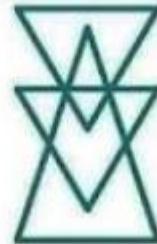




Trans European Replacement Reserve Exchange

TERRE Workshop
11th May 2015



ADMHE





Please note that these slides are a snapshot of the current status of the TERRE work streams

The information provided is still under discussion and does not reflect the final status of the project



Topics and Agenda

1. Scope, Context and Project description

2. Design:

- TERRE product
- TERRE TSOs need
- TERRE CMO
- TERRE Settlement procedure
- CBA analysis
- Timing and Scheduling
- ATC management

3. TERRE Implementation Group

4. Stakeholder inputs

5. Timelines

Scope, Context and Project description

Context

TERRE = Pilot Project validated by ENTSO-E for RR exchanges

The Design of TERRE solution will be compliant with the requirements of:

- The FW guidelines on Electricity Balancing**
- The implementation of TSO-TSO balancing model**
- The NC on Electricity Balancing (NCEB)**
 - Centralised and automatic management of XB capacity
 - Offer based on “cheapest” internal bids
 - Improved offers selection process...

TERRE aim is to support and provide experience for the entry into force of the NC EB.

TSOs involved = more than 80% of TSOs using RR

REN ✓

NG ET & IC ✓

TERNA ✓

REE ✓

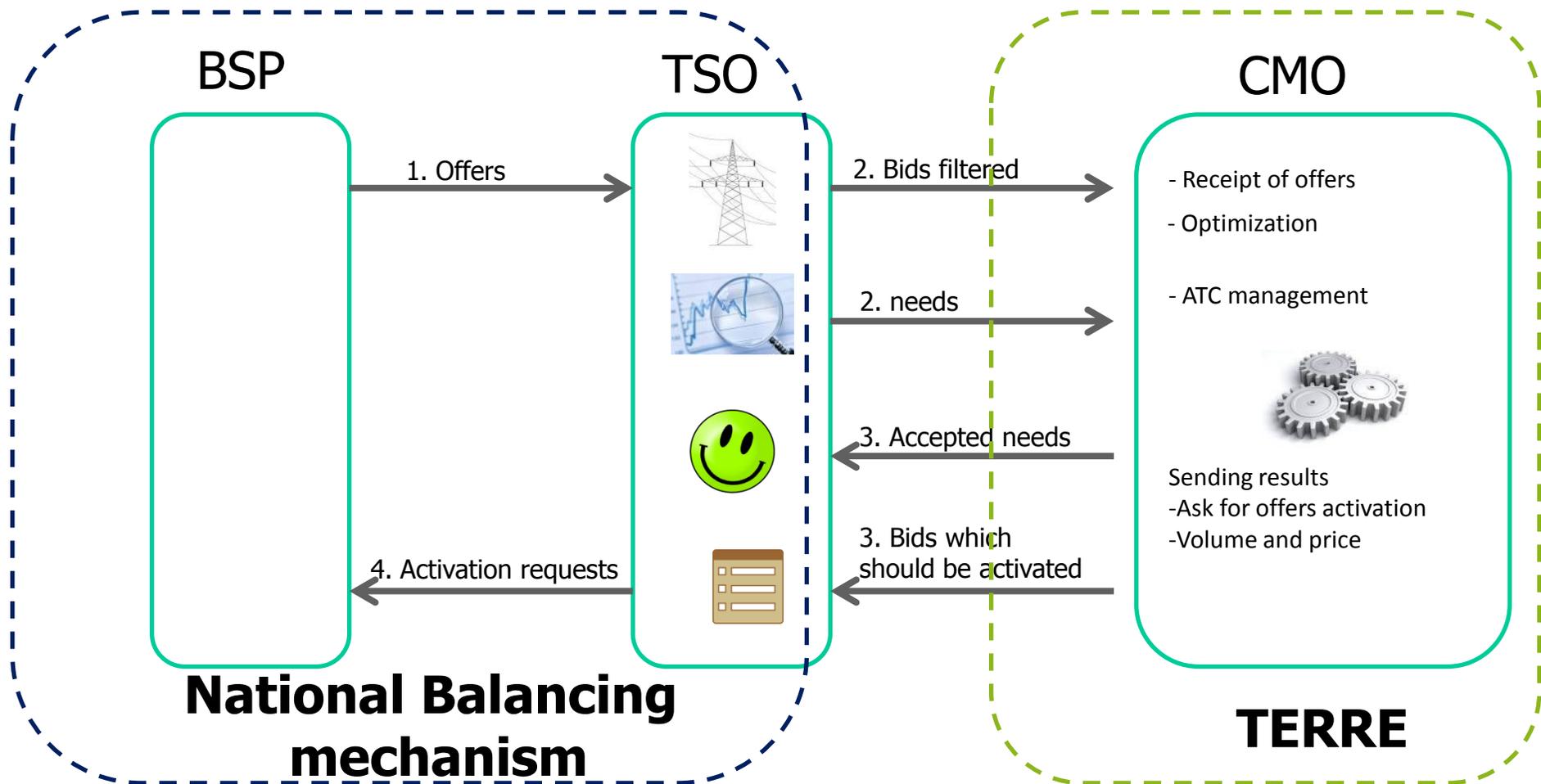
RTE ✓

ADMIE ✓

Swissgrid ✓



Pilot Project TERRE scope



Local implementation of TERRE project will be carried by the national market frameworks

Project Work Packages (1/2)

