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ACER draft amendments to the Network Code on Requirements for Generators

Fields marked with * are mandatory.

Introduction

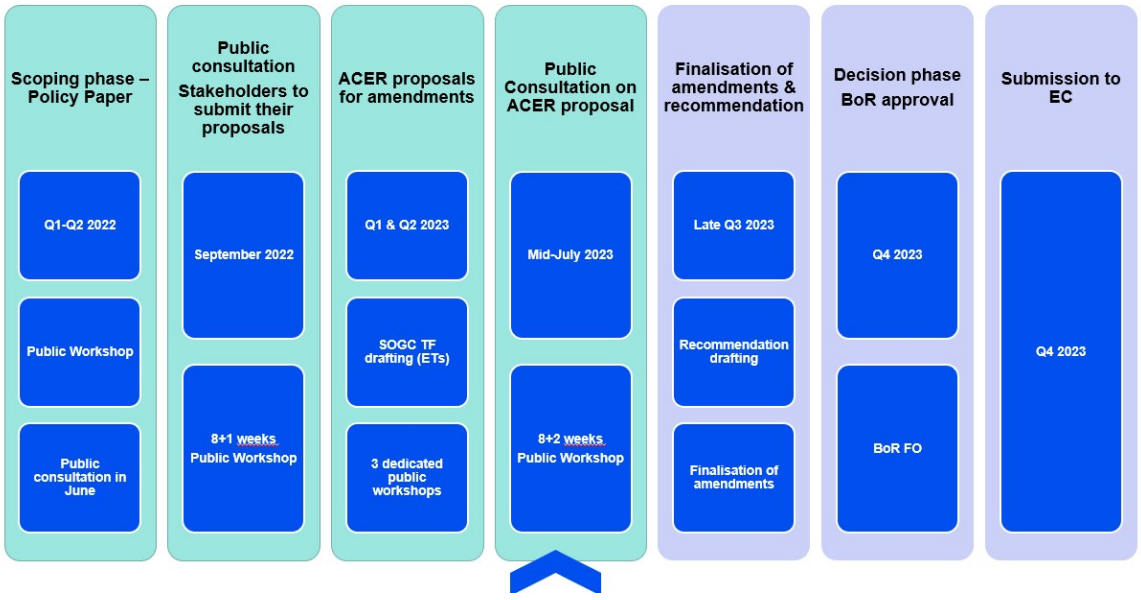
This consultation aims to present ACER's draft amendments to the Commission Regulation (EU) 2016/631 of 14 April 2016 establishing a **Network Code on Requirements for Grid Connection of Generators ('NC RfG').**
For draft amendments concerning Network Code on Demand Connection ('NC DC'), please go to the respective form: **NC DC**.

Responses to this consultation should be submitted by 25 September 2023.

Background

Important developments in the policies of decarbonisation of the European Union (EU) energy and transport sectors have taken place since the inception of the development of the first European Grid Connection Network Codes (GC NCs) in 2012.

In the framework of the Grid Connection European Stakeholder Committee (GC ESC), the European Commission proposed for ACER to initiate the process towards the amendment of the existing GC NCs in September 2022. The amendment process, as presented to the GC ESC is outlined in the Figure below:



Following the scoping phase, ACER published the Policy Paper on the revision of the network code on requirements for grid connection of generators and the network code on demand connection in September 2022. The Policy Paper aimed to transparently indicate to stakeholders the key policy areas in which amendments were to be expected.

Access the ACER Policy Paper on the revision of the NC RfG and NC DC.

As a next step, ACER launched the Public Consultation to gather stakeholders' views and concrete amendment proposals regarding the GC NCs. The stakeholders could submit their inputs by 21 November 2022.

Access the results of the Public Consultation on the amendments to the grid connection network codes.

Additionally, in the preparation of the draft amendment proposals, ACER organised three dedicated public workshops, namely:

- electromobility, power-to-gas demand units and heat-pumps (held on 17 April 2023);
- rate of change of frequency and grid forming capabilities (held on 10 May 2023); and
- electricity storage (held on 11 May 2023).

After the evaluation of stakeholders' inputs, ACER has formulated its own proposal for the amendments of the GC NCs which is subject to this public consultation.

Stakeholder's details

ACER is highly committed in processing personal data in a lawful way.
Find out more how we process your data: https://www.acer.europa.eu/the-agency/about-acer/data-protection

* Name of the stakeholder:

WindEurope

* Contact person:

[redacted]

* Contact person's email address:

[redacted]

* Country of the stakeholder's headquarters or main country of operation:

Belgium

* Type of the stakeholder:

- ( ) Generator (including association)
- ( ) Consumer (including association)
- ( ) Transmission system operator (including association)
- ( ) Distribution system operator (including association)
- (•) Manufacturers (including association)
- ( ) Academia/research institution
- ( ) Regulatory authority
- ( ) Other (please, elaborate)

Please, elaborate on your answer above, if necessary:

* Do you consent to the publication of the stakeholder's name?

- (•) Yes
- ( ) No

* Do you consent to the publication of provided answers?

- (•) Yes
- ( ) No (please, note that your answer, without your name and organization, may be shared with the EU institutions and national authorities)

Instructions

Stakeholders are invited to submit their comments to the NC RfG articles amended by ACER in three mandatory steps:
1. by downloading the ACER draft amendments in the Word file provided below. The file can also be accessed on the right panel of the consultation form under the Background Documents;
2. by commenting on the ACER's draft amendments through this online consultation form and adding their alternative text proposals to the table, if any; and
3. by uploading the alterative amendment proposals to the **entire NC RfG** using the Track Changes mode in the ACER draft amendments file downloaded from **Step 1**.

Where the stakeholder does not have any comments regarding the amendments, the relevant cells in the consultation form can be left blank.

The mandatory steps for submitting the comments are listed below.

Step 1

Please see ACER's draft amendments in the Word file provided below. The file can also be accessed on the right panel of the consultation form under the Background Documents.

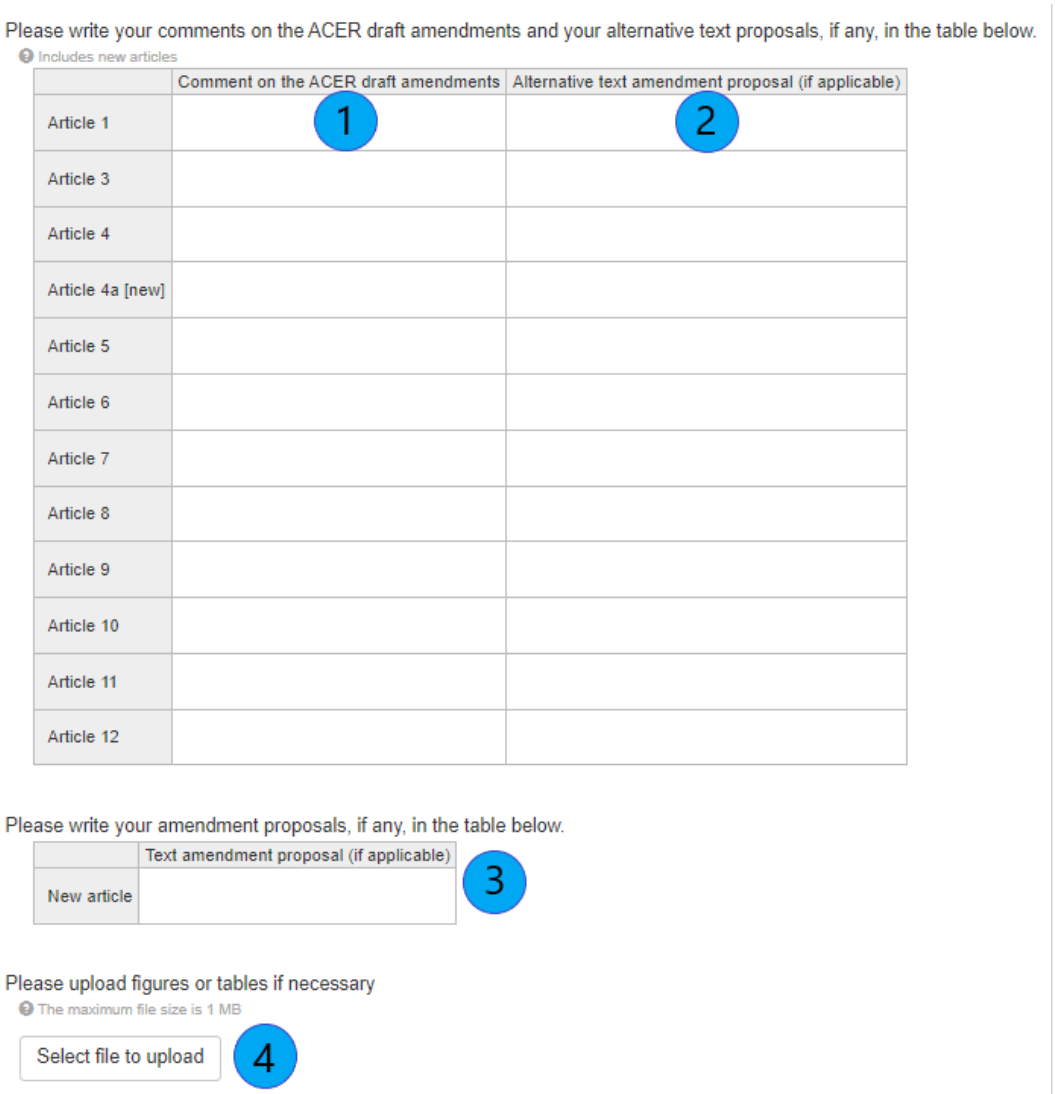
Download ACER draft amendments to the NC RfG here

Step 2

Kindly note that this consultation form follows the structure of the NC RfG amended legal text provided by ACER in Step 1.

The paragraph numbering in the form reflects paragraph numbers in the amended legal text. Nevertheless, stakeholders can comment on the deleted paragraphs/articles/titles, which are marked as [deleted]. New articles and titles are marked as [new].

Please use this form to comment on ACER draft amendments and/or to provide an alternative text proposal. The instructions are the following:


Please write your comments on the ACER draft amendments and your alternative text proposals, if any, in the table below.

Includes new articles

	Comment on the ACER draft amendments	Alternative text amendment proposal (if applicable)
Article 1	1	2
Article 3		
Article 4		
Article 4a [new]		
Article 5		
Article 6		
Article 7		
Article 8		
Article 9		
Article 10		
Article 11		
Article 12		

Please write your amendment proposals, if any, in the table below.

	Text amendment proposal (if applicable)
New article	

3

Please upload figures or tables if necessary

The maximum file size is 1 MB

Select file to upload 4

1. Leave comments on the ACER draft amendment proposals.
2. Propose (if any) alternative wording of the relevant provision, as you provided in the Word file.
3. Provide (if any) your proposals for adding new provisions to the relevant section of the NC RfG, as you provided in the Word file.
4. Upload figures or tables if necessary; text inputs should be provided directly in the consultation form.

