Smart Testing Workshop

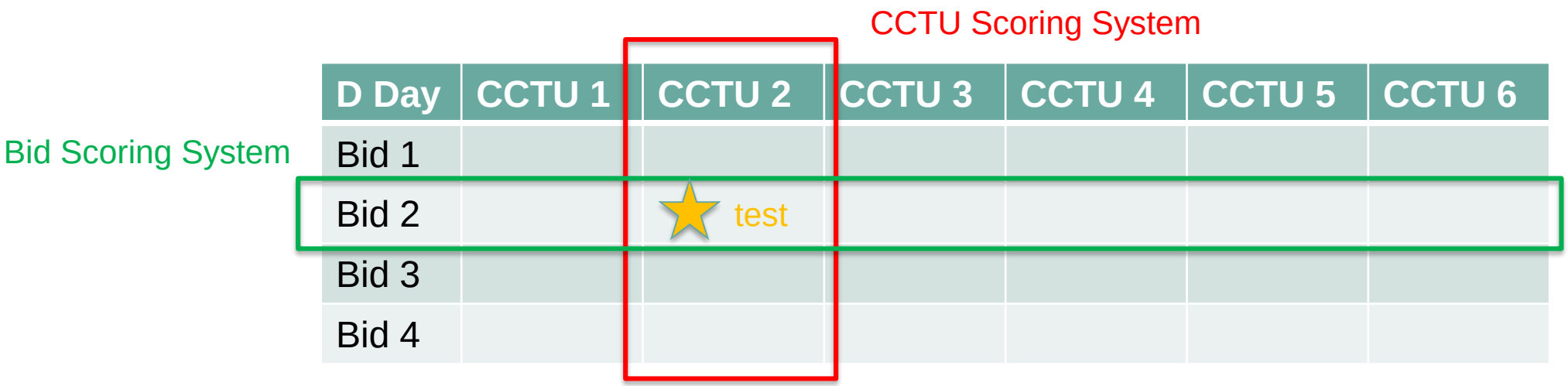
24/09/2020 | CHIM Didier

Smart Testing Workshop Agenda

1. Key Objective
2. CCTU Scoring System
3. Bid Scoring System
4. Selection of CCTU and bid to be tested based on Score
5. Test Regimes
6. Implementation of Smart Testing

General context of Smart Testing
Key Objective and Scoring System

- The **key objective** of the Smart Testing is, for **given level of reliability**, **to reduce the number of availability tests.** This reduction should lead to lower capacity reservation costs and therefore savings in procurement costs of balancing services.
- Smart Testing aims to use **more extensively the available data** in order to increase the effectiveness of availability tests
- The principles of Smart Testing should be **applicable for all balancing products**.
- The proposed methodology suggests to implement **two scoring systems**:



CCTU Scoring System

CCTU Scoring System determines which CCTU to select for an availability test

The Score per CCTU is based on 3 features:

- **Activation control:** past activations
- **Availability test:** past tests
- **Margin Analysis:** ex-post monitoring of contracted capacity

Weight to be fine-tuned

Features	Weight	CCTU 1	CCTU 2	CCTU 3	CCTU 4	CCTU 5	CCTU 6
Activation Control	33%	39	12	34	29	74	73
Availability test	33%	89	86	50	2	12	79
Margin Analysis	33%	30	18	9	82	58	50
Final Score per CCTU		52	39	31	38	48	67

The Score per CCTU ranges from 0 to 100.

- A low value indicates that the CCTU needs to be tested.

