February 2024

ACER Recommendation to amend the network code on requirements for generators – Comments from the turbine power plant sector

EUTurbines Position Paper

Introduction

EUTurbines welcomes the recommendations proposed by ACER on the Network Code Requirements for Generators (NC RfG), which brings forth significant improvements in terms of harmonising and future-proofing the grid connection requirements at EU level.

Notwithstanding, manufacturers encounter challenges due to the inconsistent and unclear requirements, coupled with the lack of a practical perspective in the NC RfG text. This results in heightened complexities when testing turbine capabilities.

As the association representing manufacturers of turbine-based gas and steam power plants in the EU, EUTurbines has historically offered valuable technical and practical insights for the revision of the NC RfG. We would like to highlight several issues that could impede the establishment of a level playing field among various manufacturers and technologies.

These seven issues are further explained below and relate to:

1. Ambiguous removal of the “Power-generating facility” definition
2. Outdated definition of “Synchronous compensation operation”
3. Unrealistic adaptation requirements for new generating plants contracts
4. Excessive Frequency limit requirements
5. Lack of consideration of system availability to LFSM-O events
6. Missing clarity for LFSM-O closed loop control functionality
7. Insufficient consensus process for drafting Implementation Guidance Documents

Our Recommendations

1. **Reinstate the original definition of “Power-generating facility”**
2. **Update the definition of “Synchronous compensation operation”**
3. **Extend the adaptation period for new generating plants contracts**
4. **Ensure appropriate system availability to maintain present frequency limits**
5. **Considering trade-offs in response-times to LFSM-O events**
6. **Clear definition for LFSM-O closed loop control functionality**
7. **More inclusive drafting process for Implementation Guidance Documents**

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Reinstate the original definition of “Power-generating facility”

In the recent amendment to Article 2(6), the original definition of "power-generating facility" has been replaced. However, numerous references to "power-generating facility" persist throughout the rest of the Regulation text, along with the definition of “power-generating facility owner.” This inconsistency introduces ambiguity in interpreting the text.

Specifically, the definition of “power-generating facility owner” lacks clarity, as the original definition of "power-generating facility" has been removed in Article 2. This leaves uncertainty regarding the actual ownership attributed to the "power-generating facility owner." Moreover, this owner is saddled with a considerable list of obligations and interactions throughout NC RfG, further complicating the interpretation of responsibilities.

In light of these concerns, **we recommend for a comprehensive review and reconsideration of the amended definition in Article 2(6) to ensure coherence and clarity in the regulatory framework.**

Update the definition of “Synchronous compensation operation”

In the current proposal by ACER, Article 2(19) lacks a comprehensive definition of "*Synchronous compensation operation*", omitting crucial requirements for ensuring the future stability of the electrical network: Synchronous condensers. This oversight is notable given the diverse applications of Synchronous condensers, such as encompassing voltage and reactive power control, inertia contribution, and short circuit current contribution (aligning with the insights from ENTSO-E - Project Inertia Phase II).

Traditionally, synchronous generating units have provided these services without specific compensation. While this behaviour is appropriately integrated into the latest draft of the NC RfG for Hydro power plants and batteries, it is perplexing why these requirements - important for future grid stability - are not explicitly outlined for synchronous condensers.

We recommend for an update to the definition of "Synchronous compensation operation" to explicitly include synchronous condensers. This definition should extend to other Power Generating Units (PGUs) and Power Generating Modules (PGMs) capable of operating as synchronous compensators when not generating active power. This update is crucial to align with future markets targeting inertia and reactive power, as exemplified by cases in the UK, Ireland, and Germany. A precedent for such inclusion is found in DIN EN IEC 60034-3, a generator product standard, already incorporates the definition of synchronous condensers.