Step 3

Where the stakeholder would like to propose an alternative amendment to the **entire NC RfG**, please upload the Word file (**downloaded from Step 1**) containing all your alternative amendment proposals in the Track Changes mode to the next **FILE UPLOAD** section and rename it with your stakeholder's name ("ACER_draft_RfG_stakeholder_name"). You can also upload your justification documents, where applicable.

In case the file size exceeds the 1MB limit, which is a consultation tool limit, kindly send the document to the functional mailbox shown on the right panel of the consultation form. Please rename the file with your stakeholder's name as indicated above and send it with the subject "ACER draft RfG legal text [stakeholder name]". Note that only submissions sent within the consultation deadline will be considered.

To facilitate the process, please, make sure that the **alternative text proposals provided in this consultation form are consistent**, to the extent possible, **with those in the Word file** you are uploading, taking into account the character limitations of each cell (max 5000 characters).

FILE UPLOAD

Please upload your file here

The maximum file size is 1 MB
Only files of the type pdf,doc,docx,odt,txt,rtf are allowed

Kindly note that in case the file size exceeds 1MB, the file can be sent to the functional mailbox shown on the right panel of the consultation form under Contact. Please ensure that the file name and email subject are consistent with the instructions in Step 3.

Please also upload any other document (i.e. **justifications)** below, if relevant.

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The maximum file size is 1 MB

Due to the significant length of this survey:

- you have the possibility to edit your answer after submission. When clicking on "Submit" button, you will be given a Contribution ID which you can then use to access your answers and edit them, if necessary.
- we kindly suggest that you download the entire survey as .pdf (link on the right), prepare your answers and then upload them at once in the EU Survey Tool, to avoid a session timeout on submission.

The maximum length of each cell is 5000 characters. This is the maximum technical limit set by the EUsurvey tool, which cannot be increased.

Whereas Section

Please write your comments on the ACER draft amendments and your alternative text proposals, if any, in the table below

Numbers in the first column correspond to the recitals of the amended version of NC RfG Whereas section, including new recitals

	Comment on the ACER draft amendments	Alternative text amendment proposal (if applicable)
(1)		
(2)		
(3)		
(s1)		
(s2)		
(4)		
(5)		

(6)	In terms of physics, the transition from traditional power system dominated by synchronous generators to very high shares of power park modules in the future leads to the need of additional ancillary services, which so far had not been thought of. Such additional system needs and the ways to satisfy them have to be assessed and organized by the regulator. Neither power facility owners, nor TSOs or DSOs can make that. The system needs and the ways to satisfy them have to be identified, defined, introduced, given a commercial value, and at the end procured. The obligation to trigger thinking and acting about this is in EU Directive 2019/944 of 5 June 2019 under the term "non-frequency ancillary service”.	Regulatory authorities should consider the reasonable costs effectively incurred by system operators in the implementation of this Regulation when fixing or approving transmission or distribution tariffs or their methodologies or when approving the terms and conditions for connection and access to national networks in accordance with Article 59(1) and (7) of Directive (EU) 2019/944 and with Article 18 of Regulation (EU) 2019/943. Regulatory authorities shall review the concept of Ancillary Services possible in their responsibility area. If the transition from a power system dominated by synchronous generators towards one high shares of power park modules needs additional Ancillary Services to be defined, introduced and procured, the regulatory authorities together with the TSO and the relevant system operator shall start this, in accordance with EU Directive 2019/944 of 5 June 2019.
(7)		
(8)		
		The significance of power-generating modules should be based on their agreed maximum continuous export capacity at the point of connection and their effect on the overall system. a. Synchronous machines should be classed on the machine size and include all the components of a generating facility that normally run indivisibly. An installation containing a set of

(9)	- The original wording of only units of same underlying technology should be assessed on their aggregated capacity and the integration of storage does not harmonize well with hybrid energy systems or hybrid power plants with multiple technologies existing behind one connection point. This wording will create ambiguity regarding the requirements for such plants and create unnecessary regulatory obstacle for cost effective RES integration and therefore achieving the EU's RES targets on time. - Need clarification on the part “... used solely for the purpose of meeting the requirements of this Regulation ...” if it refers only to the exhaustive requirements from this RfG2.0, or if also any national implementation of non-exhaustive requirements is covered by this sentence. It makes a big difference. If this sentence is not binding for the non-exhaustive requirements, then any additional inverter installed to meet requirements about synthetic inertia can be added to the PPM capacity.	synchronous machines that cannot be operated independently from each other, such as combined-cycle gas turbine installation, should be assessed on the whole capacity of that installation. b. Non-synchronously connected power-generating units of any underlying technology and any primary energy source, including electricity storage, where they are collected together to form an economic unit towards the relevant system operator and where they have a single connection point to the relevant system operator, shall be assessed based on the agreed maximum continuous active power export capacity at the point of connection, irrespective of their installed aggregated capacity. c. Moreover, to ensure an appropriate harmonisation or rules for mass-market products, the capacities of units of Type A, which have the same underlying technology and one single connection point, should be aggregated for the purpose of the determination of significance, instead of referring to the agreed maximum continuous active power export capacity at the point of connection. (for instance, photovoltaic, electricity storage, combined heat and power installations, or V2G electric vehicles) d. Electricity storage integrated to a power-generating module of type A, used solely for the purpose of meeting the requirements of this

		Regulation and its national implementation should be considered as part of such module while its capacity should not count towards the power-generating module capacity.
(10)		
(**)		
(11)		
(12)		
(13)		
(14)		
(15)		
(16)		
(17)		
(x)		
(18)		
(19)		
(**)	The term "high voltage" is used and defined. What is meant here are "over" voltage conditions, in line with the term also used at the end of the same sentence.	In order to avoid potential critical system situations caused by overvoltage, it should be possible for power-generating modules to remain connected to the system for a specified over voltage-against-time profile.
(20)		
(21)		
(22)		
(**)		

(23)	For f-ranges and all parameters for f-control it is even more relevant that the requirements from neighboring countries within a synchronous area match to each other. Especially regarding the response speed of LFSM and FSM it is not the case yet.	Voltage ranges, frequency ranges and requirements for power-frequency-control should be coordinated between interconnected systems because they are crucial to secure planning and operation of a power system within a synchronous area. Disconnections because of voltage disturbances have an impact on neighboring systems. Failure to specify voltage ranges could lead to widespread uncertainty in planning and operation of the system with respect to operation beyond normal operating conditions.
(24)		
(25)	Converter-based is the correct word instead of RES. E.g., hydro power plants are usually designed as synchronous power generating modules. The capability to provide Synthetic Inertia from converter-based generating technologies is based on technology and product design decisions, it’s a not an intrinsic (natural) characteristic / limitation of such technologies.	Synchronous power-generating modules have an inherent capability to resist or slow down frequency deviations, a characteristic which many converter-based generating modules (power park modules) do not have implemented as of today. Therefore, countermeasures should be adopted, to avoid a larger rate of change of frequency during high converter-based production periods. Synthetic inertia could facilitate further expansion of converter-based generating modules (power park modules).

(**)	- Using RES as primary source doesn't mean a plant has no inherent capability to resist frequency deviations. Think of hydro power plants using typically synchronous generators. The key is if the plant uses power electronics. Then there is nothing inherent, but certain things may be programmed into, some easier, other with more effort and cost. - Obliging all new PPM to provide the full scope of "appropriate grid-forming and rate-of-change-of-frequency withstand requirements" is probably the costliest way to enforce them. Especially all DSO connected ones will (based on the DSO request) not work as grid forming plants for system security reasons. The regulator shall make a CBA and decide differentiated, which system need is best satisfied through mandatory requirements (must-have & must-deliver) and which one shall be ensured as ancillary service. - Making converter-based PPMs grid-forming can become very expensive, while enabling a high rate-of-change-of-frequency withstand capability is usually less expensive.	Rapidly increasing penetration of dispersed generation and converted-based technologies into European networks has presented new challenges in ensuring overall system security. To the extent that an adequate contribution to the dynamically transforming system depends partly on advanced capabilities, power-generating modules should be able to support the system robustness by fulfilling appropriate grid-forming and rate-of-change-of-frequency withstand requirements. The regulator shall consider if such advanced capabilities are to be provided as ancillary services in accordance with EU directive 2019/944 of 5 June 2019 based on a publicly consulted CBA.
(26)	It must be ensured that compliance testing is differentiated as by applicable A/B/C/D-type.	Appropriate and proportionate compliance testing should be introduced so that system operators can ensure operational security, considering different approaches for types A, B, C and D.
(27)		

(28)		
(29)		
(30)		
(31)		
(32)		

Please write your amendment proposals, if any, in the table below

	Text amendment proposal (if applicable)
New recital	

Definitions (Article 2)

Please write your comments on the ACER draft amendments and your alternative text proposals, if any, in the table below

Includes new definitions

	Comment on the ACER draft amendments	Alternative text amendment proposal (if applicable)
Article 2(1)		
Article 2(2)		
Article 2(3)	The present definition text is ok for anything except Grid Forming and Fast Fault Current Injection. Both phenomena happen on a sub-cycle time scale (<<20ms), hence root-mean-square values at fundamental frequency are meaningless. An additional definition has to be established for such transient phenomena, regarding U, I, P, Q, S, f and df/dt (RoCoF).	‘voltage’ means the difference in electrical potential between two points measured as the root-mean-square value of the positive sequence phase-to-phase voltages at fundamental frequency. For any requirements about grid forming, synthetic inertia and fast-fault-current injections the relevant TSO shall publish a specific definition in accordance with the applicable IGDs, which suits the sub-cycle character of these phenomena.
Article 2(4)		
Article 2(5)		
Article 2(6)		
Article 2(7)		
Article 2(8)		
Article 2(9)		
Article 2(10)		
Article 2(10a)		
Article 2(11)		
Article 2(12)		
Article 2(13)		
Article 2(14)		
Article 2(15)		

