Congestion Risk Indicator
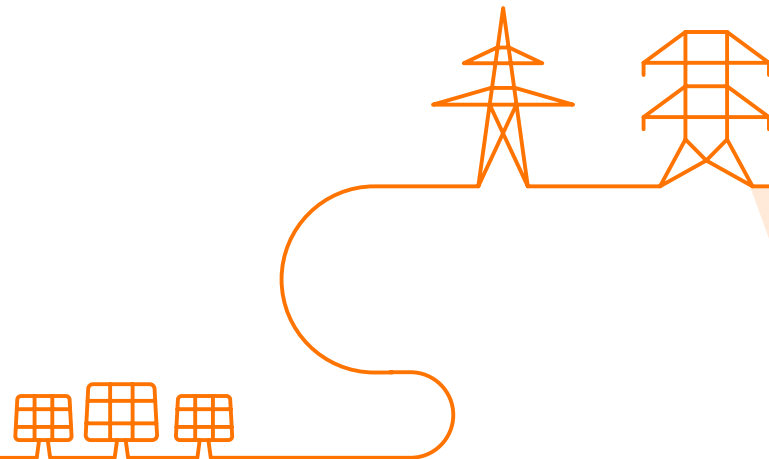
Workshop focus on filtering process

08/05/2023
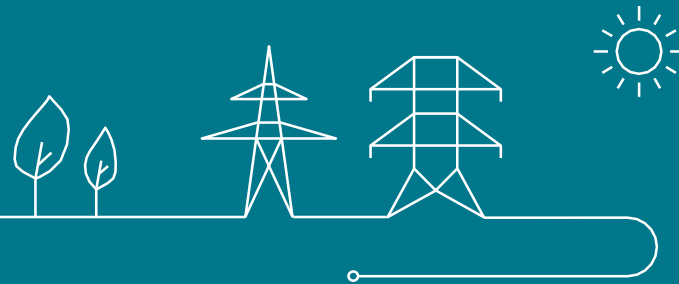
Agenda

Congestion Risk Indicator

elia group

The Congestion Risk Indicator (CRI) represents the congestion risks in an Electrical Zone

There are 3 levels of CRI:

Low CRI

No congestion are forecasted

MW cap = ∞

→ **All increases of production (resp. decrease) are tolerated by the grid**

Medium CRI

N-1 violation > 100% in case of incr./decr. of production in the zone

MW cap > 0

→ **Only a volume of MW Cap of increase of production (resp. decrease) is tolerated by the grid**

High CRI

N-1 violation > 100% with most updated forecasts / schedules

MW cap = 0 MW

→ **No increase of production (resp. decrease) is tolerated by the grid**

These levels of CRI are determined:

… **for a direction**

Upward
Downward
Both upward and downward

… **for a specific duration**

Hourly granularity

… **for an electrical zone**

- 380kV
- Langerbrugge West
- Langerbrugge East
- Brussels / Schaerbeek
- Merksem
- Liège
- Stalen
- Ruien
- Hainaut West
- Hainaut East

The CRI is used
- To set a limit (=MWCap) on the balancing energy allowed to be activated in the zone; and
- To request a Return to Schedule in real time in the direction of the congestion risk

CRI - Different process with different time horizons are linked to the CRI

1.

ZONE IDENTIFICATION

Process to define the electrical zones subject to a level of CRI

Around once a year

2.

LEVEL DETERMINATION

Process to define level of CRI (high, medium, low) for each zone

Determination in D-1

3 updates in ID

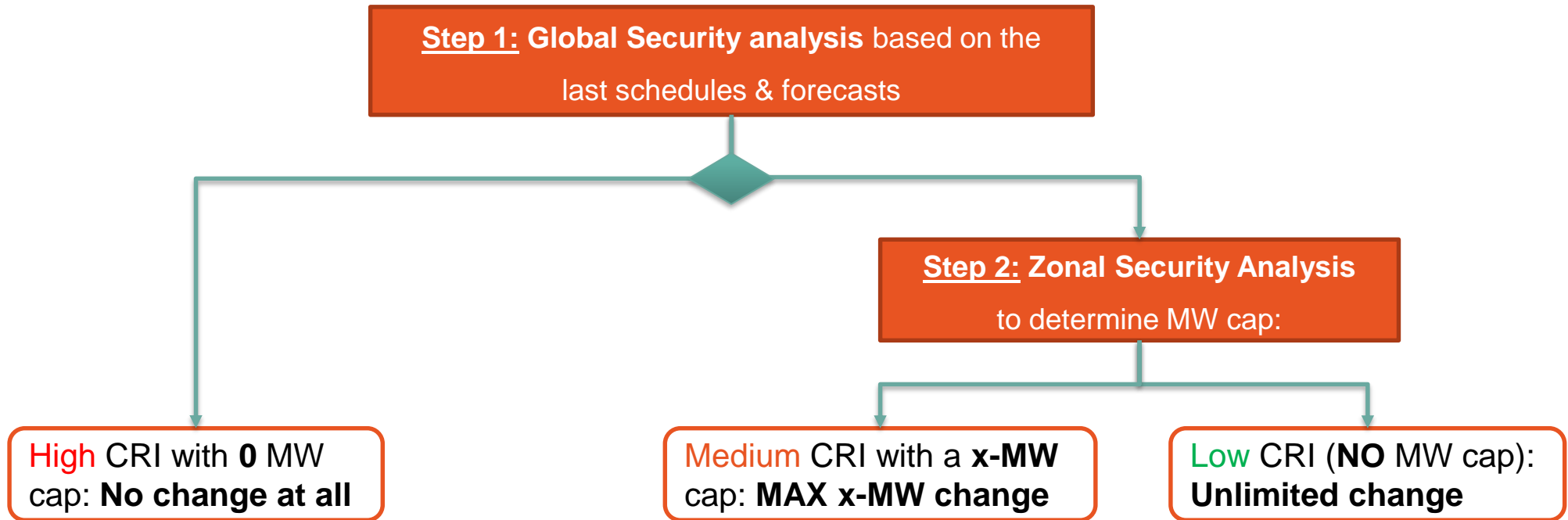**3.**

FILTERING OF BALANCING ENERGY BIDS

Process to filter aFRR & mFRR Energy Bids based on CRI levels

10' before each QH

ZONE	CRI UP	CRI DOWN	MW cap U	MW cap D
1	MEDIUM	LOW	90 MW	/
2	HIGH	LOW	0 MW	/
3	LOW	MEDIUM	/	- 60 MW
4	MEDIUM	HIGH	100 MW	0 MW

