

## 37<sup>th</sup> Grid Connection European Stakeholder Committee (GC ESC)

19 March 2025, 10:00-15:00

Location: ENTSO-E Premises, Rue de Spa 8, 1000 Brussels, Belgium and remote

### Minutes

#### *Participants*

Leonhard Bartsch	ACEA	Member Substitute
Didier Deruy	ACEA	Member Substitute
Adriana Pop	ACEA	Member
Uros Gabrijel	ACER	Chairperson
Georgios Antonopoulos	ACER	Member
Evangelia Vasilaki	ACER	Member
Domen Kodric	ACER	Observer
Lorenzo Corcione	APPLiA	Member Substitute
Marco Pasqua di Bisceglie	ARERA	Member
Rose Kuhn	BNetzA	Member Substitute
Thomas Schaupp	CENELEC	Member
Alberto Cerretti	CENELEC	Member
Julian Treichel	CharIN	Member
Benedict Florentien	DSO Entity	Member
Tony Hearne	DSO Entity	Member
Serdar Bolat	DSO Entity	Member
Tommaso Carbone	DSO Entity	Member
Santiago Gallego Amores	E.DSO	Member
Tony Kim Yeat	EASE	Member
Bernhard Schowe-von der Brelie	EFAC	Member
Richard Masquelier	EHl	Member Substitute
Mélanie Auvray	EHPA	Member Substitute
Marco Zaccaria	ENTSO-E	Member
Francesco Celozzi	ENTSO-E	Invited Speaker
Lazaros Exizidis	ENTSO-E	Member Substitute
Yuen Yee Shan Cherry	ENTSO-E	Observer
Sergio Martinez Villanueva	ENTSO-E - REE	Member
Joao Moreira	ENTSO-E - REN	Invited Speaker
Mario Ndreko	ENTSO-E - TenneT	Member
Freddy Alcazar	EUGINE	Member
Christian Bertsch	EUGINE	Invited Speaker
Assiet Aren	EUGINE	Member Substitute
Raju Srinivasa	EUGINE	Member Substitute
Thierry Vinas	EURELECTRIC	Member
Elaine O'Connell	European Commission	Member
Jakub Fijalkowski	European Commission	Member
Keith Chambers	Europgen	Member

Luca Guenzi	EUTurbines	Member
Steffen Eckstein	EUTurbines	Member Substitute
Herve Biellman	EUTurbines	Member Substitute
Mike Kay	GEODE	Member
Isabel Alcalde	Hydrogen Europe	Member
Michael van Bossuyt	IFIEC	Member
Martin Stoessl	Orgalim	Member
Sven Schumann	Siemens Energy	Invited Speaker
Catarina Augusto	Solar Power Europe	Member Substitute
Klaus Oberhauser	VGB Powertech	Member
Roman Bertle	VGB Powertech	Member Substitute
Rainer Fronius	VGBE	Member
Vidushi Dembi	WindEurope	Member

## 1. Opening

### 1.1. Review of the agenda

The Chair (Uros Gabrijel) opens the meeting and asks for comments on the agenda. The following topics are added:

- A brief presentation from CENELEC titled “TC8X WG03 Activity Report” in the AOB.

The updated agenda is approved.

### 1.2. Approval of minutes from 9/12/2024 meeting

The minutes of the previous meeting were approved without remarks and can be accessed [here](#).

### 1.3. Follow-up actions from previous meeting

Marco Zaccaria (ENTSO-E) presents the pending actions from the previous meeting:

