

# System Operation European Stakeholder Committee

Materials for meeting 29 September 2023



# Agenda

Subject	Timing	Lead
1. Opening <ul style="list-style-type: none"> <li>Review of the agenda, approval of last meeting minutes</li> <li>Review of actions</li> </ul>	09.00 - 09.15	ACER, Uros Gabrijel ENTSO-E, Cherry Yuen
2. Update on the implementation actions at pan-EU level	09.15 - 09.30	ENTSO-E, Cherry Yuen
3. Tmin FCR LER and FCR probabilistic dimensioning methodology <ul style="list-style-type: none"> <li>Update on TF LLFD analysis</li> <li>Update on outcome of the public consultation</li> </ul>	09.30 - 09.45	ENTSO-E, Luca Ortolano & Carmelo Mosca
4. Update on Winter 22/23 operational coordination <ul style="list-style-type: none"> <li>Summary and recommendations of the final report</li> </ul>	09.45 - 10.00	ENTSO-E, Laurent Rosseel
5. Report on CGM Implementation	10.00 - 10.15	ENTSO-E, Habir Paré
6. Overview of ROSC methodologies implementation	10.15 – 10.30	ENTSO-E, Erik Ahlstrom
Coffee break	10.30 - 10.45	
7. Frequency impact of sudden and large swings of vRES infeed: status update	10.45 – 11.00	ENTSO-E, Martijn Backer
8. Update of SO ESC ToR	11.00 – 11.15	ACER
9. Update on Montenegro ICS scale 2 incident	11.15 – 11.30	ENTSO-E, TBD
10. AOB	11.30 – 12.00	All

# 1. Review of actions

ENTSO-E, Cherry Yuen

# 1 Review of actions SO ESC 1/2

ACTION	ANSWER	STATUS
ENTSO-E will present the next update on DFD at the meeting either in June or September	Materials to be provided separately after RGCE approval	Ongoing
ENTSO-E will prepare an overview of ROSC methodologies implementation for SO ESC September meeting	See agenda topic #6	Done
ENTSO-E will investigate with relevant TSOs for conducting an analysis of processes in place in case of HVDC malfunctioning in the context of the root cause of the incident on the Nordlink (cyber-attack/wrong parametrisation).	Updates to be provided in today meeting (subject to Statnett's availability)	Ongoing
ENTSO-E will give an update to SO ESC on the probabilistic risk assessment (PRA) methodology	ENTSO-E will provide a presentation in the last SO ESC meeting of the year because the drafting of the report is still ongoing	Ongoing

# 1 Review of actions SO ESC 2/2

ACTION	ANSWER	STATUS
FCR probabilistic dimensioning methodology: If no public workshop is scheduled, ENTSO-E will provide an update at the next SO ESC, notably the outcomes of the public consultation	ENTSO-E is still processing the answers received during the public consultation	Ongoing
Implementation of Art.39 of SO GL and follow-up of RoCoF discussion: ACER will liaise with GC and SO ESC members to establish the Terms of References of the new Expert Group. (topic: a macro-economic study is provided by TSOs for adapting system operators to a net zero emissions power system)	EC will initiate a consultation on a forthcoming study which the new EG under GC and SO ESC will aim to support	Ongoing
ENTSO-E will investigate what are the legal conditions to allow for stakeholders' involvement while maintaining confidentiality of sensitive data	Difficulty/uncertainty to use an ENTSO-E document to protect individual TSOs' sensitive/confidential data. ENTSO-E will invite interested stakeholders to engage with the project Team in order to make the appropriate working arrangements	Ongoing

# **2. Update on the implementation actions at pan-EU level**

ENTSO-E, Cherry Yuen

# Pan-European or regional deliverables 2023: SOGL/NCER

---

SO GL  
(Article 15)

Annual report on operational security indicators (for year 2022) to be published shortly

SO GL  
(Article 17)

---

Annual report on regional coordination assessment (for year 2022) to be published shortly.

# Pan-European or regional deliverables 2023: SOGL/NCER

---

## CSAm (Article 44.5)

Secure data collection and validation platform being set up for the PRA (Probabilistic Risk Assessment) methodology expected in 2027

- annual TSO data collection process completed
  - Biennial report expected Q4 2023
- 

## KORRR amendments

Alignment with EU DSO Entity took place 13<sup>th</sup> Sept  
Conclusions follow after updates on implementation

---

## Operational Agreements

Ukraine/Moldova:

Emergency Energy Supply MLA concluded

Impact on Continental Europe Synchronous Area after synchronisation is closely monitored and reported regularly to ACER and NRAs

---



# Conclusions drawn from ENTSO-E & EU DSO discussion on KORRRR amendments (pending confirmation from EU DSO)

## Agenda

- Purpose and intention of the meeting - ENTSO-E & EU DSO
- Motivation of the amendment on threshold for real-time data exchange - ENTSO-E
- Feedback from EU DSO and discussions - EU DSO & ENTSO-E
- Open discussions & conclusions - all