Article 2(16)	Many ramp rate and maximum capability requirements refer to Pmax. These might not be possible if multiple units of the PGM are stopped. The relevant quantity is what the relevant system operator and the facility owner have agreed to be the maximum active power, which the facility is allowed to inject into the network at the connection point. How this is done inside the facility, if a higher or lower total nominal active power is installed inside the facility, shall not be relevant for the "Pmax". In addition, the term "continuous" has to be defined. For a storage system this term doesn't make sense without a timely specification.	'maximum capacity' or 'Pmax' means the maximum continuous active power which a power-generating module can export while all units are available, less any demand or losses associated solely with facilitating the operation of that power-generating module as specified in the connection agreement or as agreed between the relevant system operator and the power-generating facility owner, or determined by other appropriate means, where an agreement is not required and which may differ from the aggregated installed capacity of a power-generating module. Electricity storage integrated to a power-generating module should be considered as part of such module while its capacity should not count towards the power-generating module capacity.
Article 2(17)	Clarification to ensure that different technologies and storage can be aggregated to a PPM (e.g., but not limited to a combination of WTGs, PV-modules and BESS), a bit similar like the aggregation of gas turbines and steam turbines in a CCGT.	'power park module' or 'PPM' means a unit or ensemble of units that can export electrical energy by different technologies or if applicable additionally store electrical energy by different technologies, which is not a synchronous power-generating module and which is either non-synchronously connected to the network or connected through power electronics, and that also has a single connection point to a transmission system, distribution system including closed distribution system or HVDC system.
Article 2(18)		

Article 2(19)	‘synchronous compensation operation’ leads to many more phenomena than only the mentioned voltage control. And such a device can only contribute to regulate voltage, it can never ensure voltage regulation at all circumstance. Some of the other physically contributions are mentioned, which are crucial for the system-stabilizing impact of synchronous compensation devices.	‘synchronous compensation operation’ means the operation of an alternator without prime mover, to, amongst other phenomena, contribute to regulate voltage regulation dynamically by production or absorption of reactive power, contribute to frequency stabilization by inherent provision of inertia, provision of short circuit current in case of voltage faults in the network;
Article 2(20)		
Article 2(21)		

Article 2(22)	The present text is not useful as it is not precise and looks only at 50Hz. Different to that, a general definition of the term "frequency" is needed. The RfG2.0 text also addresses phenomena in the frequency range 0.2Hz up to 9kHz. In the interest of system stability, it is not acceptable that a key electrical value like the frequency remains with such a blurry definition. 1. Frequency cannot be measured; it is always calculated based on measurable physical quantities. Depending on what is measured over what time, and how this is eventually filtered, different values will result for the frequency. 2. In the interest of system stability it is key that the way how frequency is calculated based on measured values is harmonized across a synchronous area. Therefore, the proposal to use by default the 200ms gliding window. 3. However, at least for the requirements about RoCoF, Grid Forming and (synthetic) inertia it is crucial to have the possibility to define frequency for a much shorter time interval (e.g., 20ms) in a meaningful way. All this being said, definition of frequency could be defined at ENTSO-E level, but different definitions from different TSOs won't be feasible.	'frequency' means the inverse of the period of a periodic electrical quantity. It is calculated on the basis of measurable electrical quantities such as current or voltage. The fundamental frequency of the periodic electrical quantity is decisive for the generation, transport and use of electrical energy. Its nominal value is 50 Hz. The fundamental frequency is to be determined over a gliding time window of not more than 200ms. For any frequency-related requirements about grid forming, synthetic inertia and fast-fault-current injections, the relevant TSO shall publish a specific definition of 'frequency' in accordance with applicable IGDs, which suits the sub-cycle character of these phenomena.
Article 2(23)		

Article 2(24)	Please clarify difference to definition (50). What for is a "minimum regulating level" if it is not "stable"? If there is a timely difference between (24) and (50) this must be quantified.	
Article 2(25)		
Article 2(26)		
Article 2(27)		
Article 2(28)		
Article 2(29)	Over-voltage ride through is as important as under-voltage ride through, therefore: a voltage-time-profile. It's not relevant if the under/over-voltage situation is caused by a "secured" fault or any other. Key is that the reason is located out of the device itself. The complete definition of the FRT capability has to also include the physical location at which the reference voltage is assessed.	'fault-ride-through' means the capability of electrical devices to be able to remain connected to the network and operate through defined periods of under or over voltage at the connection point caused by faults not originating from the device;
Article 2(30)		
Article 2(31)	See comment to definition of "voltage", same applies here. For the mentioned very short-term phenomena, which are crucial for system stability, a different definition is necessary in accordance with the relevant IGD.	'current' means the rate at which electric charge flows which is measured by the root-mean-square value of the positive sequence of the phase current at fundamental frequency. Regarding fast-fault-current, grid forming, inertia and synthetic inertia the TSO shall publish a specific definition, in accordance with applicable IGDs which suits the sub-cycle character of these phenomena.
Article 2(32)		

Article 2(33)		
Article 2(34)		
Article 2(35)	Any plant can only "contribute" to the stabilization of a stable frequency. It can never maintain it on its own. (Except isolated operation)	'frequency control' means the capability of a power-generating module or HVDC system or PPM to adjust its active power output in response to a measured deviation of system frequency from a setpoint, in order to contribute to maintain a stable system frequency;
Article 2(36)		
Article 2(37)		
Article 2(38)		
Article 2(39)		
Article 2(40)		
Article 2(41)		
Article 2(42)		
Article 2(43)		
Article 2(44)		
Article 2(45)		
Article 2(46)		
Article 2(47)		
Article 2(48)	"feedback" is not the right term. It should usually be "closed-loop". However, if its closed-loop or open-loop is not relevant here. As "alternator" is the term used for the classic synchronous generator, it should be here also for consistency.	'excitation control system' means a control system that is assigned to any alternator and its excitation system;
Article 2(49)		
Article 2(50)		

Article 2(51)		
Article 2(52)		
Article 2(53)		
Article 2(54)		
Article 2(55)	As far as possible already existing definitions shall be used: (29). The defined FRT event includes with its "voltage-time-profile" already the times during and after the fault. If no reference is made to (29) "voltage deviation" would have to be specified. Also, an e. g., 1% change of voltage would be a "voltage deviation", but not necessarily a FRT event. The fast fault current has many purposes, depending on the type of fault and the specific network. The mentioned ones are some examples, but not applicable under all circumstances and by far not exhaustive. Therefore, it is better not to start mentioning some aims.	‘fast fault current’ means a current injected by a power park module or HVDC system during a fault-ride-through event;
Article 2(56)		
Article 2(57)		
Article 2(58)		
Article 2(59)		
Article 2(60)		
Article 2(61)		
Article 2(62)		

Article 2(63)	It is crucial that this notification allows to exchange power at the connection point. Power injection plays the dominant role in RfG context, but also power consumption is relevant. Both must remain within the limits agreed by the parties.	‘energisation operational notification’ or ‘EON’ means a notification issued by the relevant system operator to a power-generating facility owner, demand facility owner, distribution system operator or HVDC system owner prior to energisation of its internal network allowing to energize its power-generating facility;
Article 2(64)		
Article 2(65)		
Article 2(66)		
Article 2(67)	Complementing the proposed language changes for the definition of PPMs.	‘electricity storage module’ or ‘ESM’ means a synchronous power-generating module or a power park module which can inject and consume active power to and from the network for electricity storage, excluding pump-storage power-generating modules. A V2G electric vehicle and associated V2G electric vehicle supply equipment with a bidirectional functionality is regarded as an electricity storage module. Electricity storage integrated to a power-generating module should be considered as part of such module while its capacity should not count towards the power-generating module capacity;
Article 2(68)		
Article 2(69)		
Article 2(70)		
Article 2(71)		
Article 2(72)		
Article 2(73)		

Article 2(74)		
Article 2(75)		

Please write your amendment proposals, if any, in the table below

	Text amendment proposal (if applicable)
New definition	Article 2(76): 'generic model' means a model for the simulation of the electrical performance of a component, based on a generic structure and software modules (e.g., protection and control systems), which may deviate from specific manufacturer system. The models shall easily be parameterized to represent a manufacturer specific system but taking into account generic model has less accuracy than user-written model. Article 2(77): 'user-written model' means a model made by the manufacturer for the simulation of the electrical performance of a component, based on the algorithms and parameterization used in the component. It reflects the electrical behaviour more accurately than a generic model. Article 2(78): Inherent energy storage' means an amount of energy expressed in MWs or MWh, available in physical components of a PPM, as determined by the power-generating facility owner.

Please upload figures or tables if necessary

The maximum file size is 1 MB

TITLE I - General provisions

Please write your comments on the ACER draft amendments and your alternative text proposals, if any, in the table below

Includes new articles

	Comment on the ACER draft amendments	Alternative text amendment proposal (if applicable)
Article 1		
Article 3		
Article 4		
	- Modernisation is often a byproduct of repair and maintenance activities. It must be avoided, that maintenance and repair activities are being categorized as "significant modernisation" and hence required to comply with latest grid codes. Especially, as for NC RfG 2.0 this would include the obligation to provide grid forming for PPM. This must be excluded, or only allowed under extraordinary circumstances. - Significant Modernisation may lead to need of retesting of the changed active / reactive capability to show continued compliance to grid requirements as per connection agreement. - Here, a percentage of 20% and above is suggested from the Spanish grid code. However, typically a power range increase up to 25% is accepted in general by different standards (of course considering the components on the Power generating module are similar), as for example: PGM starts at a rated power as a based designed and by increasing cooling the power is increased without modifying the electrical performance.	1. Proposals for defining significant modernisation of power-generating modules and the requirements applicable in those cases shall be subject to approval by the relevant regulatory authority or, where applicable, the Member State. In developing the proposals, the TSO shall coordinate with relevant DSOs and conduct a public consultation in accordance with Article 10. 2. Maintenance and repair activities and spare parts are not to be subject of significant modernisation, whether or not those parts are purchased new at the time of their incorporation in the power generating module. 3. The definition of significant modernisation shall take into account at least the following criteria: (a) an increase above the existing maximum

Article 4a [new]	- As most reactive power requirements are based on a power factor requirement and therefore directly linked to the active power this (b) should not be needed. Or it should be formulated so the reactive power requirements shall still be respected after the increase stated in (a). - The original text will hamper any possibility to improve active power management capabilities of existing, old PPMs (e.g. enabling active power control by blade-pitching or advance PPC function) to allow participation in ancillary services such as secondary frequency control or fast active power reduction (e.g. SRAP service in Spain). If doing this means that PPMs needs to comply with the new requirements (e.g. being grid-forming capable), PPM owners will regrettably discard participating in these markets, and TSOs will lose a significant number of potential ancillary service providers already connected in their grids. In addition, deployment of hybrid power plants will be also impacted since a new PPM forming a hybrid installation with an existing PPM changes the P control capabilities of the power plant. - It is important to the delimit the scope of changes to major components that significantly impact the technical capabilities of the power generating module. In this sense, either the main generating plant and/or the storage plant largely delivers the technical capabilities of the power generating	capacity of the power-generating module, whether this increase results from one modernisation or several successive modernisations, of a minimum percentage to be defined in the range 20% and above (within this range, different percentages may be defined for different technologies depending on their constraints); (b) a substantial change in frequency stability capabilities, whether this change results from one modernisation or several successive modernisations, of the power-generating module apart from maintenance and repair of control software, communication network and interface. This condition is not applicable when forming a hybrid power generation facility; and (c) a change of main generating plant of a power-generating module or electricity storage module in a percentage of above 70%; 4. For each criterion defined in accordance with paragraph 2 above, the TSO's proposal shall specify the requirements of this Regulation that shall apply to the modernised power-generating module (default) or exceptionally to the entire modernised part of the power-generating module. Furthermore, the TSO shall justify their proposal based on a publicly consulted CBA.