- **Action 1 – Power-to-gas requirements:** The Chair clarifies that the points mentioned in the ENTSO-E presentation on the urgency of core technical requirements for power-to-gas demand facilities will be brought to NRA's attention during the ACER SOGC Task Force meeting on Friday 13th of December - **Closed**
- **Action 2 – Certification:** Terms of Reference (ToR) of the EG on certification for EVs and heat pumps to receive the final approval – The issue is discussed at Point 5 of the current agenda. [Post meeting note: this action is now considered **Closed**]
- **Action 3 – Simulation models:** ENTSO-E and DSO Entity to provide feedback to EUGINE on the presented slides in the previous GC ESC meeting – **Closed**
- **Action 4 - CNCs 2.0:** ENTSO-E to align with ACER to provide an updated and more clear view of the information to be uploaded on the GC ESC website on the NCs 2.0 workstreams - **Closed**
- **Action 5 – GFC DSO Activities:** To re-upload the presentation on the ESC platform and delete the sentence regarding the Spanish example presented - **Closed**
- **Action 6:** 2025 GC ESC meetings calendar: ENTSO-E and EU DSO Entity to align with ACER on new dates to host the June and the December 2025 GC ESC meetings - **Closed**

The action tracker with the ongoing tasks is available on the last page of these minutes and will be updated at each GC ESC meeting.

## 2. Progress of the EC process on grid connection

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Jakub Fijalkowski (European Commission) presents the progress on the revision of the NCs RfG and DC 2.0.

Jakub Fijalkowski (EC) highlights that the EC is progressing although not as fast as expected mainly for the following reasons: (i) DG ENER resources involvement on the newly published “Affordable energy action plan”; (ii) DG ENER has been performing a thorough review of all the inputs received from stakeholders. Moreover, the EC is not only looking at the new text recommended by ACER, but also at the existing text in force today. Therefore, the NC RfG may undergo a profound change also in terms of structure. Jakub Fijalkowski adds that the EC has so far focused on the NC RfG, while NCs DC and HVDC will follow afterwards.

Julian Treichel (ChairIN) asks for more information regarding the expected timeline and the next steps. First, Jakub Fijalkowski confirms that the adoption of the NCs will be managed in sequence and via three different “Have your say” consultations lasting four weeks, therefore the EC will start working on the NC DC as soon as the revision of the NC RfG is over. Concerning the timeline, Jakub Fijalkowski does not provide any precise timeline. However, he confirmed that the EC’s intention is to publish the NC RfG text before summer 2025. The NC RfG will be then submitted to the “have your say” consultation, where stakeholders can provide feedback. Florentien Benedict (EU DSO Entity) asks the EC to possibly consider a longer deadline in case the consultation is scheduled for the summer, due to annual leaves. Jakub Fijalkowski (EC) assures that the EC would indeed consider the summer period and is likely to extend the consultation timeframe accordingly.

Mike Kay (GEODE) asks for clarification about the EC’s intentions on having certification requirements being accommodated within both the vehicle homologation process and within CE marking. Jakub Fijalkowski (EC) responds affirmatively, remarking of being in touch with DG MOVE and other departments within DG ENER dealing with “eco-design” legislation, to align on this topic. Mike Kay (GEODE) kindly asks to stay in touch with the EC to receive updates on this issue in about a month from this meeting; highlights to be reported to the EG on certification of EVs and HPs.

Thierry Vinas (Eurelectric) asks whether the EC will use the results of the study on inertia that was launched about one year ago and conducted by an external consultant, and whether the EC intends to show the results of the study to stakeholders. Jakub Fijalkowski (EC) clarifies that the study will be finalized by the end of April, and an online workshop on May 6 is planned to share the results of this study. Vidushi Dembi (Wind Europe) asks for clarifications about the focus of the study; Jakub Fijalkowski (EC) explains that the report investigates inertia technical needs, considering the policy options on how inertia can be provided. The above-mentioned workshop will not be public, targeted stakeholders will be invited (including GC ESC representatives); 2/3 representatives per association would be allowed to take part to it. Michaël Van Bossuyt (IFIEC) asks whether the EC will consider the relevant changes to the NC DC recommended by ACER to ensure consistency to the new NC Demand Response (DR) during the adoption phase of the NC DC. Jakub Fijalkowski (EC) replies that he cannot give a definite answer yet, but he believes that it should be possible, as the two timelines seem to be converging.

Isabel Alcalde (Hydrogen Europe) asks whether the EC is still open to receiving inputs from stakeholders when it comes to the revision of NC RfG and NC DC. Jakub Fijalkowski (EC) replies that the EC is open to receiving further inputs, as long as consolidated feedback provided by stakeholders (i.e., common view) achieved within ACER’s informal discussion streams.

