Grid Forming Reasoning E.ON

Concept of the amendment proposal

An amendment proposal concept has been developed in between ENTSO-E and EU DSO-Entity as follows and has been acknowledged by both in general. E.ON does explicitly support this proposal and has in fact initiated it.

1. "Large" PPM shall mandatorily have grid forming capabilities as laid out in the draft.
2. Mandatory requirement of grid forming capabilities from "small" PPM as laid out in the draft shall be subject to a uniform national implementation roadmap defining a clear timeline. No grid forming implementation requirement is posed to "small" PPM before the points in time defined therein. The roadmap shall be defined within 2 years after entry into force of the Regulation. The roadmap could be defined by the Member state or a designated entity and should involve all relevant stakeholders. The roadmap shall be uniform for all national DSOs. It may differentiate between technologies.
3. Grid forming capability activation and deactivation capability is discarded assuming a national roadmap is introduced as described before.

A way is still sought to adequately distinguish "small" and "large" PPM in the Regulation body with reasonable effort. The aim is to include PPM that are connected to the MV level substations interconnected to a HV grid with either a direct connection to the MV busbar or a dedicated feeder connected to it that cumulates PPM (including ESM) without customers subject to the DCC. A new definition of this situation is suggested to add in the Regulation as neither absolute nominal power numbers nor type classes (A-C) do seem appropriate due to very different circumstances in between the member states.

Further details are yet in discussion in between EU DSO Entity and ENTSO-E, e.g. whether a cost-benefit-analysis from an overall system needs and local grid perspective shall (EU DSO Entity) or may (ENTSO-E) be part of the national roadmap.

Reasoning

The growing and high need for system services like inertia and short circuit currents in the ENTSO-E area is understood and acknowledged by E.ON. The necessity to provide the system needs on short notice is obvious as is the approach to let all PPM of every size and voltage level contribute. The requested grid forming capabilities of the different types themselves are not being questioned.

Still, grid forming capabilities as requested are not state of the art for small units in the bulk business, neither on the technology nor on the grid side. Research is ongoing but has not yet found definitive answers on the implications of introducing grid forming technology in an enormous number of entities on lower voltage levels. Experience on the field levels does also not exist yet. We foresee technical risks challenging a safe and reliable grid operation when introducing a technology without a proven system readiness level. Among others major questions exist on the following exemplary points:

a) adequate treatment of unintentional islands on voltage levels with sparse observability and controllability (risks of e.g. asynchronous reclosing, prevention of fault clearing, hazardous touch voltage exposure, resonance overvoltages)
b) adequacy of existing cost efficient protection, control and operation principles of distribution systems

c) adequate stability and interoperability of PPM with grid forming capability among each other and with existing assets (e.g. oscillatory instability) under all relevant conditions of operation

Introducing grid forming capability in small PPM in the bulk business on short notice – even when deactivated at first – is error prone. Healing such errors in the aftermath has large economic consequences due to the number of PPM involved (potentially several ten to hundred millions). Research for avoiding such errors is on the way but needs more time.

Preventive actions (e.g. ICT connection to every PPM, increase of grid side controllability and observability) in order to adequately prepare grid systems to incorporate grid forming PPM are possible but highly cost intensive. As far as we could observe, CBA has not been performed on the integration of grid forming PPM in the bulk business. Nonetheless, adequate pressure should be created to develop the distribution systems in favour of integration GFC also in the bulk business.

As a compromise we suggest to start integrating grid forming capability on short notice outside the bulk business in larger PPM where individual solutions can be crafted and errors may be healed with adequate efforts due to limited numbers (potential several ten to hundred thousands). Such PPM are typically connected to MV busbars of substations interconnected to HV or in voltage levels above. The very individual boundaries of Type A/B/C across the European member states make it difficult to reflect this in the types.

For smaller PPM we opt to create a uniform roadmap on a national basis on the points in time (not more than several years) and the criteria under which grid forming capabilities shall be implemented. This has several benefits form our point of view:

1. Avoidance of costly errors and increased dependability of solutions
2. Planning reliability, feasibility and pressure for manufactures
3. Planning reliability, feasibility and pressure for DSOs
4. Planning reliability and simplification and operational certainty for TSOs

With an increased knowledge due to ongoing research and field tests, solutions and standards can be found that have a very high system readiness level already on their introduction in the bulk business. Hastily developed solutions that might never be activated safely or beneficially for the system are avoided. Assets can unfold their potentials to the full extend. The overall system is not going to act as a large field test for requirement and product development. There will be less need for implementing costly fall back systems and solutions (e.g. online reparameterization infrastructure or offline processes).

Manufactures can concentrate on larger PPM development first and accompany the research and refinement of standardization of smaller PPM grid forming capabilities. The development will be based on sound requirements. The deadlines will be certain and will contribute to planning reliability. Double efforts for solution development and proving compliance of hybrid PPM capabilities will be avoided.

DSOs will get a clear uniform timeline for developing and implementing solutions on the grid side to accommodate grid forming capability in the bulk business. They may participate in refining requirements that are contributing to cost efficient overall solutions taking into account individual national circumstances of grid design and operation.

TSOs will have a uniform and plannable development over time in all their DSO systems instead of individual agreements with varying outcomes. DSOs are bound to comply instead of being able to opt

out. Dismissing the grid forming activation / deactivation capability avoids uncertainty due to an unknown state of activation or unintentional toggling (e.g. firmware updates).

A legislative solution should be achievable by the help of ACER experts to adequately and efficiently distinguish small and large PPM in the Regulation body as a point of the proposal that does remain to be formally solved.

Legals text proposal

The legal text amendment proposal concerning grid forming submitted by E.ON is largely identical to the EU DSO Entity draft and also attached. It differs in the following points:

- §20.1(b) and 21.1(b) (of the amendment proposal): E.ON suggests not to apply criteria on the status of real time monitoring and control of MV busbars to require grid forming capability, as these criteria may lead to discussion instead of certainty of interpretation. E.ON does aim at making these busbars “grid forming ready” in the next years.
- §Y.5 (of our amendment proposal, Y.6 in EU DSO Entity): E.ON deems the requirement of grid forming implementation to be part of the national roadmap definition rather than an individual TSO requirement.