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Date: 28/11/2022 20:04:47

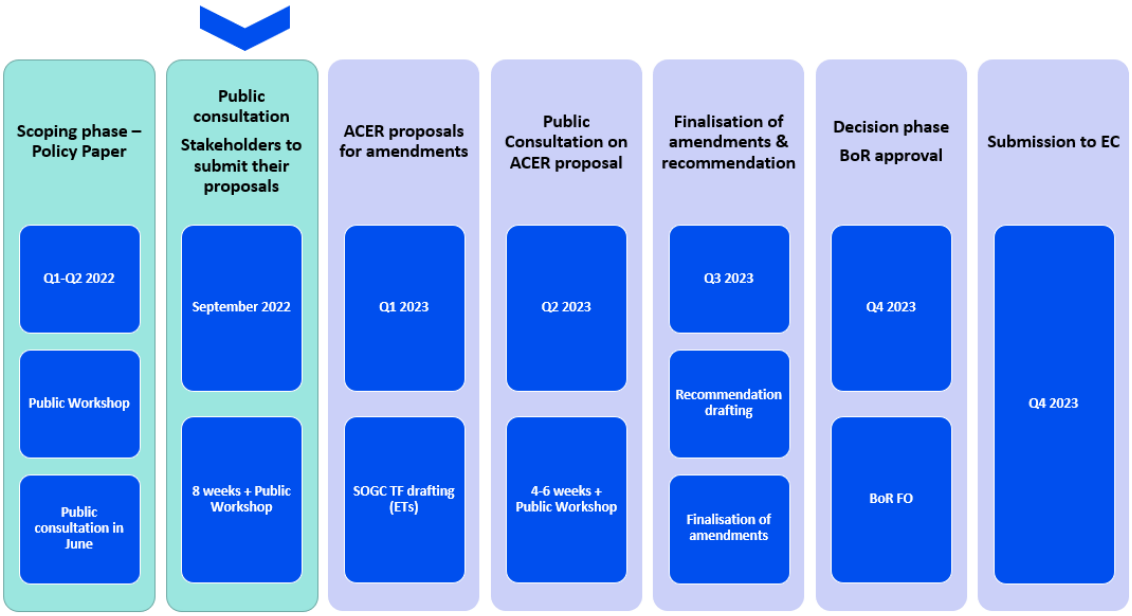
Proposals for amendments to the Requirements for Generators

Fields marked with * are mandatory.

Introduction

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 aims to transparently indicate to stakeholders the key policy areas in which amendments are to be expected. Moreover, the Paper draws on the alternative policy options and provides recommendations and proposed actions for the amendment process.

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

This consultation aims at gathering, from all interested stakeholders, concrete proposals for 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 amendment proposals concerning Network Code on Demand Connection, please go to the form: **NC DC**.

Responses to this consultation should be submitted by 28 November 2022 23:59 CET.

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* Name of the stakeholder:

WindEurope

* Contact person:

Vidushi Dembi

* Contact person's email address:

vidushi.dembi@windeurope.org

* 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, drafting team members, and other persons or entities involved in the European Grid Connection Network Codes amendment process)

Instructions

Stakeholders are invited to submit their amendment proposals to the RfG articles that they consider should be revised in a two-step process:
1. by inserting the proposed amendments in the provided Word file
2. by motivating/reasoning the proposed amendments through this online consultation form.

Both steps are mandatory for all amendment proposals.

(Where no amendment is proposed, the article text in the word file can be left unaltered and the cells in the consultation form can be left blank.)

The mandatory steps for submitting amendment proposals are detailed below. At the end of this section, you can find an example showing how to submit your proposals.

