Report from the Expert Group : Advanced capabilities for Grids with a High Share of Power Park Modules

Chair: Haririam Subramanian
Vice-Chairs: Florentien Benedict, Papiya Dattaray

[GC ESC] 26th meeting - Hybrid (Brussels & MS Teams)
15 June 2022, Brussels

EG ACPPM Structure

ACER
Agency for the Cooperation of Energy Regulators

Expert group: Advanced capabilities for Grids with a High Share of Power Park Modules

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Problem Statement

For a very high share of power park (PPM) and electricity storage (ESM) modules and less generation based on synchronous power generating modules (SPGM), new challenges evolve to maintain the stability of the European interconnected power system, including challenges regarding system restoration and potential interactions with existing generation. Technical challenges and system needs have been discussed in the previous ENTSO-E technical group on high penetration which presented its results in January 2020[1]. Several research projects (such as the "Migrate" project) investigated system aspects and possible solutions for inverter dominated power systems. Meanwhile, technical commercially available solutions, further studies and first approaches for the inclusion of grid-forming capabilities in connection network codes have been published.

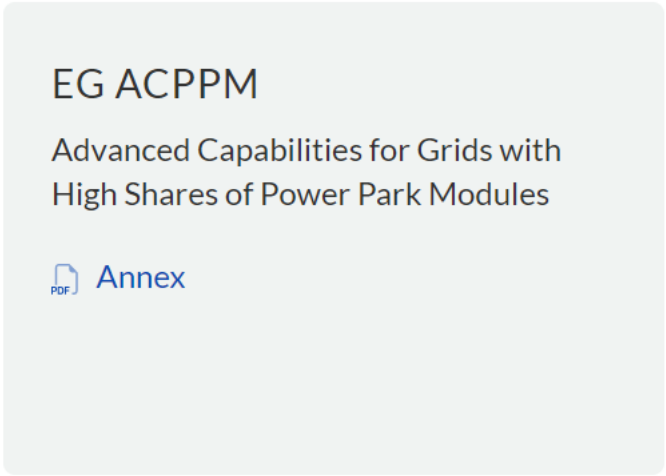
The connection codes yet do not reflect many of the needed capabilities for stable and robust operation during normal, alert and system restoration state under the assumption of very high penetration of PPMs and low system strength (inertia and short circuit power). For meeting such future system needs, new capabilities need to be defined and harmonised on the three connection network codes – as already stated in the ENTSO-E position paper[2]. Today, there is also a lack in common understanding regarding the technical capabilities needed for so called "non-frequency related ancillary services". In parallel, flexibility markets rules, such as Balancing Guidelines, could also provide incentives to such capabilities.

As a first step and starting from the current understanding of future system needs, this Expert Group proposes to map the capabilities provided by different PPMs and ESM modules as well as give an understanding of their maturity. This work will inform the review of the current Connection Network Code and the flexibility markets definition.

Objectives

- The first objective of this Expert Group is to give guidance at EU and national level how power system needs for advanced capabilities should be identified in the different TSO areas, using as a basis the

[1] High Penetration of Power Electronic Interfaced Power Sources and the Potential Contribution of Grid Forming Converters (Technical Report). Available online: https://eepublicdownloads.entsoe.eu/clean-



