

## Expert group: Identification of storage devices (EG STORAGE)

Approved by the GC ESC on September 14, 2018  
Subject to possible updates on the list of members

Revised version including phase 2 work was  
approved by GC ESC on December 12, 2019

**Chair:** ENTSO-E, Emilie Milin

**Vice-Chair:** EASE, Noce Christian

### 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)

#### Phase 1 – October 2018 to June 2019

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).

#### Phase 2 – October 2019 to June 2020

The EG Storage will proceed to evaluate how the CNCs can be further improved to incorporate the results of this analysis, with respect to the scope of the CNCs and implications to other NCs/GLs, if any.

EG Storage will also focus on the impact of Electric Vehicles (EVs). The objective is to exchange views on the different configurations and assess their effect in terms of connection requirements. Any other implications in terms of operations, market products identified will be included in the report to allow further dedicated studies by adequate expert groups.

### 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:

Phase 1 – October 2018 to June 2019

- 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).

Phase 2 – October 2019 to June 2020

Based on Phase 1 technical recommendations

- Revise any relevant Article of NC RfG, NC DCC, NC HVDC according to the results and observations of the technical assessment from phase 1.
- List and briefly assess any possible implications to other NCs/GLs that those revisions may have.
- List any possible questions to be addressed by other NCs/GLs (market, operation)

Include some information related to the specific case of Electric Vehicles

- Identify the possible configurations for grid connection, and the different mode of operation
- Asses the consequences on connection requirements
- List any possible question to be addressed by other NCs/GLs

**Deliverable**

- **Milestone 1 (phase 1):** Report to the GC ESC including proposal for the technical definition and categorization of storage devices, on the functional applications of such devices and the consequences on technical requirements.
- **Milestone 2 (phase 2):** Revise the report to include the revisions to the Connection Network Codes attached with a brief justification, and the possible implications to other NCs/GLs if any. The report will also include a dedicated paragraph related to electric vehicles: description of different configurations and operation modes, and the consequences on connection requirements.

**Timing**

- Phase 1: ~ 6 months from 01 October 2018.
- Phase 2: ~ 6 months from 01 November 2019

## Team

The following nominations to participate in EG Storage have been received (name and association):

<i>Name</i>	<i>Organisation</i>	<i>Representation at GC ESC</i>
<i>Emilie Milin</i>	RTE	ENTSO-E
<i>Yacine Hassaine</i>	RTE	ENTSO-E (only for phase 2)
<i>Carlos Izquierdo</i>	REE	ENTSO-E (only for phase 1)
<i>Antony Johnson</i>	National Grid	ENTSO-E
<i>Ioannis Theologitis</i>	ENTSO-E	ENTSO-E
<i>Francesco Celozzi</i>	ENTSO-E	ENTSO-E (only for phase 2)
<i>Jean-Noël Marquet</i>	EDF	VGB
<i>Tassi Giannikopoulos</i>	EnBW	VGB
<i>Arnim Wauschkuhn</i>	EnBW	VGB (only for phase 2)
<i>Eric Dekinderen</i>	VGB	VGB
<i>Noce Christian</i>	Enel	EASE
<i>Kevin Bradley</i>	BSEF	EASE (only for phase 2)
<i>Jean-Michel Cocciantelli</i>	Saft	EASE (only for phase 1)
<i>Raquel Garde</i>	CENER	EASE
<i>Fernando Morales</i>	Highview Power	EASE (only for phase 1)
<i>Brittney Elzarei</i>	EASE	EASE (only for phase 1)
<i>Anneli Teelahk</i>	EASE	EASE (only for phase 2)
<i>Michael Van Bossuyt</i>	IFIEC	IFIEC
<i>Guy Baret</i>	LUXOL	CEDEC (only for phase 1)
<i>Florentien Benedict</i>	STEDIN	CEDEC
<i>Marc Malbrancke</i>	CEDEC	CEDEC
<i>Bernhard Schowe</i>	FGH	EFAC
<i>Garth Graham</i>	SEE	EURELECTRIC
<i>Mike Kay</i>	ENA	GEODE
<i>Karol O'Kane</i>	ESB	EURELECTRIC
<i>Pat Dowling</i>	ESB	EURELECTRIC
<i>Robert Vorgt</i>	BDEW	EURELECTRIC (only for phase 1)
<i>Michael Iovu</i>	BDEW	EURELECTRIC (only for phase 2)
<i>Guillaume Pelton</i>	ENEDIS	EDSO for Smart Grids
<i>Manuel Jaekel</i>	Innogy	EDSO for Smart Grids (only for phase 1)
<i>Jesus Varela</i>	Iberdrola	EDSO for Smart Grids (only for phase 1)
<i>Juan Marco</i>	EDSO for Smart Grids	EDSO for Smart Grids (only for phase 1)
<i>Michael Wilch</i>	Innogy	EDSO for Smart Grids (only for phase 2)
<i>Santiago Gallego</i>	Iberdrola	EDSO for Smart Grids (only for phase 2)
<i>Andrés Pinto-Bello Gomez</i>	smartEn	smartEn
<i>Jackie Piero</i>	Nuvve	smartEn (only for phrase 1)
<i>Romain Benquey</i>	Restore	smartEn (only for phrase 2)
<i>Xavier Moreau</i>	Nuvve	smartEn (only for phrase 2)
<i>Marcus Müller</i>	Tesla	SolarPower Europe (only for phase 1)
<i>Fabian Hafner</i>	Tesla	SolarPower Europe (only for phase 2)
<i>Raffaele Rossi</i>	SolarPower Europe	SolarPower Europe
<i>Vasiliki Klonari</i>	WindEurope	WindEurope

<i>Miguel V. Rodriguez</i>	ABB	WindEurope (only for phase 2)
<i>Rafael Portales</i>	ABB	WindEurope (only for phase 2)
<i>Luca Guenzi</i>	SOLARTURBINES	EUTURBINES
<i>Gunnar Kaestle</i>	B.KWK	COGEN Europe
<i>Vincenzo Trovato</i>	ACER	ACER
<i>Christina Flaskühler</i>	BNetzA	BNetzA (only for phase 1)

**Estimated resource**

- Monthly webinars
- 2 physical meetings
- Total commitment of 10 days per member

**Target audience**

- GC ESC
- Relevant and/or interested stakeholders on the Connection Network Codes