1

Definition of the standard TERRE products

RR offer by BSP

RR needs by TSO

2

Balancing CMO

«Algorithmic optimization» including automatic ATC management

3

Settlement procedure

Marginal price as preferred solution for XB exchange

Definition of Financial settlement between the TSOs

4

Cost-Benefit analysis

Study of the potential socio-economic benefit (social welfare)

Project Work Packages (2/2)

5

Timing and scheduling

Interaction between the Intra-day market and the TERRE process

6

ATC management

Centralized ATC management module

7

Governance issues

Preparation of the NRAs approval process

Preparation of the Implementation Phase

Definitions

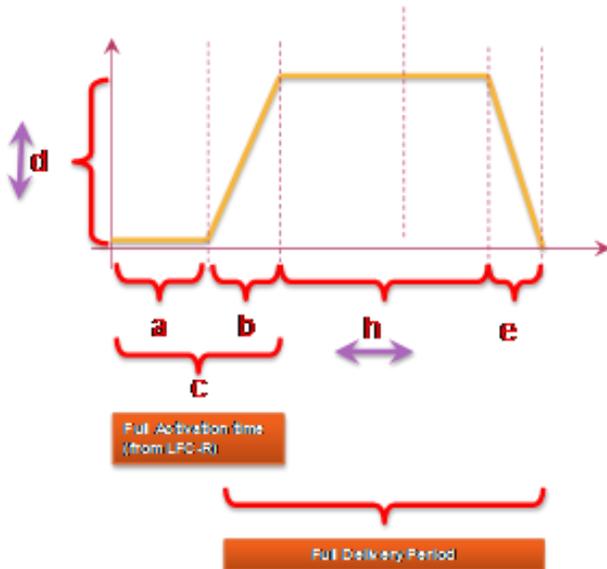
1. **Bids: Balancing Energy Bids.** They will correspond to TERRE Standard Product
2. **Needs: Volume (and price if applicable) of balancing energy (RR) needed by an electric system**
3. **Selected Bids: Bids selected in the TERRE CMO**
4. **Activation Request: Request from the Connecting TSO to the BSP to activate a Balancing Bid**

TERRE Product

TERRE product

TERRE product should:

- **be compliant with TSOs requirements**
- **be coordinated with the RR standard product definition**
- **be scheduled and manually activated**



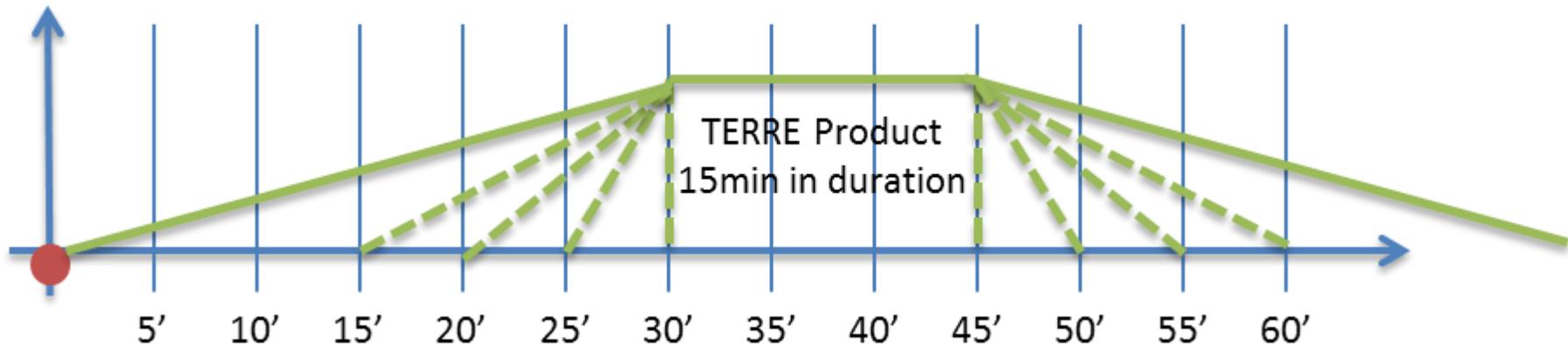
- (a) Preparation Period
- (b) Ramping Period
- (c) Full Activation Time;
- (d) minimum and maximum quantity;
- (e) Deactivation Period;
- (f) Price of the Bid;
- (g) Divisibility;
- (h) minimum and maximum duration of Delivery Period;
- (i) The Bidding Zone where the bid is located;
- (j) Validity Period;
- (k) Mode of Activation.
- (l) minimal duration between end of Deactivation Period and the beginning of following Full Activation Time

TERRE product-FAT

TWG agreed on the definition of FAT parameter = 30min

FAT = Preparation Period + Ramping Period

This definition will facilitate the participation of a variety of BSPs capable of meeting the range of ramps shown below



