lead to a saturation of the reservoir before the start of the test because baseline should be at +25 MW for the 50 MW aFRR Up PQ test
- TO BE design: possibility to prequalify asymmetric volumes by performing 2 PQ tests (up and down) & reduction of the time window to 4h
- DISCLAIMER: LER assets still subject to EMS to prove the ability of the DP to comply with the balancing product requirements

AS IS



TO BE



CONTROL & PENALTIES

Penalties Goal

	Context/Control	Penalty	Products on which the penalty applies	Goal
Closer to RT	**Submission of aFRR/mFRR Contracted Energy Bids**	**Penalty for aFRR/mFRR Made Available**	✓ aFRR or mFRR **contracted** bids	• **The goal of this penalty is to ensure that the capacity awarded in the capacity auction is available via contracted energy bids.** • The penalty scheme should give the BSP the incentive to adequately report its unavailabilities.
	Availability control	**Penalty for aFRR/mFRR Missing MW**	✓ aFRR or mFRR **contracted** bids	• **The goal of this penalty is to ensure that the balancing capacity bids are reliable, i.e., that the capacity obligation is fulfilled. It makes particularly sense for contracted bids seldomly activated (end of mFRR MOL, e.g.).** • This penalty should give a strong incentive to provide awarded capacity to Elia, and should be rather high as it is a punctual test (max 12 times/year)
	Activation control for aFRR	**Penalty for aFRR Energy Discrepancy**	✓ All aFRR energy bids	• **The goal of this penalty is to ensure that the balancing energy bids are reliable.**

Penalty for MW Made Available

Due to a Capacity Obligation not fulfilled

DESIGN AS IS

Penalty for MW Made Available

- **Context:** After clearing of Capacity Auction, all awarded capacity bids lead to the obligation to submit contracted energy bids, which must be submitted at the latest in D-1 at 15:00. The validity period of an energy bid is 15 min. If, for one QH, the MW Made Available* (per product per direction) is *lower* than the corresponding Obligation, ELIA applies the Penalty for MW Made Available.
- **Goal:** Ensure that the capacity awarded in the capacity auction is available for activation via contracted energy bids
- **Motivation:** Find right balance between incentivizing the BSPs to adequately report any unavailability & incentivizing the BSPs to fulfill their obligations

Current Penalty Formula:

$$P_{\text{aFRR Made Available}}(\text{Month M}) = \sum_{\text{All CCTU of Month M}} P_{\text{aFRR Made Available}}(\text{CCTU})$$

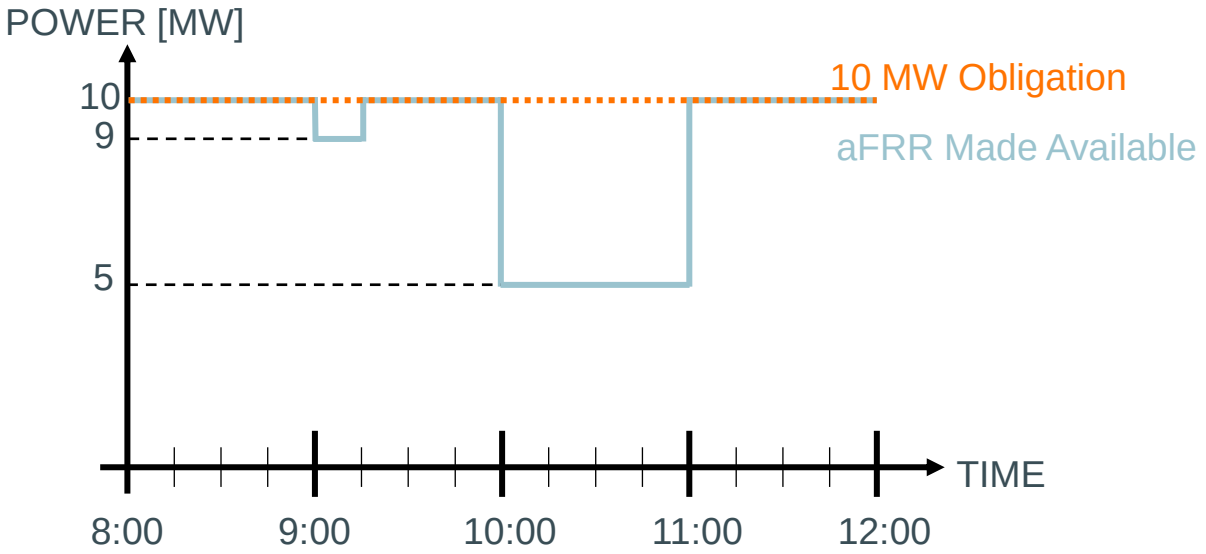
$$P_{\text{aFRR Made Available}}(\text{CCTU}) = \#\text{CCTU}_{\text{non-compliant}} * \text{MW}_{\text{not made available}} * \text{CP}_{\text{WA}}$$