	module. Hence, only the change of these plants (i.e., a genuine “repowering”) shall be included in this criterion.	
Article 5		
Article 6	It is not clear what is meant in Article 6 (e). Is "higher value" A frequency above 49 Hz or a higher requirement (meaning a lower frequency)? As the term “value” is not specific it is suggested to change it to “frequency” for clarity.	2. Pump-storage power-generating modules in generating operation, pumping operation and synchronous compensation mode shall fulfil the following requirements: (e) in pumping operation mode, no technical capability to remain connected and continue operation is requested if the frequency is below 49 Hz, unless the relevant TSO defines a higher frequency;

Article 7	3. In order to support the proper functioning of the internal electricity market within and between synchronous areas, and to achieve cost efficiencies. Instead of requiring a specific test for every country inside Europe the capability and harmonize testing of requirements shall be encourage by testing the capability of the turbines with equal or stringent requirements. This shall be only permitted based on a CBA. The CBA should consider increased costs to the PGM for solving a system issue vs another solution (new equipment to be installed by TSO) in terms of operational flexibility, costs, redundancy etc. 4. The relevant system operator or TSO shall submit a proposal for requirements of general application, or the methodology used to calculate or establish them, ...“and” instead of “or” because they are not replaceable with each other. Does “shorter time period” mean that the requirements can come in force sooner than the 2 years? That could be a challenge for some requirements.	3. When applying this Regulation, Member States, competent entities and system operators shall: (f) take into consideration agreed European standards, international standards, technical specifications, implementation guidance documents developed by ENTSO-E in accordance with Article 59(15) of Regulation (EU) 2019/943, and relevant nuclear safety rules. IEC and EN testing standards are accepted to verify compliance against this document. Testing cases deviating from specific TSO rules are accepted as far as they prove to comply with requirements that are equal or more stringent than the ones specified in this document. (g) take into consideration local system needs in specifying power-generating modules capabilities where necessary based on a publicly consulted CBA.
Article 8		
Article 9		
Article 10		
Article 11		
Article 12		

Please write your amendment proposals, if any, in the table below

	Text amendment proposal (if applicable)
New article	

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TITLE II CHAPTER 1 - General Requirements

General requirements for type A power-generating modules

Please write your comments on the ACER draft amendments and your alternative text proposals, if any, in the table below

Includes new paragraphs

	Comment on the ACER draft amendments	Alternative text amendment proposal (if applicable)
Article 13(1)		
Article 13(2)		
Article 13(3)		13 (3) (a) the power-generating module shall be capable of activating the provision of active power frequency response according to figure 1 at the frequency threshold defined in Table X of Article 15(2)(d) and droop settings specified by the relevant TSO according to Article 13.3(d) 13 (3) (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 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 activate or deactivate active power LFSM-O mode without intentional delay. 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 XX, for active power decrease in case of increasing frequency, shall be as fast as a technically feasible and as described below, unless the RSO determines that a more relaxed time responses are needed: (i) for synchronous power-generating

	13 (3) (a): NC RfG should be more specific here to avoid ambiguity. Alternative could be to delete “frequency threshold and droop settings specified by the relevant TSO;” here, as Art. 13 (3) (c) defines threshold settings and Art. 13 (3) (d) defines droop settings. In 13 (3) (c): WindEurope welcomes the harmonisation of frequency thresholds based on default values. 13 (3) (g): in real-time” can be misunderstood as infinitely fast / no delay at all, which is physically impossible. More accurate formulation would be “without intentional delay”. We propose an increase in the response time by 0.5 s to account for an initial delay up to 0.5 s, which is in line with the most demanding grid codes today (Spain and Germany). Figure 1: Pref should be the same over all frequency response control to ensure predictable behaviour during frequency events and stable performance.	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 2.5 seconds for an active power setpoint change of 50% maximum power. 13 (3) Figure 1: Pref is the reference active power to which ΔP is related and shall be specified the same for LFSM-O, LFSM-U and FSM, and may be specified differently for synchronous power-generating modules and power park modules. ΔP is the change in active power output from the power-generating module. fn is the nominal frequency (50 Hz) in the network and Δf is the frequency deviation in the network. At over frequencies where Δf is above Δf1, the power-generating module has to provide a negative active power output change according to the droop S2.
Article 13(4)		
Article 13(5)		
Article 13(6)		
Article 13(7)		

Article 13(8)	"Observation time" is undefined. Furthermore "observation time" is not applied in the conditions for automatic connection in Article 13 (9).	8. The technical capability of the power-generating module to connect to the network shall be as follows: (a) Voltage range at the grid connection point: within the voltage range that is defined for unlimited time operation if so applicable; (b) Frequency range of 47.5 Hz ≤ f ≤ 51 Hz; (c) Adjustable limitation of the gradient of active power increase ≤ 20 % of Pmax/min; and, (d) Synchronizing conditions.
Article 13(9)	"Observation time" is undefined. Furthermore "observation time" is not applied in the conditions for automatic connection in Article 13 (9).	9. Within the capability defined in paragraph (7), the default settings for an autonomous connection shall be as follows: (a) Voltage range: 0.9 pu ≤ U ≤ 1.1 pu; (b) Frequency range: — Continental Europe: 47.5 Hz ≤ f ≤ 50.1 Hz — Other synchronous areas 47.5 Hz ≤ f ≤ 50.5 Hz (c) Maximum gradient of active power increase ≤ 20 % of Pmax/min (d) Condition on voltage phase angle difference measured on each side of the circuit breaker: Δθ < 10° (e) Condition on the voltage magnitude difference measured on each side of the circuit breaker: ΔU < 0.04 pu; and (f) Condition on the frequency difference measured on each side of the circuit breaker: Δf < 0,2 Hz Autonomous connection is allowed unless specified otherwise by the relevant system operator in coordination with the relevant TSO.

Article 13(10)	- No device can guarantee constant voltage at its terminals. It can only contribute to a more constant voltage. This is a wrong expression appearing several times in this document. - As voltage control is a functionality which is depending on that the facility is operation it is recommended to delete “importing”.	10. The power generating module shall be equipped with voltage control that can contribute to constant terminal voltage when generating power at a selectable setpoint without instability over the entire operating range of the power-generating module. The relevant system operator shall have the right to specify the capability of a power-generating module to supply or absorb reactive power both when exporting active power with P-Q capability chart to be defined by the relevant system operator with boundaries not wider than Article 15, Figure 9;
Article 13(11)		
Article 13(12)		
Article 13(13)		
Article 13(14)	Grid forming was communicated to be mandatory from Type B. Proposed to delete 13 (14) (b).	

Please write your amendment proposals, if any, in the table below

	Text amendment proposal (if applicable)
New provision	

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[NEW] General requirements for type EV1 and EV2 V2G electric vehicles and associated V2G electric vehicle supply equipment

Please write your comments on the ACER draft amendments and your alternative text proposals, if any, in the table below

	Comment on the ACER draft amendments	Alternative text amendment proposal (if applicable)
Article 13a(1)		
Article 13a(2)		
Article 13a(3)		
Article 13a(4)		
Article 13a(5)		
Article 13a(6)		
Article 13a(7)		
Article 13a(8)		
Article 13a(9)		
Article 13a(10)		
Article 13a(11)		

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	Text amendment proposal (if applicable)
New provision	

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General requirements for type B power-generating modules

Please write your comments on the ACER draft amendments and your alternative text proposals, if any, in the table below

	Comment on the ACER draft amendments	Alternative text amendment proposal (if applicable)
Article 14(1)		
Article 14(2)[deleted]		

Article 14(2)	Table XX.2: Since the synchronisation of the Baltic Synchronous zone with the Continental Europe Synchronous zone is planned for the year 2025 already, it would be reasonable to harmonize also the Voltage Levels (in pu) as shown in Table XX.2 between the Baltic and the Continental Europe Synchronous zone. That would mean, that the pu value of 1.15 for Baltic 400kV voltage level must be changed to CE values of 1.10. This matter of coordination of voltage ranges between interconnected systems is already addressed in clause (23) in the preamble of this regulation. 14 (2) (a) (iii) National exceptions should not be made in the European grid code. How these voltage ranges apply to PGM type B & C, which are connected to 110 kV and above, even if they are often not directly connected to high level needs to be well explained. An appropriate place for this explanation could be in an IGD. 14 (2) (iii) Any national exceptions should be avoided in a European grid code. 14 (2) (a) (vi) It shall be clear when we need to operate in current control and when we only need to remain connected in normal operation.	Table XX.2: Baltic- 400 kV- 1,05 pu -1,10 pu - 20 Minutes 2 (a) (vi) the relevant system operator, in coordination with the relevant TSO, and the power-generating facility owner may agree on wider voltage ranges or longer minimum time periods for operation to ensure the best use of the technical capabilities of a power-generating module, if it is required to preserve or to restore system security. Such voltage ranges shall not overlap the ranges included for fault-ride-through response ranges.

Article 14(3)	Sentence to be deleted. Otherwise, it is completely open which HVRT requirements will practically face.	(c) The power-generating module shall be capable of operating stably without disconnecting from the network, if none of the phase-to-phase voltages exceeds the voltage-against-time-profile defined in Figure X at the connection point.
Article 14(4)		
Article 14(5)	Avoid specific mention of EU Regulation. In case SO GL is updated then this reference doesn't work anymore.	d) With regards to information exchange: (i) power-generating facilities shall be capable of exchanging information with the relevant system operator or the relevant TSO in real time, as specified by the relevant system operator or the relevant TSO. The content of real-time data shall be consistent with the data exchange requirements laid down in line with the relevant EU regulation;

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New provision	

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[NEW] Requirements for type EV3 electric vehicles and associated V2G electric vehicle supply equipment and V2G electrical charging parks

Please write your comments on the ACER draft amendments and your alternative text proposals, if any, in the table below

	Comment on the ACER draft amendments	Alternative text amendment proposal (if applicable)
Article 14a(1)		
Article 14a(2)		
Article 14a(3)		
Article 14a(4)		
Article 14a(5)		
Article 14a(6)		
Article 14a(7)		
Article 14a(8)		

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	Text amendment proposal (if applicable)
New provision	

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General requirements for type C power-generating modules

Please write your comments on the ACER draft amendments and your alternative text proposals, if any, in the table below

	Comment on the ACER draft amendments	Alternative text amendment proposal (if applicable)
Article 15(1)		
	- 15 (c) (i) Correction of sign (+ to -) - Table 4: Use term possible intentional frequency response insensitivity instead of deadband, to highlight this refers to not reacting to small variations of frequency; and to avoid misunderstandings and mix-up with the defined term “frequency response deadband” which refers to a deadband centered around nominal frequency. See also IGD “Frequency Sensitive Mode” from 2018 - Table 4: Droop s1 range should be kept at 2-12% as commonly used, higher droop values are not used and hence should not be required. This could require additional tests and tuning of control systems, causing unreasonable efforts if not used.	