Basic agreed criteria

0- Activation principle = **Scheduled**

1- Preparation period = **from 0 to 30 min**

2- Ramping period = **from 0 to 30 min**

3- Full Activation Time = **30 min**

4- Min quantity = **1 MW**

5- Min delivery period = **15 min or multiples of 15 min**

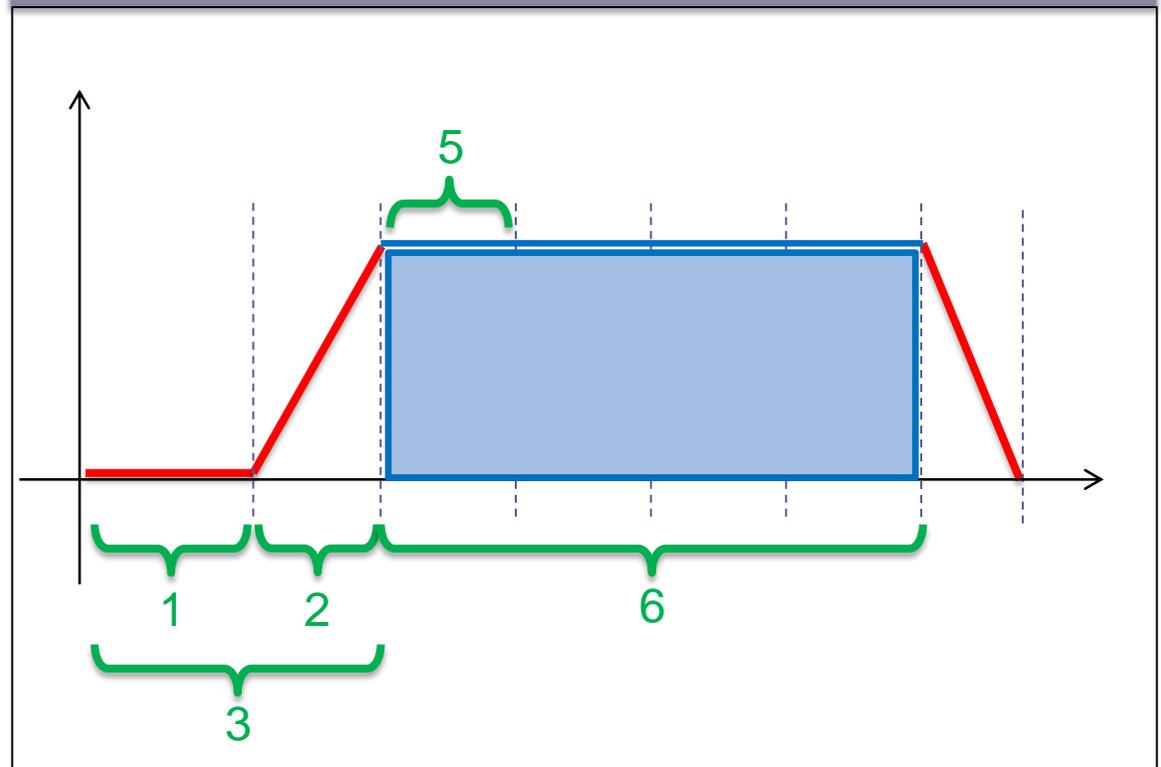
6- Max delivery period = **60 min**

7- Location = **Bidding zone**

8- Validity period = **defined by BSP but equal or less than 60 min**

9- Recovery period = **defined by BSP**

Structure of standard balancing product



criteria

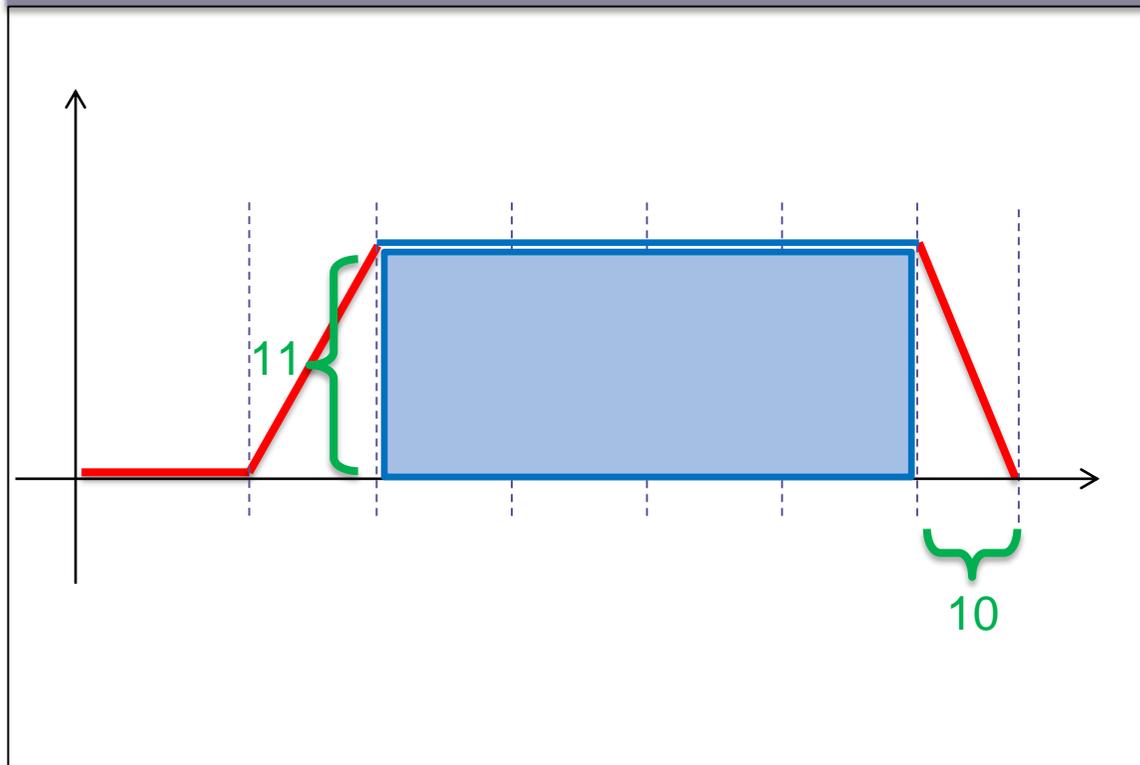
10- Deactivation period = Ramping Period

11- Divisibility Volume: Under the responsibility of BSP

- Min volume = 1MW
- Resolution = 0,1MW
- Maximum Bid Size: In case of divisible bid, no max is requested.