- CCTU_{nc}: increases by one unit after each non-compliant CCTU in a 30-day rolling window
- MW_{nma}: difference between Obligation and MW Made Available of the given CCTU
- CP_{WA}: weighted average of the capacity prices of the bids awarded to the BSP in the 30-day rolling window (weight = volume awarded)

* For aFRR, the aFRR Made Available is the quantity of aFRR Capacity (in MW) made available to ELIA by the BSP through the submission of contracted aFRR Energy Bids

Quantitative Example

- In Month M, a BSP is awarded 10 MW in aFRR capacity auctions for every CCTU of the month & CP_{WA} = 20 €/MW/h
- For CCTU3 of day 1, BSP is remunerated 10 MW x 4 h x 20 €/MW/h = 800 €, and submits the following aFRR Made Available:



Non-compliant QHs of CCTU2	9:00-9:15	10:00-10:15	10:15-10:30	10:30-10:45	10:45-11:00
aFRR Obligation [MW] (1)	10	10	10	10	10
aFRR Made Available [MW] (2)	9	5	5	5	5
(1) – (2)	1	5	5	5	5
$MW_{not\ made\ available}$ [MWh]	= ¼*(1+5+5+5+5) = 5.25				

QH → h

This table illustrates how the penalty evolves when there are multiple non-compliant CCTUs in the rolling-window (with MW_{nma} & CP_{WA} constant)

$\#CCTU_{nc}$	Penalty = $\#CCTU_{nc}$ x MW_{nma} x CP_{WA}	% compared to CCTU remuneration
1	1 x 5.25 x 20 = 105 €	105/800 = 13 %
2	2 x 5.25 x 20 = 210 €	210/800 = 26 %
3	3 x 5.25 x 20 = 315 €	315/800 = 39 %

Penalty for MW Made Available
STAKEHOLDERS FEEDBACK

There were mainly 2 types of feedback received

1. **Quadratic evolution of the penalty due to the #CCTU$_{nc}$ factor** ⇒ large penalties after a few non-compliances in the rolling window ⇒ incentive to not report unavailabilities & take the risk to be tested or activated
2. **Penalty linked to a given non-compliant CCTU is function of previous non-compliant CCTUs in the rolling window**
   - E.g.: penalty is greater for 10 times 1 MW not made available than 1 time 10 MW not made available
   - Mainly a concern for BSPs with large number of DPs constituting their pool

Other feedbacks:

- Suggestion to introduce a flat rate
- Rolling window is too large
- Penalty formula is too complex

Penalty for MW Made Available
NEW DESIGN PROPOSAL

Introduction of 2 penalty levels

$$P_{aFRR\ Made\ Available}(Month\ M) = \sum_{All\ CCTUs\ of\ Month\ M} P_{aFRR\ Made\ Available}(CCTU)$$

1st level: $P_{aFRR\ Made\ Available}(CCTU) = factor1 * MW_{not\ made\ available} * CP_{CCTU}$

2nd level: $P_{aFRR\ Made\ Available}(CCTU) = factor2 * MW_{not\ made\ available} * CP_{CCTU}$

*Where factor1, factor2 are **constants*** and CP_{CCTU} is the capacity price weighted average of the concerned CCTU awarded to the BSP*

- **Proposal to:**
  - ✓ Keep a progressive penalty scheme in order to make a distinction between exceptional and frequent unavailabilities
  - ✓ Avoid penalty levels that provide wrong incentives while still ensuring responsible behavior of the BSPs in the capacity auctions
  - ✓ Introduce **2 penalty levels** with a **threshold** to go from level 1 to level 2 based on the average compliance in a 30-day rolling window, where level 1 is the default penalty and level 2 is meant for BSPs with *large* non-compliances in the rolling window

* To be calibrated by next workshop (22/06)

