

## Expert group: Requirements for pump-storage hydro power generation modules (EG PSH)

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, Ralph Pfeiffer

**Vice-Chair:** VGB, Klaus Oberhauser

### Problem Statement

On 11 June 2018, the Grid Connection European Stakeholder Committee (GC ESC) has decided to establish an expert group on requirements for pump-storage hydro modules (PSH). 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.

### Target (objectives)

The objective of the EG PSH is to identify specific characteristics / constraints for this kind of Power Generating Module (PGM) for each operation mode (generation, pumping, synchronous compensation), which may have impact on the connection requirements as defined by Commission Regulation (EU) 2016/631 of 14 April 2016 establishing a network code on requirements for grid connection of generators (NC RfG). The EG PSH will proceed to targeted recommendations on how the NC RfG can be further improved to incorporate the results of this analysis with respect to the scope of NC RfG and any implications to other NCs/GLs, if any.

### Legislative background

NC RfG, Article 6(2) foresees that: “*Pump-storage power-generating modules shall fulfil all the relevant requirements in both generating and pumping operation mode. Synchronous compensation operation of pump-storage power-generating modules shall not be limited in time by the technical design of power-generating modules. Pump-storage variable speed power-generating modules shall fulfil the requirements applicable to synchronous power-generating modules as well as those set out in point (b) of Article 20(2), if they qualify as type B, C or D.*”;

### Task description

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

- Discussions with stakeholders / responses received during consultations / stakeholder interventions at the GC ESC / in workshops have revealed that this provision is probably too generic and in its generality lead to requests for derogations or compliance issues. In particular, a better distinction of the applicability of the RfG requirements in the different operation modes (generating, pumping, synchronous compensation) and different types of pump storage facilities needs to be investigated;

- Challenges in complying with the NC RfG requirements shall be identified separately for each operation mode and, if applicable, technology-dependent (e.g. specific peculiarities of variable speed pumps);
- Clarifications shall be provided on technical capabilities of these PGMs to be able to comply with operational requirements from SO GL and NC ER; and
- Improvements or mitigation of shortcomings concerning both the requirements and PGM designs shall be proposed.

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

- Revise Article 6 (2) and any other relevant Articles of NC RfG according to the results and observations of the technical assessment.
- List and briefly assess any possible implications to other NCs/GLs that those revisions to NC RfG may have.

#### **Deliverables**

- **Milestone 1 (phase 1):** Report to the GC ESC on specific characteristics / constraints for these kinds of PGMs for each operation mode (generation, pumping, synchronous compensation) and the consequences on connection requirements.
- **Milestone 2 (phase 2):** Revise the report to include the revisions to the NC RfG attached with a brief justification.

#### **Timing**

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

#### **Team**

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

<i>Name</i>	<i>Organisation</i>	<i>Representation at GC ESC</i>
<i>Hans Abele</i>	TransnetBW	ENTSO-E
<i>Ralph Pfeiffer</i>	Amprion	ENTSO-E
<i>Ioannis Theologitis</i>	ENTSO-E	ENTSO-E
<i>Francesco Celozzi</i>	ENTSO-E	ENTSO-E (only for phase 2)
<i>Klaus Oberhauser</i>	Verbund	VGB
<i>Heinz Berger</i>	Axpo	VGB
<i>Tassi Giannikopoulos</i>	EnBW	VGB
<i>Eric Dekinderen</i>	VGB	VGB
<i>Klaus Krueger</i>	VOITH	EASE
<i>Alexander Schwery</i>	GE Renewable Energy	EASE (as EASE for phase 2)
<i>Brittney Elzarei</i>	EASE	EASE (only for phase 1)
<i>Kelvin Sim</i>	Highview Power	EASE (only for phase 1)
<i>Michael Iovu</i>	BDEW	EURELECTRIC (only for phase 1)
<i>Orkan Akpınar</i>	Schluchseewerk	EURELECTRIC
<i>Fernando Perán Montero</i>	Iberdrola	EURELECTRIC

<i>Edvard Lauen</i>	Agder Energi	GEODE
<i>Tobias Thurnherr</i>	ABB	WindEurope (only for phase 2)
<i>Rafael Portales</i>	ABB	WindEurope (only for phase 2)
<i>Vincenzo Trovato</i>	ACER	ACER

**Estimated resource**

- monthly webinars;
- 2 f2f meetings; and
- total commitment of 10 days per member.

**Target audience**

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