

Grid Connection Network Codes # Ask me anything webinar

by Expert Group on Existing Network Codes

11 December 2023, 14.30 – 16.00 CET

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1. Warm Welcome to our Webinar #Ask Me Anything

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Presenters:

DSO Entity Experts:

- Florentien Benedict
- Tony Hearne
- Erno Leväniemi
- Mike Kay

Secretariat:

- Serdar Bolat
- Tommaso Carbone



We are happy to respond your questions.

Write your questions in the Chat or speak up in the Q&A timeslots!

Agenda

1. **Welcome to the Webinar** – Florentien Benedict (Chair of the Expert Group)
2. **Introduction of DSO Entity Expert Group on Existing Network Codes (NC)** – Serdar Bolat
3. **Short quiz #1** – Tommaso Carbone
4.
 - a. **Overview of the existing network codes** – Florentien Benedict
 - b. **Focus on the revision of the Grid Connection NC** – Mike Kay
5. **Focus on the next challenges and solutions for connecting new technologies within DSO Grids:**
 - a. **Electromobility** – Erno Leväniemi
 - b. **Grid forming technologies** – Tony Hearne
 - c. **Storage** – Mike Kay
 - d. **Significant modernisation and mixed customer sites** – Mike Kay
 - e. **Demand connection topics: LFDD, reactive power exchange** – Florentien Benedict, Tony Hearne
 - f. **New certification requirements-** Mike Kay
6. **Short quiz #2** – Tommaso Carbone
7. **Q&A** – moderated by Secretariat
8. **Final remarks. Conclusions** – Florentien Benedict

2. Introduction of our Expert Group Existing NC (1/2)

Main pillars of DSO Entity



Network Codes & Guidelines

Participates in drafting of Network Codes and Guidelines relevant for DSO grids

- Network Code **Cybersecurity**
- Upcoming **Network Code Demand Response**
- Review of all **existing NC**
- Further **delegated implementation** assignments