Article 15(2)	- Figure 5: The Figure is about FSM. Using any Pref of the LFSM context does not make sense. FSM is with a dead band and LFSM has thresholds. Moreover, FSM dead band, insensitivity and threshold are not well defined here. - Table 5: The response time to achieve 100% of the response (equivalent to t2) in Ireland and Northern Ireland is 15 seconds. Therefore, the text should say: “15 sec for SA Ireland and Northern Ireland”. Needs to be clarified with the Irish SO. - 15 (2) (c) (vi): Like Art. 13(3) (g), here as well we propose an increase in the response time by 0.5 s to account for an initial delay up to 0.5 s, which is in line with the most demanding grid codes today (Spain and Germany). - 15(2) (d) (iv): The term “without inertia” is ambiguous and lead to discussions about to which generators it applies.	- Table 4: Maximum combined effect of inherent frequency response insensitivity and possible intentional frequency response insensitivity for power-generating modules providing FSM. Table 4: Droop s1 2-12% 15(2) (c) (vi) The response time Tresp (Figure XX) for LFSM-U shall be as fast as technically feasible and as described below, unless the RSO determines that a more relaxed time responses are needed: - For SPGM: less or equal to 5 min for an active power setpoint change of 20% maximum power, - For PPM: less or equal to 5.5 s for an active power setpoint change of 20% maximum power if the power is above 50% of the maximum power. 15 (2) (d) (iv) the initial activation of active power frequency response required shall be as short as possible. If the delay in initial activation of active power frequency response is greater than two seconds, the power-generating facility owner shall provide technical evidence demonstrating why a longer time is needed. For electricity storage modules, the relevant TSO may specify a shorter time than two seconds. If the power-generating facility owner cannot meet this requirement they shall provide technical evidence demonstrating why a longer time is needed for the initial activation of active power frequency response;
Article 15(3)[deleted]		

Article 15(3)		
Article 15(4)	15 (4) (a) (vi) : Block load needs to be defined in the definition section or else this should be deleted. Houseload level should also be defined through a reference. 15 (4) (b): Draft amended paragraph subject to this consultation is too open and inadequate. RSO and power generating facility owner shall agree in information exchange which may include a set of defined disturbances to be withstood, studies and reporting scope, tests to be performed etc. Would it not be a better solution to address this requirement e.g., in the compliance simulation part of this regulation? 15 (4) (c) "Quick" is an unspecified duration and hence must be avoided. In line with agreed protection strategy should suffice.	15(4) Type C power-generating modules shall fulfil the following requirements relating to system restoration: (a) with regard to black start capability: (vi) a power-generating module with black start capability shall at least: - be capable of regulating load connections in block load, (b) with regard to the capability to take part in island operation: (v) the power-generating module control schemes, including FSM, LFSM-O, LFSM-U and voltage control system (synchronous power-generating modules) or voltage control mode (power park modules) shall be able to continuously and stably operate during the transition from interconnected system operation to island operation without relying on information provided by the relevant system operator. Information exchange on how robustness is achieved during the transition from interconnected system operation to island operation under disturbances to be withstood shall be agreed between the power generating facility owner and the relevant system operator or TSO. (c) with regard to quick re-synchronisation capability: (i) in case of disconnection of the power-generating module from the network, the power-generating module shall be capable of re-synchronisation in line with the protection strategy agreed between the relevant system operator in coordination with the relevant TSO and the power-generating facility;

	- As generic models are requested, some limitation in accuracy may need to be accepted. - NDAs are generally regarded as the best way to ensure protection of IP. Preferably some more guidance could be added for a harmonized approach on NDAs. Further harmonization on model requirements (scope, format, etc.) would be a big improvement for fulfilling these requirements.	15(5). Type C power-generating modules shall fulfil the following general system management requirements: (c) with regard to simulation models: (i) at the request of the relevant system operator or the relevant TSO, the power-generating facility owner shall provide simulation models which adequately reflect the behaviour of the power-generating module for the relevant study purpose in both steady-state and dynamic simulations (root mean square) or in electromagnetic transient simulations. The simulation model requirements and data provided shall not violate or force disclosure of manufactures intellectual property. The relevant network operator shall enter an NDA if requested. The power-generating facility owner shall ensure that the models provided have been verified against the results of compliance tests referred to in Chapters 2, 3 and 4 of Title IV, and shall notify the results of the verification to the relevant system operator or relevant TSO. The TSO shall define, subject to public consultation and approval of relevant stakeholders, the verification standards and acceptance criteria considering international standards. Member States may require that such verification be carried out by an authorised certifier; (iii) For the purpose of electromechanical dynamic simulations (RMS simulation studies) the relevant system operator or the relevant TSO shall have the right to specify the power park modules simulation model requirements (encrypted user written RMS model or generic model). Without prejudice to the Member State's rights to introduce additional

Article 15(5)	- We have also proposed definitions for Generic models and User written models in Article 2. - Article 15(6)(c)(i) highlights that simulation model requirements and data provided shall not violate manufactures intellectual property, hence a modification is suggested accordingly in (iii). - As ENTSO-E EG ISSM highlights, EMT simulations apply to a wide range of frequencies and therefore require a very detailed representation of components (for example the high voltage equipment, the control and protection (C&P) systems, converters switching components, etc.). An accurate representation can be achieved with manufacturer specific models (e.g., DLL based models) that need to be encrypted in order to protect the manufacturers intellectual property. - 0.2 Hz to 2500 Hz is a very large range to consider for interaction studies. Generally, most interactions are observed up to 200Hz. To accommodate for future developments, up to 1000Hz could be reasonable. The behaviour at frequencies higher than this will be dominated by the passive components with negligible impact from the control system. - The modelling of these passive components should be considerate of aggregation principle. - There should be further elaboration on the methodology to be used for frequency dependent	requirements, the simulation models of the power park modules provided by the power generation facility owner shall: - be acceptable in case of encrypted user-written RMS models (e.g., DLL based models) and models shall be valid for the specified operating range and the required control modes of the power-generating facility. The Relevant system operator (RSO) shall specify necessary information to ensure that both the provided model and its format will be applicable by the RSO in the relevant national regulatory framework, while preserving the confidentiality surrounding manufacturers intellectual property. The RSO together with the plant owner and PGM technology manufacturer shall specify requirements of the model structure and the signal interfaces; - encrypted detailed RMS models should include a proper representation of the converter modules and its control systems (including the synchronization module) that influence the dynamic behaviour of the power-generating module in the specified time frame; - as alternative be generic model for cross border network stability studies; - in the case that encrypted detailed RMS models are accepted by the relevant TSO, the relevant TSO shall specify the requirements of the model encryption according to national regulations (for example use of source code, the model structure and the signal interfaces to be observable in the network studies); - include the relevant protection function models; (iv) For the purpose of time domain electromagnetic

	impedance calculation such that model is suitably tested/adapted as necessary. - The converter impedance below 75 Hz has a high dependency on the load point of the PGU. A requirement to provide impedance characteristics from 5 Hz would lead to numerous document submissions (e.g., one data sheet per possible load point). Therefore, the frequency range should start at 75 Hz as this also captures the first inter-harmonic. - The purpose of frequency dependent impedance model up to 9000Hz is not understood. It is important to note that many passive components will behave very differently at high frequencies, dominating the behaviour. The impact of the PPM controllers will be very negligible. Small signal stability analyses is still developing and other models than frequency dependent PGF impedance model can be much more robust and efficient. The regulation should be therefore open to new methods and technologies and allow parties to utilize these for the benefit of system development towards 100 % RES. - In general, analytical models have many limitations. The analytical approach has less benefit to the accuracy of the model (with more effort behind it). The entire passage for the TSO choice should be deleted. Models should be judged based on performance, not based on method of creation.	transient (EMT) simulations the relevant system operator or the relevant TSO shall have the right to specify the model requirements of the power park module. Without prejudice to the Member State's rights to introduce additional requirements, the models shall contain the following: - be valid in the frequency range 0.2 Hz - 1000 Hz for relevant interaction studies. The validity of the PPM model shall be ensured for the given frequency range at the connection point; - be valid for specified operating range and control modes of the PPM in the positive, negative and in the zero phase sequence; - reproduce the detailed response of the power-generating module and its control blocks during balanced and unbalanced AC network faults in the valid frequency range; - include the power plant level control and the power plant relevant functionalities if applicable; - include the frequency dependence of the lines and /or cables in the power-generating facility; - represent the PPM transformers model including saturation, resistors, filter, breaker and AC arrester in the valid frequency by applying aggregation principles; - include all the relevant protection function models for the relevant interaction studies; - be capable to be used for the numerical calculation of the frequency dependent impedance of PPM at the connection point (impedance amplitude and impedance phase angle) in accordance with state of the art international standards in the frequency range that the model is valid); - be encrypted

		The relevant system operator or the relevant TSO shall have the right to specify the model encryption based on national regulations (for example the model structure and the signal interfaces to be observable in the network studies);' (v) For the purpose of frequency domain simulations for the risk assessment of the resonance stability of the power park module, the relevant system operator or the relevant TSO shall have the right to request from the power-generating facility owner the frequency dependent impedance model of the power-generating facility at the connection point. Without prejudice to the Member State's rights to introduce additional requirements, the following requirements shall apply: - The impedance model of the power-generating facility shall be requested at least in the range 75 Hz - 2500 Hz; TSO and power-generating facility owner may deviate from this frequency range if they agree on other models for small signal stability assessments other than a frequency dependent impedance model of the power generating facility.