Penalty for Missing MW

Due to a failed availability test

DESIGN AS IS

Penalty for Missing MW

- **Context:** ELIA can request an availability test on **contracted energy bids,** for which BSP must use the DPs composing the tested bid
  - **aFRR:** the availability test is failed if the aFRR Power Supplied is inferior (respectively superior) to the aFRR Requested for more than 15 Time Steps in case of availability test in the upward direction (respectively downward direction)
  - **mFRR:** the availability test is failed if the mFRR Supplied is inferior (respectively superior) to the mFRR Requested in case of availability test in the upward direction (respectively downward direction)
- **Goal:** Ensure the availability of contracted energy bids. Makes most sense for seldomly activated bids (end of mFRR MOL, e.g.)
- **Motivation:** Incentive for the BSP to allocate its flexibility means in line with its capacity obligations

Current Penalty Formula (in case of failed test) – same for mFRR:

$$P_{\text{aFRR Missing MW}} = \sum_{\text{month M}} \alpha \times \text{aFRR Missing MW} \times CP_{WA} \times \#\text{CCTU} \times \text{hours}_{\text{CCTU}}$$

- **α** = 0.75 by default. If 2nd consecutive test failed, then α = 1.5
- **CP_{WA}**: weighted average of the capacity prices of the bids awarded to the BSP in the 30-day rolling window (weight = volume awarded)
- **#CCTU**: the number of CCTUs for which at least one capacity bid of the concerned product has been awarded to the BSP in a 30-day rolling window
- **Missing MW**: difference between the volume requested during the test and the volume actually delivered

Quantitative Example in case of failed mFRR Availability Test (same principle for aFRR)

- A BSP has continuously participated in mFRR capacity auctions & has been awarded some volume across all CCTUs of the 30-day rolling window (CP_{WA} = 20 €/MW/h)
- ELIA requests an availability test on a 10 MW contracted energy bid of BSP
- BSP fails the availability test by supplying only 8 MW
- $Penalty_{mFRR\ Missing\ MW}$ = α * mFRR Missing MW * CP_{WA} * #CCTU * $hours_{CCTU}$
  = 0.75 * (10 – 8) * 20 * (6 CCTUs/day * 30 days) * 4
  = 21.600 €
- If BSP fails the second consecutive availability test, α equals to 1.5
- In the exact same conditions as the first test, the penalty linked to the 2nd failed test is doubled

Penalty for Missing MW
STAKEHOLDERS FEEDBACK

No concerns were expressed by MPs on the penalty formula

- Most market parties agree with significant penalty in case of failed availability test, as capacity obligations correspond to a firm commitment from the BSP
- A MP proposed to do more availability tests & reduce the penalty for a failed test. ELIA reminds that availability tests are **not** remunerated.

Proposal to: **not** modify the penalty formula, but rather implement **smart testing** to have better insight on capacity availability

Penalty for Activation Control aFRR
DESIGN AS IS

Penalty for Activation Control aFRR

- **Context:** ELIA continuously controls the quality of aFRR delivery via the activation control (contracted & non-contracted energy bids)
- **Goal:** check the quality of the aFRR Supplied

Current Penalty Formula:

$$\text{aFRR Energy Discrepancy penalty(M)} = 1{,}3 \times \frac{\text{aFRR Energy Discrepancy(M)}}{\text{aFRR energy requested(M)}} \times \text{remuneration(M)}$$

Where remuneration(M) is the sum of capacity remuneration & | energy remuneration | of the month

Quantitative Example

- For Month M, BSP A earns 300k € of capacity remuneration (= aFRR Awarded remuneration) & 200k € of energy remuneration (= aFRR Requested remuneration). *The 15% tolerance band is neglected for the sake of the example.*
- aFRR Energy Requested(M) = 1000 MWh
- aFRR Energy Supplied(M) = 950 MWh
- Discrepancy(M) = 1000 – 950 = 50 MWh
- Failed: 50/1000 = 5%
- aFRR Energy Discrepancy penalty(M) = $1.3 * \frac{aFRR\ Energy\ Discrepancy(M)}{aFRR\ Energy\ Requested(M)} * remuneration(M)$

$$= 1.3 * \frac{50}{1000} * (300 + 200) * 10^3$$

$$= 32.500\ €$$

Penalty for Activation Control aFRR
STAKEHOLDERS FEEDBACK

There were mainly 2 types of feedback received

1. The monthly granularity does not capture the value of the service at the time of the discrepancy, and may lead to situations of arbitrage when large price spreads occur during a given month
2. Some MPs don’t understand why the capacity remuneration is considered in the penalty formula, and suggest to remove it