CRI level determination
is performed in two-step approach:

Step 1: Global Security analysis based on the last schedules & forecasts

Step 2: Zonal Security Analysis to determine MW cap:

High CRI with **0** MW cap: **No change at all**

Medium CRI with a **x-MW** cap: **MAX x-MW change**
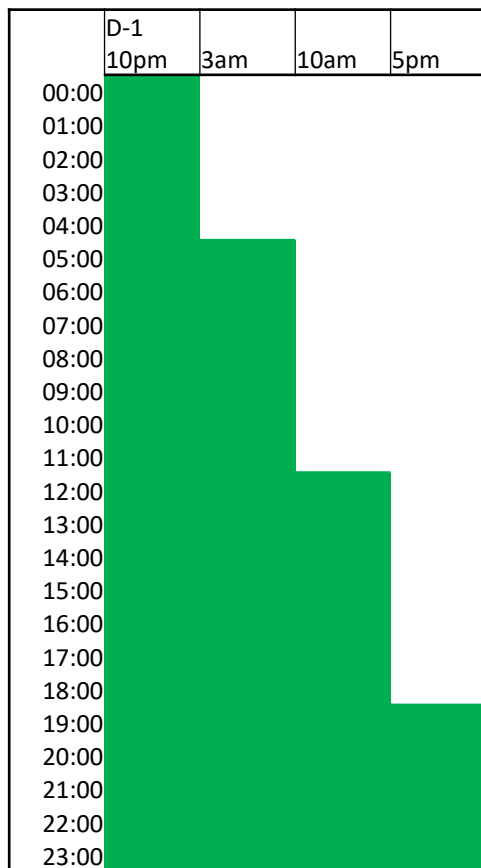
Low CRI (**NO** MW cap): **Unlimited change**

The outcome of this determination is a the **CRI level** (High, Medium, Low) **per zone**, **per hour & per direction**
ELIA informs the BSP of the CRI levels determination & updates:
➜ via the dedicated ELIA web page &
➜ via a B2B message for impacted DP

The CRI determination process runs at least 3 times in Intraday

	D-1 10pm	3am	10am	5pm
00:00				
01:00				
02:00				
03:00				
04:00				
05:00				
06:00				
07:00				
08:00				
09:00				
10:00				
11:00				
12:00				
13:00				
14:00				
15:00				
16:00				
17:00				
18:00				
19:00				
20:00				
21:00				
22:00				
23:00				

- In D-1: results for the whole day at 10pm

- In ID*:

    - Delivery hour: 4 am covering period from 5 am to 12 am

    - Delivery hour: 11 am covering period from 12 pm to 12 am

    - Delivery hour: 6 pm covering period from 7 pm to 12 am

timings are indicative and may be subject to change

In practice

elia group

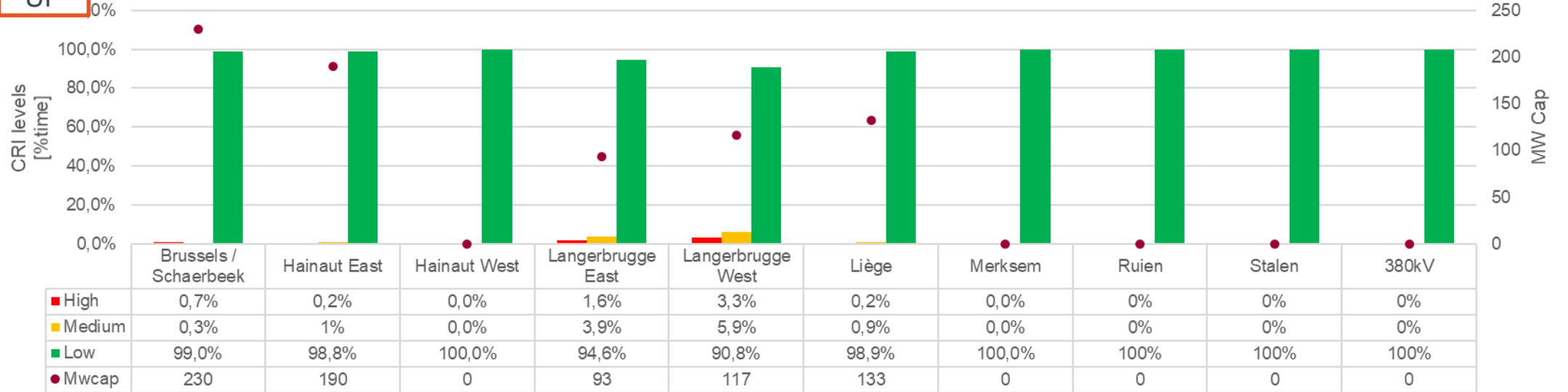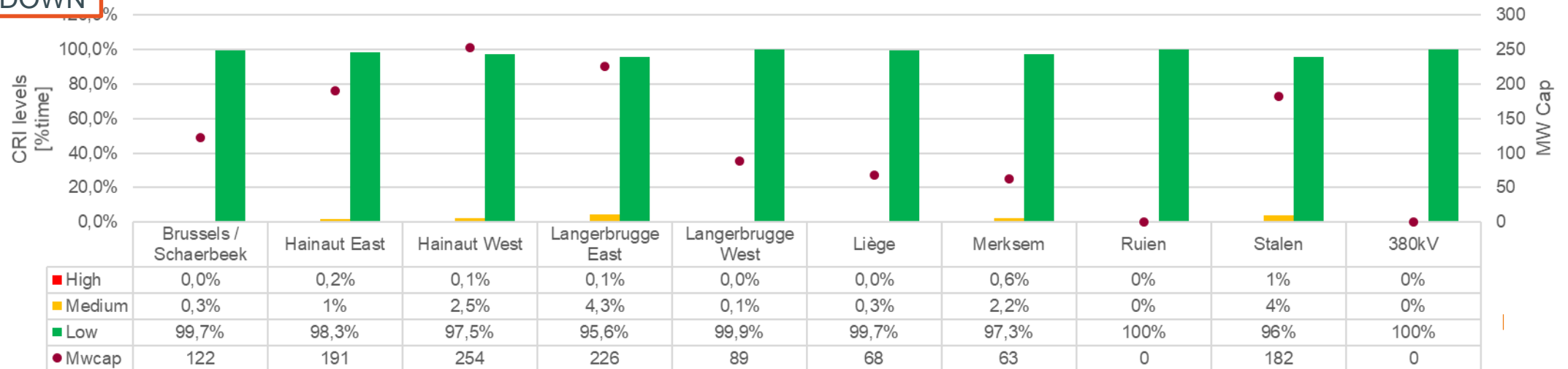|	Before October 2022	AS IS	Post mFRR & iCAROS go-live
Determination of indicator	• Once in D-1, ad-hoc in ID	• Level determined at 10pm in D-1 & updated 3 times in ID • Based on a structural methodology and quantitative yearly process	
Impact of the indicator	Use to: • Prevent change of schedules • Set a limit on bids activation (BFU strong filter – mFRR/aFRR operator decisions – Risk Manangement)		Use to: • Set a limit on aFRR/mFRR bids & limit deviation from Schedules • Freedom of dispatch: No impact on schedules