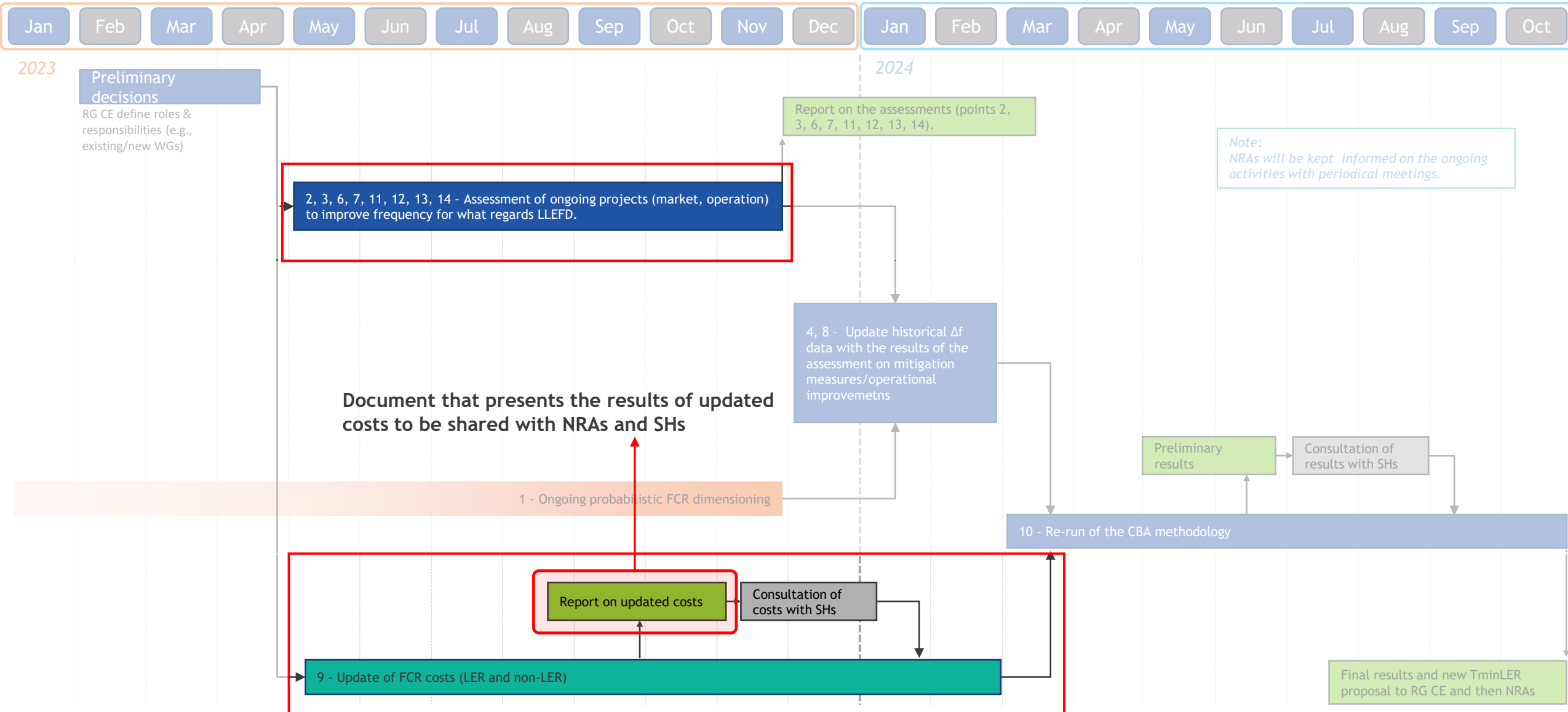
## Conclusions & next steps

- Motivation is not to relax the real-time data exchange threshold but leave it more open to allow small units to participate also in DSF -> concerns of sunk investments from DSOs side should be subdued
- ENTSO-E not to pursue the KORRRR amendments until CACM review resumes and NC DR is consolidated
- ENTSO-E and EU DSO to restart discussions after submission of the draft of NC DR to ACER, in order have a more holistic and coherent view on what will be needed regarding data exchange

# 3. T<sub>min</sub> FCR LER and FCR probabilistic dimensioning methodology

ENTSO-E, Luca Ortolano, Carmelo Mosca

# Update of FCR Costs analyses



## Update on FCR costs

- According to the agreed schedule, the results shall be consulted with stakeholders by November 2023.
- The draft of **LER and non-LER cost update has been shared with RG CE and MC members** in July-August 2023 to gather comments and feedback.
- The work is supported by the external consultant (CESI), which already supported ENTSO-E during the methodology definition.
- The work is ongoing with the following tasks:
  - ***RG CE approval process foreseen on 26<sup>th</sup> September 2023***
  - ***MC approval process will follow***
- After RG CE e MC approval, **dedicated meeting with NRAs and ACER** will be held. If NRAs and ACER agree with the WG proposal, the **public consultation** will proceed.

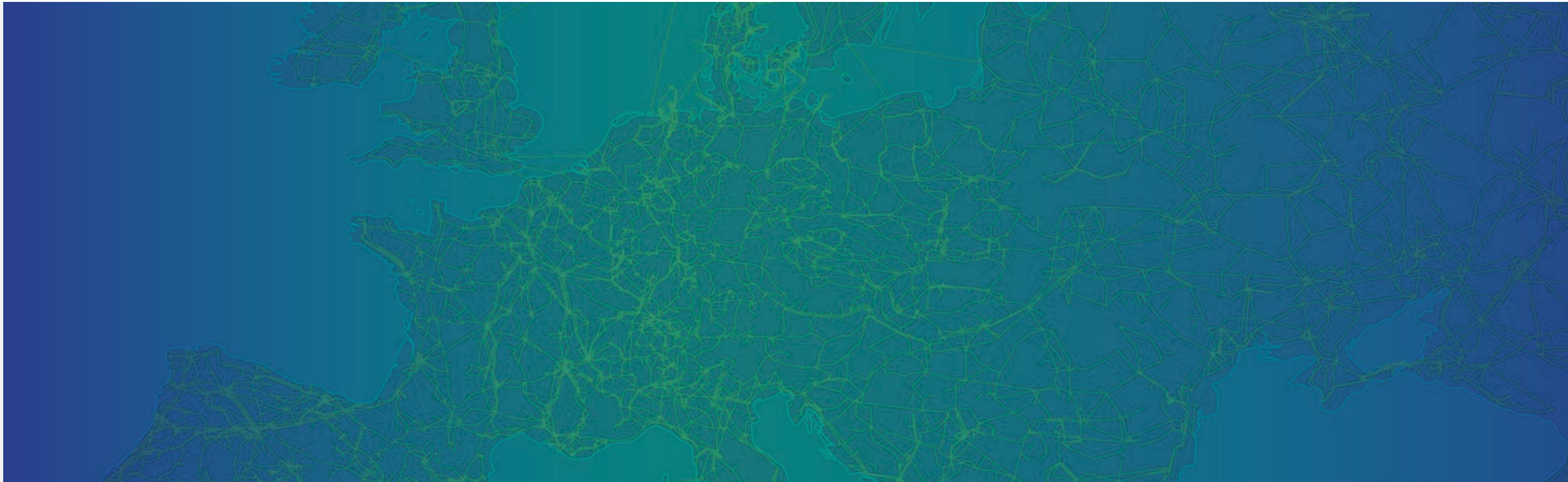
# Investigations on most relevant LLEFD

- The overall task is aimed at performing an assessment of ongoing projects (market, operation) to improve frequency for what regards LLEFD.
- TSOs already performed an analyses of these events, with a focus on their root causes (involved Blocks, trigger, causes of underperforming reserve activation).
- **NRAs asked for a more detailed explanation** on:
  - possibility of **cross-border reserve activation**;
  - **how** TSOs are going **to improve** their **operational procedures** to reduce/mitigate similar future events.
- The **priority is on the further investigations about countermeasures/procedures/TSO means to ease LLEFD, starting from the in-deep analysis** of the ones occurred in the past.
- The TF followed up on the NRAs requests collaborating more closely with the **TSOs which contributed to the largest events occurred in the past; in particular the availability of structural and operational mitigation actions, already in place or planned, it's being assessed.**

# FCR probabilistic Dimensioning (Art.153(2) SO GL) Consultation comments from SHs

Data classification level:  
[Restricted]

Carmelo Mosca, **DD** September 2023



*For Info*

# Consultation of the FCR dimensioning approach with Stakeholders - Overview

The public consultation about the TSOs proposal for a probabilistic FCR dimensioning approach pursuant Art.153(2) of SO GL has been held in the period 15<sup>th</sup> May – 15<sup>th</sup> July.