Extend the adaptation period for new generating plants contracts

There is a contradiction between article 7(5) and article 4(2)(b). Article 7(5) mandates RSO or TSOs to propose requirements within 24 months of the NC RfG publication. In parallel, article 4(2)(b), stipulates that these requirements apply to new generating plants with a signed contract after the 24-month period, potentially subjecting the plant to yet-undefined standards. This introduces substantial economic risk

concerning both the requirements and associated verification costs, an untenable situation for manufacturers.

Given the industry's need for adequate adaptation time, especially in the context of increasingly complex compliance assessments, **we recommend incorporating in article 4(2)(b) a provision allowing for a grace period of 1 year after the entry into force of new requirements, or 2 years from the publication of the regulation, whichever is later.** This adjustment will provide the necessary flexibility for manufacturers to align with the evolving regulatory landscape.

Ensure appropriate system availability to maintain present frequency limits

Article 13(2)(d) sets requirements for frequency stability demanding power-generating modules to operate at the frequency between 51.5 Hz - 52.5 Hz for 10 seconds. However, the imposition of a 52.5 Hz frequency limit represents an unprecedented extension beyond current operational values, leading to an impractical broadening of the operational range. The risks associated with this situation are uncertain and difficult to assess, posing potential challenges in terms of significant costs and system reliability issues. This encompasses the process of conducting design reviews, updating product standards, and performing capability assessments for all electrical system components.

We recommend maintaining the current frequency limits of 51.5Hz to ensure appropriate system availability, and adopting 51.5 Hz as the upper limit value, aligning with standards for short-time transients. Moreover, ensuring future system stability necessitates containing the frequency deviation lower than 10 seconds. The containment of frequency deviation should be managed by a local inertia market and related solutions, prioritizing them as crucial for ensuring the future stability of the system.

Considering trade-offs in response-times to LFSM-O events

Article 13(3)(g) sets requirements for Limited Frequency Sensitive Mode – Overfrequency (LFSM-O) response time where a rapid decrease in active power, 45% of maximum power within 8 seconds, is defined for synchronous power generating modules. The basis for this requirement is an Implementation Guideline Document (IGD) published by ENTSO-E in 2018, which was not approved with the consensus of manufacturers. **Although this requirement may be technically possible, such operation could potentially lead to other technical, safety and emission requirements not being fulfilled.** This issue has been recognised by several Member States, which have adopted different values, and, when not explicitly stated, have permitted units to operate within their capabilities.

If the amendment to Article 13(3)(g) proposed by ACER becomes a legal requirement, it will effectively increase the length and complexity of the certification process. In our experience, the exemption clause ("*If the response time is greater than stated above, the power-generating facility owner shall justify the delay, providing technical evidence to the relevant TSO*") will result in lengthy and uncertain negotiations around exemptions and will not be sufficient to prevent some technologies being excluded from markets.

With this in mind, we recommend making the requirement optional, thereby partially easing the compliance process. Additionally, it is advisable to establish a comprehensive and standardised

definition that manufacturers can universally apply, moving beyond high-level explanations provided by ENTSO-E.

Clear definition for LFSM-O closed loop control functionality

In the ACER text proposal, articles 52.2(d) and 51.2(d) suggest the potential testing of Limited Frequency Sensitive Mode – Overfrequency (LFSM - O) in closed-loop control of the power generating module by the system operator. Yet, the lack of a description for LFSM-O closed-loop control in previous sections of the NC RfG and the absence of an official definition for this control gives rise to concerns.

Currently, in Germany LFSM-O closed-loop control requirements are being drafted and are still under development – these discussions demonstrate differing expectations for controllability and generating unit reactions compared to the requirements outlined in article 13 of the NC RfG. Such discrepancies in expected behaviour, create uncertainties and may lead to misunderstandings.

Given the prolonged discussion on closed-loop functionality and the perceived lack of clarity, we recommend amending the current text as outlined in the annex of this document.