Statistics - CRI levels determination in Q4 2022

UP

	Brussels / Schaerbeek	Hainaut East	Hainaut West	Langerbrugge East	Langerbrugge West	Liège	Merksem	Ruien	Stalen	380kV
■ High	0,7%	0,2%	0,0%	1,6%	3,3%	0,2%	0,0%	0%	0%	0%
■ Medium	0,3%	1%	0,0%	3,9%	5,9%	0,9%	0,0%	0%	0%	0%
■ Low	99,0%	98,8%	100,0%	94,6%	90,8%	98,9%	100,0%	100%	100%	100%
● Mwcap	230	190	0	93	117	133	0	0	0	0

DOWN

	Brussels / Schaerbeek	Hainaut East	Hainaut West	Langerbrugge East	Langerbrugge West	Liège	Merksem	Ruien	Stalen	380kV
■ High	0,0%	0,2%	0,1%	0,1%	0,0%	0,0%	0,6%	0%	1%	0%
■ Medium	0,3%	1%	2,5%	4,3%	0,1%	0,3%	2,2%	0%	4%	0%
■ Low	99,7%	98,3%	97,5%	95,6%	99,9%	99,7%	97,3%	100%	96%	100%
● Mwcap	122	191	254	226	89	68	63	0	182	0

Overview of the CRI impact

High CRI (0 MW Cap)

No increase of production (resp. decrease) is tolerated by the grid:

Until RD GCT*
- If schedule update in the direction (freedom of dispatch) ➔ Redispatching evaluated

From RD GCT to RT
- Limitation of activation of energy balancing bids in the direction
- No deviation from the schedules in the direction (Return-to-schedule request)

RD GCT = 45' before Real-Time (RT)

Low CRI (NO MW Cap)

All increases of production (resp. decrease) are tolerated by the grid:
- All activation of energy balancing bids in the direction
- Deviation from the schedules in the direction are allowed in real-time (update of Schedules in context of mFRR baseline requierd)

Medium CRI with x MW Cap

Only a volume of MW Cap of increase of production (resp. decrease) is tolerated by the grid:
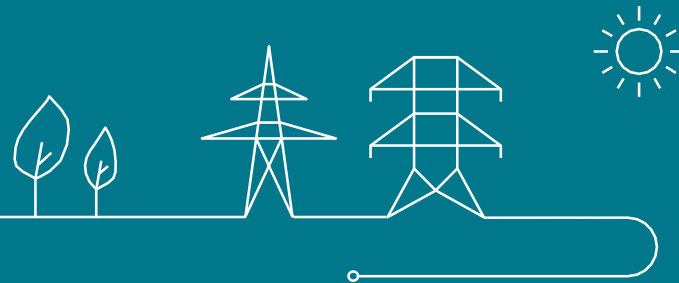
Until RD GCT*
- If schedule update, impact on the MW Cap.
- If schedule update in the direction (freedom of dispatch) ➔ Redispatching evaluated

From RD GCT to RT
- Limitation of activation of energy balancing bids could be activated
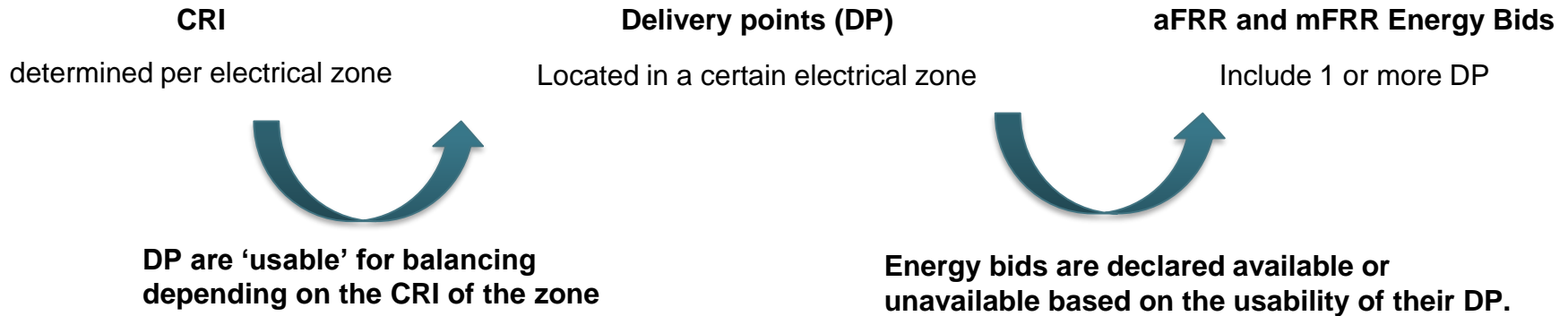- No deviation of schedules are allowed (Return to schedules request)

CRI filtering process

CRI - Different process with different time horizons are linked to the CRI

1.   **ZONE IDENTIFICATION**

Process to define the electrical zones subject to a level of CRI
    Around once a year

2.   **LEVEL DETERMINATION**

Process to define level of CRI (high, medium, low) for each zone
    Determination in D-1