Activation control score in CCTU Scoring System

Initial scoring based on magnitude of activations

Weighting of newer data

$$Score_{Activation}(CCTU) = \sum_{M} Score_{refActivation}(CCTU, M) * F_{failure}(CCTU, M) * F_{freshness}(CCTU, M)$$

Accounts for failures in activation controls

Activation control Score	(A)	(B)	(C)	(A)*100	(1-(B)) * (1-(C))		
Month	Maximum Requested Volume (%) compared to average obligation of the month	Maximum Volume of Failed Activation (%) compared to obligation of the month	'Percentage of time of failure compared to total time of activation request	**Initial Score**	**Failure Factor**	**F freshness**	Final Score
M-2	46%	9%	10%	46	82%	4	5
M-3	80%	2%	5%	80	93%	4	10
M-4	49%	10%	10%	49	81%	4	5
M-5	86%	2%	5%	86	93%	3	8
M-6	6%	4%	4%	6	92%	3	1
M-7	44%	0%	0%	44	100%	3	4
M-8	38%	2%	9%	38	89%	2	2
M-9	10%	1%	7%	10	92%	2	1
M-10	22%	1%	8%	22	91%	2	1
M-11	54%	0%	0%	54	100%	1	2
M-12	34%	3%	3%	34	94%	1	1
M-13	70%	0%	0%	70	100%	1	2
					Total CCTU Activation Score		**43**

Availability test score in CCTU Scoring System

- If a test failed = 0 for a failed test
- If no test was performed = 50
- If all test were successful = 100

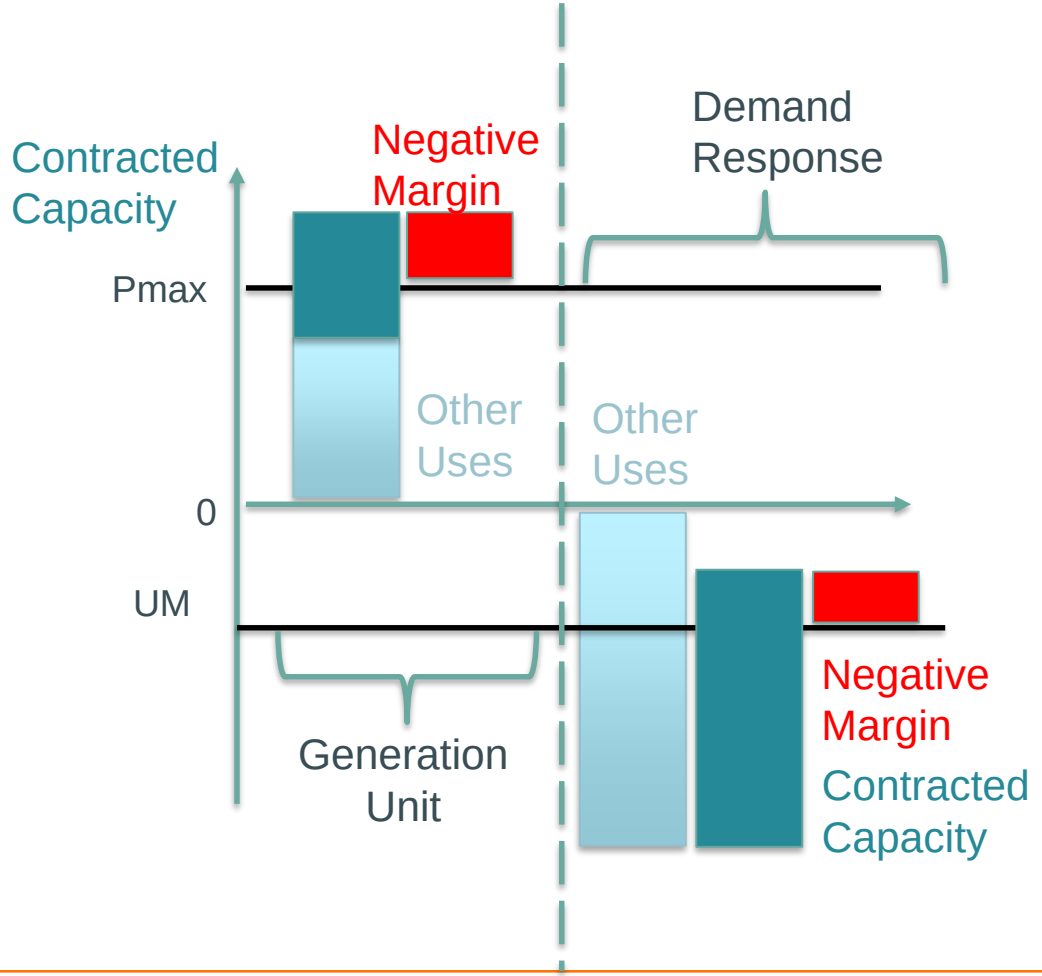
$$Score_{Availability}(CCTU) = \sum_{M} Score_{refAvailability}(CCTU, M) * F_{freshness}(M)$$