**Action 1** – Mike Kay, as Chair of the ESC Certification Development, to follow up with Jakub Fijalkowski and Elain O’Connell regarding DG ENER and DG MOVE intentions for NC RfG 2.0 and NC DC 2.0 certification requirements.

## 3. DSO Entity

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### 3.1. Updates DSO Entity activities

Florentien Benedict (EU DSO Entity) presents the latest updates from the EU DSO Entity; the presentation is available [here](#):

- As first item, EU DSO Entity worked on the support document for DSOs on national grid forming roadmap. The document has been written with the aim of assisting DSOs to assess the risks and issues associated with Grid Forming power park modules within their distribution networks. The document already went through a first round of comments from stakeholders. The document is available [here](#).
- The second item is the expert group on certification for EVs and heat pumps. More detailed information is presented at Point 5.
- The third item is the letter that DSO Entity wrote to the EC on the expected timeline for the adoption of the amended NCs RfG and DC. In this letter, EU DSO Entity highlighted the importance of having in force as soon as possible up-to-date regulation. The main risk is not having harmonized requirements among Member States.

- The fourth item refers to the letter with appendices that EU DSO Entity sent in February to the EC with the summary of DSOs positions with regard the revision of NC RfG and NC DC. These letters replace all previously submitted comments sent by EU DSO Entity. (these letters are available on ENTSO-E's GC ESC website). The final item is about the one-pager produced on the definition of "electric vehicles", which can be accessed [here](#). The document emphasizes the fact that the definition of "electric vehicles" does not limit to cars.

### **3.2. EU DSO Entity work on Grid Forming**

Tony Hearne (EU DSO Entity) presents the EU DSO Entity work on grid forming; the presentation is available [here](#). The draft document was circulated to GC ESC members on March 3, 2025. The document is intended to assist DSOs in undertaking the risk assessment process. The first section of the document is about the risk analysis of the formation and maintaining of islands. Another chapter in the first section is on the impact of summated LV connected generation on MV network. The second section of the document discusses the consequence of, and potential mitigations for, island formation.

Michaël Van Bossuyt (IFIEC) states that the report should highlight the case of intended and managed islands. Tony Herne (EU DSO Entity) responds that the comment is noted and in the future the document will include the case of intended islands. As a note, not necessary mentioned in the meeting, Michael shared his comments to DSO Entity during the meeting.

Thomas Schaupp (CENELEC) highlights that islands happen with grid following converters as well. Moreover, he emphasizes one element that was widely discussed during the 'Island Detection Working Group 3' in February 2025: active island detection as it was developed in the past 20 years, were intended to prevent single PV installations to run in island mode, they were not capable of detecting large islands. This is why EN 50549 does not include any anti-islanding requirements. He concludes that the standards as they stand today are meant for the detection of islands in a household, but not in the medium and low voltage grids.

Mario Ndreko (ENTSO-E) remarks that the document should emphasize more that the analysis refers to DSOs grids only. Secondly, he mentions that the word "guidance" in the title could be confusing, as the same word is also used for the Implementation Guidance Documents (IGDs), which represent a legal mandate for the entity in charge of drafting. Therefore, he suggests using another wording instead of "guidance". Finally, he highlights that the report seems describing more the risks, although this document could be used in the discussion on the capability of Power Park Modules (PPMs). Entso-e would like to see how the new capabilities are integrated in long term within DSO grids taking the right measures from DSOs. Tony Hearne (EU DSO Entity) responds by saying that DSO Entity will come up with a different word if "guidance document" may lead stakeholders to intend this document as an IGD. He then highlights that the technical aspects will be discussed during a bilateral meeting with ENTSO-E taking place in the coming weeks.

Catarina Augusto (SolarPower Europe) asks whether stakeholders can provide comments to the document. Tony Hearne (EU DSO Entity) responds that EU DSO Entity is happy to receive comments from stakeholders. Caterina Augusto (SolarPower Europe) also asks about the milestones connected to the document. However, due to the poor quality of the audio, participants in the room could not hear it, and Caterina Augusto was asked to submit her question via email.