12- Price of submitted bids= the Cap & Floor prices will be compliant with the local market rules

Structure of standard balancing product



*For settlement result-Clearing/Marginal definition of cap and floor Price:
Still under validation*

Link between the bids/firmness

- ❖ The links between the bids accepted by the TERRE solution are under discussion
- ❖ There is a different level of complexities regarding the implementation of these possibilities.

The aim is to reach a compromise between the complexity of algorithmic implementation and incentivizing flexibility for maximum liquidity purposes (flexibility for BSPs participation).

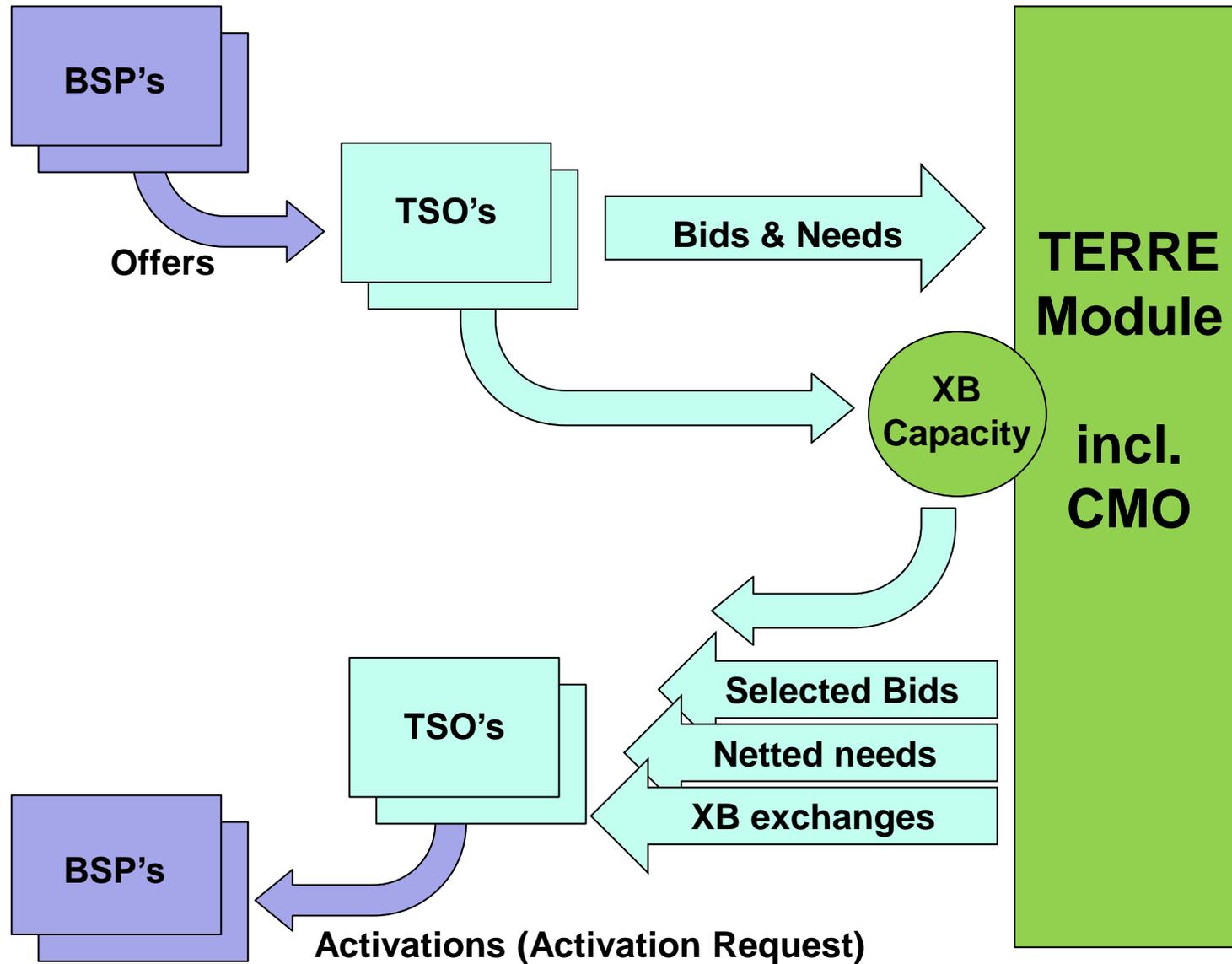
Once the offer is selected by the matching process and asked for activation, the connecting TSO is responsible for the energy delivery on its border.

Needs definition

- ❖ The methodology is under the responsibility of the TSO → we don't need to have an harmonized methodology.
- ❖ As for the TERRE product, the parameters which describe the need submitted to TERRE platform should be defined.
- ❖ The XB scheduling impacts the characteristics of the need. This topic is addressed within TERRE project.