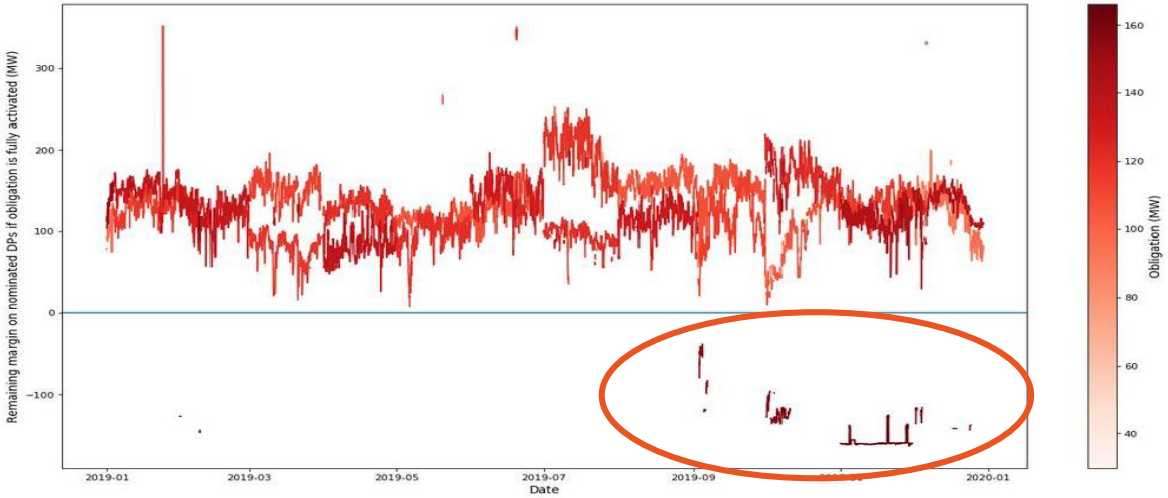
Weighting of newer data

Availability					Fail = 0, No test = 50; Success = 100		
	Percentage of successful availability tests for a given month	Number of test	Number of succesful test		Initial Score	F freshness	Final Score
M-2	0%	1	0		0	4	0
M-3	No Test Performed	0	0		50	4	7
M-4	100%	1	1		100	4	13
M-5	No Test Performed	0	0		50	3	5
M-6	No Test Performed		0		50	3	5
M-7	No Test Performed	0	0		50	3	5
M-8	No Test Performed	0	0		50	2	3
M-9	No Test Performed	0	0		50	2	3
M-10	100%	1	1		100	2	7
M-11	100%	1	1		100	1	3
M-12	100%	1	1		100	1	3
M-13	No Test Performed	0	0		50	1	2
					Total CCTU Availability Score		**57**

Margin analysis

The margin analysis is an ex-post monitoring of the availability of contracted capacity of the BSP.