**Action 2 – SPE, Caterina Augusto - to follow up by email the request to DSO Entity**

## **4. ENTSO-E**

### **4.1. Updates on GFC Phase II Expert Group**

Mario Ndreko (ENTSO-E) provides an update on the work of the ongoing ENTSO-E Technical Group on Grid Forming Capability (TG GFC) involving stakeholders (so called Phase II, after the publication of the Phase I interim report on PPMs technical requirements). The focus of the TG GFC is on Article Y, as well as Articles 6, 21, and 22 of the draft NC RfG 2.0 recommended by ACER to the EC, which define grid forming capabilities in a technology-agnostic manner. ENTSO-E published a [first interim report](#) in May 2024, aiming to provide initial guidance on the implementation of grid forming capability at national level. Due to the novelty and complexity of the topic, ENTSO-E had launched a second phase of the work. This phase, conducted under ENTSO-E's coordination, involves broad stakeholder participation (including WindEurope, SolarPower Europe, EASE, EU DSO Entity, and CENELEC) and aims to deliver a final consolidated report with detailed requirements and compliance recommendations.

The objective is to establish a shared technical understanding of mandatory grid forming requirements, supporting future national implementation of the NC RfG 2.0. The report will also serve as a basis for a future IGD, helping to define measurable parameters, certification processes, and compliance verification. The intention is to achieve consensus among all key stakeholders to facilitate efficient and harmonized national implementation. The interim report was initially prepared by TSO experts; since then, industry stakeholders have been actively engaged through joint discussions, including physical meetings.

The TG GFC's discussions are structured around seven key priorities identified for improving the draft report. These include amendments, clarifications, and additions to support technical understanding.

All RfG requirements remain at the PPM level, but Article Y introduces specific requirements and compliance checks at the unit level. Effective impedance will be specified using a maximum value only, after consultation with stakeholders. Initial passivity requirements (as for HVDC systems) are being reviewed for potential application to grid forming PPMs.

Regarding the timeline, finalisation of the last priority discussion is expected in April and final discussions are scheduled for May. Final report publication is expected in September–October 2025.

Assiet Aren (EUGINE) asks for clarification on whether the requirements apply to PPMs or Power Generating Units (PGUs) and how these are linked to the work of FNN going on. Mario Ndreko (ENTSO-E) explained that Article Y specifically targets type A PPMs, not PGUs. However, the voltage source behaviour is a PGU requirement, as written in RfG 2.0. The requirements of the TG GFC report aim to explain the implementation of grid forming as in Article Y. They are different from the pre-qualification requirements of the inertia market in the German FNN report. It is confirmed that the requirements are applicable to non-synchronous generating units.

The presentation is available [here](#).

#### **4.2. Project Inertia: main highlights from the position paper ([link](#)) investigating evolution of inertia levels over the long-term horizons in the CE Synchronous Area and related challenges**

Joao Moreira (ENTSO-E) presents the latest updates on the Project Inertia Phase II. The main finding of the initial report, which was previously published, were loss of system resilience in case of system splits and need for the implementation of foundational measures. The focus is on reinforcing the foundational aspects of system resilience, not enhancing beyond historical levels but recovering lost resilience. The latest report was published in January. The objectives were to initiate external debate based on informed decision-making, provide a clear roadmap and concrete proposals to address system resilience challenges, and facilitate stakeholder engagement and eventual implementation of necessary measures. The report is accompanied by a position paper summarizing key messages and includes supporting technical aspects with in-depth data and methodology.

Regarding the Roadmap, the next steps by 2025 are to gather stakeholder and institutional feedback, finalize the summary report with integrated feedback, and define agreed actions to implement resilience-enhancing measures. The study's main focus is on foundational resilience in case of system splits. Resilience recovery is a shared responsibility across all Continental Europe countries. Thus, a common minimum level of inertia must be ensured. Failure to meet targets in one area could undermine the overall system stability. The study proposes a minimum equivalent inertia of 2 seconds for 50% of the time. This would reduce the most severe system split scenarios but not eliminate all blackout risks. A monitoring methodology based on ex-post operational assessment is proposed. Countries will be assessed annually on compliance with minimum inertia targets and results should be comparable across Europe to support investment/solution decisions.