TERRE CMO

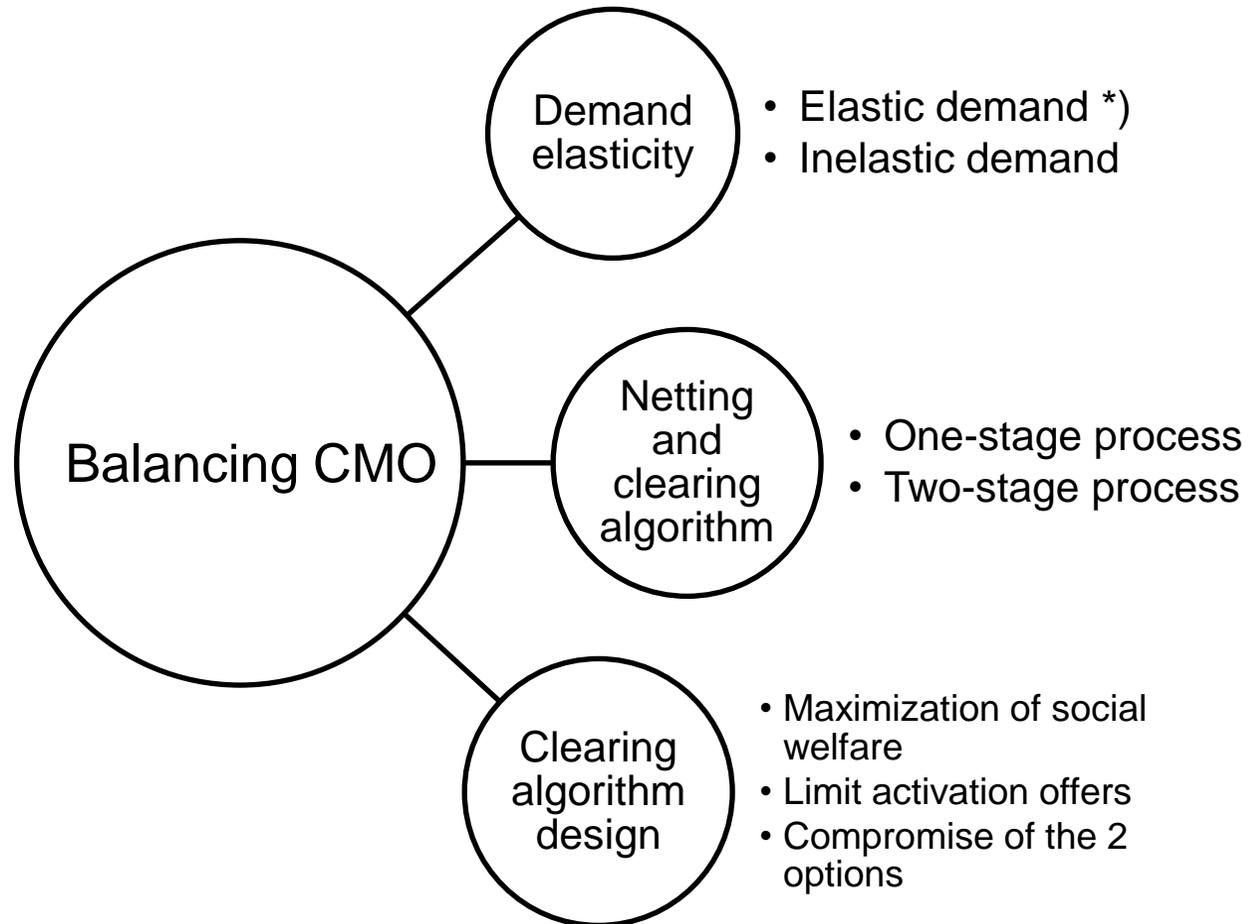
TERRE process



CMO

- ❖ Different design options are actually under discussion in the TERRE Working Group
- ❖ Evaluation process is actually not finished, different combinations of the design options are still under investigation and are simulated
- ❖ A principle question related to the clearing algorithm is under investigation and needs to be clarified in general:
 - ❑ **Is it appropriate to activate positive and negative RR at the same time only because of the financial benefit or should the activation of BSP offers be limited when the TSO need is fulfilled?**

CMO – Design Options



*) Remark:

The expressions “elastic” and “inelastic demand” are established and defined wordings in economics and represent the need of the TSO

CMO

❖ Actually favorited solution from TWG:

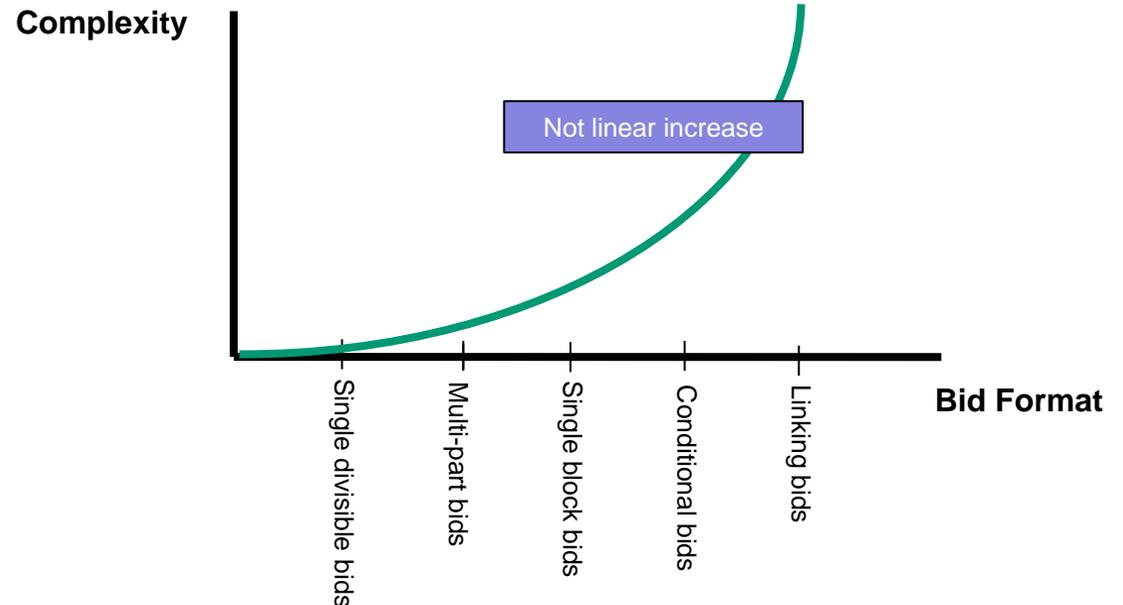
- ☑ **Elasticity → Elastic demand**
 - + **Simplifies the process**
 - + **Gives flexibility to each system**
- ☑ **Algorithm → One stage process**
 - + **Higher efficiency**
 - + **More compliant with the elastic demand principles**
 - + **Simpler settlement**
- ☑ **Design/objective function → Maximization of social welfare**
 - + **Best solution regarding economic criteria**
 - + **Simple process**