DSO/TSO cooperation

Promotes optimal and coordinated planning and operation of DSO/TSO networks

- **MoU** with ENTSO-E
- Cooperation on **Network Codes**

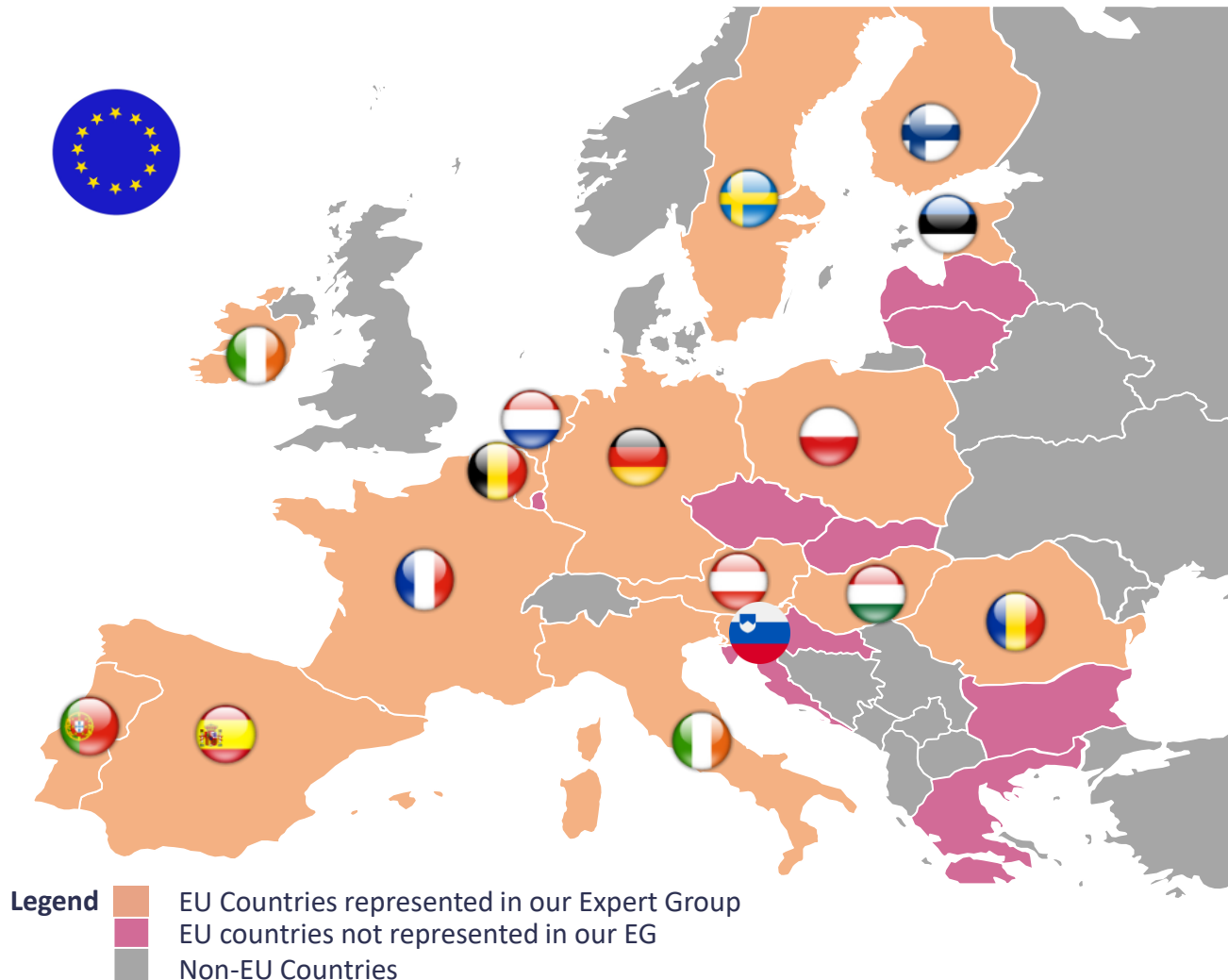


Sharing best practice

Expert Groups and forum provide expertise and enable exchange of views

- **Various forms of knowledge sharing** as foreseen in the Knowledge Sharing Strategy

2. Introduction of our Expert Group Existing NC (2/2)



Presenting our Expert Group:

- A. **25 experts**, coming from **16 EU countries**. The Expert Group started its activities in October 2022
- B. Expert Group mandate **is to review all existing network codes**
- C. Our EG is representing all **DSO categories** (small, medium and large DSOs), reflecting the views of all EU
- D. **Main tasks** in **2022-2023** focused on the revision of **Grid Connections Network Codes**
- E. **Chairmanship of the Expert Group**
 - A. Florentien Benedict, Chair (NL)
 - B. Tony Hearne, Co-Chair (IE)
 - C. Erno Leväniemi, Co-Chair (FI)

3. First Quiz



The question will appear in the Zoom interface



You will have 1 minute to respond



We look forward to your opinions and comments

4.a Overview of the Existing Network Codes

What are Network Codes?

Network Codes are a set of rules drafted by EU legislators (eg **ACER, EC, ENTSO-E** and **DSO Entity**) to facilitate the harmonisation, integration and efficiency of the European electricity market

Network Codes families

Under Public Consultation in 2023



4.b Focus on the revision of the Grid Connection NC (1/3)

Grid Connections Topics:



Requirements for PSH PGMs



Determination of Significance



Significant Modernisation



Requirements for Storages



Rules on E-Mobility



Mixed Customer Sites



Requirements for Type A PGMs



Simulation models and compliance monitoring



Capabilities for Grids with DER



Weather Hazards Requirements



Active Customers & Energy Communities



Requirements for Units Providing DRS

4.b Focus on the revision of the Grid Connection NC (2/3)

DSO Entity's key role in the consultation:

- In September 2023, **DSO Entity submitted more than 80 RfG and 15 DCC detailed comments** to ACER consultation
- **DSO Entity comments were both significant policy issues**, such as grid forming and EVs, and many points of detail arising from our knowledge of the shortcomings of the existing NCs
- During **October 2023**, several interactions were held with ACER and ENTSO-E