3 updates 3 times in ID

3.   **FILTERING OF BALANCING ENERGY BIDS**

Process to filter aFRR & mFRR Energy Bids based on CRI levels
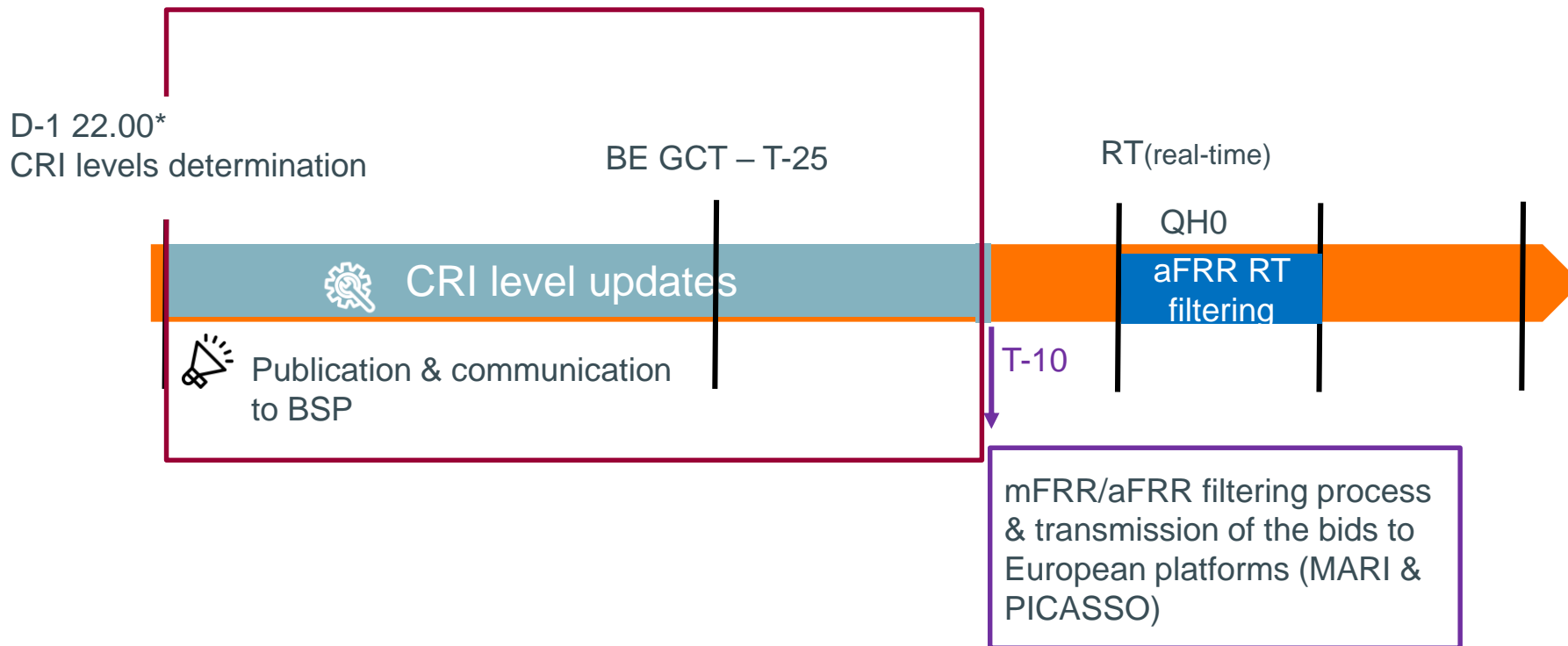   **10' before each QH**
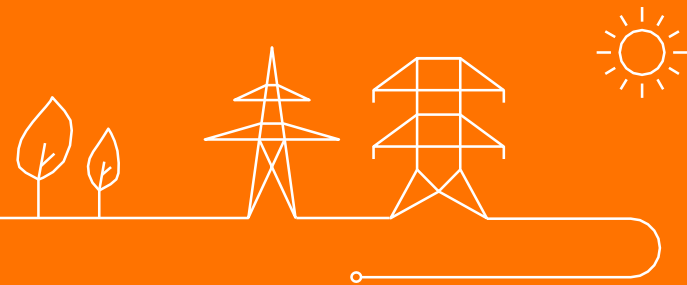
Steps in CRI filtering process

CRI

determined per electrical zone

DP are 'usable' for balancing depending on the CRI of the zone

Delivery points (DP)

Located in a certain electrical zone

aFRR and mFRR Energy Bids

Include 1 or more DP

Energy bids are declared available or unavailable based on the usability of their DP.

aFRR & mFRR Energy bids with DP in a Medium & High CRI zones may be set unavailable

Note: FCR bids are not impacted by filtering process

Timeline about information on DP usability for QH0

D-1 22.00*
CRI levels determination

BE GCT – T-25

RT(real-time)

QH0

CRI level updates

aFRR RT filtering

Publication & communication to BSP

T-10

mFRR/aFRR filtering process & transmission of the bids to European platforms (MARI & PICASSO)

*at the latest

Before filtering process

Before filtering process

- The **CRI levels can be updated until filtering process**:
  - Why: due to update of schedules, changes in forecasts or remedial actions taken to solve a congestion.
  - CRI levels updates are communicated before filtering process to inform the BSP of the risk that the concerned mFRR Energy Bid(s) may be filtered (= declared as "unavailable")
    - Publication of CRI level on the Elia website
    - B2B message sent to the concerned BSP
  - → Before BE GCT, the **BSP** has a best effort obligations to **avoid unavailability of contracted energy bids** based on the CRI information (cfr article II.11.18 in aFRR BSP contract and article II.10.9 in mFRR BSP)
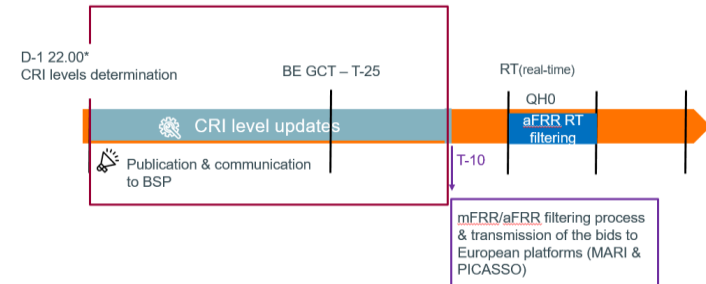
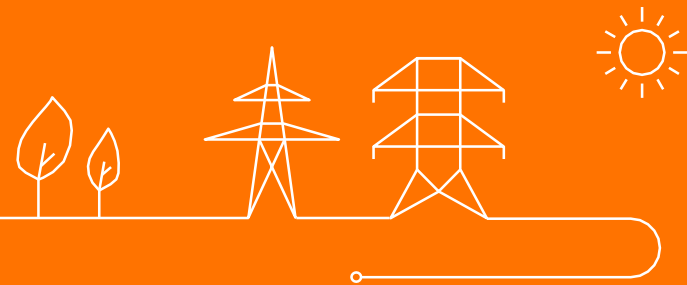**A CRI before filtering process gives the following message:**