Arbitrage Identification

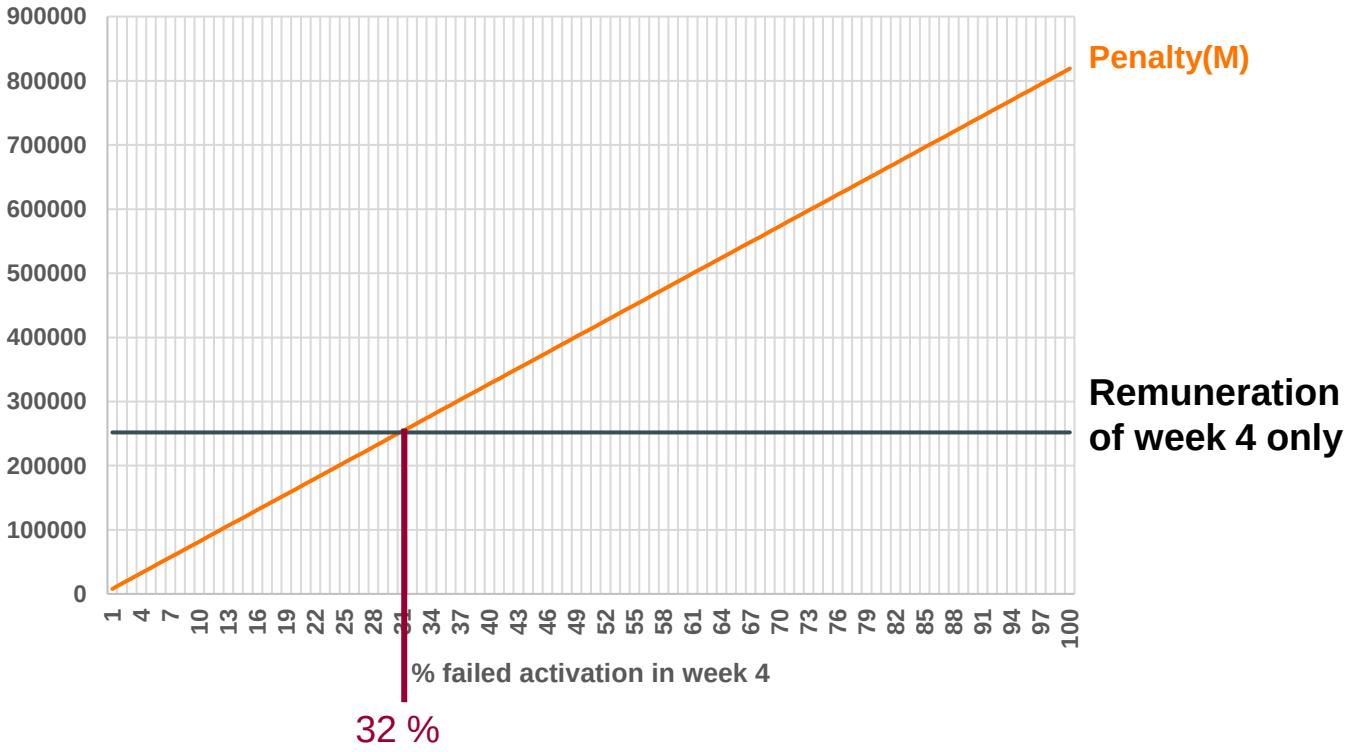
- Consider a BSP, contracted for 10 MW of aFRR up on all CCTUs of the 1st and 4th weeks of month M with:
  - ✓ High capacity & energy prices at start of the month
  - ✓ Low capacity & energy prices at end of the month
  - ✓ 100% activation of all the energy bids
- Penalty for activation control is function of the remuneration of the whole month ⇒ BSP may have incentive to bid less capacity/energy at the end of the month to avoid that underdelivery at the end of the month influences high remuneration of beginning of the month

Period	# of CCTUs	Volume awarded per CCTU	Capacity Price	Capacity Remuneration	Energy Price	Energy Remuneration
WEEK 1	42	10 MW	200 €/MW/h	200 x 10 x 4 x 42 = 336 k€	350 €/MWh	350 x 10 x 4 x 42 = 588 k€
WEEK 4	42	10 MW	50 €/MW/h	50 x 10 x 4 x 42 = 84 k€	150 €/MWh	150 x 10 x 4 x 42 = 252 k€

- Total remuneration of week 1 = capacity remuneration + energy remuneration = 924 k€
- Total remuneration of week 4 = 336 k€