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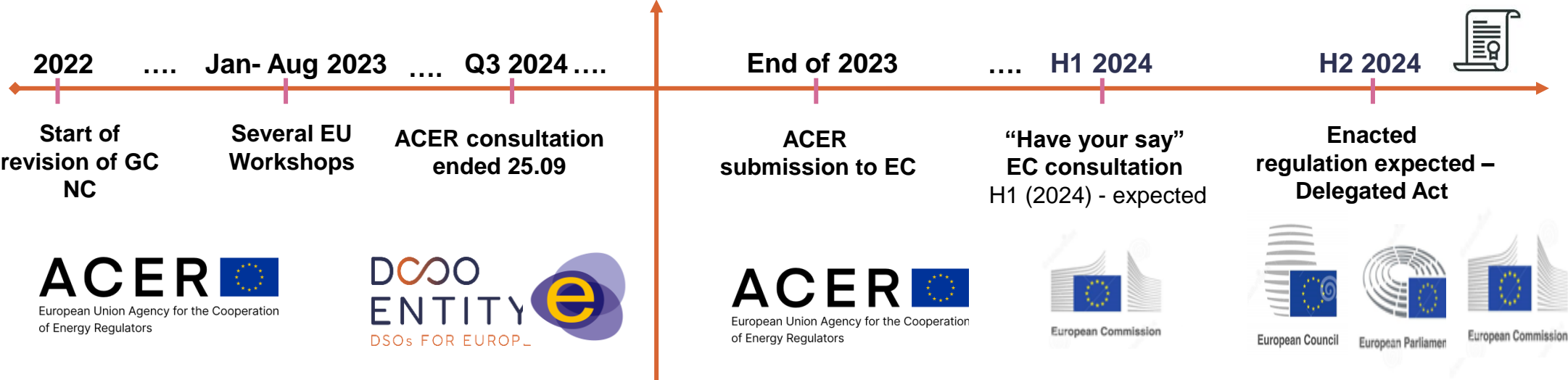
ACER 
European Union Agency for the Cooperation
of Energy Regulators



4.b Focus on the revision of the Grid Connection NC (2/3)

Legislative timeline:

As of December 2023



Grids Network Codes @Ask me anything webinar

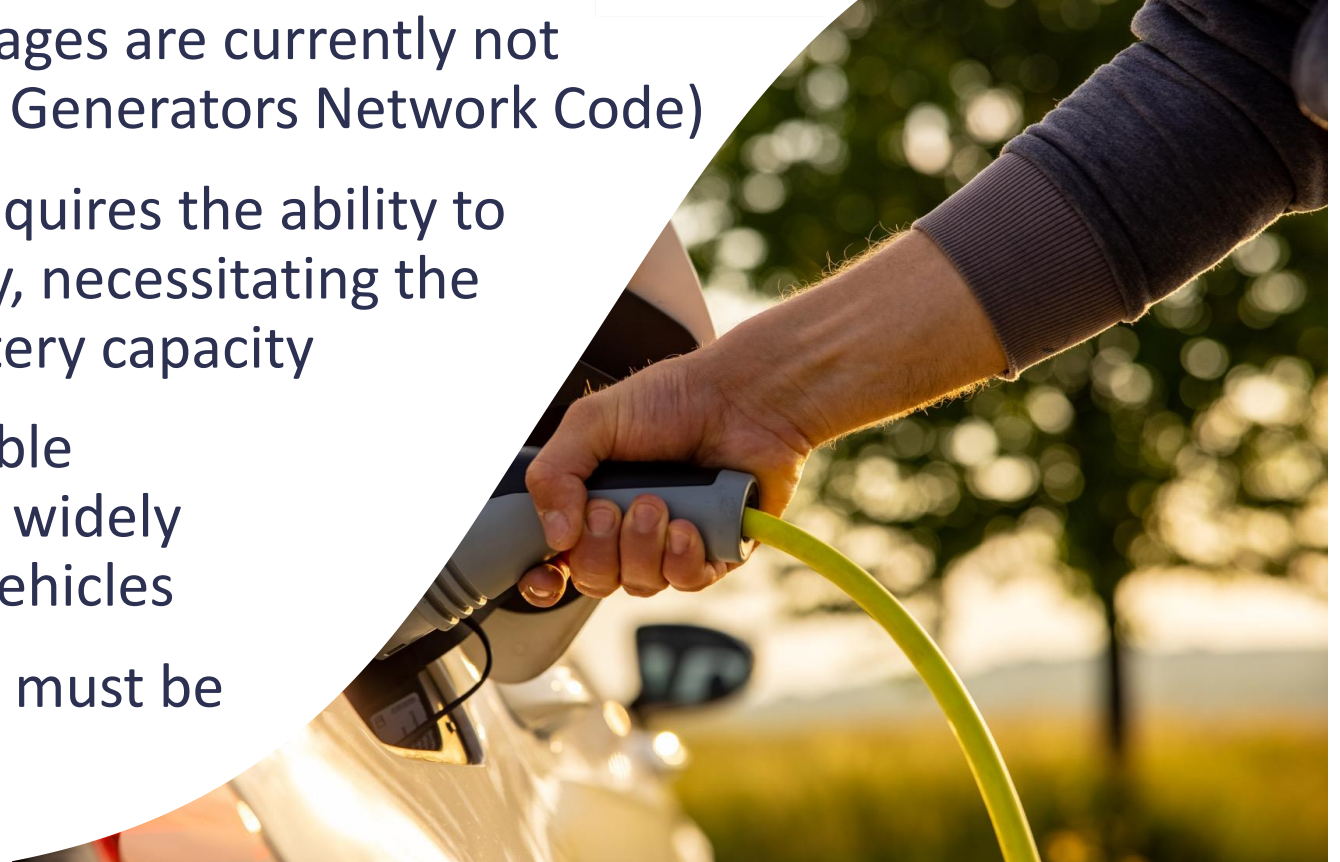
5. Focus on the next challenges and solutions for connecting new technologies within DSO Grids