Low CRI

DP is usable

Medium CRI   High CRI
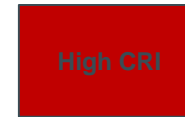
DP may become unusable depending on the outcome of CRI filtering
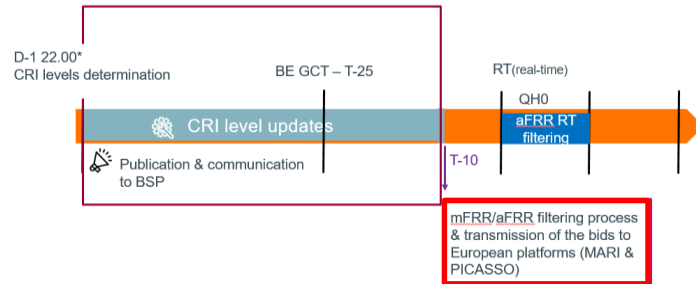
CRI filtering for mFRR

Principles for filtering mFRR Energy bids

1) Determination of the usability of the DP included in the mFRR Energy bid, based on:
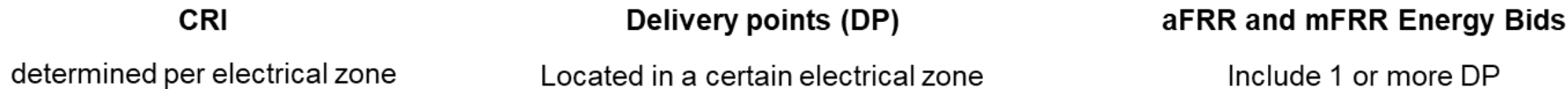
- CRI level of the zone of the DP
- Filtering rules for Medium CRI zone

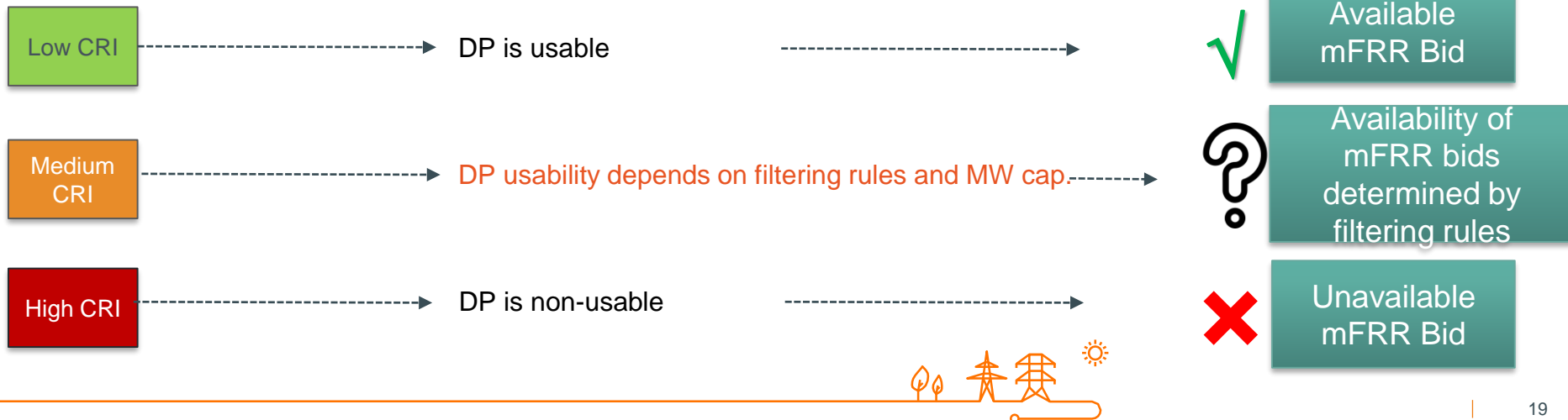2) Determination of the availability of the bid

- All DPs are usable ➔ bid is available
- One DP is unusable ➔ bid is unavailable

Filtering of mFRR bids at T-10'
from CRI level to availability of bids

CRI
determined per electrical zone

Delivery points (DP)
Located in a certain electrical zone

aFRR and mFRR Energy Bids
Include 1 or more DP

Filtering of mFRR Energy bid depends on the CRI levels of DPs included in the mFRR energy bid and filtering rules

Low CRI	DP is usable	✓ Available mFRR Bid
Medium CRI	DP usability depends on filtering rules and MW cap.	? Availability of mFRR bids determined by filtering rules
High CRI	DP is non-usable	✗ Unavailable mFRR Bid

D-1 22.00*
CRI levels determination

BE GCT – T-25

RT(real-time)

QH0

CRI level updates

aFRR RT filtering

Publication & communication to BSP

T-10

mFRR/aFRR filtering process & transmission of the bids to European platforms (MARI & PICASSO)

D-1 22.00*
CRI levels determination

BE GCT – T-25

RT(real-time)

QH0

CRI level updates

aFRR RT filtering

Publication & communication to BSP

T-10

mFRR/aFRR filtering process & transmission of the bids to European platforms (MARI & PICASSO)

DP usability determines the availability status of a bid

- mFRR Energy Bids are **automatically filtered at T-10'** by the system

- The bidding system will mark as « **unavailable** » the filtered bids

Case 1

DP included in mFRR energy bid	CRI impact on DP usability	Bid availability status
DP1	usable	
DP2	usable	available
DP3	usable	

Case 2

DP included in mFRR energy bid	CRI impact on DP usability	Bid availability status
DP1	**Non-usable**	
DP2	usable	unavailable
DP3	usable	

Case 3

DP included in mFRR energy bid	CRI impact on DP usability	Bid availability status
DP1	**Non-usable**	
DP2	**Non-usable**	unavailable
DP3	**Non-usable**	