➢ **Consider 0 % failed activation for week 1, and y% for week 4**

Period	Remuneration (M) [€]	aFRR Energy Requested (M) [MW]	aFRR Energy Discrepancy(M) [MW]	Penalty activation control [€]
WEEK 1	336 + 588 = 924 k€	10 x 4 x 42 = 1680 MW	0 MW	/
WEEK 1 + WEEK 4	924 + 84 + 252 = 1260 k€	1680 + 10 x 4 x 42 = 3360 MW	0 + y% x 1680 MW	1.3 x (0 + y% x 1680) / 3360 x 1260k

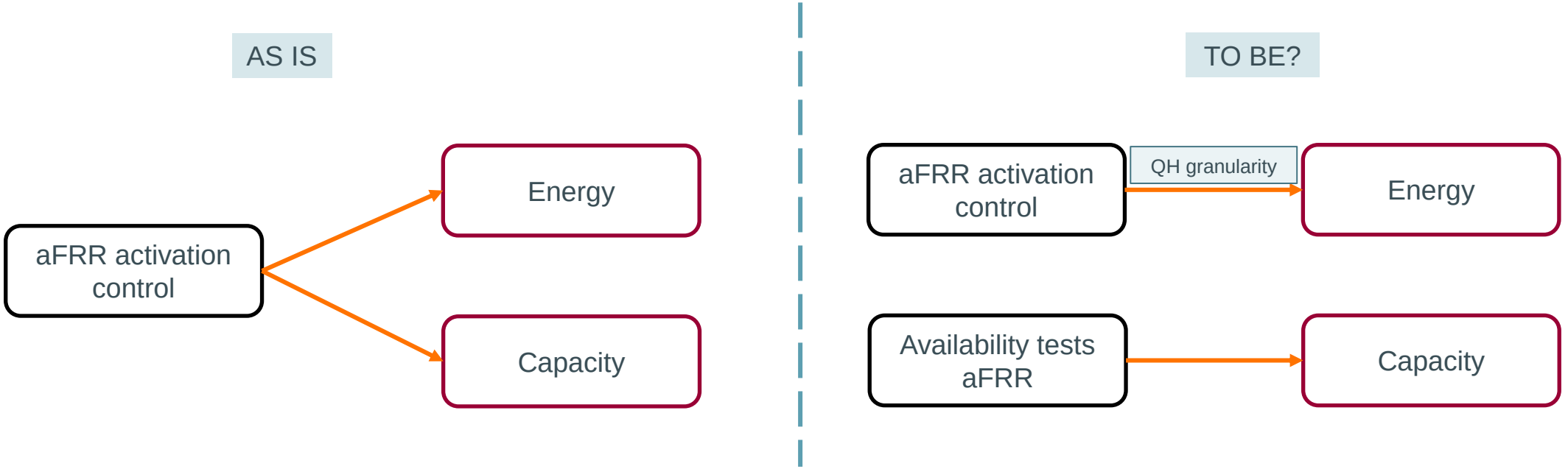


- In this example, the BSP loses all remuneration of week 4 due to a failed activation of 32% during week 4
- If the failed activation is greater, it loses remuneration of week 1

- A failed activation, during a given time period (CCTU or QH, e.g.), should a priori only be function of the energy delivered, the energy discrepancy, and the remuneration *of the given time period*

Penalty for Activation Control aFRR
NEW PRELIMINARY DESIGN PROPOSAL

ELIA has investigated a potential reduction in granularity & the removal of the capacity remuneration factor



- Today, ELIA controls both aFRR energy & capacity via aFRR activation control with a monthly granularity
- Going for a QH granularity allows to link the penalty to the QH remuneration and prevents risks of arbitrage in case of large price spreads
- In the future, ELIA expects to have more aFRR non-contracted bids. A potential entry barrier for non-contracted bids is the coupling between energy & capacity remunerations and their associated penalties ⇒ ELIA is investigating how to decouple energy and capacity controls

NEXT STEPS

Next Steps

- ELIA reminds that any feedback is welcome and preferably to be provided by **22/05**
- Next stakeholders workshop foreseen on **22/06** in which ELIA will, in addition to stakeholders' feedback:
  - Deep dive more in the new PQ design proposal
  - Calibrate the constants in the Penalty for MW Made Available to give BSPs the right incentives
  - Investigate alternatives for aFRR activation control penalty formula

Thank You.