Thierry Vinas (Eurelectric) remarks that, since inertia in Europe is currently provided for free by rotating machines like hydro, thermal, and nuclear power plants, whether there is a possibility to formally recognize and compensate it in the future, especially if inertia becomes a paid service. The response shows that the proposed bottom-up approach would allow each country to assess its own local inertia needs and relative services; potential remuneration is left up to national decisions. If a country meets the target, no action is needed; if not, it must take steps to improve the *status quo* and promote new capability. The approach is technology neutral and acknowledges that inertia can come from various and different sources—existing rotating machines, TSO assets, or new solutions. All contributions are considered important to support a resilient European electricity system. A final remark from ENTSO-E is shared on the study assumptions i.e., on the long-term generation mix, which is changing as the related available technical capability; therefore, if same level of inertia must be ensured, some actions have to be implemented.

Thierry Vinas (Eurelectric) insists on the fact that some countries with a lot of rotating machines provide inertia to countries with fewer ones, and that this service works all time long (except in case of grid splits between these two countries, but this situation happens only a very small percentage of the time), thus it is a service provided by countries with lot of inertia to countries with less inertia, making the European electrical system more resilient.

Some concerns are shared by VGBE about using country borders as limits for the study, given that the European secondary frequency restoration reserve market operates across borders. It is questioned whether inertia can only come from within national borders, especially when system splits may occur not at country borders. The response clarifies that, while interconnected operations allow reserves to come from any country, the unpredictability of system splits (in terms of timing and location) presents challenges. The importance of ensuring inertia well-distributed across regions is emphasized, acknowledging that while markets may have their challenges, the focus is on ensuring that inertia is available in a balanced way within split subsystems to address these challenges.

Freddy Alcazar (EUGINE) emphasizes that inertia market will support the availability of technologies providing inertia. Joao Moreira (ENTSO-E) highlights the importance of being aware that, given the context of the system split challenge regarding the need for well-distributed inertia in split subsystems, in case of scarcity of offers in a given country or region, huge risks are then foreseen in such scenario due to this specific system split challenge. Luca Guenzi (EUTurbines) emphasizes that distributed inertia contribution is expected, and, in case of a split, the market can support to have a more balanced level of inertia; therefore, regional understanding is considered relevant.

Herve Biellman (EUTurbines) asks when the mechanism for providing additional inertia as a service may allow investments for these kind machines as manufacturers. Joao Moreira (ENTSO-E) remarks the neutral approach to be provided in terms of inertia needs; therefore, decisions on solutions should be taken at national level to meet those needs. All contributors are considered helpful; all users entering the grid should provide inertia. Nevertheless, the issue shall be solved via a country-by-country approach. Assiet Aren (EUGINE) highlights that installing inertia does not mean that it will be in operation when needed. Francesco Celozzi (ENTSO-E) adds that the first aim of the project is looking at future needs; the more the transition advances, the more a shift in the generation mix is observed. National choices should guide in terms of strategy, and operational monitoring of the inertia levels should guide the long-term planning.

The Chair asks for clarification about the expected project next steps. Joao Moreira (ENTSO-E) replies that the final report will be available by the end of 2025 as summary of the received feedback from stakeholders and agreed actions.

The presentation is available [here](#).

## **5. Updates on ESC EG on Certification on EVs/HPs**

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### **5.1. General update on the EG activities**

Mike Kay (DSO Entity) provides an update on EG on Certification on EVs and HPs. The EG has met five times and both Workstreams (WSs) for EVs and HP have met three times. The ToR for EG as well as for WSs were finalized. Approval for the EG's ToR is requested during the meeting.