Bid formats

- ❖ Different possibilities for bid formats are still under evaluation
- ❖ The calculation time of the CMO algorithm is strongly depending on the complexity
- ❖ Sustainable statements about the possibilities can be made only after testing with realistic data volume

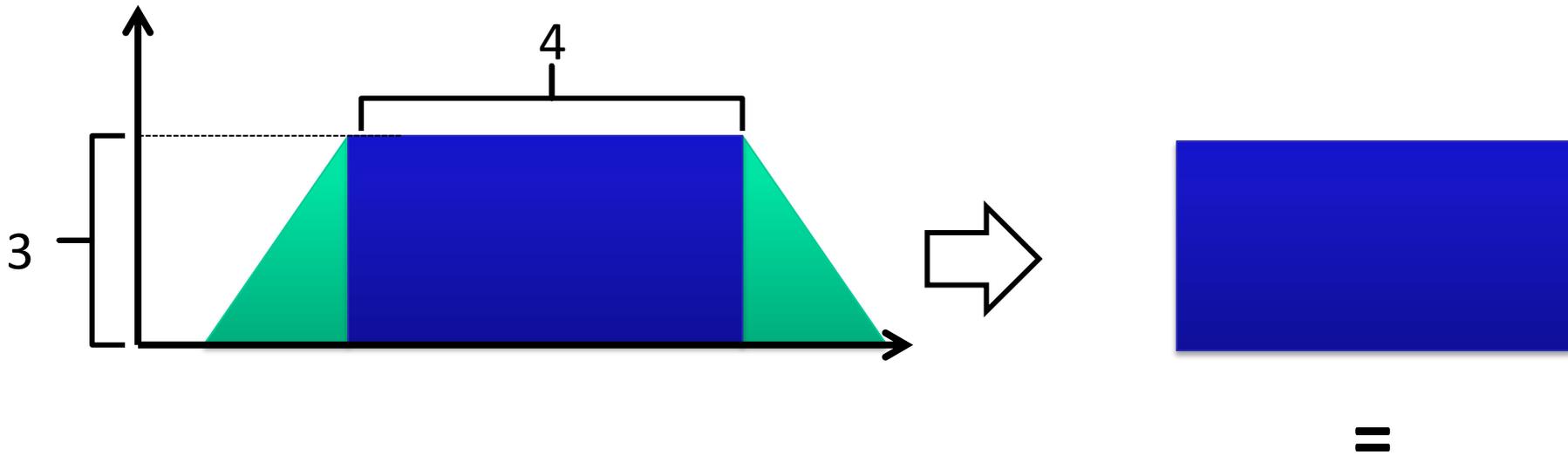
- ❖ Different Bid formats:

- Single divisible bid
- Multi-part bid
- Single block bid
- Conditional bid
- Linking bid



TERRE Settlement

Settlement TERRE product



Financial exchanges between TSOs will be based on this energy volume

Energy volume used for the centralized CMO

Marginal Price vs Pay-as-bid TSO-TSO Settlement

- ❖ Characteristics of design of TERRE pilot project:
 - ❖ Supra-regional scope (not bilateral)
 - ❖ Optimization algorithm (not FCFS) for efficient allocation of bids and needs maximizing social welfare and optimizing use of interconnections and balancing resources

- ❖ Two analyzed options for settlement of XB schedules
 - Pay as cleared (marginal) – preferred solution by FG EB / NC EB
 - Pay as bid (subject to CBA that demonstrates that it is more efficient)