Filtering in Medium CRI

D-1 22.00*
CRI levels determination

BE GCT – T-25

RT(real-time)

QH0

aFRR RT filtering

CRI level updates

Publication & communication to BSP

T-10

mFRR/aFRR filtering process & transmission of the bids to European platforms (MARI & PICASSO)
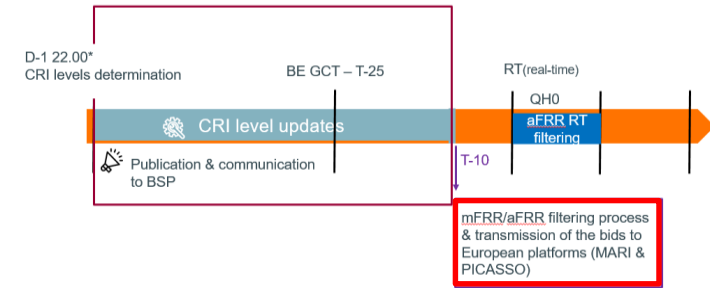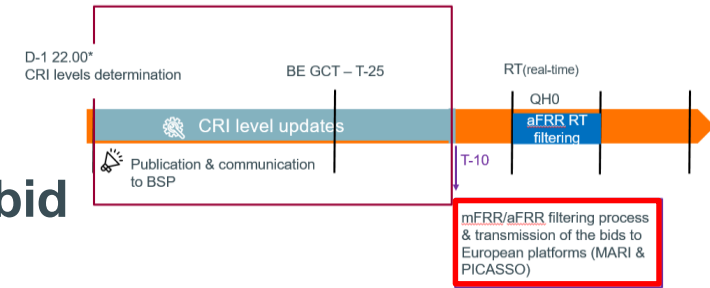
1. Determination of the "reference volume" of the Energy bid with DP in a Medium CRI

2. Determination of the "effective" MWcap used to filter the bids

3. Filtering according to filtering rules

D-1 22.00*
CRI levels determination

BE GCT – T-25

RT(real-time)

QH0

aFRR RT filtering

CRI level updates

Publication & communication to BSP

T-10

mFRR/aFRR filtering process & transmission of the bids to European platforms (MARI & PICASSO)
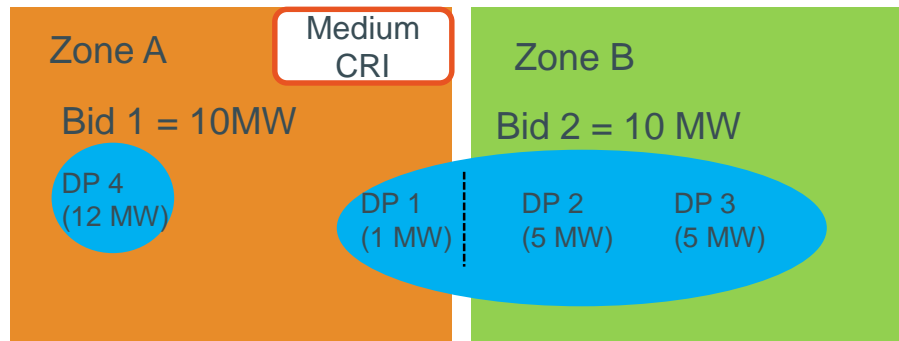
Determination of the "reference volume" of the Energy bid

Filtering of mFRR balancing energy bid in medium CRI zone will be based on:

- Bid with DPsu or single DPpg:

  bid volume

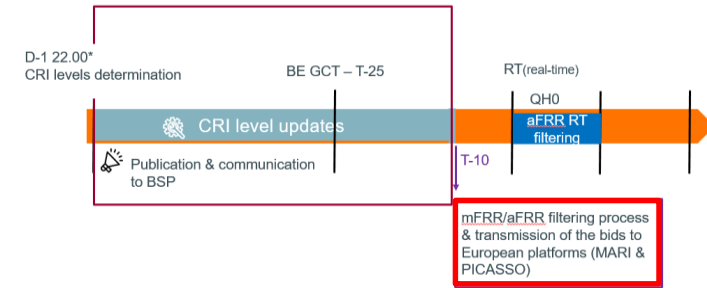- Bid containing several DPpg, where DPpg are located in several electrical zones:

  Minimum ($\Sigma_{\text{DP in CRI zone}}$ $DP_{\text{mFRR max}}$, bid volume)

Zone A

Medium CRI

Zone B

Bid 1 = 10MW

Bid 2 = 10 MW

DP 4 (12 MW)

DP 1 (1 MW)

DP 2 (5 MW)

DP 3 (5 MW)

	Bid volume	Reference Volume in Zone A
Bid 1	10	10
Bid 2	10	1

Values in () are the DP mFRR max of the DP

"Effective" MW cap for the automatic CRI filtering

- CRI determination (*) will provide a MW Cap for each Electrical Zone with a Medium CRI level

- This MW Cap will be used in the automatic filtering to determine the availability of mFRR energy bids

- Preliminary, the **effective MW cap** must be computed considering

    1. Volume of available aFRR Energy bids (**) is deducted

    2. Volume of mFRR Energy bids activated in **Direct Activation (DA) in previous QH** is deducted or added

    depending on the direction (Up or Down)
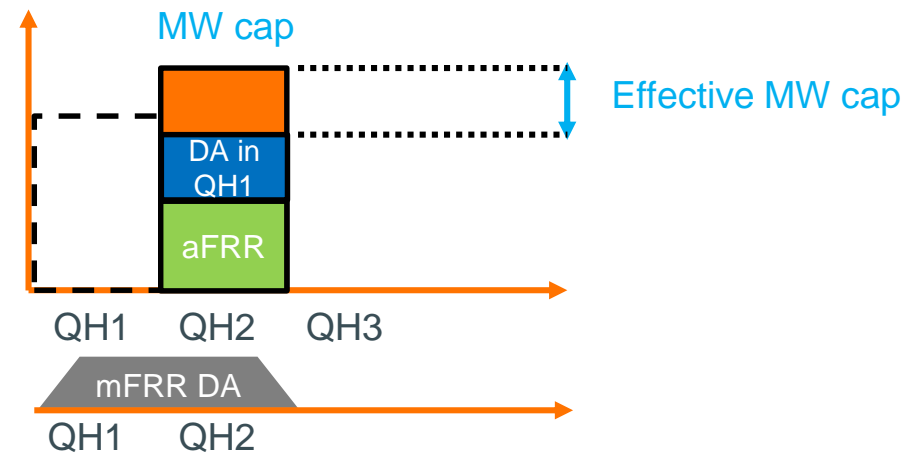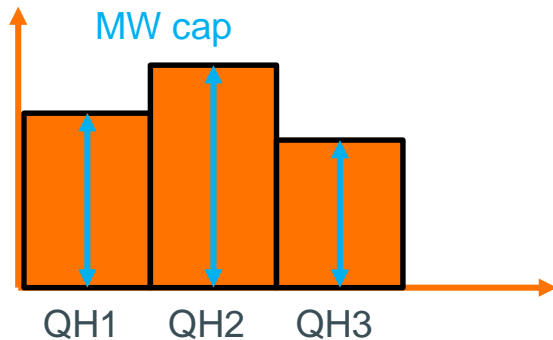
(*) Rules for Coordination and Congestion Management
(**)volume of aFRR bid follows rule for reference volume (previous slide)