Four stakeholders provided a response. Respondents are:

- An association of the electricity sector (UFE, representing producers, transmission and distribution system operators) and a producer (EDF). They provide a shared response (comments are identical).
- A provider of energy control services.
- A research institute.

Some SHs asked for confidentiality in publicly sharing their names.

The proposal is currently under review to acknowledge comments from NRAs (shadow opinion) and SHs.

The final TSOs' proposal is expected to be approved by RG CE in the plenary of November 2023. The proposal will then be submitted to NRAs for approval.

NRAs approval process can legally take up to six months. Shouldn't NRAs request any amendment, the expected final approval is possible by June-July 2024.

# Consultation of the FCR dimensioning approach with Stakeholders - Overview

**CONFIDENTIAL**

*Provider of energy control services*

Few **request for clarification on the model.**

*Comments and replies can be published without the SH name.*

**CONFIDENTIAL**

*Research institute*

The contribution is **aimed at engaging with TSOs** in the FCR dimensioning and other related topics.

*Comments and replies can't be published.*



Contributions from EDF and UFE are exactly the same.

The contribution is **wide and articulated. Observations, suggestions, criticism and requests for clarification are provided.**

*Comments and replies can be published with the SH name.*



# Consultation of the FCR dimensioning approach with Stakeholders - Overview

SHs' comments regards all articles of the proposal. The most significant ones regard the following topics:

- Request of clarifications about the LER modelling.
- Request of clarification about the definitions (e.g., “LER”, “Equivalent reservoir energy capacity”).
- Suggestion about the modelling of further elements such as HVDC, local lines, etc.
- Request of clarification and comments about the definition of “critical condition”, leading to the need of FCR increase.
- Suggestion to combine probabilistic and deterministic FCR dimensioning approaches.
- Suggestion about the symmetry of reserve.
  
- Suggestion to increase the level of detail in the proposal (i.e., by including some explanations/clarification currently present only in the explanatory document).
- Request of clarification about the recalculation process to be undertaken periodically by TSOs (which entity is in charge of it? What's the expected periodicity? What can trigger a recalculation?).

Feedback about the model presented in the proposal

Feedback about the document and the dimensioning process

# **4. Update on Winter 22/23 operational coordination**

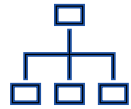
ENTSO-E, Laurent Rosseel

# Lessons learnt

The interim report lists numerous lessons learnt



Time-saving solutions to be applied whilst setting up a Task Force



Advices on structure of the Task Force to best represent the Association



Best practices on conducting surveys between TSOs and RCCs



Advices on tightening the cooperation with ENTSOG









Suggestions on recurrent revisions of processes and procedures



Recommendations on building a cross-competence teams (based on example of WS5 where System Operations and Communication experts cooperated)

# Recommendations

## Existing processes and procedures

-  Applying the survey practices of Workstream 1 for future needs
-  Deeper inclusion of RCCs in monitoring and reviewing after the Seasonal Outlook has been published
-  Ensuring quality inputs of individual TSOs and adequate training of all staff for qualitative STA process;
-  Evaluating the possibility of providing D-3 Early Assessment by RCCs/RSCs other than TSCNET and Coreso
-  Revising of the CGS Communication process and providing a training for all TSOs and RCCs at least once a year
-  Organising a training on STA process for all TSOs and RCCs at least once a year

# Recommendations

## Proposals for further development



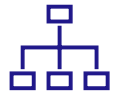
Investigating and delivering on current practices and possible conflicts regarding operational aspects and decision making in case of scarcity situations



Delivering on coordinated load shedding approach



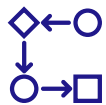
Maintaining an open operational communication channel with ENTSOG



Delegating the task of evaluating any ad-hoc requests from the Members to one of permanent structures under SOC



Implementing the re-use of the OPI tool for network contingency studies in D-3 in wider spectrum



Evaluating the possibility of implementation of the Management on Frequency Procedure in the SAs other than CE



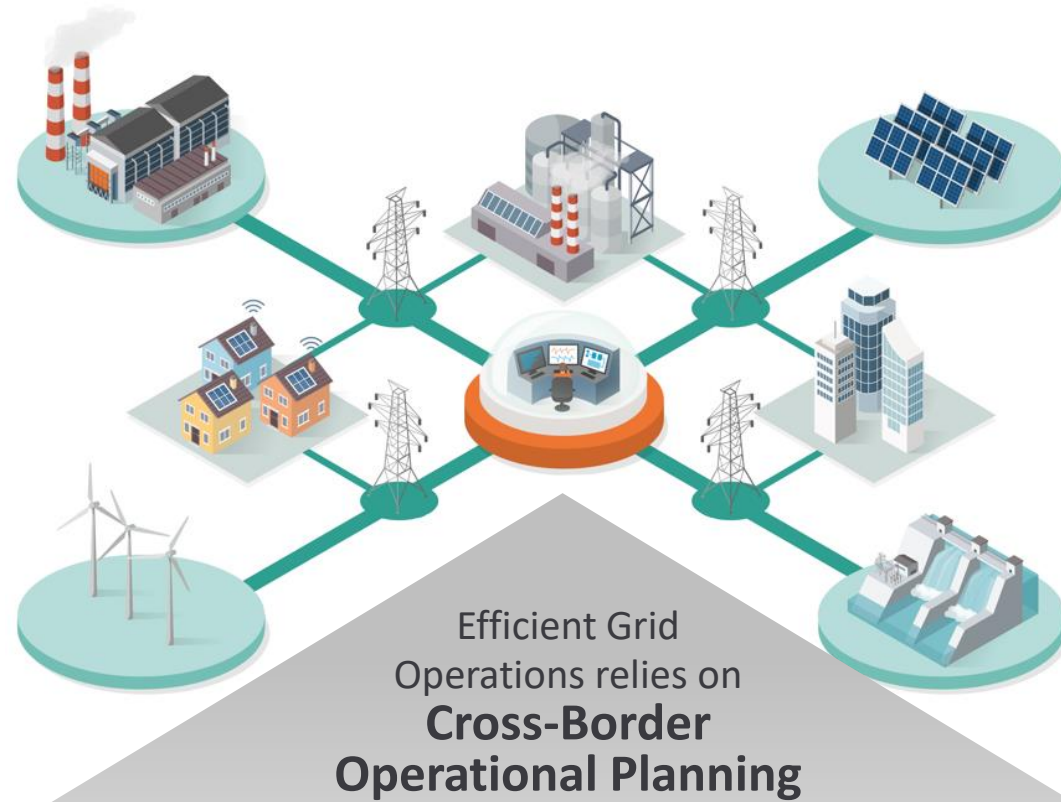
Organisation of training on STA process shall be organised in all RCCs and TSOs