**Pay-as-cleared
(marginal price)
for settlement of
XB Balancing
schedules**

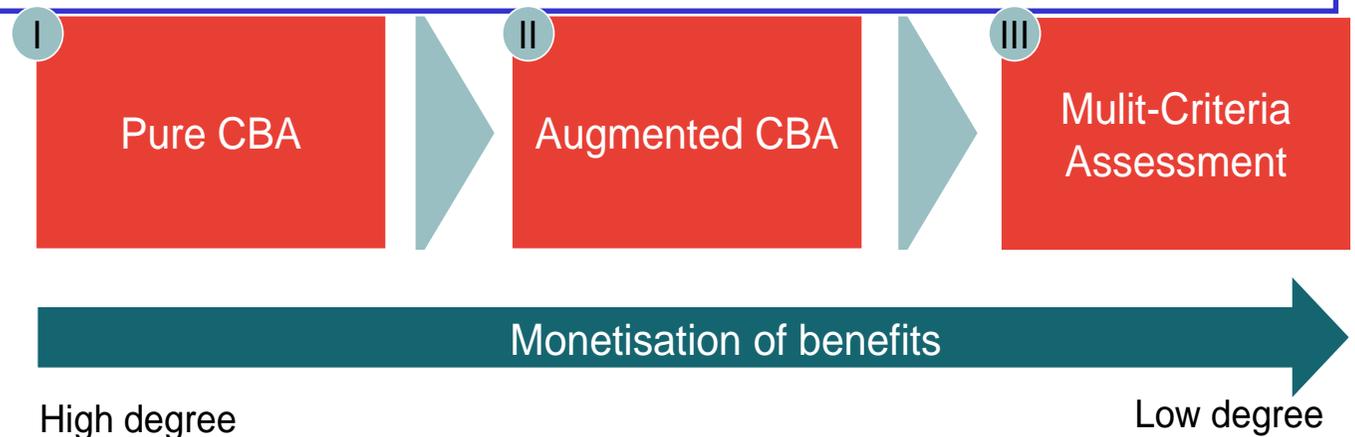
Settlement procedure

- ❖ As presented before, two solutions are discussed for the CMO definition
- ❖ This situation obliged the TWG to define the TSO-TSO settlement procedures for this two options:
 - ❑ **Clearing algorithm → One stage process for settlement**
 - **The marginal price should be defined (for upward and downward activation? Pay-as cleared?)**
 - **The congestion rent should be described...**
 - ❑ **Pre-netting + Clearing algorithm → Two stages process for the settlement**
 - **A settlement for the pre-netting phase based on avoided offer activations?**
 - **A settlement for the clearing phase based on pay-as-cleared price?**
 - **What is the impact on the congestion rent ...**

TERRE CBA

CBA

- ❖ Currently working to prove the methodology and tool that will be used to assess social welfare
 - ❖ In the meantime each TSO is progressing with the data capture for whole 2013 period (experience at NG has indicated this can be very time consuming!) – **Target to have all data by end April**
 - ❖ RTE has developed a tool which is now compliant with the simulation needed
- ❖ ENTSO-E currently working with Frontier Economics to develop a standard CBA methodology. TERRE's aim is to use this where possible to structure CBA
 - ❖ Currently three approaches being considered:



TERRE project agreed that we should try and use the Augmented CBA approach as it was felt this best captured the quantitative and qualitative aspects of TERRE

CBA

❖ **Methodology:**

- ❖ The simulation tool developed for TERRE project will be used to calculate the historical costs of balancing the system for each TSO using actual data from 2013. This will form the counterfactual or 'as is' scenario.
- ❖ We will then use this tool to simulate what the costs would have been if all the available bids/offers in that period were in a Common Merit Order List and were activated in a clearing process which took into account ATC.
- ❖ Social welfare / benefit will then be calculated based on the comparison

❖ **Results will also be produced on a national level to see the distribution of benefits between TSOs**

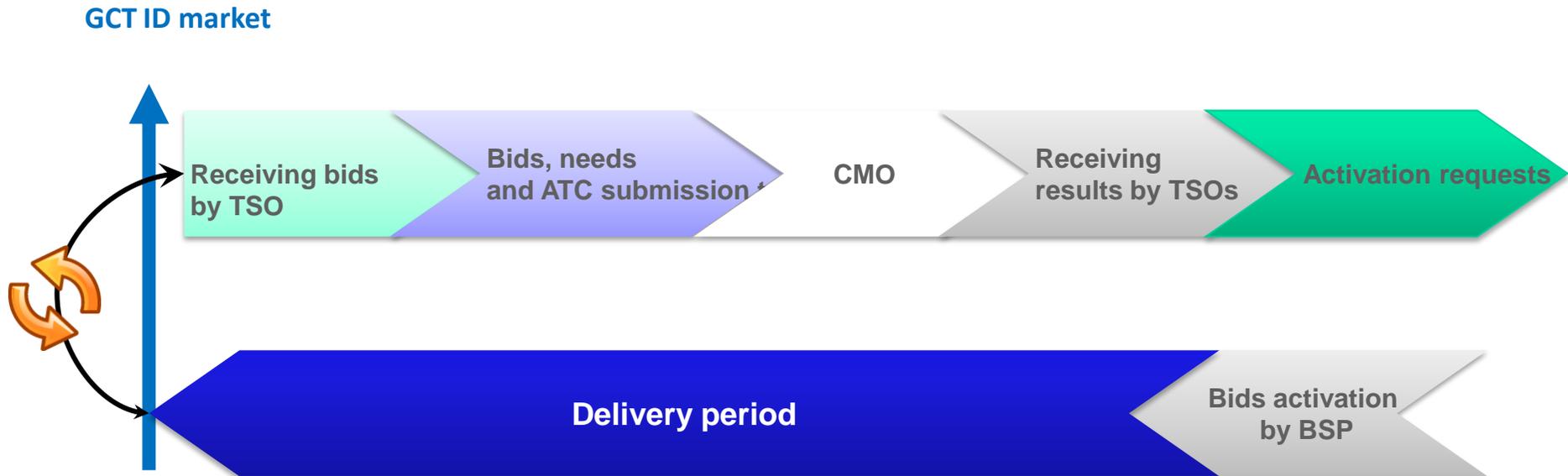
- ❖ **Looking at defining sensitivity analysis (e.g. varying ATC could indicate potential benefits of reserving ATC for balancing as per GL EB)**
- ❖ **Work has started on detailed CBA document, detailing methodology (e.g. discount factors etc) and highlighting the assumptions made both in the data collection and simulation in order to be transparent about the potential limitations of the CBA.**