- For a **demand response**, the **unscheddable margin (UM)** is used instead of the Pmax.
- The unscheddable margin **is approximated by the lowest off-take** value recorded for analysed time period

Margin score in CCTU Scoring System

Initial score for each day, D of the month, M

$$Score_{margin}(CCTU) = \sum_{M} \sum_{D \in M} \frac{Score_{refMargin}(CCTU, D)}{100 * D} * F_{freshness}(M)$$

Weighting of newer data

$$Score_{refMargin}(CCTU, D) = \begin{cases} 100, if\ margin \geq 0 \\ 100 - \frac{non - compliant\ bid\ volume}{obligation\ for\ CCTU}, else \end{cases}$$

The % in volume of the non-compliant bid is removed from the score

Month	Average volume (%) compared to average awarded capacity of the month	Initial Score	F freshness	Final Score
M-2	84%	84	4	11
M-3	88%	88	4	12
M-4	81%	81	4	11
M-5	82%	82	3	8
M-6	99%	99	3	10
M-7	99%	99	3	10
M-8	100%	100	2	7
M-9	95%	95	2	6
M-10	90%	90	2	6
M-11	100%	100	1	3
M-12	81%	81	1	3
M-13	97%	97	1	3
		Total CCTU Margin Score		**90**

	CCTU 1	CCTU 2	CCTU 3	CCTU 4	CCTU 5	CCTU 6
Day 1	100	100	100	70	100	90
Day 2	100	60	100	100	50	100
Day 3	100	100	40	100	100	100
Day 4	...	...	...	...	...	...

Bid Scoring System

Bid Scoring System determines which bid to select for an availability test

The Score per CCTU is based on 3 features:

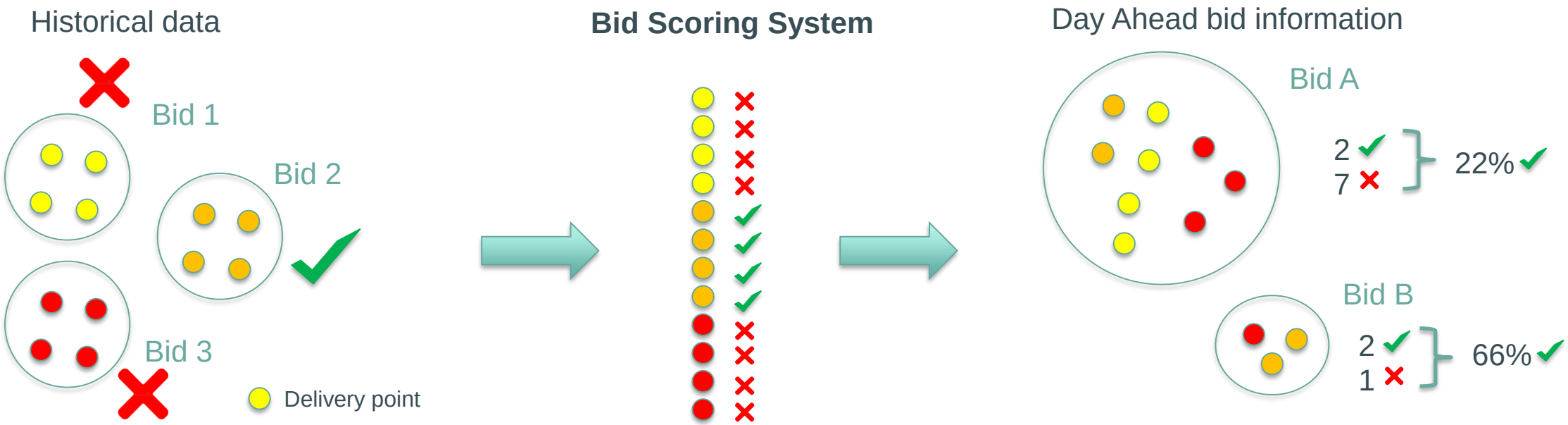
- **Activation control:** past activations
- **Availability test:** past test
- **Margin Analysis:** ex-post monitoring of contracted capacity

Weight to be fine-tuned

Features	Weight	Bid 1	Bid 2	Bid 3
Volume		60 MW	30 MW	10 MW
Activation Control	33%	39	12	34
Availability test	33%	89	86	50
Margin Analysis	33%	30	18	9
Final Score		52	39	31

- The Score per Bid is based on same 3 features but are adapted to the Bid Scoring System.