5. Electromobility. Why is the NC RfG essential for EVs? (1/3)



- Electromobility and electrical storages are currently not addressed in the RfG (Request for Generators Network Code)
- Reduction of the CO₂ emissions requires the ability to temporarily store electrical energy, necessitating the utilization of available mobile battery capacity
- Vehicle manufacturers aim to enable bidirectional charging (V2G) more widely by incorporating converters into vehicles
- Vehicles travel across borders and must be able to function correctly in all the member states



5. Electromobility. What's new for NC RfG (2/3)

New definitions

1. V1G electric vehicle

Vehicle that can smartly withdraw electricity from the grid

2. V2G electric vehicle

Vehicle that is able to import and export electricity from the grid



3. Electric vehicle charging point or installation

Infrastructure that is connecting EV to the electric supply grid

4. Electrical charging park

A collection of devices where multiple electric vehicles can simultaneously connect to the grid using a single connection point.

EV types	0,8 kW < EV1 < 2,4 kW	2,4 kW < EV2 < 42 kW	42 kW < EV3 < 1 MW
Applicability	<ul style="list-style-type: none"> • frequency ranges • RoCoF withstand capability • logic interface for charging infrastructure • autonomous connection • LFSM-U EV and LFSM-O EV • voltage robustness/FRT 	As in EV1	<ul style="list-style-type: none"> • requirements applicable to type EV1 and EV2 • voltage ranges for MV/HV/EHV • system management • reactive power capabilities • post-fault active power recovery • grid forming capabilities
Compliance	Equipment certificates only, no operational notification required in the NC RfG	Operational notification procedure and requirements to demonstrate the compliance (Article 30a, RfG)	Operational notification procedure and requirements to demonstrate compliance (Article 30b, RfG)

5. Electromobility. Conclusions on NC RfG amendments concerning electromobility (3/3)

- The new definitions of *V1G*, *V2G*, *EV supply equipment* and *Electrical charging park* are clear
- The three EV categories seem unnecessary
- Establishing consistent requirements for electric vehicles throughout the EU is notably important to ensure the free movement of vehicles
- DSOs retain the ability to require prior notification of connection, as the RfG is silent on this