CBA

- ❖ **However while we are making good progress on the assessment of potential benefits, assessing the costs is more difficult..**
 - ❖ Will link to work on IT WG and tender process for delivery of IT platform
 - ❖ Difficulties taking into account costs incurred by national TSOs for local implementation of TERRE
 - ❖ Uncertainty around how best to take into account costs incurred by market participants, particularly given the timelines...
- ❖ **CBA will obviously be a key part of the NRA approval process and at previous stakeholder sessions, questions have been asked whether this will be independently audited.**
- ❖ **Hence there will be some key interdependencies between tasks in the IT WG, CBA work stream and NRA approval process that will require careful planning**

Timing and scheduling

TERRE process (current proposal)

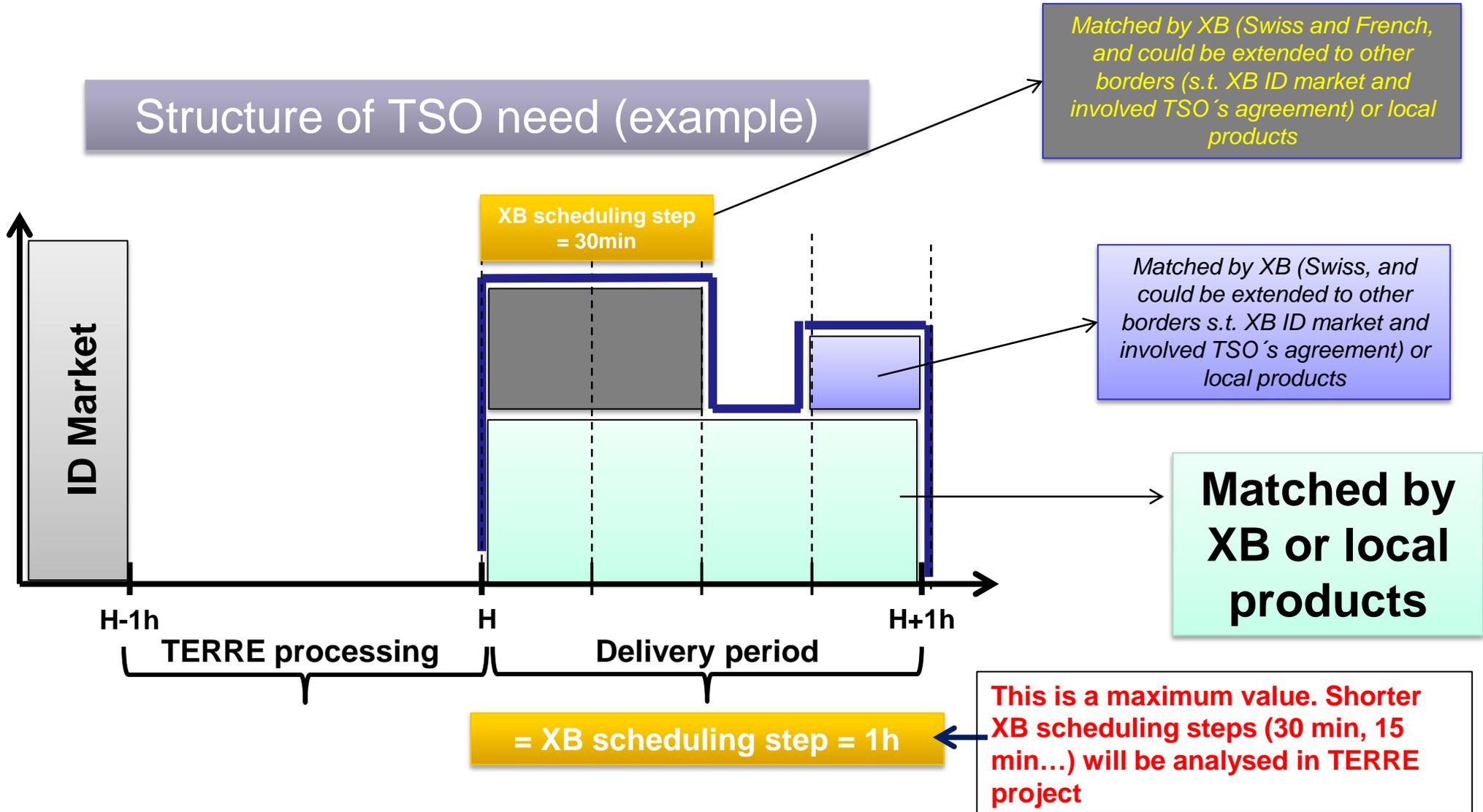


The process is still under discussions

- Warning: ID market GCT not harmonized
- The timings of each phase are is not completely defined yet

Interaction between CMO and XB scheduling step

Structure of TSO need (example)



TERRE IG

TERRE IG

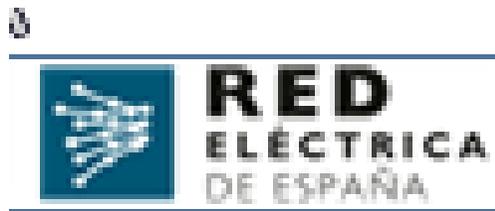
- ❖ **An Implementation Group was set up between the TSOs and the NRAs**
- ❖ **The aim is to discuss the progress of the project, the risks and the preparation of the implementation phase.**
- ❖ **The frequency of the meeting during the design phase = one each 2/3 months**

Stakeholder events/meetings

Stakeholder events/meetings

- ❖ **Project TERRE has organized the current meeting in order to communicate on the relevant information toward market participants.**
- ❖ **The questions and comments from the market participants will be highly considered.**
- ❖ **BSPs/BRPs could also contact their connecting TSOs in order to be informed about the local impact related to the implementation of TERRE.**
- ❖ **Project TERRE will organize another workshop or meeting before the end of the design phase.**

Timelines



Thank you...