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Filtering rules of mFRR balancing bids in medium CRI zones:

- Σ **mFRR** **bid reference volume in the medium CRI zone ≤ effective MW cap** then all bids remain available.

- Σ **mFRR bid reference volume in the medium CRI zone > effective MW cap then bid filtering is necessary**

  ☐ Elia will use **Merit Order of mFRR** in order to release mFRR balancing volume till "effective MW cap" of the medium CRI zone is reached.

  ☐ **Due to the fact that "MW cap" of each QH could vary from QH to QH**, Elia must mitigate the risk of an mFRR Direct Activation if it violates the "MW cap" for the second QH. For this reason, **Elia will consider in the CRI filtering the MW cap for DA**:

    ○ MW cap for DA = min(effective MW cap QH, effective MW cap QH+1)

  ☐ mFRR bids are filtered according to **mFRR MO** and the "**MW cap volume for DA**"

  ☐ The **mFRR bids below the effective MW cap** are sent to EU platform with status equal to "**available**", all mFRR bids above effective MW cap are filtered (i.e. sent with unavailable status).

Example 1: CRI Filtering with decreasing MW cap in medium CRI zones

	QH0		QH1		QH2		QH3
CRI level	low		medium		medium		medium
MW cap	infinite		30		25		30
MW cap for DA =min(QH,QH+1)	30		25		25		
order by prices (mFRR MO)							
bid 1	10	SA+DA	10	SA+DA	10	SA+DA	
bid 2	10	SA+DA	10	SA+DA	10	SA+DA	
bid 3	10	SA+DA	10	SA+DA	10	SA+DA	
bid 4	10	SA+DA	10	SA+DA	10	SA+DA	
bid 5	10	SA+DA	10	SA+DA	10	SA+DA	

Filtering process
1) mFRR bids are filtered according to MO + "MW cap volume for DA"
2) activation status is changed to "unavailable" when "MW cap for DA" is reached

Legend	availability status
	available
	unavailable

Example 2: CRI Filtering of balancing bids in medium CRI zones:

	QH0		QH1		QH2		QH3	
CRI level	low		medium		medium		medium	
MW cap	infinite		30		25		30	
MW cap for DA =min(QH,QH+1)	30		25		25			
order by prices (mFRR MO)								
bid 1	10	SA+DA	10	SA+DA	10	SA+DA		
bid 2	10	SA+DA	10	SA+DA	10	SA+DA		
bid 3	10	SA+DA	10	SA+DA	10	SA+DA		
bid 4	5	SA+DA	5	SA+DA	5	SA+DA		
bid 5	10	SA+DA	10	SA+DA	10	SA+DA		

Filtering process

1) mFRR bids are filtered according to MO + "MW cap volume for DA"

2) activation status is changed to "unavailable" when "MW cap for DA" is reached

Legend	availability status
	available
	unavailable

Example 3: CRI Filtering with different activation types (SA only/SA+DA)

	QH0		QH1		QH2		QH3	
CRI level	low		medium		medium		medium	
MW cap	infinite		30		25		30	
MW cap for DA =min(QH,QH+1)	30		25		25			
order by prices (mFRR MO)								
bid 1	10	SA+DA	10	SA+DA	10	SA+DA		
bid 2	10	SA+DA	10	SA+DA	10	SA+DA		
bid 3	10	SA only(*)	10	SA only(*)	10	SA only(*)		
bid 4	10	SA+DA	10	SA+DA	10	SA+DA		
bid 5	10	SA+DA	10	SA+DA	10	SA+DA		
	(*) activation type sent by BSP							

Filtering process
1) mFRR bids are filtered according to MO + "MW cap volume for DA"
2) activation status is changed to "unavailable" when "MW cap for DA" is reached

Legend	availability status
(green)	available
(red)	unavailable

Filtering rules with linked mFRR bids

Conditional links

- In the filtering process of mFRR bids, **only mFRR bids available & conditionally available are considered** in the filtering process.

Parent-Child links and Exclusive Group links:

- Obligation to have the **same availability status** for bids linked with Parent-Child links or Exclusive Group links (Rules defined on the MARI platform).

  - ➔ If **one bid of Parent-Child group or of Exclusive Group is set unavailable** by the CRI filter then all bids part of that group are unavailable for that QH.

mFRR filtering

Example 4: CRI Filtering with linked mFRR bids

	QH0		QH1		QH2		QH3		QH1	
CRI level	low		medium		medium		medium		medium	
MW cap	infinite			30	25			30		30
MW cap for DA =min(QH,QH+1)		30		25	25					25
order by prices (mFRR MO)					unavailable due to linking					
bid 1 (P-C links with bid 3)	10	SA+DA	10	SA+DA	10	SA+DA			10	SA+DA
bid 2	10	SA+DA	10	SA+DA	10	SA+DA			10	SA+DA
bid 3 (P-C links with bid 1)	10	SA+DA	10	SA+DA	10	SA+DA			10	SA+DA
bid 4	5	SA+DA	5	SA+DA	5	SA+DA			5	SA+DA
bid 5	10	SA+DA	10	SA+DA	10	SA+DA			10	SA+DA