Regarding the EV WS, there was a face-to-face meeting in Brussels at the end of February. It has focused on reviewing the roadmap standards, which are generally deemed appropriate. However, many of the existing standards need updates to accommodate the RfG and DC requirements. There are uncertainties regarding the certification approach, particularly around the use of vehicle homologation and CE marking, which will need further clarification from the Commission.

For the HP WS, early discussions were initiated by the EHPA regarding the potential use of CE marking. The focus is on developing compliance requirements for heat pumps and deciding whether these should be formalized into standards or legislation. One concern is the potential overlap with the development of standards for dispatchable loads. It is important to ensure these two areas are linked to avoid duplication of efforts.

There is also an issue of overlap between the EV and HPs WSs regarding the text presented in the NC DC. The texts agreed upon in both workstreams overlap, with the HP version missing some points from the EV agreements. This needs to be addressed to ensure that nothing essential is lost when the two sets of text are combined.

Lastly, the draft ToRs for the EG are presented and circulated for approval. No objections are raised, and the ToRs are unanimously approved:

- EG ToR is available [here](#)
- EV WS ToR can be found [here](#)
- HP WS ToR is located [here](#)

Full presentation is available [here](#).

### **5.2. ACEA/CharIN views on the NC RfG regulation**

Leonhard Bartsch (ACEA) presents ACEA/CharIN views on the NC RfG regulation. The presentation addresses the certification process for EVs, with a focus on the standards needed for vehicles in production in the 2028-2029 timeframe. The development of hardware and orders for EVs are underway, but there is uncertainty about the timing of the regulation's publication and enforcement.



A key request is for an Implementation Act to define the certification process for vehicles, particularly differentiating between DC and AC power exchange. AC charging is more complex, requiring combined satisfaction of DCC and RfG requirements for EVs and EVSEs, and interoperability between them. A consistent implementation is needed to ensure interoperability across different EVSEs in Europe.

The certification process also needs clarification on whether vehicle components (e.g., onboard chargers) require specific certification or if a platform certification is sufficient. The need for certification to be verifiable through testing is emphasized, with an understanding of how to upgrade certification documents for vehicles.

The participants discuss the importance of harmonizing national and regional standards, as current deviations complicate compliance for vehicles that travel across Europe. The proposal includes using emissions regulations (e.g., EUR 6, EUR 7) as a model for the certification of EVs with the NC RfG and NC DC, ensuring a standardized process for meeting certification requirements.

The group also calls for further discussions with the EC to address these concerns in more detail. There is a need for a consistent harmonized framework to handle certification across Europe, including how to manage the migration between different standards and revisions.

The presentation is available [here](#).

## 6. EUGINE

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Christian Bertsch (EUGINE) gives a presentation on introduction of Functional Mock-Up Interface (FMI) standards. The FMI is a tool-independent and free standard designed for exchanging simulation models across different platforms. It enables a clear separation between model development and simulation environments, promoting broad reusability while ensuring intellectual property protection.

FMI was first introduced in 2008 through the publicly funded MODELISA project. The primary objective was to create a system simulation approach comparable to digital mock-ups in CAD design, facilitating seamless collaboration between OEMs and suppliers. The first version, FMI 1.0, was released in 2011, followed by FMI 2.0, which remains the most widely used version today. In 2021, FMI 3.0 was introduced in response to evolving requirements, and its adoption is growing rapidly.

After its initial development phase, FMI transitioned into a Modelica Association project. Over time, it has been widely adopted across multiple industries, including automotive, aerospace, maritime, and production. Currently, more than 200 tools support FMI, including major platforms such as MATLAB and Simulink. Additionally, new layered standards are being built on top of FMI, particularly in the automotive sector, allowing for industry-specific adaptations.

The Modelica Association not only oversees FMI but also manages several related standards. These include the Modelica Language, which enables high-level system modelling using differential equations, and System Structure and Parameterization (SSP), which defines system compositions of multiple Functional Mock-up Units (FMUs). Extensions for real-time and embedded systems are also under development.