# 5. Report on CGM Implementation

ENTSO-E, Habir Paré

# Importance of CGM & OPDE to facilitate RCCs coordinated services

The Common Grid Model (CGM) and the Operational Planning Data Environment (OPDE) are fundamental enablers for reliable and efficient Grid Operations



Regional coordination processes

Coordinated Security Analysis

Coordinated Capacity Calculation

Outage Planning Coordination

Short and Medium Term Adequacy

ENABLED BY

Common/shared planning data

Common Grid Model (CGM)

SHARED AND ACCESSED THROUGH

Digital infrastructure for pan-European data exchange & storage

Operational Planning Data Environment (OPDE)

# Next steps / focus areas for 2023

## FOCUS AREA

## ACTIONS

## MILESTONES

### OPDE DELIVERY & USAGE

- Achieve full OPDE access for all stakeholders
- Await regulatory resolution to allow TSO with legal issues to participate
- Deliver new OPDE functionalities which will simplify installation, configuration and operation for all TSOs/RCCs
- Identify improvements to vendor support arrangements
- Identify improvement for TSO performance self-monitoring (IGM quality, inclusion of IGM into CGM)

- Q2 2024
- [Asap]
- OPDE Releases: Q2 2023, Q4 2023
- ongoing

### GRID MODELLING

- SOC decision taken on 15 February 2023: CGMES 2.4.15 will be maintained for now (enabling focus on existing CGM service)
- **Continuous review/improvement** of effectiveness of all-TSO-RCC modelling group and interoperability, to maximise increases in overall performance
- Development of business quality criteria to enable HVDC modelling and integration of CGM service with other operational services

- Q1 2023
- Q1-Q4 2023
- ongoing

### USE OF CGM IN OPERATIONAL PROCESSES

- Keep up to date the roadmap of use of CGM in CGMES format in RCCs tasks
- Reinforce the collaboration with other Working Groups to mitigate risk on misalignment between different Operational processes.
- Facilitate the connection of Operational processes to OPDE.

- ongoing
- ongoing
- ongoing



# 6. Overview of ROSC methodologies implementation

ENTSO-E, Erik Ahlstrom

# Request from SO ESC

Following request was received from SO ESC:

*Eurelectric (Marie Bourousse) would like the principles for Regional Operational Security Coordination methodologies to be discussed in the next SO ESC meeting. These methodologies are developed at Capacity Calculation Regions level. An overview of the parameters for free implementation in different regions would be welcomed since stakeholders might be affected based on the implemented redispatching and countertrading.*

**Action: ENTSO-E will prepare an overview of ROSC methodologies implementation for SO ESC September meeting**

CSA SPOCs in each CCR were responsible by:

- Providing all ROSC specificities (times, regional parameters etc.) regarding the activation/ordering of redispatching and countertrading remedial actions that impact generators in the corresponding next slide
- Regional differences in ROSC implementation: expected since principles on redispatching and countertrading are not specified in CSAm

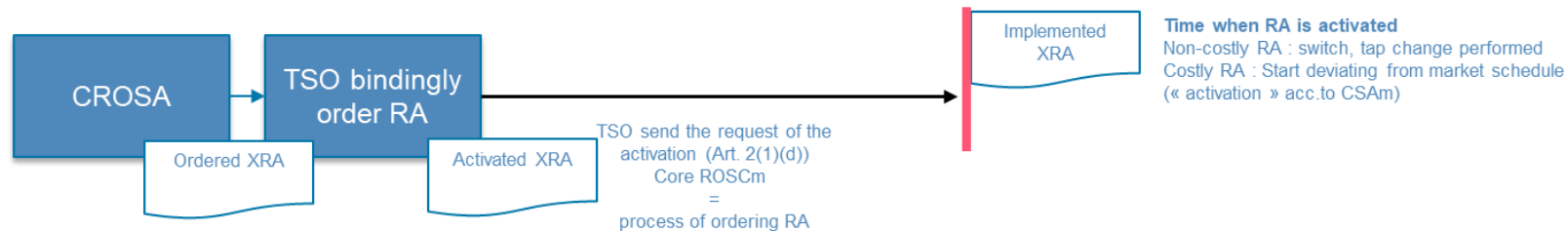
## CCR Baltic

- Redispatching RAs are only expected as exceptional measure for CSA processes
- In case countertrading RAs are foreseen in CSA processes, they will be performed according to "Redispatching and Countertrading Cost Sharing methodology" referenced in Baltic ROSC
- Only general requirements are defined regarding activation/ordering of redispatching and countertrading remedial actions

# CCR Core

## Distinction between Ordering and Activation of costly RAs

- Core ROSCm Art. 2(1)e states that an Ordered XRA (ORA) is an agreed XRA that is **bindingly ordered after the end of the CROSA** because their activation cannot be postponed until the next CROSA due to specific activation constraints (e.g., required activation time)
- Core ROSCm Art. 2(1)f states that an Agreed but not Ordered XRA (ANORA) is an agreed XRA that has not been ordered after the end of CROSA
- Core ROSCm Art. 31 includes that each XRA connecting TSO shall **activate XRAs at the latest time compatible with technical, operational and procedural constraints** of the resources in accordance with CSAm.