5. Grid forming technologies (1/2)

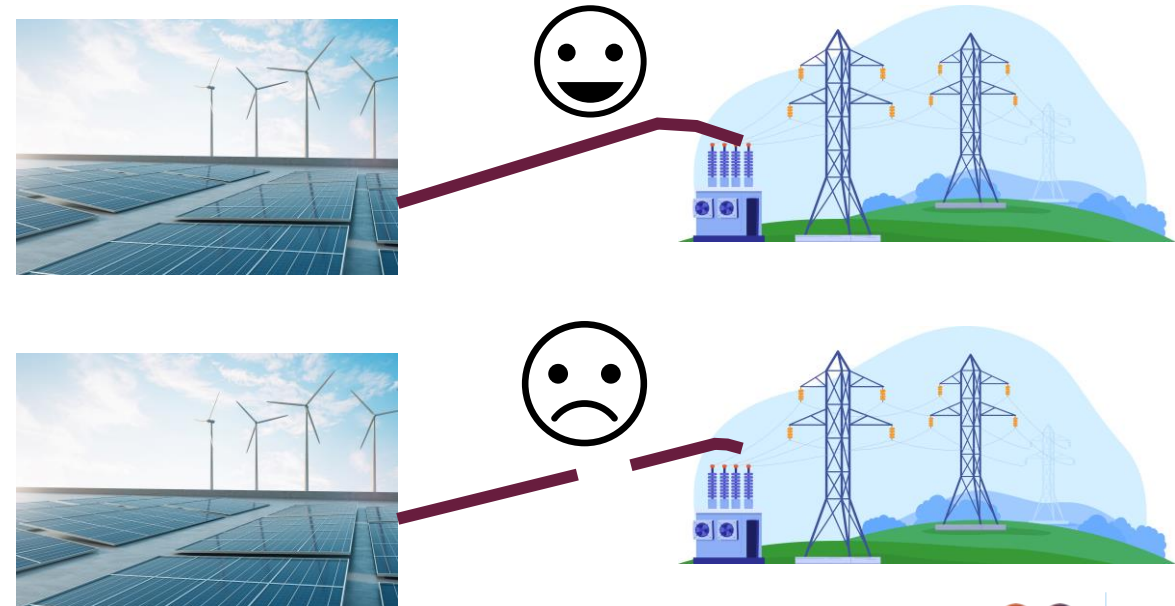
So, what do we mean by “Grid-Forming”?

- Generally, we mean that they don't need an electricity grid to start up
- Most conventional or synchronous generators are inherently grid forming



On the other hand, “Grid-Following”

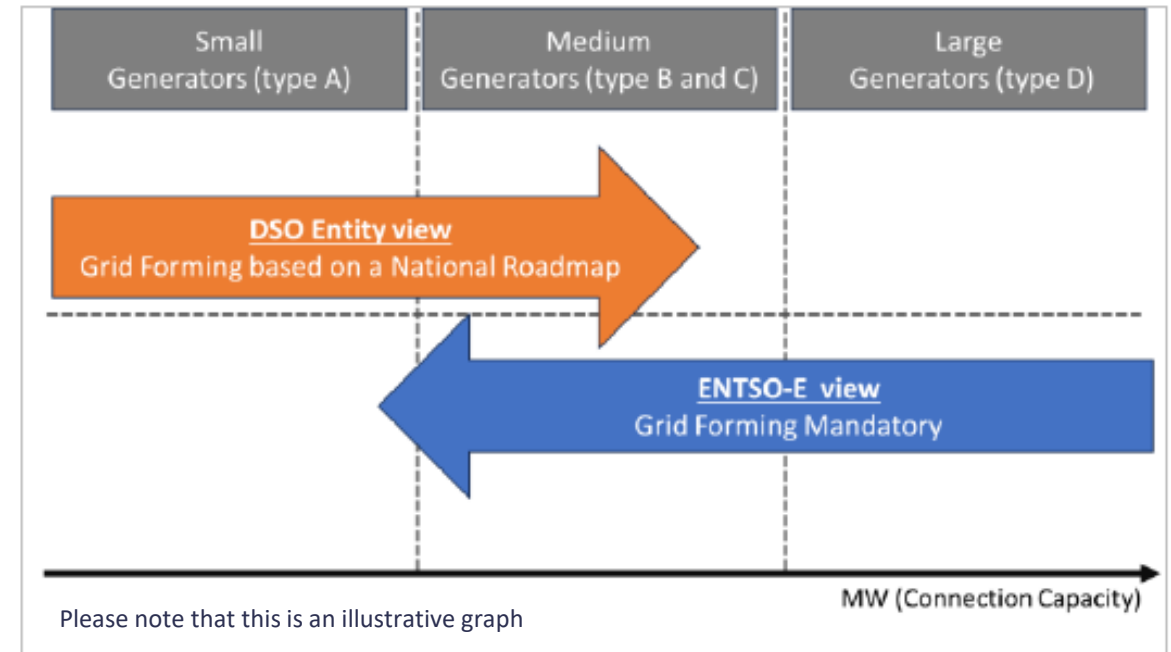
- Many non-synchronous generators [Power Park Modules or PPMs] such as wind and solar farms are currently what is known as “Grid Following.”
- They need to be connected to an electricity grid, to function properly



5. Grid forming technologies (2/2)

So, what's the problem?