FMI 3.0 is expected to become the dominant version within the next one to two years. While FMI 2.0 will continue to be maintained, ongoing improvements are being made to FMI 3.0 to enhance its capabilities. There is also growing potential for broader adoption in the power systems domain, mirroring trends seen in other industries.

EUGINE acknowledges and appreciated the feedback received from ENTSO-E on their presentation in the September 2024 GC ESC meeting.

EUTurbines supports EUGINE's presentation and is in favour of incentivizing the use of FMI standards. Mario Ndreko (ENTSO-E) highlights that it is important to harmonize but it shall not become a legal obligation since lot of European TSOs currently use software without FMI. EUGINE shows its concerns about the fact that there are no software vendors within the GC ESC.

The discussion is closed by agreeing that GC ESC members will discuss again this issue later on given that, at the moment, the implementation of the CNCs 2.0 is a priority.

**Action 3** – FMI standards: To open the discussion again later in 2026 (EUGINE & ENTSO-E).

Full presentation can be accessed [here](#).

## 7. Hydrogen Europe

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Isabel Alcalde (Hydrogen Europe) presents examples of implementation of the NC DC for Power-to-Gas (P2G) units in Germany and Denmark - lessons learned and implications at EU-level. The examples focus on Denmark and Germany and these insights were drawn from ongoing work in the P2G stream and aim to assess how DCCs affect the development and integration of electrolyser technologies.

Isabel states that Denmark has introduced specific requirements for retrofitting capabilities of electrolysers. According to Energinet statements national requirements apply to demand facilities (including electrolysers) above 200 MW (Category 7), which includes power recovery, post-fault safety, and LFSM-U functionalities. ENTSO-E, comments that the current NC DC requirements are applicable for all types and sizes of transmission-connected demand facilities.

In the Danish national legislation in terms of demand connection requirements, there are different demand facility categories 3, 4, 5, 6 included. A category 7 is also included (with P2G in mind). Category 3, 4 or 5 will be converted to a category 7 when a connection agreement above 200 MW is agreed. Category 7 introduces additional requirements, such as FRT (Fault-Ride-Through) and LFSM-U on top of categories 3, 4 and 5.

These requirements are not exclusive to P2G but also cover large industrial consumers, such as data centres. Currently, no P2G facilities in Denmark meet these requirements. The largest active project is Siemens' 50 MW Kasso facility, which falls under Category 3 and was only subject to load-shedding requirements. As for comments, for the purpose of the minutes, but not necessary expressed in the meeting, ENTSO-E comments that - All transmission connected demand facilities meet the requirements for connection. The Kassø facility is 80 MW not 50 MW, and it also has all requirements according to its size, however not the category 7 requirements. The facility faced some delays mainly due to simulation models, power quality and finally LFDD. Regarding technical implementation and challenges, Siemens Energy used simulation models to demonstrate plant behaviour and obtain regulatory approval for Kasso. Approval processes were delayed by about a year due to technical challenges, particularly related to precise 8% frequency step requirements.

A comparison between Danish and EU DCC Fault-Ride-Through (FRT) curves revealed initial confusion due to inconsistencies in naming conventions and numbering. While the initial values appear similar, the EU's final curve aligns more closely with Type B generation units, which is more demanding than the Danish equivalent. It is recommended that clearer visual representations of the FRT curve be included in future versions to prevent misunderstandings during project planning.

Regarding German example, a joint initiative involving four German TSOs, the German Hydrogen Association, and industry representatives has produced the first formal paper outlining how electrolysers can comply with grid requirements in a feasible way.

The goal is to ensure compliance with FRT and ramp-up requirements while enabling the hydrogen industry to scale up sustainably. The published paper is already active and applies to all electrolyser units, including those installed before formal enforcement of new rules. The same working group is also drafting future mandatory requirements to ensure alignment and avoid discrepancies. The process took over 1.5 years and involved multiple workshops and technical meetings. Productive outcomes were achieved through small, technical working groups rather than broad political discussions.