- The timing when to order a costly RA is not defined in the methodology

# CCR Core

## Alignment with Core NRAs/ACER on the ordering process of a costly RA

- Core NRAs and ACER agreed with these principles
  - Ordering a “ $\Delta P$ ” rather than a “setpoint” after the CROSA process
  - In order to ensure availability of redispatch proposed by the CROSA process, it is deemed necessary to order the redispatch **directly after CROSA**
    - Exceptions: Countertrading and curtailment of Renewables Energy Sources
  - This principle can only work efficiently in case TSOs are allowed to restrict the market for power plants assigned as ORAs at least in the direction which increases the congestion

## Next steps

- The Core ROSC methodology will be amended accordingly in the near future
- National legislations must be adapted in case not compatible with the principles

## CCR GR-IT

- Redispatching RAs are not used as XRAs as Italy and Greece are connected only via an HVDC link – these RAs are only applied to solve internal congestions on both systems
- Countertrading RA can be applied, practically resulting in a setpoint change in the HVDC link
- The coordinated countertrading actions and redispatching actions are decided after all other available and effective non-costly actions (e.g. grid topology variations, coordinated use of PSTs) have been considered and if network elements are still congested

## CCR Hansa

- CCR Hansa grid does not contain any generators, thus activation/ordering of redispatching/countertrading RAs that impact generators is not relevant in the region

# CCR Italy North

- Provide all ROSC specificities (times, regional parameters etc.) regarding the activation/ordering of redispatching and countertrading remedial actions that impact generators



## CCR Nordic

- Nordic CCR is currently working on v1.0 of the CSA service which does not entail any RA
- Redispatching and countertrading will be considered as RAs eventually, but regional specificities have not been defined yet

## CCR SEE

- Redispatching and countertrading RAs are foreseen once ROSC is implemented
- In case countertrading RAs are foreseen in CSA processes, they will be performed according to "Methodology for coordinated redispatching and countertrading for the SEE CCR"
- Only general requirements are defined regarding activation/ordering of redispatching and countertrading remedial actions

## CCR SWE

- SWE does not expect to use redispatching RAs, except REN – RE coordinated redispatch for voltage angle issues
- Merit order GLSK will be used for countertrading in Spain and Portugal, linear GLSK (proportional to Pmax) will be used in France

# 7. Frequency impact of sudden and large swings of vRES infeed: status update

ENTSO-E, Cherry Yuen & Martijn Backer

# Background

The project investigates fast changes in renewable infeed that occur for expected regulatory/market reasons like:

- New regulations related to negative prices can impact the profits of solar and wind may rapidly shut down (and later on restart) if there is no profit margin. Some regulations even introduce penalties if they stay on the grid
- Environmental regulations can also lead to rapid wind shutdowns and (later on) restarts. For instance, noise regulations on wind farms may require them to stop during the night

Very fast shutdown of a large volume of renewables can lead to very fast frequency decreases and DFDs as they may correlate with schedule change and tariff change hours

## Objective

To investigate the causes and potential mitigation measures of this regulation-induced vRES variability, the StG OF has established a dedicated **Project Team**. The team performs an analysis to answer the following questions:

- 1 Which regulations cause vRES operators to rapidly curtail their production and bring it back online after? Do they differ from one country to another?
- 2 Is the phenomenon applicable to all kinds of renewables or just a subset?
- 3 What is the size of the problem? How much renewables are involved in each country? How will the problem evolve in the coming years?
- 4 What is the precise impact on the frequency (RoCoF, and absolute variation (DFD))?
- 5 What measures could be taken to mitigate / limit the problem?

# Approach

## Step 1(i) + (ii) - data gathering and analysis

- Wind data from TNG + Elia, 2019 - 2023
- Identification of large 15-min. ramps
- Correlation of wind ramps with negative prices is analyzed

## Step 2 (i) + (ii) - dynamic impact analysis

- Model set-up and simulation runs based on largest ramps of Step 1, to identify impact on frequency

## Step 3 - regulatory framework analysis

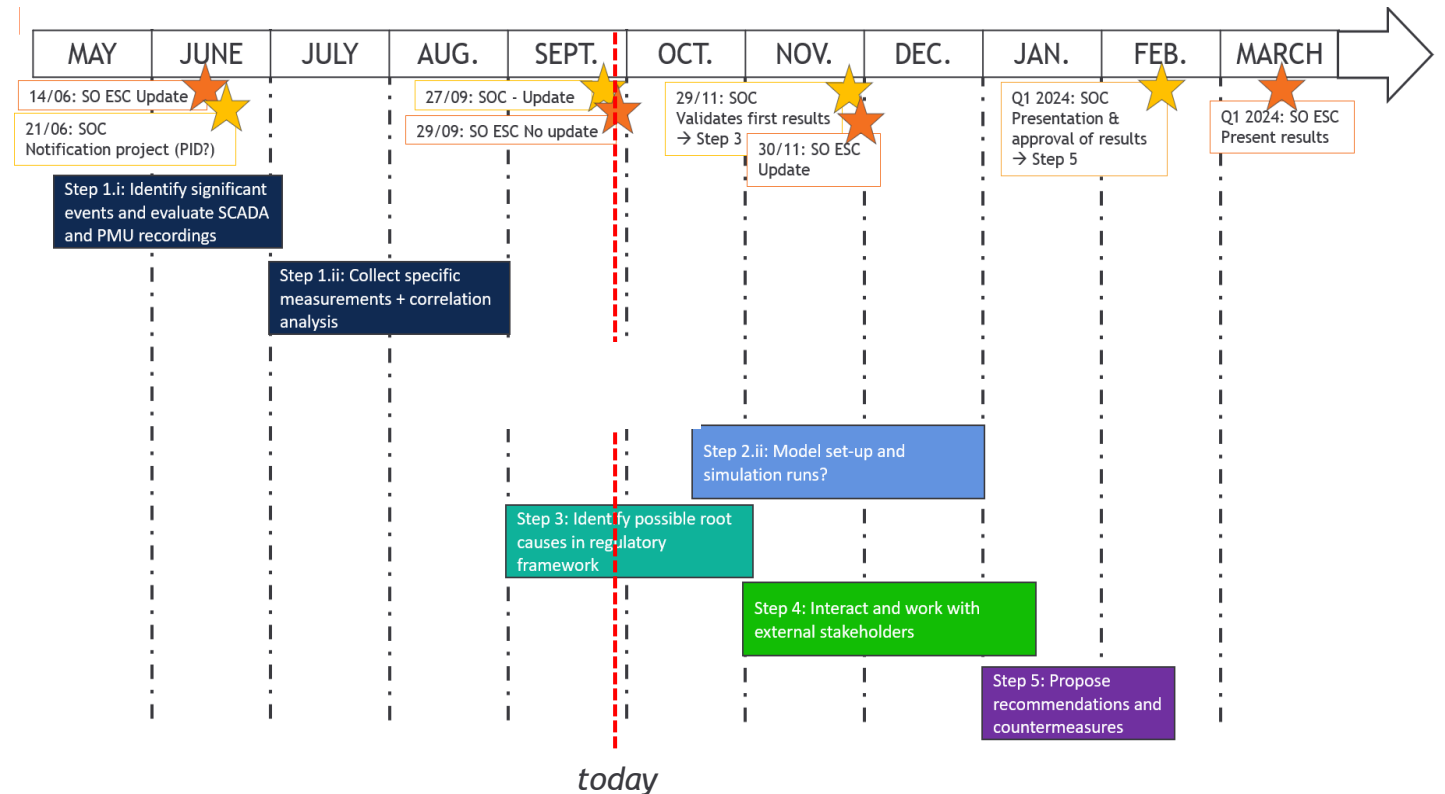
- Identify possible root causes in regulatory framework  
→ data collection on current regulations