Bid Scoring System: Disaggregation of the results of activation control and availability test on a delivery point level



- Given that delivery points **can freely change** from one bid to another **depending on the strategy of the BSP**, **information on delivery point level** is necessary in order **to have reliable data** for the Bid Scoring System.
- Thus, the information of **activation control and availability test is disaggregated** from bid to delivery points level and then **re-aggregated when the bids (and underlying DPs) are submitted by the BSP.**

Activation control scoring for the Bid Scoring System

Weighting of newer data

Initial scoring based on successful activations

Adjustment factor by DP size

$$Score_{Activation}\,(bid) = \sum_{M} F_{freshness}(M) * Adjust\,(bid, M) * (\sum_{dp \in bid} Score_{refActivation}\,(dp, M) * F_{ratio}\,(dp, M) * Adjust\,(dp, M)\,)$$

Adjustment factor by bid size

Accounting for relative and absolute activation ratio

DP level analysis

		(A)	(B)	(C)	100* (A)
Month	Activation Control	Percentage of successful activation control	Activation Ratio (%) compared to total activation time	Activation Ratio (%) compared to the month	Initial Score
M-2	DP1	85%	59%	15%	85
M-2	DP2	80%	58%	69%	80
M-2	DP3	92%	84%	67%	92
M-2	DP4	93%	72%	86%	93
M-2	DP5	96%	67%	1%	96
M-2	DP6	88%	93%	66%	88
M-2	DP7	100%	100%	58%	100
M-2	DP8	89%	96%	5%	89
M-2	DP9	84%	83%	88%	84
M-2	DP10	91%	60%	70%	91
M-3					

Bid level analysis

		(A)*100 *(B)*(C)	(D)	(E)	(1-E) * (D)
	DP Size Adjustment	Final Score per DP	Intial Score per bid	Bid Size Adjustment	Final Score per bid
Bid 1	85,0%	6			
Bid 1	5,0%	2			
Bid 1	5,0%	3			
Bid 1	5,0%	3	13	60%	5
Bid 2	25,0%	0			
Bid 2	25,0%	14			
Bid 2	25,0%	15			
Bid 2	25,0%	1	29	30%	20
Bid 3	54,5%	33			
Bid 3	45,5%	17	51	10%	45

Availability test scoring for the Bid Scoring System

- If a test failed = 0 for a failed test
- If no test was performed = 50
- If all tests were successful = 100

Weighting of newer data

$$Score_{Availability}\,(bid) = \sum_{M} F_{freshness}(M) * Adjust(bid, M) * \left(\sum_{dp \in bid} Score_{refAvailability}(dp, M) * Adjust(dp, M) \right)$$

Adjustment factor by bid size

Adjustment factor by DP size

DP level analysis

Month	Availability test	Percentage of succesful availability test	Initial Score
M-2	DP1	100%	100
M-2	DP2	100%	100
M-2	DP3	100%	100
M-2	DP4	100%	100
M-2	DP5	50%	50
M-2	DP6	50%	50
M-2	DP7	100%	100
M-2	DP8	50%	50
M-2	DP9	50%	50
M-2	DP10	50%	50
M-3			

Bid level analysis

	DP Size Adjustment	Final Score per DP	Initial Score per bid	Bid Size Adjustment	Final Score per bid
Bid 1	85,0%	85		60%	40
Bid 1	5,0%	5			
Bid 1	5,0%	5			
Bid 1	5,0%	5	100		
Bid 2	25,0%	13		30%	44
Bid 2	25,0%	13			
Bid 2	25,0%	25			
Bid 2	25,0%	13	63		
Bid 3	54,5%	27		10%	45
Bid 3	45,5%	23	50		