Filtering results

	QH0		QH1		QH2		QH3	
CRI level	low		medium		medium		medium	
MW cap	infinite		30		25		30	
MW cap for DA =min(QH,QH+1)	30		25		25			
order by prices (mFRR MO)								
bid 1 (P-C links with bid 3)	10	SA+DA	10	SA+DA	10	SA+DA		
bid 2	10	SA+DA	10	SA+DA	10	SA+DA		
bid 3 (P-C links with bid 1)	10	SA+DA	10	SA+DA	10	SA+DA		
bid 4	5	SA+DA	5	SA+DA	5	SA+DA		
bid 5	10	SA+DA	10	SA+DA	10	SA+DA		

Legend	availability status
	available
	unavailable

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Change of CRI level between QH

- **Elia will not modify the activation type (SA+DA) of submitted bids** when there is a change of CRI level between 2 QHs or when "MW cap (QH2)"< "MW cap (QH1)"

- Following CRI filtering rules, **Elia can set a bid as "unavailable" in QH where low CRI is applicable** in order to **avoid a Direct Activation** in next QH where MW cap is either below the bid volume or if a high CRI was identified.

QH1	QH2
CRI Low	CRI Medium
CRI Low	CRI High
CRI Medium	CRI High

Example 5: CRI Filtering with high CRI level

	QH0		QH1		QH2		QH3	
CRI level	low		high		high		high	
MW cap	infinite			0		0		0
MW cap for DA =min(QH,QH+1)	0			0		0		0
order by prices (mFRR MO)								
bid 1	10	SA+DA	10	SA+DA	10	SA+DA		
bid 2	10	SA+DA	10	SA+DA	10	SA+DA		
bid 3	15	SA+DA	15	SA+DA	15	SA+DA		
bid 4	10	SA+DA	10	SA+DA	10	SA+DA		
bid 5	10	SA+DA	10	SA+DA	10	SA+DA		

Filtering process
1)mFRR bids are filtered according to MO + "MW cap volume for DA"
2)activation status is changed to "unavailable" when "MW cap for DA" is reached

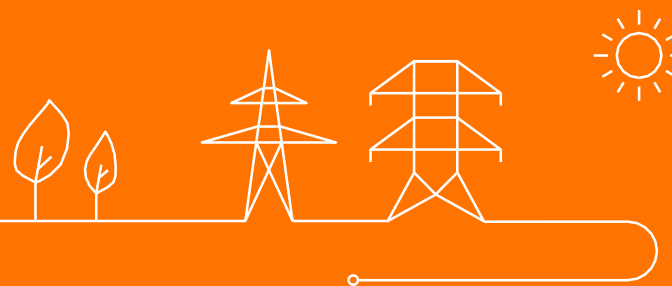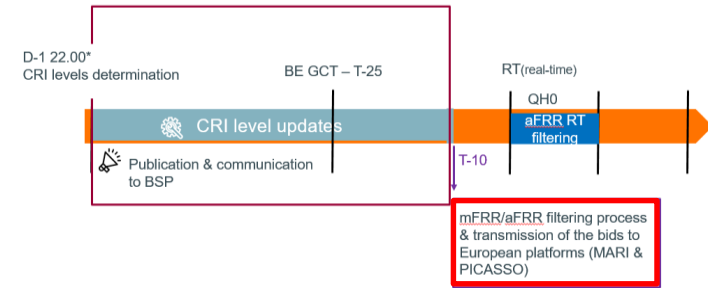| Legend	availability status
	available
	unavailable

Back-up DP

Back-up DP

The filtering of DP due to CRI also applies on the use of **DP as back-up** :

- o Back-up DP in **low CRI zone are usable**
- o Back-up DP in **medium or high CRI zone are non-usable in the direction of the congestion**
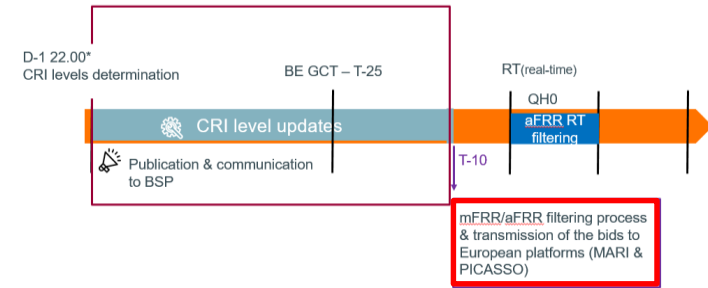
CRI filtering for aFRR

Conditions for filtering aFRR Energy Bids

- aFRR Energy Bids will be filtered when following conditions are met

  1. The electrical zone of one of the DPs included in the aFRR Energy Bid is defined as High (or Medium CRI)

     AND

  2. The Real-Time Security Analysis based on measurements (every 5min) identified an overload on a network grid element due to aFRR activation

- This approach allows to reduce the occurrences of filtering of aFRR Energy Bids. It's suitable to aFRR because of the possibility to deactivate aFRR during a QH, reducing possible overloads to durations < 15 minutes, which is acceptable.

D-1 22.00*
CRI levels determination

BE GCT – T-25

RT(real-time)

QH0

CRI level updates

aFRR RT filtering

Publication & communication to BSP

T-10

mFRR/aFRR filtering process & transmission of the bids to European platforms (MARI & PICASSO)

Process in case of filtering of aFRR Energy Bids

- **aFRR filtering**: In T-10 in case the conditions (previous slide) are fullfilled, the aFRR Energy bid will be filtered for the next QHs, and the BSP will be requested to make best effort to adapt his aFRR Energy bids in such a way that no volume would unnecessarily be declared unavailable (cf. BSP aFRR Contract Article II.11.18)

- **aFRR RT filtering**: in case the congestion needs to be solved during the QH:
  - ✓ The aFRR requested of the BSP is instantly set to 0MW ➔ as portfolio activation is allowed and as the BSP receives only one aFRR Requested signal, this is the only way to avoid that the DP causing the congestion is delivering aFRR
  - ✓ The activation control will not be performed for that QH
  - ✓ Elia will provide an ex-post justification

- Important precisions :
  - ✓ If the overload occurs less than 10 minutes before the end of the QH, the aFRR Requested will remain at 0MW for the next QH
  - ✓ BSP aFRR Contract Article II.11.18 remains applicable even when reducing the filtering occurences. In order words, in case of medium or high CRI, the BSP will still receive a notification before aFRR Balancing GCT and the BSP is subject to the best effort obligation

Thank you.