- TSOs want to make most PPMs Grid Forming going forward for transmission stability reasons
- DSOs have concerns that this will increase the likelihood and duration of uncontrolled islands on distribution networks
- Two competing views:
 - TSO: Make most PPM types mandatory on Entry into Force
 - DSO: Put as much as possible of PPM types on a "roadmap"



- ✓ The roadmap would be agreed at the national level between TSO, DSO and Regulators
- ✓ It would give the DSO time and space to put mitigations in place
- ✓ We await ACER/Commission decisions on where this boundary will land

5. Storage

- ACER's proposals for storage are pretty much those of the ESC (European Stakeholders Committee) Expert Group on Storage
- Electricity Storage Modules (ESMs) become a subset of Power Generating Modules and need to obey all the same requirements as Power Generating Modules
- The key frequency response of ESMs when both exporting and importing are included in the NC RfG (ie the importing part as well, not in the NC DC)
- ACER might also be subtly changing the NC RfG so that non-synchronous PGMs, including ESMs are NOT aggregated on a single site, unless each unit is identical. This could be quite a change for how DSOs have to treat Power Park Modules.



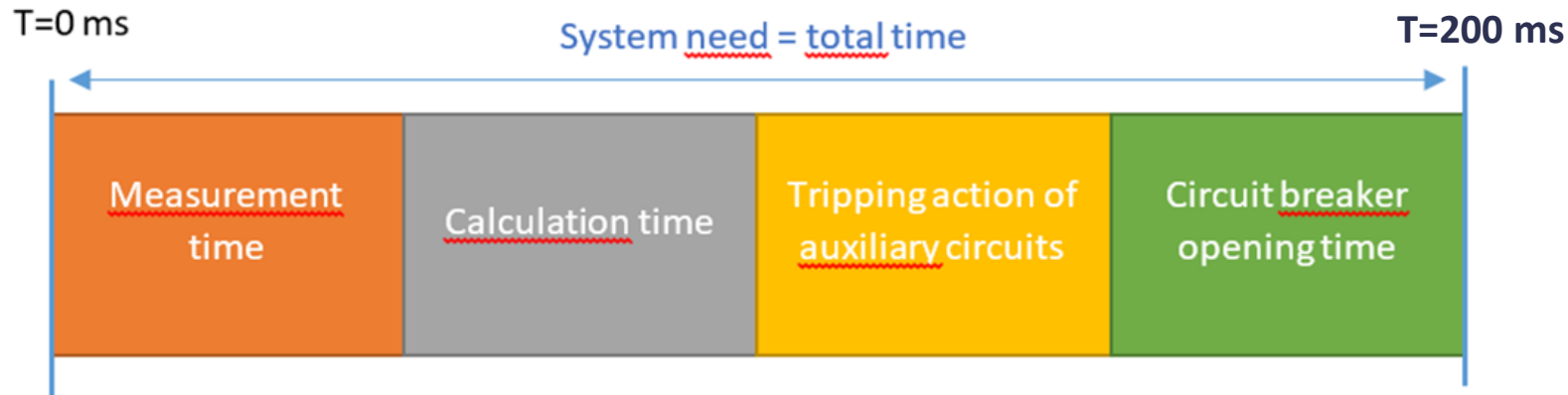
5. Mixed Customer Sites

- There is a particular problem caused by the 110kV threshold criterion which defines all power generating modules connected at, or above, this voltage as Type D
- This is clearly inappropriate for small generation installed on an industrial site
- An ESC EG suggested an amendment whereby a MW threshold can be set nationally such that the 110kV rule does not apply BELOW this MW threshold
- By default this threshold is 10MW, but can be set nationally between 5MW and the C/D threshold
- In the national agreement, we would expect DSOs would wish to agree the C/D threshold, whereas TSOs, who make the proposal, will probably wish it to be lower