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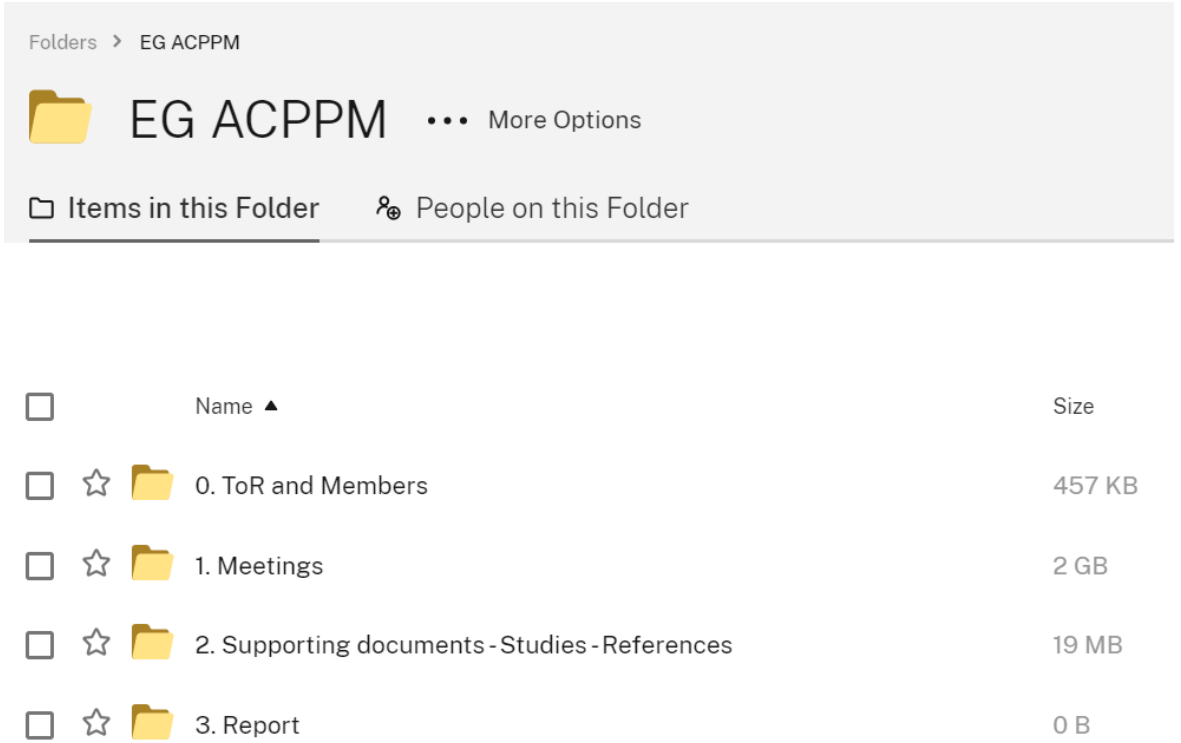
Advanced Capabilities for Grids with High Shares of Power Park Modules

Annex

Public Information



Folders › EG ACPPM

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Items in this Folder | People on this Folder

Name ▲	Size
0. ToR and Members	457 KB
1. Meetings	2 GB
2. Supporting documents - Studies - References	19 MB
3. Report	0 B

Internal Repository

EG ACPPM Meetings and Plans

- 22 April 2022 kick off meeting – Online (Teams)
- Monthly meeting scheduled (planned until Christmas 2022)
- Potential F2F meeting in Brussels planned (For September)

Lots of participants, over 40 experts representing from :

- EU Turbines
- WindEurope
- VGBE
- COGEN Europe
- EASE
- Solar Power Europe

- Overall good collaboration
- High quality technical discussion
- More than 80 % attendance rate (approx.)
- Good input in accordance with the agreed follow up actions
- Typically information are exchanged through email and shared repository
- Schedule continues as per plan

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Status Quo

High Penetration of Power Electronic Interfaced Power Sources and the Potential Contribution of Grid Forming Converter

Increased power electronic devices in the Legacy power system. Identified concerns

- ❑ Create system voltage
- ❑ Contribution to inertia
- ❑ Contribute to fault level / fault current contribution
- ❑ Sink for harmonics
- ❑ Sink for unbalances
- ❑ System survival to allow effective operation of Load Frequency Demand Disconnection
- ❑ Preventing adverse control interactions