Margin Scoring for the Bid Scoring System

$$Score_{margin}(bid) = \sum_{M} F_{freshness}(M) * Adjust(bid, M) * \left(\sum_{dp \in bid} \sum_{qh \in M} \frac{Score_{refmargin}(dp, qh)}{\#\, qh} * Adjust_{CB}(dp, M) \right)$$

Weighting of newer data

Adjustment factor by bid size

average time of a DP is part of a bid with a positive margin

Adjustment factor by DP size

$$Score_{refmargin}(dp, qh) = \begin{cases} 100, & if\ bid\ margin \geq 0 \\ 0, & else \end{cases}$$, only when a DP is effectively part of a bid and for non-activated bid

DP level analysis

	Margin	Average time (%) of a DP being part of a bid with positive margin	Initial Score
M-2	DP1	74%	74
M-2	DP2	10%	10
M-2	DP3	54%	54
M-2	DP4	38%	38
M-2	DP5	42%	42
M-2	DP6	96%	96
M-2	DP7	38%	38
M-2	DP8	3%	3
M-2	DP9	58%	58
M-2	DP10	50%	50
M-3			

Bid level analysis

	DP Size Adjustment	Final Score per DP	Intial Score per bid	Bid Size Adjustment	Final Score per bid
Bid 1	85,0%	63			
Bid 1	5,0%	1	44		
Bid 1	5,0%	3			
Bid 1	5,0%	2		60%	17
Bid 2	25,0%	11			
Bid 2	25,0%	24	45		
Bid 2	25,0%	10			
Bid 2	25,0%	1		30%	31
Bid 3	54,5%	32	27		
Bid 3	45,5%	23		10%	24

Selection of CCTU and bid based on Score

Selection in Smart Testing

The actual selection of the CCTU and bid(s) remains confidential in order to keep the unpredictability aspects of the availability testing. Elia will keep a balance between an optimal selection of the CCTU and/or bid(s) and the randomness of the test. Moreover, further considerations including impact on operational processes need to be taken into account during an implementation phase.

Selection of the worst score

CCTU	1	2	3	4	5	6
Score	10	15	20	50	60	70
Selection (%)	**100**	0	0	0	0	0

Selection probability is function of the score

CCTU	1	2	3	4	5	6
Score	10	15	20	50	60	70
Selection (%)	24	23	21	13	11	8

Selection probability is equal for the 3 worst scores

CCTU	1	2	3	4	5	6
Score	10	15	20	50	60	70
Selection (%)	33	33	33	0	0	0

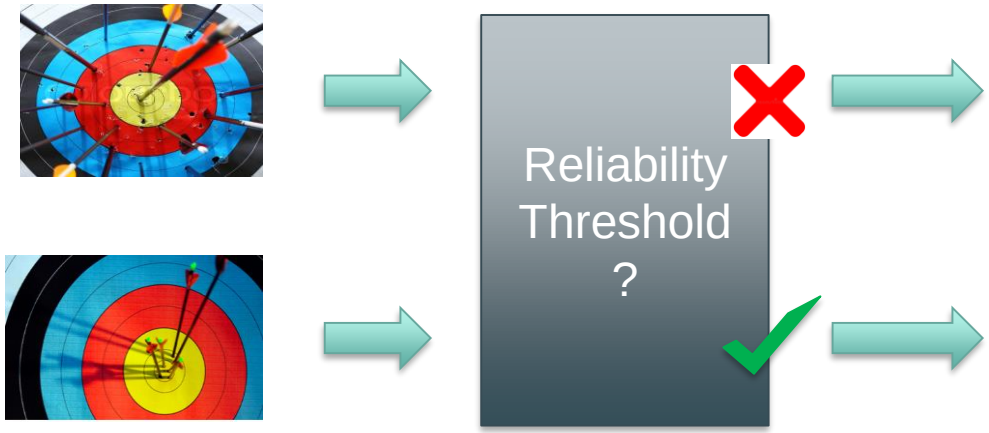
Test regimes

This is what the potential subhead looks like

Test regimes: approach to reduce volume of test

Additionally to the scoring system, **two test regimes** are introduced to limit the impact in volume and number of availability tests.

