

Report from the Expert Group 'Identification of storage devices' (EG STORAGE)

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13th Grid Connection European Stakeholder
Committee Meeting

21 March 2019, Brussels

EG STORAGE structure



Chair: ENTSO-E, Emilie Milin
Vice-Chair: EASE, Noce Christian

Expert group: Identification of storage devices (EG STORAGE)

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Problem Statement

On 11 June 2018, the Grid Connection European Stakeholder Committee (GC ESC) decided to establish an expert group on the definition of storage devices. The creation of this EG was proposed by ENTSO-E to elaborate on connection network code (CNC) issues, which had been raised by stakeholders during the CNC implementation. The ENTSO-E proposal was based on a stakeholder survey to identify priority topics.

In order to prevent a confusion of the definition of the storage devices and the energy storage as defined in the forthcoming recast of the Electricity Directive a different title has been chosen for this EG, i.e. identification of storage devices.

Target (objectives)

The objectives of the EG Storage are to:

- identify storage technologies/applications/topologies;
- investigate the possibility of a useful definition of storage device which could lead to the definition of connection requirements at EU level (due to cross-border relevance); and
- categorize storage devices (if reasonable).

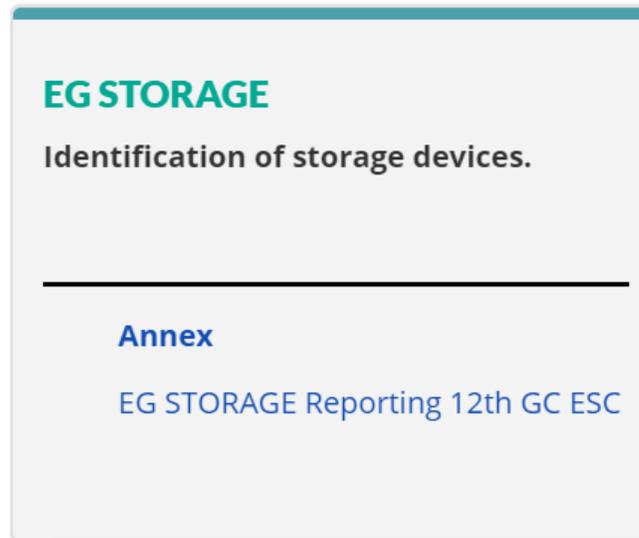
Task description

Without prejudice to national grid codes, the Network Code on Requirements for Generators (NC RfG) and Demand Connection Code (NC DC) do not currently apply to storage devices, except pump-storage power generating modules.

Discussion with stakeholders / stakeholder interventions at the GC ESC / in workshops with stakeholders have revealed some questions related to storage devices, especially regarding the connection requirements for such units, because of the growth of energy storage projects. The EG Storage is tasked to consider the following actions:

- identify energy storage technologies and topologies: for each, case of application including in combination with other system users, present penetration and growth potential, main characteristics;
- categorize the different storage technologies: depending on their cross-border impact at the grid connection point characterized (e.g. facility size, functionalities, robustness, protection settings, etc..) while taking into account the findings from the previous point;
- identify relevant functional applications for storage devices: Limited frequency sensitive mode at overfrequency/underfrequency (LFSM-O/U), Frequency Sensitive Mode (FSM), Demand Response (DSR), Fault Ride Through, ramping rates etc.; and
- define if/how these applications could be implemented by standalone storage devices, in association with other system users (e.g. storage device as part of a new or existing power generating facility or demand facility).

Public space



Internal EG space

EG STORAGE

+ new document or drag files here

All Documents

Find a file

- ✓ Name
- Additional references
- archive (non-exhaustive)
- Kick-off meeting_181015
- meeting_190318_Brussels
- report
- ToR and Annex
- webinar_181123
- webinar_181220
- webinar_190125
- webinar_190221
- 180914_GC ESC_EG STORAGE_notes from preparatory call
- EG STORAGE draft table of requirements
- EG STORAGE draft table of requirementsSAFTanswer300119
- EG STORAGE reporting_12th GC ESC
- EG STORAGE_contact list
- READ ME

EG STORAGE meetings



- 15 October 2018 kick off meeting
- 23 November 2018, webinar
- 20 December 2018, webinar
- 25 January 2019, webinar
- 21 February 2019, webinar
- 18 March 2019, meeting
- **20 March 2019, joint EGs meeting**
- 18 April 2019, webinar



- 41 listed members (+7 since last time)
- 16 different representative organizations (+4 since last time)
- ~45% participation of members (slight drop since last time)
- ~75% participation of organizations (slight drop since last time)



- Overall good collaboration among the members, with useful discussions and presentations that help to draft the report
- Common space (SharePoint) and emails are used to provide inputs
- The Expert Groups aims at finalizing the work beginning of May to be submitted to GC ESC in June's meeting

Classification of storage technologies

- The EG identified the storage technologies and grouped them with respect to connection requirements:
 - *Synchronous Electricity Storage module – similar requirements to SPGMs*
 - *Non-Synchronous Electricity Storage module – similar requirements to PPMs*

Definitions have been discussed:

A **Synchronous Electricity Storage Module** would be one in which the Storage Module converts electrical energy into a form of energy which can be stored, the storing of that energy and the subsequent re-conversion of that energy into electrical energy. The transfer of that electrical energy would be through one or more synchronous machines connected to the system.

(In terms of requirements similar to Synchronous Power Generating Module under RfG).