Please write your amendment proposals, if any, in the table below

	Text amendment proposal (if applicable)
New provision	

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General requirements for type D power-generating modules

Please write your comments on the ACER draft amendments and your alternative text proposals, if any, in the table below

	Comment on the ACER draft amendments	Alternative text amendment proposal (if applicable)
Article 16(1)		
Article 16(2)		
Article 16(3)		
Article 16(4)		

Please write your amendment proposals, if any, in the table below

	Text amendment proposal (if applicable)
New provision	

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TITLE II CHAPTER 2 - Requirements for synchronous power-generating modules

[NEW] Requirements for type A synchronous power-generating modules

Please write your comments on the ACER draft amendments and your alternative text proposals, if any, in the table below

	Comment on the ACER draft amendments	Alternative text amendment proposal (if applicable)
Article X		

Please write your amendment proposals, if any, in the table below

	Text amendment proposal (if applicable)
New provision	

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Requirements for type B synchronous power-generating modules

Please write your comments on the ACER draft amendments and your alternative text proposals, if any, in the table below

	Comment on the ACER draft amendments	Alternative text amendment proposal (if applicable)
Article 17(1)		
Article 17(2)		
Article 17(3)		

Please write your amendment proposals, if any, in the table below

	Text amendment proposal (if applicable)
New provision	

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Requirements for type C synchronous power-generating modules

Please write your comments on the ACER draft amendments and your alternative text proposals, if any, in the table below

	Comment on the ACER draft amendments	Alternative text amendment proposal (if applicable)
Article 18(1)		
Article 18(2)		

Please write your amendment proposals, if any, in the table below

	Text amendment proposal (if applicable)
New provision	

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Requirements for type D synchronous power-generating modules

Please write your comments on the ACER draft amendments and your alternative text proposals, if any, in the table below

Includes new paragraphs

	Comment on the ACER draft amendments	Alternative text amendment proposal (if applicable)
Article 19(1)		
Article 19(2)		
Article 19(3)		
Article 19(4)		

Please write your amendment proposals, if any, in the table below

	Text amendment proposal (if applicable)
New provision	

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TITLE II CHAPTER 3 - Requirements for power park modules

[NEW] Requirements for type A power park modules

Please write your comments on the ACER draft amendments and your alternative text proposals, if any, in the table below

	Comment on the ACER draft amendments	Alternative text amendment proposal (if applicable)
Article Y(1)		
Article Y(2)		
Article Y(3)		
Article Y(4)		
Article Y(5)	A specific process must be design at this level defining under which circumstances the TSO may require grid forming capabilities. A generator should know in advance if the plant is going to need grid forming or not. It is not clear in the literature if demanding to even type A generators grid forming capabilities is advantageous or detrimental. Additionally, be aware that, in order to provide grid forming capabilities, reverse current flows must be tolerated.	The relevant TSO in coordination with the relevant system operator shall technically justify if type A power park modules shall be capable of providing grid forming capability at the connection point.
Article Y(6)		

Article Y(7)	Any requirement about grid forming and synthetic inertia addresses a time scale significantly shorter than the root-mean-square time (20ms), which is the basis for all the definitions in Art. 2 The existing definitions are hence meaningless. To make meaningful, unequivocal specifications for the sub-cycle time domain additional definitions are compulsory. This affects at least the listed physical quantities. One suitable place to define these could be an IGD.	The relevant system operator may specify that the activation of grid forming mode is subject to necessary adaptations to the system operator's network and operating and maintenance procedures. The Member State or the entity designated by the Member State may set the formal and substantive conditions under which the relevant system operator may conduct such specification. Prior to the introduction of any requirement about grid forming or synthetic inertia according to the present article, the relevant system operator in coordination with the TSO and subject to public stakeholder consultation, shall publish definitions at least of the following physical quantities, so that these can be used in the sub-cycle time frame (transient) relevant for grid forming or synthetic inertia: - voltage - current - phase and phase angle - frequency - active power - reactive power
	- For avoiding conflicts with Article Y(5)	In case specified in accordance with Article Y(5) and subject to primary energy source availability, a power park module shall be capable of providing grid forming capability at the connection point as listed below. (a) Within the power park module's limits (including but not limited to current, energy and mechanical limits), the power park module shall

	appropriate text is introduced. - The term individual unit is not defined in the document. This must be defined. Please consider for that definition hybrid multi-energetic source of plants (Wind + Solar+Bess+H2). Requesting grid forming for the entire plant may lead to local instabilities. - Mechanical limits must be taken into account. - Voltage source behind an internal impedance (Thevenin source) is a rather simplified statement which only applies down to a certain frequency range in the d-q-domain. Below that, active power controllers will have an effect. - The term "grid disturbance" is not defined a very unambiguous. Proposal is to avoid it and replace it be more precise electrical parameters. These will provide a better basis for add. requirements e. g. on national level for making grid forming requirements fully exhaustive. - The text on inherent energy storage is proposed to move to definition section. Permanent curtailment below the available power could lead into high power losses. - The option of activating and deactivating grid forming seems to have been introduced due to missing alignment between DSO and TSO about the need of and capability to securely control grid forming on distribution level.	be capable of behaving at the terminals of the individual unit(s) or as a whole at connection point as defined by the power generating facility owner as a voltage source behind an internal impedance (Thevenin source), during normal operating conditions (non-disturbed grid conditions) and upon inception of a grid disturbance (including voltage, frequency and voltage phase angle disturbance). The Thevenin source is characterized by its internal voltage amplitude, voltage phase angle, frequency and internal impedance. Its power output in the absence of grid disturbances corresponds to the active and reactive power set-points of the power park module and may fluctuate due to primary power variation and/or control actions. (b) Upon inception of a change in positive-sequence voltage phase angle or positive-sequence voltage magnitude, while the power park module capabilities and limits are not exceeded, the instantaneous AC voltage characteristics of the internal Thevenin source according to paragraph (a) shall be capable of not changing its amplitude and voltage phase angle while positive-sequence voltage phase angle steps or positive-sequence voltage magnitude steps are occurring at the terminal of the individual units or the connection point. The current exchanged between the power park module and the network shall flow naturally according to the main generating plant and converter impedances and the voltage difference between the internal Thevenin source

Article Y(8)	The possibility to de/activate grid forming on PPMs does not only come with significant organizational and technical implications (double tests & verifications for both grid following and grid forming), but also service implications as both features would need to be maintained. Such requirement leads to inadequate and unnecessary costs e. g. but not limited to product development, PGF design, operations and PGF integrity for ensuring grid code compliance over the PGF's lifetime. It might be acceptable that well defined functionalities of grid forming controls get temporarily deactivated by parameter setting changes with an implementation time to be agreed between the RNO and PGFO. - General comment: This very unspecific set of gid forming requirements opens space for lots of interpretation and various deviating additional requirements on national level. ACER is kindly requested to make these more exhaustive in a legally binding manner. As it stays right now, the draft introduces a lot of risks and may drive LCOE unnecessarily. Would propose to adjust the language or providing more flexibility in the implementation of this new technology and generally allow to meet the requirements on unit or PPM level. This will facility lower LCOE and reduce risks. The additional text aims to reduce ambiguity. Allow for more flexible solutions either on unit or PPM level and guide the development of add.	and the voltage at the terminal of the individual units or at the connection point. (c) After inception of a change in positive-sequence voltage phase angle or positive-sequence voltage magnitude, the following shall apply within the power park module's capability, including limits and inherent energy storage capabilities of each individual unit and/or the PPM. (i) The relevant system operator in coordination with the TSO shall specify the temporal parameters of the dynamic performance regarding voltage control and synthetic inertia according to Article 21 (4)(b) in a technology neutral, functional manner by referring to voltage amplitude, voltage phase angle, current, frequency, rate-of-change-of-frequency, power, etc. , which can be either fulfilled by the PPM as a whole or by individual units within the PPM. The specification process must include a full transparent CBA and a public consultation. (ii) Where current limitation is necessary, the relevant system operator may specify additional requirements regarding contribution of active and reactive power at the point of connection. (iii) The power park module shall be capable of stable operation when reaching the power park module current limits, without interruption, in a continuous manner and returning to the behaviour described in paragraph (b) as soon as the limitations are no longer active. If reaching the current limit, the grid forming behaviour must be maintained for responses as specified in

	Regulations/requirements on TSO level. Whatever gets further defined in detail should clearly analyzed according to costs & benefits and publicly consulted.	paragraph (b) for disturbances that require the current to vary in the opposite direction of the current limitation. Inherent energy storage means an energy reserve available in physical components of a power park module, which has not necessarily been designed to suit the grid forming requirements of this article, but may be used for such purposes, without effecting the design of the physical components of individual units and without applying any curtailment.

Please write your amendment proposals, if any, in the table below

	Text amendment proposal (if applicable)
New provision	

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Requirements for type B power park modules

Please write your comments on the ACER draft amendments and your alternative text proposals, if any, in the table below

Includes new paragraphs

	Comment on the ACER draft amendments	Alternative text amendment proposal (if applicable)
Article 20(1)		
Article 20(2)	(b) The text on fast fault current deleted should not be deleted. The assumption was probably that all future PPM's will be using grid forming capability in the future. But is this really the case and is it not a huge risk to assume this and write this in a European law without knowing how it will work in reality (and without large scale trials). Once this is published as EU law amendments will take several years as we currently see. Consider including this again because: - not all PPMs might be grid forming in the future and it may not be needed that all PPMs are grid forming (this has not been assessed by industry). - Is it clear that within a PPM all units must have grid forming control enabled? This is an area which is not assessed sufficiently.	Keep b) in BUT change the text to: (b) The relevant system operator in coordination with the relevant TSO shall have the right to specify that a power park module not requested to provide grid forming capability be capable of providing fast fault current at the connection point in case of symmetrical (3 phase) faults, under the following conditions:

Article 20(3)	Paragraph to be generally aligned with Grid forming requirements, this is still FFCI driven	3. Type B power park modules shall fulfil the following additional requirements in relation to robustness: (b) the specifications shall be in accordance with the following principles: (i) if applicable, interdependency between fast fault current requirements according to points (b) and (c) of paragraph 2 and active power recovery;
Article 20(4)	Added wording on inherent energy storage capabilities to reduce ambiguity.	4. With regard to grid forming capability, type B power park modules shall fulfil the following additional requirements in relation to grid forming capability: (a) The relevant, TSO in coordination with the relevant system operator, shall specify the contribution to synthetic inertia. The power park module shall be capable within its inherent energy storage capabilities of contributing to limiting the transient frequency deviation under high frequency conditions. Additionally, the electricity storage module shall be capable of contributing to limiting the transient frequency deviation under low frequency conditions.