A key compromise was defining the "smallest independent unit" to include the converter, electrolytic cell, and essential supporting processes (e.g., cooling), distinguishing it from the full industrial plant. A critical clarification is made to ensure that new technical requirements apply only to the electrolyser unit and not to downstream industrial processes (e.g., synthesis, steelmaking). This ensures that the hydrogen production remains grid-compliant without overburdening unrelated industrial systems.

There is also discussion on voltage dips and fault events: tripping the plant results in gas production loss and slow recovery. While theoretically, grid isolation or faster islanding could help, practical options for voltage management during faults remain limited. Operators will ultimately need to decide whether to prioritise protection or continuity, based on their system configuration and cost considerations.

Mario Ndreko (ENTSO-E), on the electrolysers pipeline, highlights that TSOs cannot predict how much capacity will be actually approved and constructed, and that power-to-gas is considered an important cross-border topic. Moreover, P2G will play an important role, and nobody is aiming at slowing its ramp-up. Harmonisation of connection requirements is then considered supportive for stakeholders and manufacturers. In addition, he remarks that 2 GW HVDC links will be developed and they use DC chopper for FRT compliance, highlighting in the same way the importance of preserving such relevant loads from disconnection and that same approach may be taken, with choppers. Sven Schumann (Siemens Energy) reacts sharing that load shedding would be considered as alternative option, still supporting system needs.



Mario Ndreko (ENTSO-E) adds that ENTSO-E approach was aiming to promote fully harmonised requirements of FRT in Europe for the power to gas units, while preserving system needs of all TSOs. Sven Schumann (Siemens Energy) remarks that one FRT curve for all Europe is considered fine, while different times after fault would be required. Mario Ndreko (ENTSO-E) highlights that post-fault recovery is already non-exhaustive in ACER's recommendation.

The discussion is closed by the Chair by stating that ACER will reinstate the P2G discussion stream to discuss new information. The Chair will plan meetings before the summer. Mario Ndreko (ENTSO-E) remarks a request to add in the protocol of the meeting that we should not re-open any discussion on the FRT requirements.

**Action 4** – To reopen the P2G workstream (ACER)

**Action 5**– To update the FRT curve for P2G in the presentation (Hydrogen Europe)

Full presentation can be found [here](#).

## **8. AOB**

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Thomas Schaupp (CENELEC) presents on the TC8X WG03 Activity Report. The presentation is available [here](#). Mario Ndreko (ENTSO-E) remarks that ENTSO-E is available to present to IEEE and IEC the current state of works of the TG GFC. ENTSO-E cannot commit in being an active member but rather providing the content of the TG GFC work.

Marco Zaccaria (ENTSO-E) inform that an email will be circulated, kindly requesting all stakeholders to confirm or update the names and email addresses of their respective GC ESC Members, Substitute Members, and Observers to ensure that the distribution list is up to date.

**Action 6** – To confirm or update the GC ESC members (all the associations)

### ***Annex: Action Tracker***

This corresponds to a new section where the ongoing actions will be tracked. The idea is to perform a test in order to assess whether the action tracker Excel file could be replaced by this section.

#	Raised on	Topic	Description	Responsible	Due date
1	GC ESC 19/03/2025	Certification Requirements	Mike Kay to follow up with EC (Jakub Fijalkowski and Elaine O’Connell from DG ENER and DG MOVE) on intentions for NC RfG 2.0 and NC DC 2.0 certification requirements	DSO Entity	2025
2	GC ESC 19/03/2025	Solar Power Europe on DSO Entity Grid Forming Roadmap	Caterina Augusto to follow up by email to DSO Entity	SPE	2025
3.	GC ESC 19/03/2025	FMI standards	To open the discussion again later in 2026	EUGINE & ENTSO-E	2026
4.	GC ESC 19/03/2025	Power-to-Gas workstream	To reopen the P2G workstream to discuss new topics	ACER	05/06/2025
5.	GC ESC 19/03/2025	Hydrogen Europe slides	To update the FRT curve for P2G in the presentation	Hydrogen Europe	05/06/2025
6.	GC ESC 19/03/2025	GC ESC members list	To confirm or update the GC ESC members' list	All the associations	04/04/2025