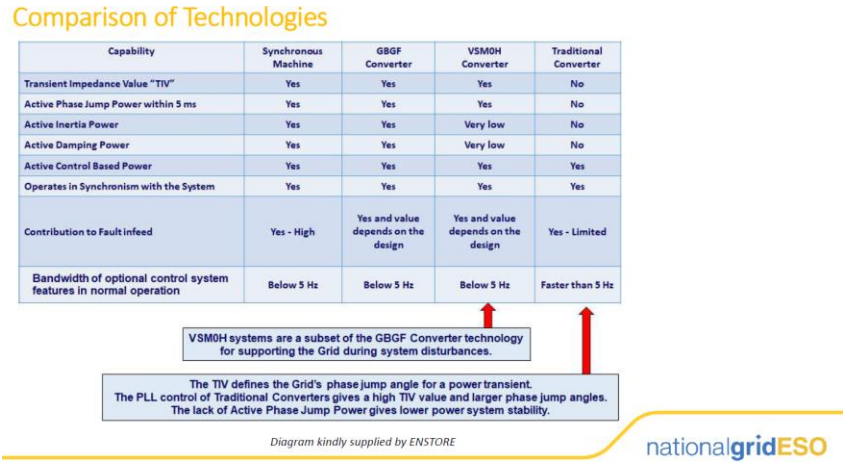
Working Group Key Focus

- How power system needs for advanced capabilities should be identified in the different TSO areas ?
- Identify all capability options that could satisfy these system needs and to provide commonly agreed definition about which of these capabilities fall under the “grid-forming category“ ?
- Overview on the technology readiness level of the capabilities of power park modules, HVDC-Systems, electricity storage modules and other relevant equipment (such as FACTs / Statcoms / Grid Booster…).
- Harmonization and description of such capabilities (requirements) and recommend their inclusion on the relevant articles (objective , performance, test methodology) of the connection network codes

Find Answers to questions around grid forming control from Nomenclatures to Modeling, Testing, Verification etc.,

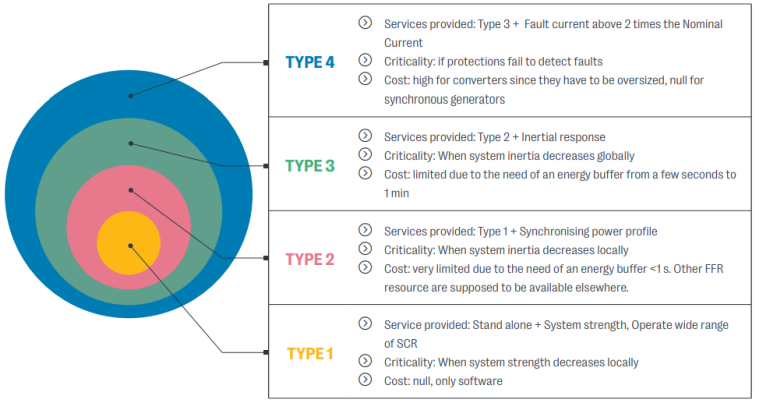
Progress

- Done so far:
  - Understand the problem definition from ToR
  - Planning for Technical Nomenclature : Definitions
    - Lists from different members
  - Presentation by National Grid ESO
  - Overview about OSMOSE project



National Grid ESO (Ref : A.Johnson, National Grid)

- Exchange of papers and ideas related to Grid forming, power system stability
  - Brainstorming of key open questions
  - Ideas from various experts
  - Know how and indication of works done from various other working groups and technical committees (like VDE FNN, OSMOSE, CIGRE etc.,)



OSMOSE : https://www.osmose-h2020.eu/

Follow up steps

- Creation of subgroups : Focus : Write chapters and issue
- Planning of documentation skeleton
- Creating a timeline

Question to ACER/CEER

On policy paper on the revision of network codes RfG and DC

- To what extent do you agree with the policy analysis and recommendations **on the advanced capabilities for grids with high penetration of DER**

- What is the reason for mentioning DER?
- Why is this subject mentioned in the policy paper, while the expert group has not finished it yet ?

Other Question

- What do you expect from the expert group about the electric vehicles?

Thank you