Please write your amendment proposals, if any, in the table below

	Text amendment proposal (if applicable)
New provision	

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Requirements for type C power park modules

Please write your comments on the ACER draft amendments and your alternative text proposals, if any, in the table below

Includes new paragraphs

	Comment on the ACER draft amendments	Alternative text amendment proposal (if applicable)
Article 21(1)	Here the approach should be same as type D, hence suggested addition of Article Y (8) (d) in the references	Type C power park modules shall fulfil the requirements listed in Article 13, Article 14, Article 15, Article Y(6), and (8) and Article 20, except for Article 13(2)(b) Article 13(6), Article Y (8) (d), and Article 13(8) and Article 20(2)(a), unless referred to otherwise in point (v) of paragraph 3(d).
Article 21(2) [deleted]		
	- Figure 8 should represent the type C PPM U-Q /Pmax profile but appears to be an identical copy of Figure 7 for the type C SPGM in Article 18. As a result, the inner envelope shown in Figure 8 exceeds the maximum Q/Pmax range for type C PPMs as detailed in Table 9. - 2 (d) (i): Rare reactive power control modes with unclear usability should not be listed in the European NC. - 2 (d) (v): We support this proposal and would recommend adding a time between steps as well. The test procedures will need to follow this as well. - 2 (d) (f): Power-generating facility owners are not able to fulfill this obligation, if power system data is not provided with them on time. Therefore the	2. Type C power park modules shall fulfil the following additional requirements in relation to voltage stability: (b) Table 9: Nordic , Maximum range of steady-state voltage in PU: 0,15 (d) with regard to reactive power control modes: (i) the power park module shall be capable of providing reactive power automatically by voltage control mode, reactive power control mode, or power factor control mode, as specified by the relevant system operator, in coordination with the relevant TSO and with the power park module owner; (f) with regard to power oscillations damping control, if specified by the relevant TSO a power park module shall have a power oscillation damping function which, helps to attenuate the power oscillations. The power oscillation damping shall be able to damp inter area low frequency electromechanical oscillations in a frequency range

Article 21(2)	proposed obligation for the power-generating facility owner must be complemented with an obligation by the TSO to provide data. - The minimum range proposed of 0,1 – 1,0 Hz would have been fine, but the text says “at least”. So basically, any country can request the range that they want (like Spain, who wants to request 0.1 – 2.5 Hz) as long as the range is bigger than the one specified here. Power system inter-area modes are in the range 0.1-0.7 Hz. Power electronics-based equipment are designed/tuned to damp the inter-area modes. The higher frequency modes are in general the local modes of the conventional machines for which PSS provides the damping. - Text added to make the wording more unambiguous. Any function is allowed when it damps the oscillations. The TSO may not choose the method.	specified by the relevant system operator in coordination with the relevant TSO. The voltage and reactive power control characteristics of power park modules must not adversely affect the damping of power oscillations. The relevant TSO is obliged to provide sufficient power system data on time to power-generating facility owner for performing control system tuning studies. (i) For cases where the required damping performance cannot be obtained simultaneously with fulfilling the requirements for voltage and reactive power control laid down in point (d) of Article 21(3), the relevant system operator or the relevant TSO shall specify whether voltage and reactive power control or power oscillation damping shall be prioritized. (ii) the power park module shall be capable of either continuously contribute to damping or activate the damping contribution by detection of a relevant oscillation event (discontinuous operation). (iii) the frequency range specified by the relevant system operator, or the relevant TSO shall be between 0.1 Hz and 1.0 Hz inclusive.
	- Text was agreed as a compromise position between WindEurope and ENTSO-E. - ENTSO-E and WindEurope agree that any imposed forced oscillation is a disturbance for our	In the frequency range between 0,1 Hz and 20 Hz, the control systems and design characteristics of Type C power park modules shall be subject to the following requirements relative to the total active power and current forced oscillations, when system conditions are within the frequency ranges as specified in table 2 and voltage ranges as specified in table 10: (a) The forced oscillations shall not exceed continuously the maximum of:

Article 21(3)	electrical transmission system, while disagreeing on the potential risks introduced regarding power system stability. - From ENTSO-E's view PPMs should in general not be allowed to impose any forced oscillations, while WindEurope states that oscillations physically cannot be completely omitted, hence the low limits were introduced in article 21 for type C PPMs. - Due to the nature and design of wind turbines, they are not able to completely reduce the oscillations. Challenges with oscillations increase with the size of wind turbines. The price for limiting oscillations will also increase with turbine size. - WindEurope highlights if for all ranges the most stringent values are chosen, compliance may only be achieved with significant cost impacts. - Moreover, an addition of the word "constant" is also proposed in the first sentence, saying "At a constant frequency in the range between 0,1 Hz and 2,0 Hz…" This will ensure to make it clear that the requirement intends to limit the generation of (one or more) forced oscillations, which are imposed oscillations with varying amplitude but constant frequency. Any of such forced oscillations in the mentioned range hence need to comply with the requirements in (a) (b) and (c), limiting the amplitude, duration and exceedances.	(i) a limit in the range of +/- 0,1% to +/- 1% of the maximum capacity, as defined by the relevant TSO. The default limit shall be +/-0,5%. (ii) a limit in the range of 200 kW to 500 kW, as defined by the relevant TSO. The default limit shall be 500 kW (b) In case that the limits defined in (a) are temporarily exceeded, forced oscillations shall: (i) not exceed a limit in the range of +/- 0.5% to +/- 3% of the maximum capacity, as defined by the relevant TSO. The default limit shall be +/-2,5%. (ii) be within the limits defined in (a) within a range of 100-180 seconds, as defined by the relevant TSO. The default limit shall be 180 sec. (iii) be damped to be lower than 50% of the limit specified in (i) within 50% of the time limit specified in (ii) (c) While always respecting the criteria defined in (b), temporarily exceedance of the limits defined in (a), not considering oscillations that are damped to be within the limits within 10 seconds, is allowed for: (i) a maximum percentage of time per day, as defined by the relevant TSO in a range between 1% and 2%. The default limit shall be +/- 1%. (ii) a maximum in a range of 2-4 times per hour, based on the range of the 85th to 95th percentile of hourly exceedances measured over one week, as defined by the relevant TSO. The default maximum shall be 3 times and default percentile shall be 95. (d) Forced oscillations originated from system support requests by the relevant system operator,

		such as power oscillation damping, are excluded from this requirement.
Article 21(4)	- Added wording to reduce ambiguity. - Additional energy storage should be wisely agreed upon, based on cost, efficiency etc. Only a CBA on socio-economic level can provide. To ensure sufficient product offerings a reimbursement scheme should be agreed upon on national level.	With regard to grid forming capability, type C power park modules shall fulfil the following additional requirements in relation to grid forming capability: (a) The relevant TSO, in coordination with the relevant system operator, shall specify the contribution to synthetic inertia. The power park module shall be capable of contributing energy within its inherent energy storage capabilities to limiting the transient frequency deviation under high and low frequency conditions. (b) For the provision of additional energy above the inherent energy storage, the relevant TSO may apply to the regulatory authority for the right to require the provision of additional energy beyond the inherent energy storage in coordination with the relevant system operator. Such an application shall include a cost-benefit analysis, comparing the available options for securing the required additional energy provision to the system, and a corresponding reimbursement scheme, which will compensate for costs.

Please write your amendment proposals, if any, in the table below

	Text amendment proposal (if applicable)
New provision	

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Requirements for type D power park modules

Please write your comments on the ACER draft amendments and your alternative text proposals, if any, in the table below

Includes new paragraphs

	Comment on the ACER draft amendments	Alternative text amendment proposal (if applicable)
Article 22(1)		

Article 22(2)	- Rare reactive power control modes with unclear usability should not be listed in the European NC. - Power-generating facility owners are not able to fulfill this obligation, if necessary, if power system data is not provided with them on time. Therefore, the proposed obligation for the power-generating facility owner must be complemented with an obligation by the TSO to provide data. - The minimum range proposed of 0,1 – 1,0 Hz would have been fine, but the text says “at least”. So basically, any country can request the range that they want (like Spain, who wants to request 0.1 – 2.5 Hz) as long as the range is bigger than the one specified here. Power system inter-area modes are in the range 0.1-0.7 Hz. Power electronics-based equipment are designed/tuned to damp the inter-area modes. The higher frequency modes are in general the local modes of the conventional machines for which PSS provides the damping. - Text added to make the wording more unambiguous. Any function is allowed when it damps the oscillations. The TSO may not choose the method.	With regard to power oscillations damping control, Type D power park module shall have a power oscillation damping function which helps to attenuate the power oscillations. The power oscillation damping shall be able to damp inter area low frequency electromechanical oscillations in a frequency range specified by the relevant system operator in coordination with the relevant TSO. The voltage and reactive power control characteristics of power park modules must not adversely affect the damping of power oscillations. The relevant TSO is obliged to provide sufficient power system data on time to power-generating facility owner for performing control system tuning studies. (i) For cases where the required damping performance cannot be obtained simultaneously with fulfilling the requirements for voltage and reactive power control laid down in point (d) of Article 21(3), the relevant system operator or the relevant TSO shall specify whether voltage and reactive power control or power oscillation damping shall be prioritized. (ii) the power park module shall be capable of either continuously contribute to damping or activate the damping contribution by detection of a relevant oscillation event (discontinuous operation). (iii) the frequency range specified by the relevant system operator, or the relevant TSO shall be between 0.1 Hz and 1.0 Hz inclusive.

Please write your amendment proposals, if any, in the table below

	Text amendment proposal (if applicable)
New provision	

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TITLE II CHAPTER 4 - Requirements for offshore power park modules

Please write your comments on the ACER draft amendments and your alternative text proposals, if any, in the table below

	Comment on the ACER draft amendments	Alternative text amendment proposal (if applicable)
Article 23		
Article 24	Seems to be a wrong reference to be corrected.	AC-connected offshore power park modules shall fulfil the requirements relating to frequency stability laid down in Articles 13, 15(2) and 21 (4), except for Article 13(2)(b), (6) and (7) respectively.
	25 (2): Is this exemption for Spain still needed? If there are no specific systems needs and CBA showing that this exemption is still needed for Spain, we propose to delete this Article. National variations should be avoided in European grid codes. 25 (3): Voltage range requirement topic. Especially the range outside 0,9 p.u. and 1,1 p.u. Equipment standards are not aligned and updated to the voltage range requirements outlined in this regulation. There is a gap which has not been closed since the entry into force of the first version of this regulation (RfG1.0). The extended voltage range is seen as a cost driver for PPM's and OEM's equipment. This topic has been raised to the ESC meeting in March 2022 and SGRE see a need to comment again.	

Article 25	The defined voltage ranges are also used for the HVDC connected PPM's. Add additional sentence below Table 10 as suggested as this is also used by TSOs (Amprion and 50Hertz). 25 (5): - Generally, requirements should be based on system needs and CBA, not on simplifying national requirements with limited impact compared to the impacted synchronous area. Furthermore, the amendment proposal unnecessarily exceeds the voltage ranges shown on Table 10. - The 66kV voltage level is currently the most common used standard worldwide to connect Offshore Wind Turbines directly to Offshore platforms. In case the TSO will build and operate the Offshore platforms, the 66kV voltage level standard shall be part of that regulation too. Please include the 66kV voltage level also in Table 10 with the same ranges as 110 kV.	Sentence below Table 10: Requirements on the voltage ranges 0,85 to 0,9 as well as 1,1 to 1,15 pu. are only applicable when explicitly required by the TSO.” Table 11: Nordic, Maximum range of steady-state voltage in PU: 0,15
	- References to paragraphs et. al. needs to be corrected in accordance with the new index. - Text regarding forced oscillations was agreed as a compromise position between WindEurope and ENTSO-E.	1. AC-connected offshore power park modules shall fulfil the requirements relating to robustness laid down in Articles 14(3)(b), 15(3), 16(3)(a), and 20(3) respectively. 2. Outside of the frequency range between 0,1 Hz and 2,0 Hz, the system stability requirement laid down in Article 21.4 shall apply to AC-connected offshore power park modules.