More inclusive drafting process for Implementation Guidance Documents

The Implementation Guidance Documents (IGDs) exclusively owned and prepared by ENTSO-E lack an appropriate participative process. Article 58 emphasizes that IGDs are non-binding documents. It is crucial to note that unlike European standards - which undergo approval by the technical committee of European Member States with stakeholder contributions and meeting attendance - IGDs lack a legal foundation. Consequently, these documents might include technical issues that, if not addressed, could impact the functionality of the electrical system.

We recommend alignment of the decision-making process for IGDs with that of European Standards, ensuring the same quality in document drafting and avoiding technical errors that could adversely affect the electrical system.

ANNEX

Reinstate the original definition of “Power-generating facility”

Text proposed by ACER	*Amendment recommendation*
Article 2(6) ~~6) ‘power-generating facility’ means a facility that converts primary energy into electrical energy and which consists of one or more power-generating modules connected to a network at one or more connection points~~;	Article 2(6) (6) **‘power-generating facility’ means a facility that converts primary energy into electrical energy and which consists of one or more power-generating modules connected to a network at one or more connection points**;
Explanation Numerous references to "power-generating facility" persist throughout the rest of the Regulation text, along with the definition of “power-generating facility owner.” Deleting this definition will create inconsistency and ambiguity in interpreting the RfG text.	

Update the definition of “Synchronous compensation operation”

Text proposed by ACER	*Amendment recommendation*
Article 2(19) (19) ‘synchronous compensation operation’ means the operation of an alternator without prime mover to regulate voltage dynamically by production or absorption of reactive power;	Article 2(19) (19) ‘synchronous compensation operation’ means the operation of an alternator without prime mover **or a PGU that is not generating active power**, to regulate voltage dynamically by production or absorption of reactive power, **to provide inertia to the system and to provide short circuit contribution to the system**;
Explanation This definition can apply to other PGU and PGM technologies that can operate as synchronous compensator when they do not generate active power ("prime mover" is off). So far has been used for Hydro power plant PGU/PGM. Note that "prime mover" is not defined in the NC RfG. The update of this definition is needed for future markets targeting inertia and reactive power.	

Extend the adaptation period for new generating plants contracts

Text proposed by ACER	*Amendment recommendation*
Article 4(2)(b) (b)the power-generating facility owner has concluded a final and binding contract for the purchase of the main generating plant by two years after the entry into force of this Regulation.	Article 4(2)(b) (b) the power-generating facility owner has concluded a final and binding contract for the purchase of the main generating plant by two years after the entry into force of the Regulation **and at least one year after the definition of new requirements and compliance scheme as defined in art 7(5), whichever it is later**;

Explanation
Article 7(5) stipulates that Member States must propose non-exhaustive requirements within two years of the regulation's entry into force. Consequently, new plants (post two years) lack information on the requirements they must adhere to, which is deemed unacceptable. To address this, new requirements can only apply to plants with contractual agreements signed at least one year after the publication of the finalized requirement (not the initial draft proposal).

Ensure appropriate system availability to maintain present frequency limits

Text proposed by ACER	*Amendment recommendation*
Article 13(2)(d) (d) the power-generating module shall be capable of remaining connected to the network and operate at the frequency between 51.5 Hz – 52.5 Hz for 10 seconds.	Article 13(2)(d) (d) ~~the power-generating module shall be capable of remaining connected to the network and operate at the frequency between 51.5 Hz – 52.5 Hz for 10 seconds.~~ **A power generating module or power generating unit shall not unreasonably withhold wider frequency and time duration if their technology permits it. In such a case they need to state their capabilities. Frequency limits in table 2 are considered at rated voltage. Combined frequency and voltage variation can result in different requirements; applicable European product technical standard shall apply in such cases.**
Explanation A maximum frequency of 52.5 is not acceptable. Product standard for synchronous generators (IEC 60034) are not considering such high frequency deviation. It is therefore recommended to use 51.5Hz as upper frequency limit value. However, it is considered fair that if a generating unit can accept higher frequency than the proposed, this capability shall not be withhold. Finally note that the proposed ROCOF profile and values for SPGMs were present in the first IGD and even in such IGD it was recognized an upper frequency limit of 51.5Hz.	