1. The first test regime **aims to ensure** that a significant part of **the contracted capacities** from a BSP **is compliant.**
2. The second test regime aims **to keep in check the compliancy** of a BSP but with a **lower volume and number of availability tests**



Threshold for the second test regime

- The threshold is the **average of the obligations** from the last 12 months, adjusted by the freshness of the data.

$$Threshold = \sum_{M} F_{freshness}(M) * Average_{M}[Max_{D}\left(Obligation(CCTU, D)\right)]$$

Weighting of newer data

Maximum Obligation per day D

Average Obligation for the month M

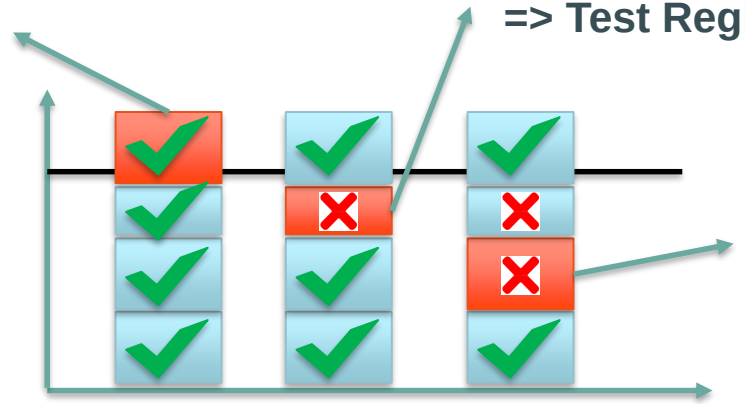
- In the **second test regime**, a **maximum of 4 successful tests** can be performed on a rolling 12 months basis. For each availability test (in the second regime), the tested volume is **capped to 50%** of the contracted volume of the day.
- A **BSP which <u>performs well</u>** has its **volume and number of tests reduced** compared to the current design.

Conditions of validity for Second Test Regime

- In order for a BSP to be in the second test regime, the BSP needs to have an **cumulative activated volume** of each delivery point (via activation control or availability test) **above the threshold** in the last 12 months (M-2 to M-13).
- The **activated volume** of a delivery point **is considered as valid** if it was part of an bid which was successfully activated during the last activation control and/or availability test.
- If a delivery point (and associated volume) **is not valid anymore**, then the BSP may fall below the threshold and **go back to test regime 1**.

Last activation is **successful,**
total activated volume **above threshold**
=> **Test Regime 2**

Last activation control **is failed**,
total activated volume **remains above threshold**
=> Test Regime 2



Last availability test **is failed**,
total activated volume **is below threshold**
=> Test Regime 1

Activation control or availability test

New control or test

Implementation of Smart Testing

Decision on the implementation of Smart Testing

- The decision on the implementation of Smart Testing and the related planning will be discussed with the stakeholders during the next Working Group Balancing meetings.
- The goal of the approach is to provide to the stakeholder a forum where they can express their views on a global overview of the work plan for upcoming projects in the years to come and to agree on priorities.
- The implementation decision will be based on the feedback of the stakeholders, priorities and technical feasibility. The recommendation to implement or not and, provided a positive implementation decision, the implementation plan will be part of the final report.

Step-wise implementation of Smart Testing

If **an implementation is decided**, Elia proposes **a step-wise implementation of Smart Testing starting with mFRR,** for the following reasons:

- **REX** from implementation of one product should **increase the efficiency** of the development (adjusted by the complexity and specificity of the product to be implemented)
- The **mFRR product is ideal candidate** as a starting point given:
    - Limited amount of data to be handled compared to other products
    - Clear request from stakeholders for the mFRR product
- Additionally, Terms and Conditions for BSP of all balancing products would require to be amended at the same time (including public consultations, consultation report and approval).