Do we need an update of the network code on Requirements for grid connection of generators?

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Justification

VGB and Eurelectric detected some illogical provisions in the network code on Requirements for grid connection of generators (NC RfG) :

- The coherence with the Guideline on electricity transmission system operations (GLSO) is missing. The GLSO was published on 25/8/2017 and the coherence could be investigated only recently.
- Technical developments since the drafting of this network code, especially for batteries.
- The impact of the large amount of Renewable Energy Sources installed recently in Europe and connected to DSOs.
  This issue was raised by CENELEC at the GC ESC of 8/9/2017
- Some technical gaps are identified in the RfG NC.

HOW DO WE DEAL WITH THESE SHORTCOMINGS?

Classification of PGMs

Art. 5 defines a classification of power generating modules (PGM) depending on their capacity and on the voltage at the connection point.

Each PGM connected at 110 kV or above is defined as a type D, meaning that a photo-voltaic panel of 100 W at an industrial consumer, connected at 110 kV or above, is a PGM of type D and is treated identically to a nuclear PGM of 1000 MW. Some countries expect a class derogation for not using this criterion on connection voltage.

This classification is also used in the GLSO.

The GLSO imposes operational planning procedures in Part III for relevant PGMs type B,C and D without a definition of the notion “relevant” creating also uncertainty. The procedures are justified for a nuclear PGM but NOT for smaller PGMs at industrial sites.

Those procedures will reduce the interest of large industrial consumers to install RES and cogeneration units at their site.

HOW CAN WE SOLVE THIS?

Measurement precision of the frequency.

In the NC RfG, Art. 14 table 4 imposes

- a frequency response insensitivity between 10 mHz and 30 mHz
- a dead band between 0 mHz and 500 mHz

for PGMs operating in FSM.

In the GLSO, Art.154 and the table in Annex V require a “Maximum combined effect of inherent frequency response insensitivity and possible intentional frequency response dead band of the governor of the FCR providing units or FCR providing groups” of 10 mHz for CE.

We see a conflict between both provisions, or at least no more flexibility in implementing the RfG Code even though the requirement is **non-exhaustive**.

What is the correct interpretation?

Max. voltage in 400 kV grids

In the NC RfG, table 6.2 imposes for Continental Europe that equipment has to withstand a voltage of 1.05 pu to 1.1 pu during a period of time not less than 20 minutes and not more than 60 minutes. The value of 1 pu is 400 kV (Art.6.2.iv). In the GLSO, Art. 27 and Annex II table 2 limit the voltage in the normal state of the 400kV grid to the level of 1.05 pu or 420 kV, supposing 1 pu equal to 400 kV.

We are convinced that the requirement to withstand 440 kV during 20 minutes or more is a violation of Art. 1 of NC RfG requiring that system operators make appropriate use of the power generating facilities capabilities because grid components are not capable to withstand voltages above 420 kV during more than 20 minutes.

Notes :

- The value of 420 kV is also the upper limit specified in the IEC established technical standard to be taken into particular consideration according to the NC RfG recital 27.
- A similar requirement for the installations of the grid operators does not exist.

A solution for this issue could be to modify the time duration in the NC RfG Table 6.2 in the lines 1.05 pu – 1.10 pu to “As specified by the TSO according to the characteristics of the connecting grid”.

Battery storage devices

Art.3.2.d indicates that battery storage devices are not subject to the code.

Since the drafting of the NC RfG, batteries have become a common, mature equipment for storage and we believe that this technology will have an increasing impact on the electrical system. Up-to-date batteries exhibit even higher performance than synchronous generators, especially in the domain of response times. Depending on the answers to questions below, batteries could be included in the scope of NC RfG maybe with some minor adaptations.

Are requirements for batteries at European level justified?
If yes, what is the solution?

GL SO is based on classification of NC RfG. If batteries are excluded from NC RfG, can GL SO provisions be imposed on batteries?

Pumped storage devices

Pumped-storage devices have to fulfil the requirements in both generating and pumping mode.

As stated in Art.14.3 a single fault-ride-through requirement applies for both operating modes.

Due to the hydraulic phenomena in the penstock, it is technically justified to allow different characteristics, one for the generating mode and another one for the pumping mode.

How could we solve this issue?

Regarding the CENELEC proposal

VGB and Eurelectric believe that the proposal made by CENELEC to add provisions in the NC RfG is technically justified for smaller PGMs to create a level playing field at European level.

But : A clear distinction has to be made between:

- Smaller PGMs as subject of a European standardisation with market based equipment and single values for some characteristics,
- Larger PGMs designed and constructed according to specific characteristics and ranges as specified currently in NC RfG. Each member state can define its own value in a range.

The CENELEC proposal must not lead to a similar standardisation with unique values for larger PGMs.

Next steps

We propose to create a dedicated “ad-hoc stakeholder group” as specified in Art. 11 of the NC RfG

- To discuss the items proposed in this presentation
- To add other items if desired by other stakeholders
- To propose a solution for each item
- According to the Terms of Reference of this GC ESC
- With all involved stakeholders
- Chaired by ACER

in order to establish a common proposal.