## Step 4 - stakeholders' management

- Interact with external stakeholders

## Step 5 - conclusions and recommendations

- Propose recommendations and countermeasures



# Next steps

## Wind ramp / correlation analysis

- Collect and analyse data from other TSOs
- Collect 1 min. data for the observed significant events → to be used for simulations by SG SPD (Subgroup system protections & dynamics)
- Collect localized, detailed data about vRES plants involved in the significant events

## Simulations to analyze effect on frequency

- Investigate the need for performing simulations and setting up an appropriate model (SG SPD)
- Run simulations and identify possible countermeasures / recommendations

## Regulatory framework

- Identify possible root causes in regulatory framework → analyse current regulations
- Discuss with stakeholders on the operations of vRES production sites and the possible root causes of sudden ramps

**!! The project team would benefit greatly from the support by other TSOs/stakeholders, in the form of**

- Project participants
- Data (particularly, wind infeed data)
- Experience on the topic

Two external stakeholders have volunteered to participate in the project but are being held back, pending legal clearance related to sensitive data (NDA):

- CoGen
- WindEurope

# 8. Update of SO ESC ToR

ACER



# 9. Update on Montenegro ICS scale 2 incident

ENTSO-E, Laurent Rosseel

# Introduction

CGES has detected an incident that has been classified as **Scale 2** according to the ICS Methodology:

- *Time of the incident - 28.05.2023. (17:52h)*
- *Neighbouring TSOs - NOS BiH, EMS, TERNA, KOSST, OST, HOPS.*
- *All neighbours reported limited impact of the incident on their grid. No special measures were activated by the neighbours.*
- *ICS criteria thresholds that were been violated - ICS T2 (Incidents on network elements (T))*

# Sequence of events

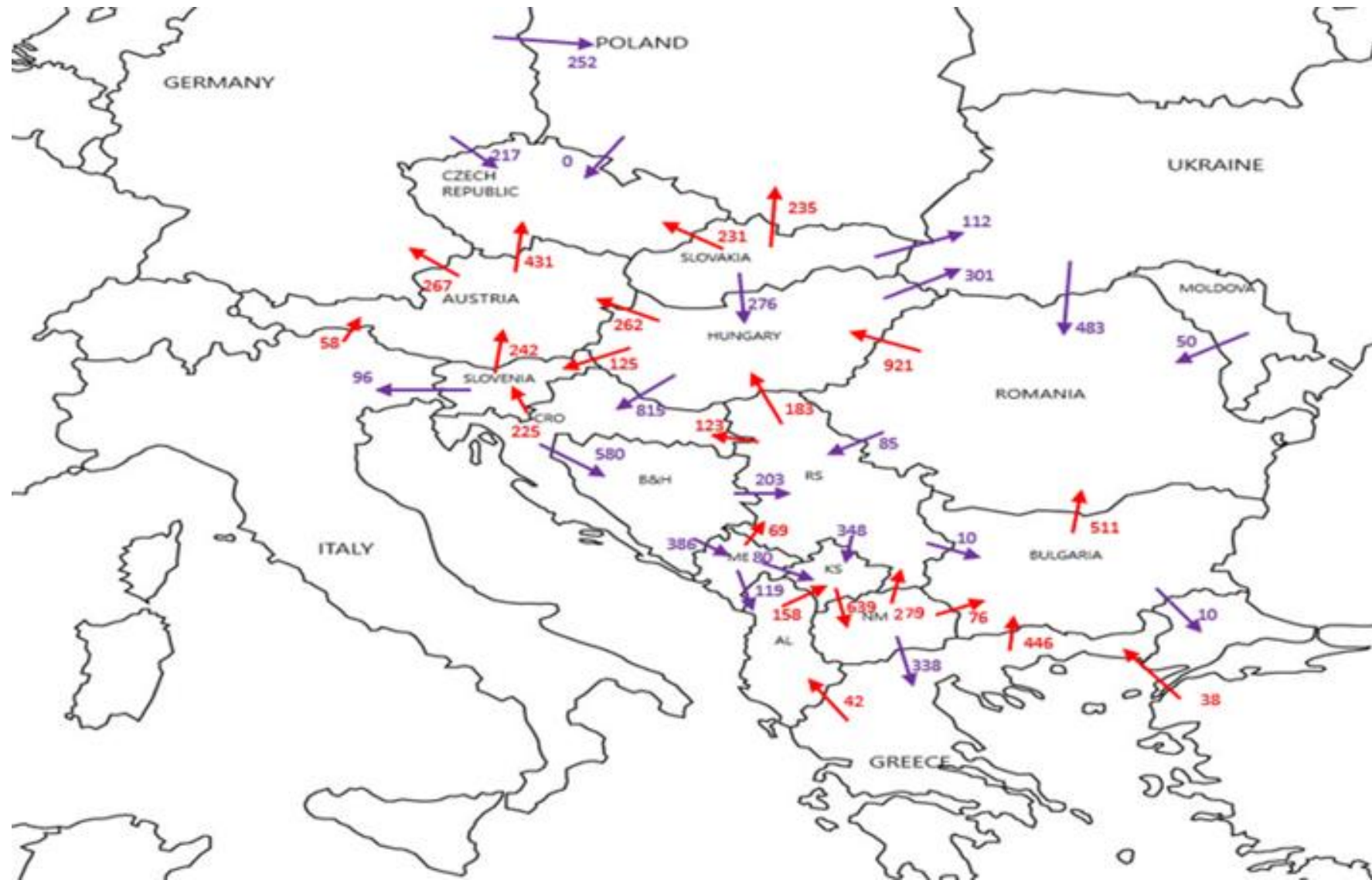
1. Outage of TIE 400 kV Lastva (ME) – Trebinje (BA) at 17:52 h, tripped by distance protection.
2. Outage of TIE 110 kV Nikšić (ME) - Bileća (BA) at 17:53 h, triggered by overload protection.
3. Outage of TIE 220 kV HPP Perućica (ME) – Trebinje (BA) at 17:53 h, triggered by overload protection.
4. Outage of TIE 220 kV HPP Piva (ME) – Sarajevo 20 (BA) at 17:56 h, triggered by first-stage overcurrent protection.