Considering trade-offs in response-times to LFSM-O events

Text proposed by ACER	*Amendment recommendation*
Article 13(3)(g) (g) the power-generating module shall be capable of operating stably during LFSM-O operation. When LFSM-O is active, the LFSM-O setpoint will prevail over any other active power setpoints which would result in an increase of active power above the LFSM-O setpoint. The power-generating module shall be able to receive and react on an external signal allowing the relevant system operator to block active power LFSM-O mode in	Article 13(3)(g) (g) the power-generating module shall be capable of operating stably during LFSM-O operation. When LFSM-O is active, the LFSM-O setpoint will prevail over any other active power setpoints **from the power plant facility** which would result in an increase of active power above the LFSM-O setpoint. The power-generating module shall be able to receive and react on an external **active power output** ~~signal allowing~~ **from**

real-time. The TSO in coordination with the relevant system operator shall define the framework conditions for the use of this function. The response time, Tresp in Figure (4)XX1, for active power decrease in case of increasing frequency, shall be as fast as technically feasible and as described below: (i) for synchronous power-generating module: less or equal to 8 seconds for an active power setpoint change of 45% maximum power. (ii) for power park module: less or equal to 2 seconds for an active power setpoint change of 50% maximum power. If the response time is greater than stated above, the power-generating facility owner shall justify the delay, providing technical evidence to the relevant TSO.	the relevant system operator. ~~to block active power LFSM-O mode in real-time. The TSO in coordination with the relevant system operator shall define the framework conditions for the use of this function~~. The **step** response time **capability**, Tresp in Figure (4)XX1, for active power decrease in case of increasing frequency, shall be as fast as technically feasible. ~~and as described below~~: ~~(i) for synchronous power-generating module: less or equal to 8 seconds for an active power setpoint change of 45% maximum power.~~ ~~(ii) for power park module: less or equal to 2 seconds for an active power setpoint change of 50% maximum power.~~ ~~If the response time is greater than stated above, the power-generating facility owner shall justify the delay, providing technical evidence to the relevant TSO.~~
Explanation If the amendment to Article 13(3)(g) proposed by ACER becomes a legal requirement, it will effectively increase the length and complexity of the certification process. In our experience, the exemption clause ("If the response time is greater than stated above, the power-generating facility owner shall justify the delay, providing technical evidence to the relevant TSO") will result in lengthy and uncertain negotiations around exemptions and will not be sufficient to prevent some technologies being excluded from markets.	

Clear definition for LFSM-O closed loop control functionality

Text proposed by ACER	*Amendment recommendation*
Article 51.2(d) (d) The relevant TSO has the right to request that compliance is demonstrated for the stability of the LFSM-O control in a close loop operation set up of the synchronous power-generating module.	Article 51.2(d) ~~(d) The relevant TSO has the right to request that compliance is demonstrated for the stability of the LFSM-O control in a close loop operation set up of the synchronous power-generating module~~.
Article 52.2(d) (d) The relevant TSO has the right to request that compliance is demonstrated for the stability of the LFSM-U control in a close loop operation set up of the synchronous power-generating module.	Article 52.2(d) ~~(d) The relevant TSO has the right to request that compliance is demonstrated for the stability of the LFSM-U control in a close loop operation set up of the synchronous power-generating module.~~
Explanation Articles 52.2(d) and 51.2(d) suggest the potential testing of Limited Frequency Sensitive Mode – Overfrequency (LFSM - O) in closed-loop control of the power generating module by the system operator. Yet, the lack of a description for LFSM-O closed-loop control in previous sections of the NC RfG and the absence of an official definition for this control give rise to concerns.	

EUTurbines represents the leading European gas and steam turbine manufacturers.

EUTurbines advocates an economic and legislative environment for European turbine manufacturers to develop and grow R&I and manufacturing in Europe and promotes the role of turbine-based power generation in a sustainable, decarbonised European and global energy mix.

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