

A worker in a yellow hard hat and safety vest is carrying a large solar panel on a roof. The background shows a hazy landscape with trees and mountains under a bright sky.

ACER Workshop on Electricity Storage

11 May 2023

DSOs' approach to Storage

DSO entity: Expert Group Existing Network Codes

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Introducing EU DSO Entity

An EU association legally mandated
by EU Regulation 2019/943



“ Art. 52.1: Distribution system operators shall *cooperate at Union level through the EU DSO Entity*, in order to promote the *completion and functioning of the internal market for electricity*, and to promote optimal management and a coordinated operation of distribution and transmission systems. ”

A body of cooperation and neutral
expertise between all DSO in the EU

900+ DSOs
connecting
250 million
customers in
the EU

EU DSO Entity represent the voice of all EU DSOs and has a clear mandate alongside ACER and ENTSO-E for developing NC



Network Codes & Guidelines

Participates in drafting of Network Codes and Guidelines relevant for DSO grids

- Joint proposal with ENTSO-E on **Network Code (NC) Cybersecurity (14/1/22)**
- **Upcoming Network Code (NC) Demand-side Flexibility**
- **Review of existing network codes (NC)**



DSO/TSO cooperation

Promotes optimal and coordinated planning and operation of DSO/TSO networks

- **MoU** with ENTSO-E (DSO-TSO work plan)
- Cooperation on **Network Codes (NC)**
- Joint initiative on **Vision 2050**



Sharing best practice

Expert Groups and forum provide expertise and enable exchange of views

- **Various forms of knowledge sharing** with DSO Entity's members
- Via **project teams** (e.g. events, expert tables)
- **DSO radar reports**

EU DSO Entity welcomes the general approach outlined by ACER for amending current NCs RfG and DC

- **EU DSO Entity** welcomes the review of the current grid connection codes:
 - NC Requirements for generators (NC RfG).
 - NC Demand connection (NC DC).
- **DSOs' experts** have been actively involved in the preparatory work regarding the review of these NCs, namely in several Expert Groups under the European Stakeholder Committee Grid Connection (GC ESC).
- **EU DSO Entity's objective is to collaborate closely with ACER, ENTSO-E and DG ENER (EC's Directorate-General for Energy) on these amendments.**
- **EU DSO Entity** welcomes forthcoming active involvements with all EU Stakeholders in future amendments of other existing network codes and guidelines such as:
 - Guideline System Operation (SO GL) and in particular the KORRR methodology (on data exchanges)
 - Guideline Electricity Balancing (EB GL)

DSO Entity's approach

- The network codes for connexion are purely technical documents.
- From a technical point of view electricity storage is a source and sink of power; sources are generators, sinks are loads.
- Therefore a discharging storage device should be treated like any other generation, and when recharging, like any other load.
- However, DSOs recognize the key flexibility attributes that many electrical storage devices have, and can see that it makes sense to cover those key technical attributes that contribute to system defence in just the NC RfG.

Storage Expert group, phase II final report

- The Grid Connection ESC Expert Group was established to consider the way in which Storage plants are dealt with by the three European Connection Network Codes (RfG, HVDC and DCC) and, where applicable, to make recommendations on how such equipment should be treated.
- This is on the basis that Storage equipment (other than Pumped Storage Plant) is explicitly excluded from the Connection Network Codes and against a background of a significant growth in this area over the last few years.
- In part 1 of their work, the group came up with a number of options to resolve the issues identified, particularly in respect of topology, definitions and capability.
- As a continuation, in part 2 of the group's work, they were tasked with considering the options produced in part 1 in addition to considering the behaviour of storage technologies during low frequency conditions, the requirements (as applicable to Electric Vehicles), the interaction with other European Codes and consider how the legal text for RfG, HVDC and DCC Network codes could be updated to include storage.

Storage Expert group, phase II final report

- https://www.entsoe.eu/network_codes/cnc/expert-groups/
- Final Draft May 2020
- 11 recommendations

DSO entity's approach on Storage Recommendations

#	Recommendations	DSO Entity View
1	A clear definition for electricity storage	Agree
2	Storage to be treated as generation – ie SPGM or PPM as appropriate	Agree
3	Storage can be stand-alone or integrated into other PGMs	Agree
4	Short duration energy stores that are not intended to act as controllable sources of energy, eg flywheels, regenerative braking etc	Agree
5	Data associated with storage should be subject to relevant EU NCs	Agree
6	Technical requirements should be in the NCs connexion, and that operational requirements should be in operational NCs	Agree
7	V1G is treated as demand; V2G as generation	Agree
8	Storage should contribute to frequency management under emergency conditions	Agree
9	V1G behaviour under emergency conditions should be in the NC DC	Agree
10	QoS is an important issue, but is not appropriately addressed in NCs connexion	Agree
11	The capabilities of small storage devices should be included in any considerations of changing the requirements for existing Type A or Type B PGMs	Agree