Article 26	- ENTSO-E and WindEurope agree that any imposed forced oscillation is a disturbance for our electrical transmission system, while disagreeing on the potential risks introduced regarding power system stability. - From ENTSO-E's view PPMs should in general not be allowed to impose any forced oscillations, while WindEurope states that oscillations physically cannot be completely omitted, hence the low limits were introduced in article 21 for type C PPMs. - Due to the nature and design of wind turbines, they are not able to completely reduce the oscillations. Challenges with oscillations increase with the size of wind turbines. The price for limiting oscillations will also increase with turbine size. Relaxation is mainly relevant for offshore wind turbines, which are larger than onshore turbines, hence the relaxation of requirements for OPPMs for the frequency range 0.1-2Hz. - WindEurope highlights if for all ranges the most stringent values are chosen, compliance may only be achieved with significant cost impacts. - An addition of the word "constant" is proposed in the first sentence, saying "At a constant frequency in the range between 0,1 Hz and 2,0 Hz…" This will ensure to make it clear that the	In the frequency range between 0,1 Hz and 2,0 Hz, the control systems and design characteristics of an AC-connected offshore power park modules shall be subject to the following requirements relative to the total active power and current forced oscillations, when system conditions are within the frequency ranges as specified in table 2 and voltage ranges as specified in table 10: (a) The forced oscillations shall not exceed continuously the maximum of: (i) a limit in the range of +/- 0,5% to +/- 2% of the actual value, as defined by the relevant TSO. The default limit shall be +/- 1%. (ii) a limit in the range of +/- 0,25% to +/- 1% of the maximum capacity, as defined by the relevant TSO. The default limit shall be +/- 0,5%. (b) In case that the limits defined in (a) are temporarily exceeded, forced oscillations shall: (i) not exceed a limit in the range of +/- 2,5% to +/- 5% of the maximum capacity, as defined by the relevant TSO. The default limit shall be +/- 4% (ii) be within the limits defined in (a) within a range of 100-180 seconds, as defined by the relevant TSO. The default limit shall be 180 sec. (iii) be damped to be lower than 50% of the limit specified in (i) within 50% of the time limit specified in (ii) (c) While always respecting the criteria defined in (b), temporarily exceedance of the limits defined in (a), not considering oscillations that are damped to be within the limits within 10 seconds, is allowed for: (i) a maximum percentage of time per day, as

	requirement intends to limit the generation of (one or more) forced oscillations, which are imposed oscillations with varying amplitude but constant frequency. Any of such forced oscillations in the mentioned range hence need to comply with the requirements in (a) (b) and (c), limiting the amplitude, duration and exceedances.	defined by the relevant TSO in a range between 1% and 2%. The default limit shall be 1%. (ii) a maximum in a range of 2-4 times per hour, based on the range of the 85th to 95th percentile of hourly exceedances measured over one week, as defined by the relevant TSO. The default maximum shall be 3 times and default percentile shall be 95. (d) Forced oscillations originated from system support requests by the relevant system operator, such as power oscillation damping, are excluded from this requirement.
Article 27	Offshore Windfarms have grown to GW scale and continue to grow. Such PPMs comprise not only lots of generating units but also PPM internal electrical infrastructure like large HV array systems, substations, reactive power compensation stations, EHV cable systems or even HVDC systems. Such large systems in the scale of a distribution system cannot be safely re-energized and restarted in the same short time as e. g. a Type C onshore wind farm. Trip to house load is not an available safe and robust alternative.	AC-connected offshore power park modules shall fulfil the requirements relating to system restoration laid down in Articles 14(4) and 15(4) respectively. In addition to Article 15(4), the relevant system operator in coordination with the relevant TSO and the power-generating facility owner can agree on a larger time limit than 15 minutes considering project specific design conditions.
Article 28	References to paragraphs et. al. needs to be corrected in accordance with the new index.	AC-connected offshore power park modules shall fulfil the requirements relating to system management laid down in Articles 14(5), 15(5), 16(4) respectively.

Please write your amendment proposals, if any, in the table below

	Text amendment proposal (if applicable)
New article	

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TITLE III - Operational notification procedure for connection

Please write your comments on the ACER draft amendments and your alternative text proposals, if any, in the table below

Includes new articles

	Comment on the ACER draft amendments	Alternative text amendment proposal (if applicable)
Article 29		
Article 30		
Article 30a [new]		
Article 30b [new]		
Article 31	- Language added to support the harmonization and support the efficiency of the certification processes. - Technology has to be allowed to emerge. The power system and especially the transition to more RES needs new technologies. Prototypes of new technology have to be possible in some way, at least for a limited time. Such prototypes have to meet certain minimum requirements, but not from the very first day all requirements, which would apply regularly, according to the applicable type. Equipment certificates usually can be provided only 2 years after the prototype started operation. Models shall reflect the actual performance of the new technology; hence they cannot be provided prior to all internal tests and developments being completed.	The operational notification procedure for connection of each new type B, C and D power-generating module shall allow the use of equipment certificates issued by an authorised certifier whereas equipment certificates are issued based on international or European testing standards. The national regulatory authority (NRA) shall define a grace period for the provision of models, which applies to new generation technologies, in order to enable prototypes to be commissioned and operated under a special Limited Operation Notification.

Article 32	In order to support the proper functioning of the internal electricity market within and between synchronous areas, and to achieve cost efficiencies via harmonization or verification methods. Instead of requiring a specific test for every country inside Europe the capability and harmonize testing of requirements shall be encourage by testing the capability of the turbines with equal or stringent requirements.	(f) compliance test reports according to IEC or EN standards demonstrating steady-state and dynamic performance as required by Chapters 2, 3 and 4 of Title IV (test cases showing compliance with equal or more stringent requirements are accepted) including use of actual measured values during testing, to the level of detail required by the relevant system operator; and;
Article 33		
Article 34		
Article 35	- In the third bullet point of Article 15 (5) (c) (iii), under the RMS section where generic models are specified “for cross border network stability studies”. What happens if the study shows a compliance issue for which the generic models do not adequately model the functionality of the proposed turbines? To this effect, IEEE P2800_2 includes the following: “In cases where the latest generic models do not adequately represent the IBR plant for a given intended use, an explanation should be provided of the shortcomings of the generic models for the intended use, and the recommended models and their parameters to be used instead.” This is why we suggest the inclusion of this clause in Article 35. - Please keep the clause (5) in order to allow an extended flexibility for both TSO and the Developer in case this is needed due to very good reasons which are not in control of either TSO or Developer	35(3)(d) simulation models, as specified by point (c) of Article 15(5) and required by the relevant system operator. If generic models are required by the RNO and the accuracy of simulations with these is deemed insufficient, the RNO shall proceed with user-written models, without delaying the connection process.

Article 36		
Article 37		
Article 38		
Article 39		

Please write your amendment proposals, if any, in the table below

	Text amendment proposal (if applicable)
New article	

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TITLE IV - Compliance

Please write your comments on the ACER draft amendments and your alternative text proposals, if any, in the table below

	Comment on the ACER draft amendments	Alternative text amendment proposal (if applicable)
Article 40		
Article 41		
Article 42		
Article 43		
Article 44		
Article 45		
Article 46		
Article 47		
Article 48		
Article 49		
Article 50		
Article 51		
Article 52		
Article 53		
Article 54		

Article 55	55 (2) (d) “stability compliance” is not clear. No justification provided in the legal text of NC RfG 55 (7) (b): Since the requirement is non-exhaustive and needs further national specification for its entire application, we as power-generating unit (PGU) / power park module manufacturer, experienced a wide variety of national implementations of this requirement. This leads to uncertainties regarding the requirement interpretation on national level and has the potential to negatively influence project execution timelines. Hence further clarification and guidance is needed. We also propose to provide an Implementation Guidance Document (IGD) on Power Oscillation Damping (POD) control, since this capability is still considered as emerging technology and standardization in terms of both capability and performance is not practical (see also IEEE 2800-2022). We are happy to share our experience with Power Oscillation Damping (POD) provided by wind power park modules in order to draft jointly such an IGD.	(7)(b) the simulation shall be deemed successful if the following conditions are cumulatively fulfilled: (i) the simulation model of the power park module is validated against the compliance tests for reactive power capability set out in paragraph 6 of Article 48; and (ii) the damping is greater with the Power Oscillation Damping (POD) function enabled than with the Power Oscillation Damping (POD) function disabled and shall be verified by compliance simulations based on a relevant test network, and; (iii) compliance with the requirements laid down in points (b) and (c) of Article 21(2) is demonstrated.
Article 56		
Article 57		
Article 58		
Article 59		

Please write your amendment proposals, if any, in the table below

	Text amendment proposal (if applicable)
New article	

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TITLE V - Derogations

Please write your comments on the ACER draft amendments and your alternative text proposals, if any, in the table below

	Comment on the ACER draft amendments	Alternative text amendment proposal (if applicable)
Article 60		
Article 61		
Article 62		
Article 63		
Article 64		
Article 65		

Please write your amendment proposals, if any, in the table below

	Text amendment proposal (if applicable)
New article	

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[DELETED] TITLE VI - Transitional arrangements for emerging technologies

Please write your comments on the ACER draft amendments and your alternative text proposals, if any, in the table below

	Comment on the ACER draft amendments	Alternative text amendment proposal (if applicable)
Title VI [deleted]		

[NEW] TITLE VI - Transitional provisions

Please write your comments on the ACER draft amendments and your alternative text proposals, if any, in the table below

	Comment on the ACER draft amendments	Alternative text amendment proposal (if applicable)
Article 70a [new]		

Please write your amendment proposals, if any, in the table below

	Text amendment proposal (if applicable)
New article	

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TITLE VII - Final provisions

Please write your comments on the ACER draft amendments and your alternative text proposals, if any, in the table below

Includes new articles

	Comment on the ACER draft amendments	Alternative text amendment proposal (if applicable)
Article 71		
Article 71a [new]		
Article 72		

Please write your amendment proposals, if any, in the table below

	Text amendment proposal (if applicable)
New article	

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Other additional provisions

Please write your amendment proposals, if any, in the table below

	Text amendment proposal (if applicable)
Other new provisions	

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Background Documents

NC_RfG_ACER_draft_amendments_for_PC_2023_E_07.docx

Contact

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