DCOO ENTITY DSOS FOR EUROPE

### Grid Forming Capabilities DSO Update ESC GC 9th December 2024

Tony Hearne Vice-Chair Existing Network Codes Working Group

## **Survey of WG members**

At our last in-person meeting in September, each member was asked to report back on how much GFC related activity (if any) there was in their respective Countries/DSOs.

- The majority of members reported that there was no substantive activity or awareness of Grid Forming and potential impacts.
- However, the response from some members were particularly noteworthy and are described in the following slides.

Spain

- Regular TSO-DSO meetings. TSOs intend going ahead with some changes including GFC, ahead of RfG V2.0
- Three initiatives developed by i-DE (Iberdrola) to improve the operation of the grid under such conditions (similar initiatives have been developed by other DSOs):
  - Implementation of remote control for new connections of generators > 1 kV.
  - When a protection element is triggered, automatic software for restoring the grid (ARA) identifies the generators connected to the part of the grid that has been affected and disconnects them before proceeding to locate/isolate the fault.
  - SCADA alarms for potential islanding. The measurands of the disconnected elements are checked, and if they have voltage, the SCADA displays an alarm to warn that might be some islanding.

### France

- Enedis raising the awareness of the topic.
- Explained to Central Development Partners.
- Some concern around low short circuit currents.
- Need for new tools to deal with instability identified by a PhD student, which predicts inter PPM oscillations if too much GFC on distribution systems.

## Italy

- Very high level of awareness among DSOs
- Very large concerns about the inability to detect islands and/or network earth faults.
- Concern also about continuity impact due to ineffectiveness of automatic restoration schemes.
- The DSOs don't have evidence about preliminary analysis/studies (Network Development study) to define the best trade-off about GFCs introduction at LV and MV generators.

## Ireland

• Initial conversation on topic with TSO. TSO commencing work on quantification of GFM needs.

### **Great Britain**

- TSO gone to market for Grid Forming.
- Some GFM projects now connected.
- Specs to be updated based on experience
- Likely to be made mandatory for Type D PPMs
- DSOs unaware and RfG won't apply anyway.

## Portugal

- Widespread Grid Forming distribution connected generation is a major concern for the DSO.
- The TSO has not initiated contacts on this subject.

## Germany

- Intense activity here. Such is the level of concern of some German TSOs are pushing for GFM introduction now.
- Roadmap for System Stability published for a 100% renewables power system. GFM identified as key enabler.
- Conclusion that due to lack of experience, piloting should be carried out before introducing GFM to LV.
- Guidance being prepared for GFM controllers to be subsumed into Grid and Distribution Codes in due course.
- In parallel, RA's preparing for creation of a market for spinning reserve.
- Study last year on performance of anti-islanding protection conclusion: not one of the methods used could identify an island in a high [>20%] GFM environment.



### The Roadmap System Stability pushes the introduction of GFM

#### Roadmap Systemstabilität

Bundesministeriu für Wirtschaft

Fahrplan zur Erreichung eines sicheren und robusten Betriebs des zukünftigen Stromversorgungssystems mit 100 % erneuerbaren Energien



The roadmap was published in December 2023 by the German Federal Ministry for Economic Affairs and Climate Action The roadmap shows a way forward for a secure and stable energy system with 100% renewables.

Roadmap System Stability, p.6

#### Topics

- Frequency stability
- Voltage control
- Short-circuit currents, angle stability
- Grid operation and system restoration

Generation and consumption units in the <u>distribution grid</u> have a significant influence on system stability

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<u>Converter-based units</u> replace the stabilizing properties of disappearing conventional power plants

<u>Grid Forming</u> is identified as a key technology to ensure system stability.

Due to lack of experience, piloting, definition of technical requirements, and clarification of open questions should be carried out initially.

### Germany

- A funded R&D project with focus on LV-grids with two universities is under preparation. Efforts being made to get manufacturers on board.
- A funded R&D project with focus on MV-grids with Enercon (Local Wind Turbine Manufacturer) and other partners is under preparation.



Expected start of project: 2026, 3 years duration



## Laboratory for Electrical Energy Supply

JADE HOCHSCHULE

#### 3 Phasige Netzmodell – (physikalisches Realmodell) Stufentransformator Windparkregelung mit Spannungsregelung Kraftwerks-FCU (RegD) nachbildung Lade-Leitungsstation nachbildungen STATCOM 11// 1111 Scenario Control System Steuerbare Lasten Windenergie-

anlagen

# Further Activities: $\mathcal{P}_{DLR}$ Institute of Networked Energy Systems





Control centre of the emulation laboratory DLR\_NESTEC at the Institute of Networked Energy Systems

All test series in the emulation lab for networked energy systems can be controlled from the control centre Image: 1/5, Credit: © DLR. All rights reserved



#### DLR\_NESTEC

The DLR\_NESTEC laboratory uses emulation to create a protected space in which the behaviour of real distribution grids can be tested in a realistic environment. Devices such as charging stations, battery storage systems, heat pumps or photovoltaic inverters can be set up on site and coupled with an environment that emulates a wide range of framework conditions for the components to be analysed in real time.

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# Questions?