DSO entity's approach on storage

- The DSO Entity is familiar with the existing Expert Group report on electricity storage and broadly agrees with its recommendations.
- The legal text (or some other document) should make it clear that non-synchronous ESMs are additive to PPMs to make larger PPMs.
- One point that the DSO Entity now believes requires more thought is the assumption that the EG included in its draft legal text “An electricity storage module shall be capable of satisfying the requirements of this Regulation irrespective of whether the electricity storage module injects and consumes active power to and from the network.”
- This has been replicated in Art 6.6 of ACER's draft RfG text.
- From recent DSO experience it is not clear how this would apply to NC RfG requirements such as reactive power control and fast fault current injection, for example, and we should consider this bland requirement quite carefully before including it, or making it more specific.

DSO entity example/question

- 1 ESM 0,8 MW behind connection (type A on it's own)
- 1 PPM 0,8 MW behind (the same) connection (type A on it's own).
-
- Together 1,6MW, type B, behind the same connection?!
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- With other words,
 - -can we add ESM and PPM behind the same connection?
 - -do we have to add ESM and PPM behind the same connection?
- *) A/B threshold is 1MW in this example

NC RfG ESM detailed issues - 1

Reference	Comment
Recital s1	Flywheels etc; it is inappropriate for any technical issues to be specified by the TSO, it should be the RSO. Many of these effects are only local. Or will be covered in specific contracts for ancillary services.
2.67	Would it not be more correct to define ESM as a PGM that can inject or withdraw, rather than referring to SPGMs and PPMs separately? Is there a subtle reason for this?
4 & 72	The text is missing so we cannot review the intertemporal arrangements.
6.6	Initially in this sentence V2G EVs and their charging points are both explicitly mentioned; but later in the sentence there is reference to charging points, but not EVs. Is this deliberate? Our reading of this clause is that EVs are included at both points in the sentence.
13.1(b)(iii)	This should be substituted with the words: "If rate-of-change-of-frequency (RoCoF) is used for loss of mains protection, the relevant system operator, in coordination with the relevant TSO, shall specify the threshold of this rate-of-change-of-frequency-type loss of mains protection."
13.1(c)	This needs to be amended to recognize the text to be substituted in 13.1(b)(iii).
13.9	In (a), (d), (e) (f) and (g), ESM is explicitly mentioned, in (b) and (c) not. Is this deliberate? Would it not be better to be consistent?
13.9(g)	Is 8s reasonable for all SPGM technology? It might be reasonable to accept that T_{id} might be up to 2s, and that T_{resp} is 10s.
13.9(f)	There is no 13.2 and Figure XX in this extract.
13.10	There is no need for the last sentence. Type A PGM behaviour is determined by its size, not connexion voltage. If the connexion point happens to be above LV there is no reason to add confusion to the specification of this equipment by relaxing.
Y.6	Relevant system operators should be singular. There is only one RSO per connexion point.

NC RfG ESM detailed issues - 2

Reference	Comment
Y.7(a)	“entry into force of this regulation” – we cannot judge if this is correct or not without understanding the detailed drafting of the intertemporal arrangements.
Y.9	It is necessary to preface this text with “Where specified by paragraph 6, or allowed by paragraph 7 above, PPMs shall be capable...”
Y.9(c)(ii)	Not clear why a RSO would want current limitation – and why is this not a RSO decision?
20	We believe the following text should be inserted at the start of Article 20: “After a transition period, proposed by the relevant TSO in coordination with the relevant system operator and adjacent TSOs, a type B PPM shall be capable of providing grid forming ...”
20.4(a)	The reference to Y.8(c)(i) should be to Y.9(c)(i)
20.1	Is it deliberate that Y.9(d) is not included?
20.4(a)	We need to check if it is appropriate to include the term “synthetic inertia” as this term is usually associated with characteristics of grid following inverters, not grid forming ones.
20.4 & 21.4	The structure of these clauses is subtly different. Accepting they have different requirements, should we not harmonize the formatting?
21	We believe there needs to be some text here that allows the introduction of GFC to be agreed between TSO and DSO, or varies the size range within Type C where GFC becomes mandatory. The variation to size range could be made in the same way as it is done in Art 5 in the draft legal text provided by ENTSO-e in response to the policy consultation.
21.4(a)	We need to check if it is appropriate to include the term “synthetic inertia”