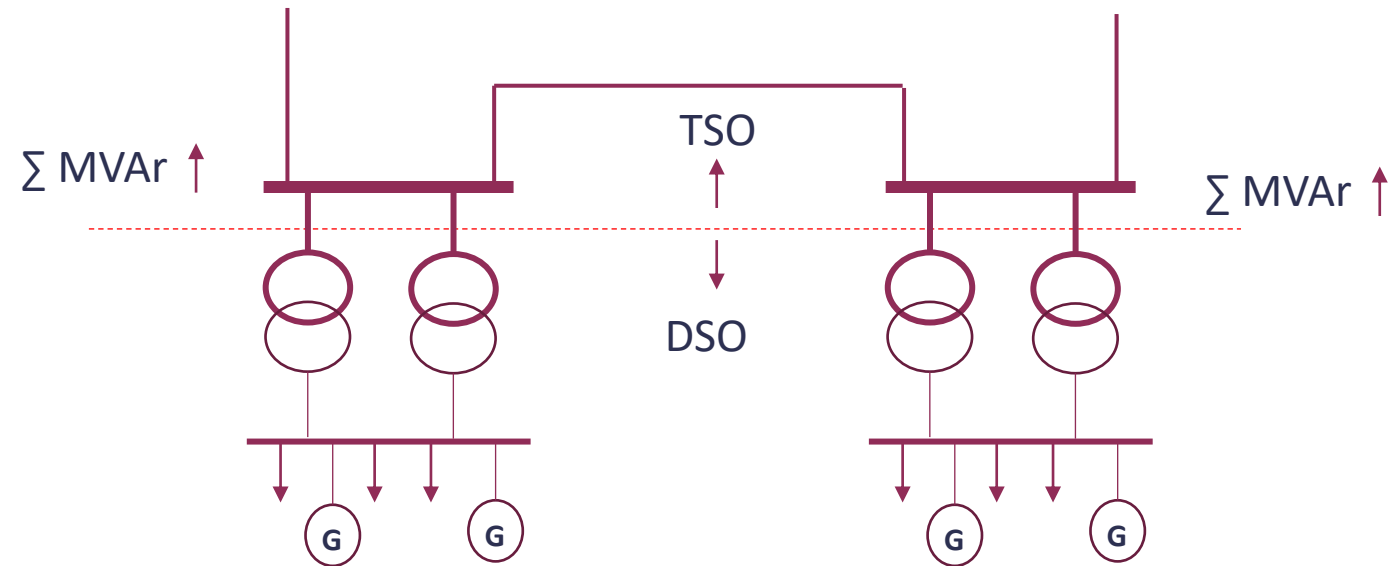
5. NC Demand Connection - LFDD

- LFDD = Low Frequency Demand Disconnection
- Article 19.1 Network Code on Demand Connection (2016/1388)
- NC DC 1.0: Definition of total time was not clear enough
- NC DC 2.0: Proposal DSO Entity for total time of 200ms and a clear definition of total time
- ACER accepted our proposal



5. NC Demand Connection [DC] - Reactive Power

- NC DC V1 text had safeguards that required DSO involvement if the TSO needed to impose limits on reactive power exported into the Transmission System on a single or group of interface stations
- Publicly consulted NC DC text had this text deleted
- The DSO Entity argued that these safeguards needed to be in place
- ACER agreed, and we expect that ACER will draft in a similar safeguard



5. New certification requirements (1/2)

Background

- The concept was introduced in the NC RfG, NC DC in 2016
- The NC RfG drafting seems to be an EU description of the existing situation in Germany, Spain and possibly some other countries
- An equipment certificate must be awarded by an authorised certifier
- The authorised certifier in turn must be accredited by a national authority in accordance with Regulation (EC) No 765/2008. (requirements for accreditation and market surveillance relating to the marketing of products and repealing Regulation (EEC)- No 339/93)



5. New certification requirements (2/2)

Implications for DSOs

- ACER are recommending that equipment certificates shall be mandatory for EVs and EV charging equipment and for heat pumps
- If mandatory, DSOs will need to own accreditation schemes in accordance with ISO/IEC 17067 for EVs and heat pumps
- However, for EVs and for Type A PGMs, the requirements are global (or only with minor differences) and an accreditation scheme, or core scheme, can probably be created for all EU DSOs – or at least per synchronous area
- National requirements (eg anti-islanding protection) need separate consideration
- Manufacturers will need to find accredited certifiers who in turn, will need to be accredited for the DSOs' scheme(s) by a national body



6. Second quiz



The question will appear in the Zoom interface



You will have 1 minute to respond



We look forward to your opinions and comments

7. Q&A



Now it's your turn!

We are happy to respond to your questions. Write your further questions in the chat box.

8. Final Remarks

- Both Grid Connection on NC RfG 2.0 and NC DC 2.0 - expected to be finalized in 2024
- In 2024 probably, the next existing Network Codes will be submitted for further amendments
- We are looking forward to your participation in the upcoming 2024 DSO Entity webinars!

Thank you for your participation!