*After these outages, CGES-NOSBiH interconnection was completely disconnected. The outages lead to overloads within Montenegro. CGES activated an emergency state. An emergency state of the system implies a situation in which one or more operational security limits are violated. This critical situation will represent a larger-scale alert because a subsequent outage could jeopardize the rest of the interconnections.*

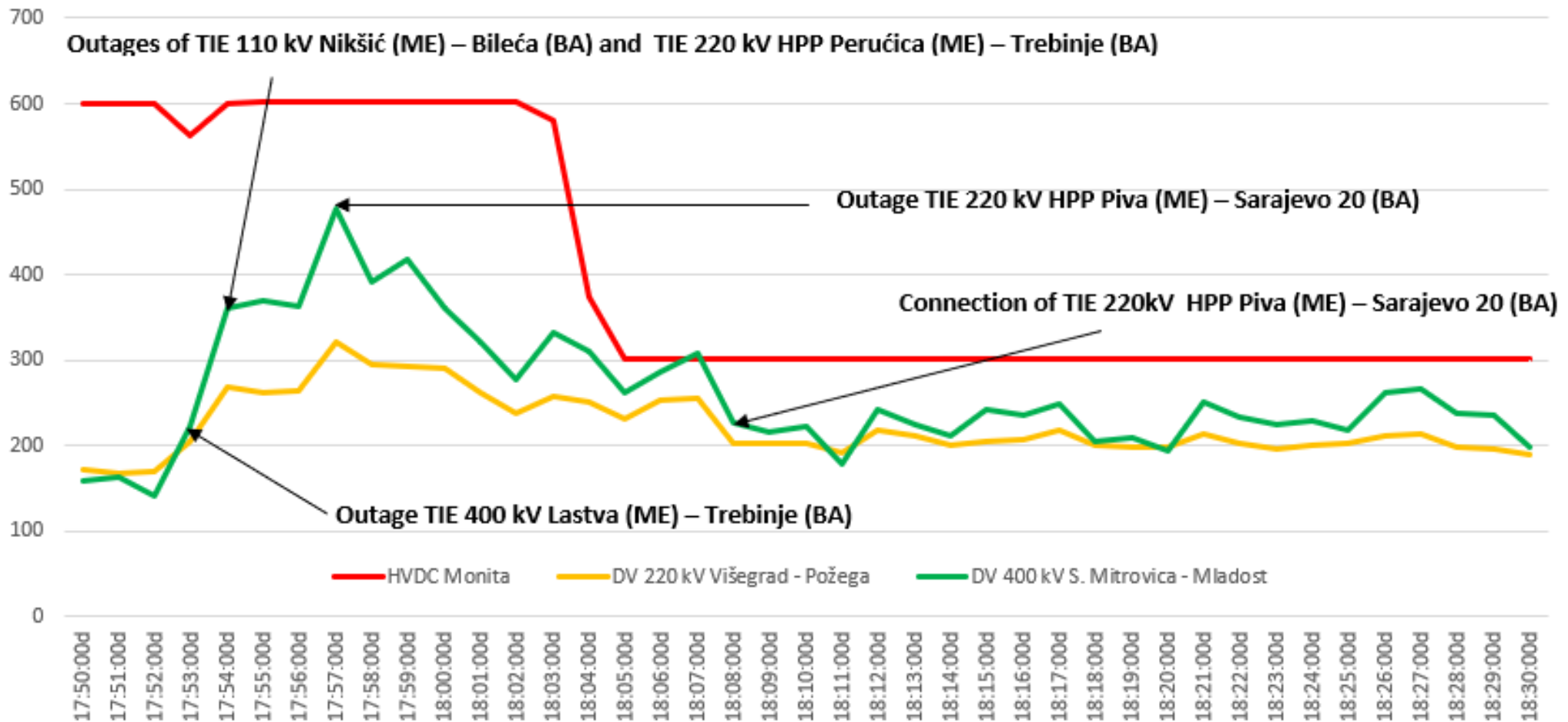
5. TIE 400 kV Lastva - Trebinje was restored at 17:56 h.
6. To eliminate the resulting overloads caused by the outages, it was necessary to adjust the power exchange on the HVDC system by implementing a new setpoint value, in accordance with Montenegro's System Defense Plan measures. As a result, HVDC Monita operated at 600 MW from 18:02 h to 18:05 h, after that the power was rapidly reduced to 300 MW.
7. TIE 220 kV HPP Piva (ME) - Sarajevo 20 (BA) was energized at 18:07 h.
8. Synchronization and breaker operation issues occurred in SS Trebinje.
9. CGES activated once again measure from the Defense Plan, to reduce power exchange on HVDC Monita to 100 MW (starting from 19:00 h).
10. After this adjustment, all transmission lines were connected.

*In the CGES network, production and consumption were at planned values before the outages occurred.*

The difference between scheduled and physical flows is represented by the colours purple (positive) and red (negative)