A **Non-Synchronous Electricity Storage Module** would be one in which the Storage Module converts electrical energy into a form of energy which can be stored, the storing of that energy and the subsequent re-conversion of that energy into electrical energy. The transfer of that electrical energy would be connected to the System through an asynchronous machine or through power electronics.

(In terms of requirements similar to Power Park Module under RfG).

Assessing definitions against CEP definition of energy storage

Clean Energy Package definition – (grid connection perspective):

'energy storage' means, in the electricity system, deferring the final use of electricity to a later moment than when it was generated or the conversion of electrical energy into a form of energy which can be stored, the storing of that energy, and the subsequent reconversion of that energy back into electrical energy or use as another energy carrier'.

- the conversion of electrical energy into a form of energy which can be stored, the storing of that energy, and the subsequent reconversion of that energy back into electrical energy : **this case of application addressed by the EG STORAGE definitions**
- the conversion of electrical energy into a form of energy which can be stored the storing of that energy, (...) use as another energy carrier : **this case of application addressed by DCC : it's seen as a load at the connection point because it absorbs power.**

Table of requirements

- The EG categorized the different technologies under synchronous and non-synchronous and has been assessing their capabilities against the RfG requirements (starting point)
- The table can be finalized after the inputs from the last meeting on March 18
- Possible technology additions e.g. power to gas (P2G) in the final version
- **Additional requirements from DCC, HVDC requirements or E&R requirements related to storage behaviour**
 - low frequency demand disconnection during importing modes of operation (DCC).
 - Active power control (ramping, switching) (HVDC – Article 13)
 - Switch or disconnect storage devices before 1st step of LFDD (E&R – Article 15)

Grid connection configurations

- The EG has been studying two main categories:

Standalone device: A facility comprising solely of one or more storage units

Co-located: Installed in the same facility than a Generating Unit or a Demand Unit.

Two cases:

❖ **Supplementary Component**

In this case operation of the storage device is linked to the operation of the generation unit/demand unit. For example use of the storage device to comply with RfG requirements (e.g. FSM) when modernising an existing generation unit.

- Example: Use of a storage system to comply with FSM and reactive power requirements for the modernization of an existing run of the river hydro power plant
- Component could be shared between units in the same facility

❖ **Independently controlled**

In this case operation of the storage device is independent from the operation of the generation unit/demand unit.

Compliance

Compliance will need to take the above categories into account.

The EG will provide examples and note any consequences regarding the technical requirements – in alignment with the EG Mixed Customer Sites

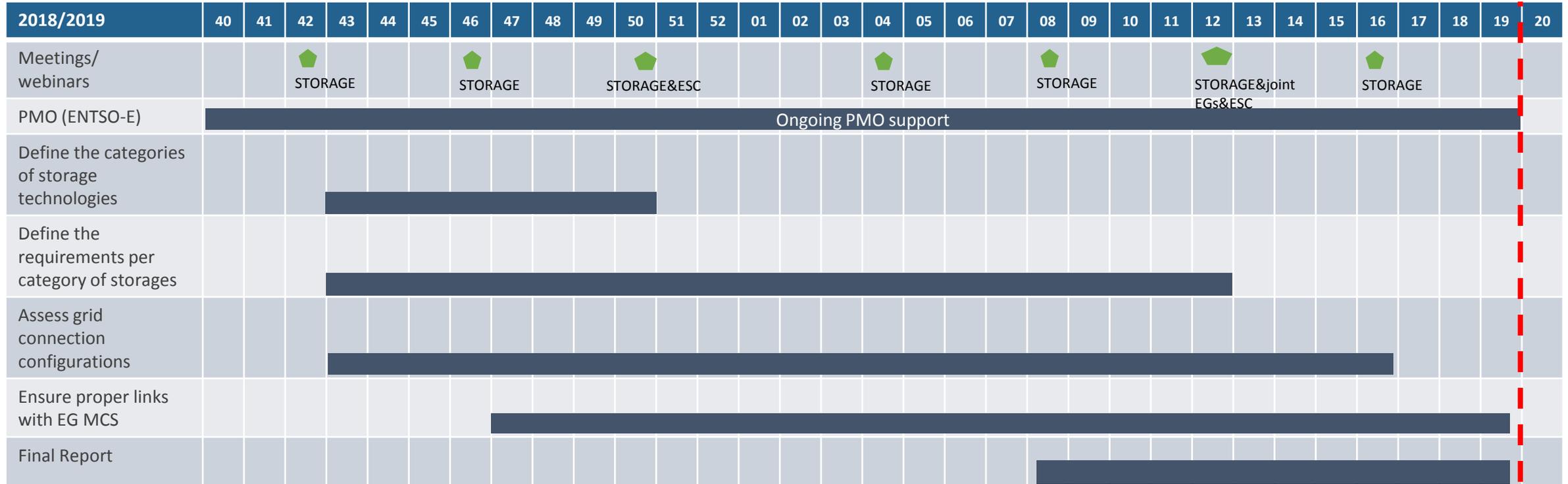
Final Report

The report will:

- include the status regarding RfG requirements / other requirements
- detail how co-located sites are treated (with examples)
- include material presented to the group including experiences from Member States
- will include reference to applicable standards
- will include references to
- will make references to the mixed customer sites align the work with the respective EG

However, the report shall refrain from a recommendation, whether storage devices should be covered by amending the existing codes or drafting a dedicated new code.

Workplan and next steps



- The EG will work on finalizing the report over the next period in April's meeting
- In April's meeting, final comments will be addressed and conclusions will be reviewed
- The format of the report will be aligned with the rest of the reports from the other EGs
- The EG will submit both the report and the excel file to the GC ESC – as final deliverable to be published