# Impact of outages on HVDC MONITA, TIE 220 kV Visegrad-Požega and OHL 400 kV S.Mitrovica-RP Mladost



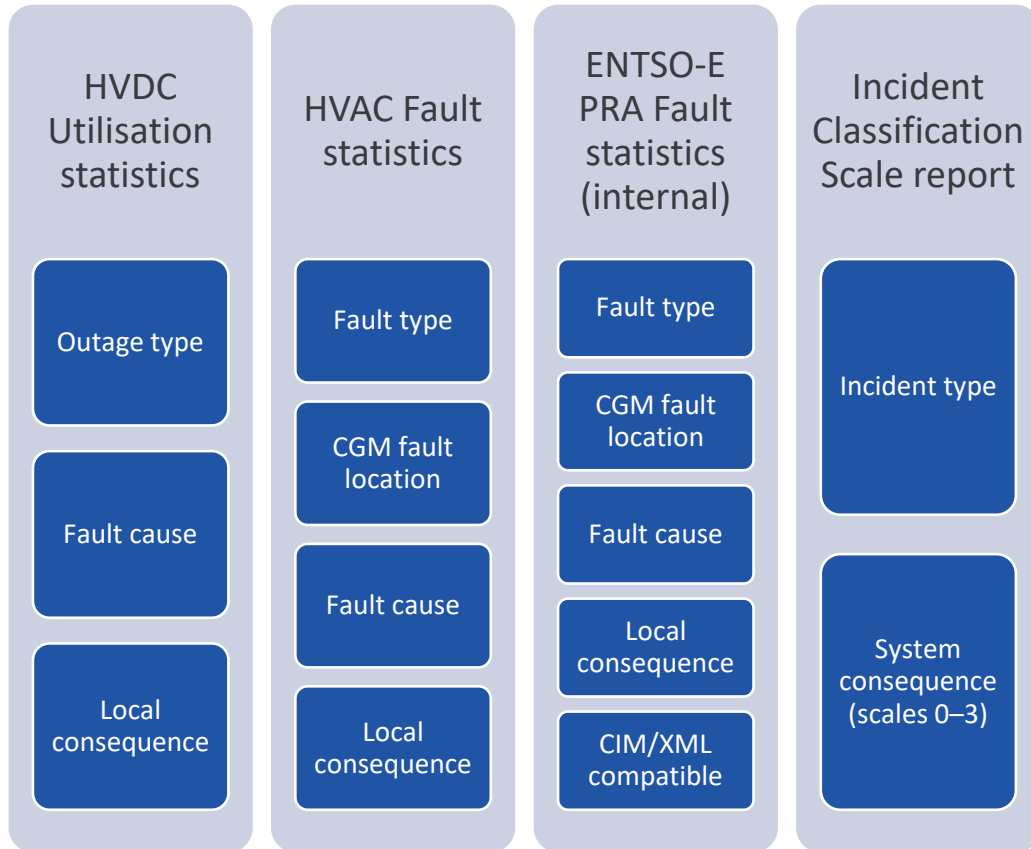
# Conclusions

- Incident classified as ISC Scale 2 due to cascading event on the lines (Incidents on transmission network elements (T2))
- No load shedding was applied
- Small \ no impact on the neighbours
- Significant differences between scheduled and physical flows were observed before the incident
- Similar conditions (difference between scheduled and physical flows) occur recurrently in this part of CE system.
  
- An investigation with one report being published (similarly to 18<sup>th</sup> May 2021 incident in Poland) will be organised.
- **Expert Panel is being established (ENTSO-E, ACER, NRAs) lead by Laurent Rosseel**
- Preliminary timeline indicates that the **report shall be ready by end of 2023.**

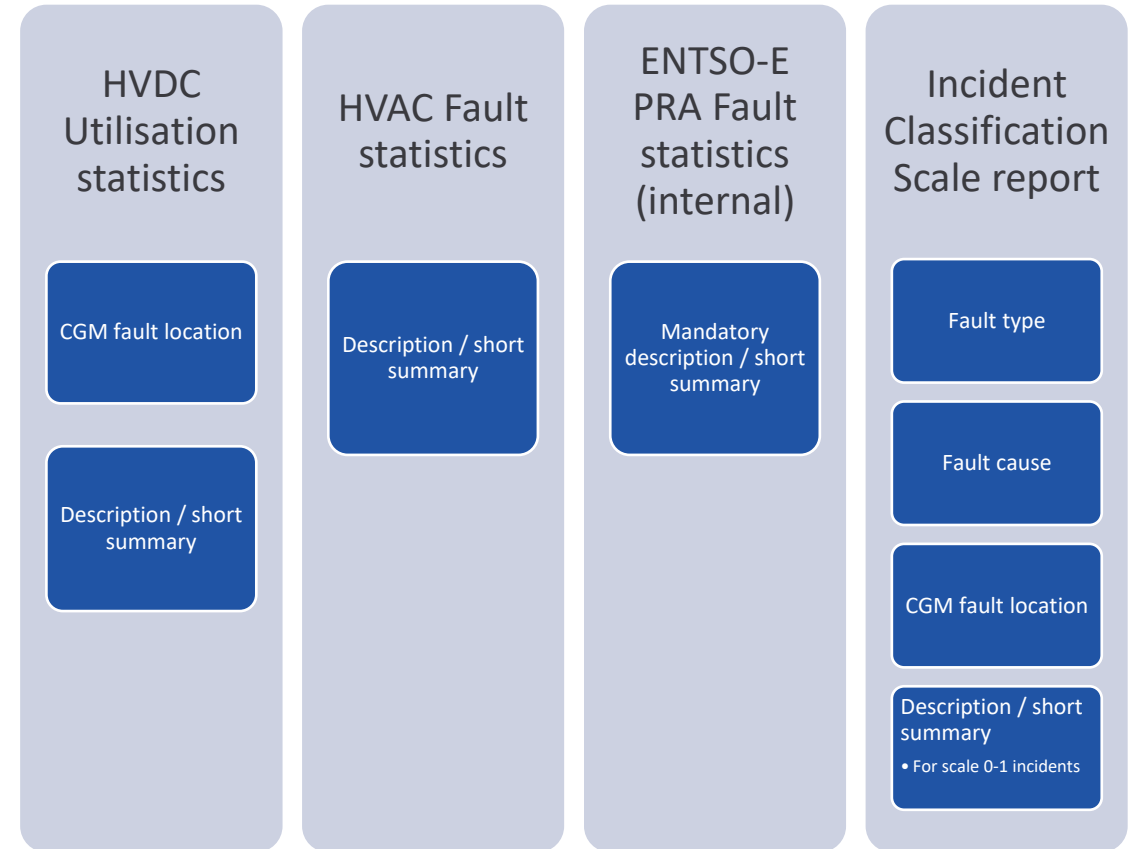
# 10. AOB

# All related historical ENTSO-E Statistics

## What we have



## What is missing?



## Relevant links

- [ENTSO-E Grid Disturbance Definitions for the Power System Above 100 kV](#)
- [Incident Classification Scale Methodology](#)



# What should be done with the reporting?

## Current reporting

### HVDC Utilisation statistics

- Excel data collection and manual report creation

### HVAC Fault statistics

- CIM/XML based reporting via ENTREC

### ENTSO-E PRA Fault Statistics (internal)

- CIM/XML based reporting via ENTREC

### Incident Classification Scale report

- Excel based data collection via ENTREC

## What is the best solution?

Extend the ENTSO-E PRA

### **SCOPE** and **STATISTICS**

- Mandatory description / short summary (normally reported in local language)
- Include HVDC and generation outages when CGM for all units over 100kV are available
  - CIM/XML compatibility necessary
- Improve CGM fault location accuracy
  - e.g., line vs tower

# List of abbreviations

RG CE	Regional Group Continental Europe
STA	Short-term adequacy
CGS	Critical grid situation
OPI	Operation Planning Incompatibility
SA	Synchronous Area
CCR	Capacity calculation regions
ROSC	Regional operational security coordination
CSA(m)	(Methodology for) coordinating operational security analysis
RA	Remedial action
XRA	Cross-border Remedial action
CROSA	Coordinated regional operational security assessment
GLSK	Generation and load shift key
SG SPD	Subgroup System protections & dynamics
PRA	Probabilistic risk assessment