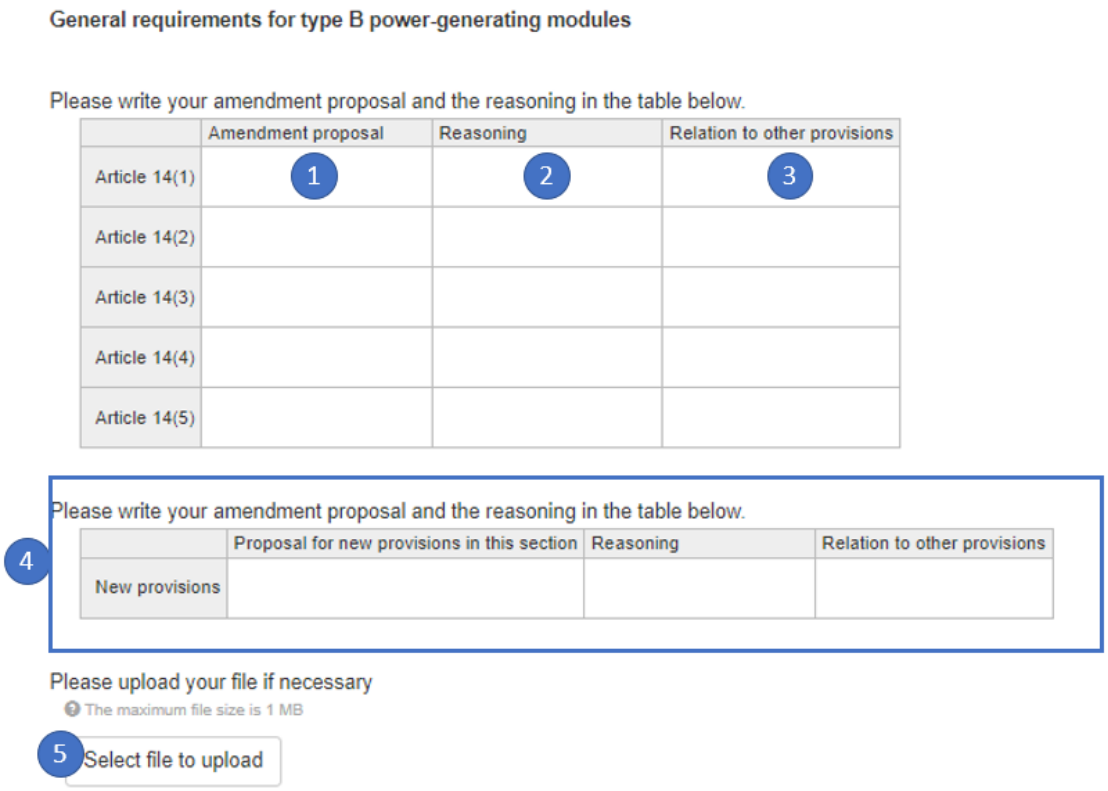
Step 1

Please include all your amendment proposals in the **Word file provided below using the Track Changes mode**. Once you edit the file and rename it with your stakeholder's name ("NC_RfG_stakeholder_name"), please upload it in the last section of this form (FILE UPLOAD)

Download the Word file (NC RfG)

Step 2

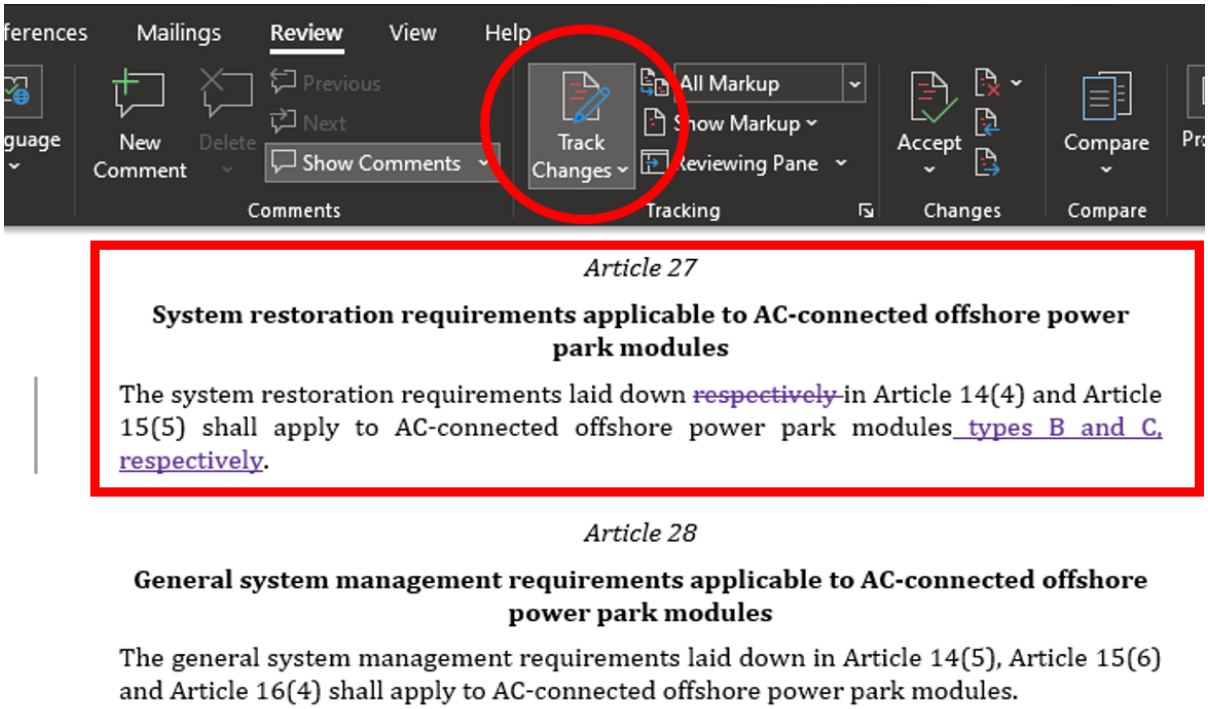
In addition, please use this form to motivate/reason your proposals, following the instructions:



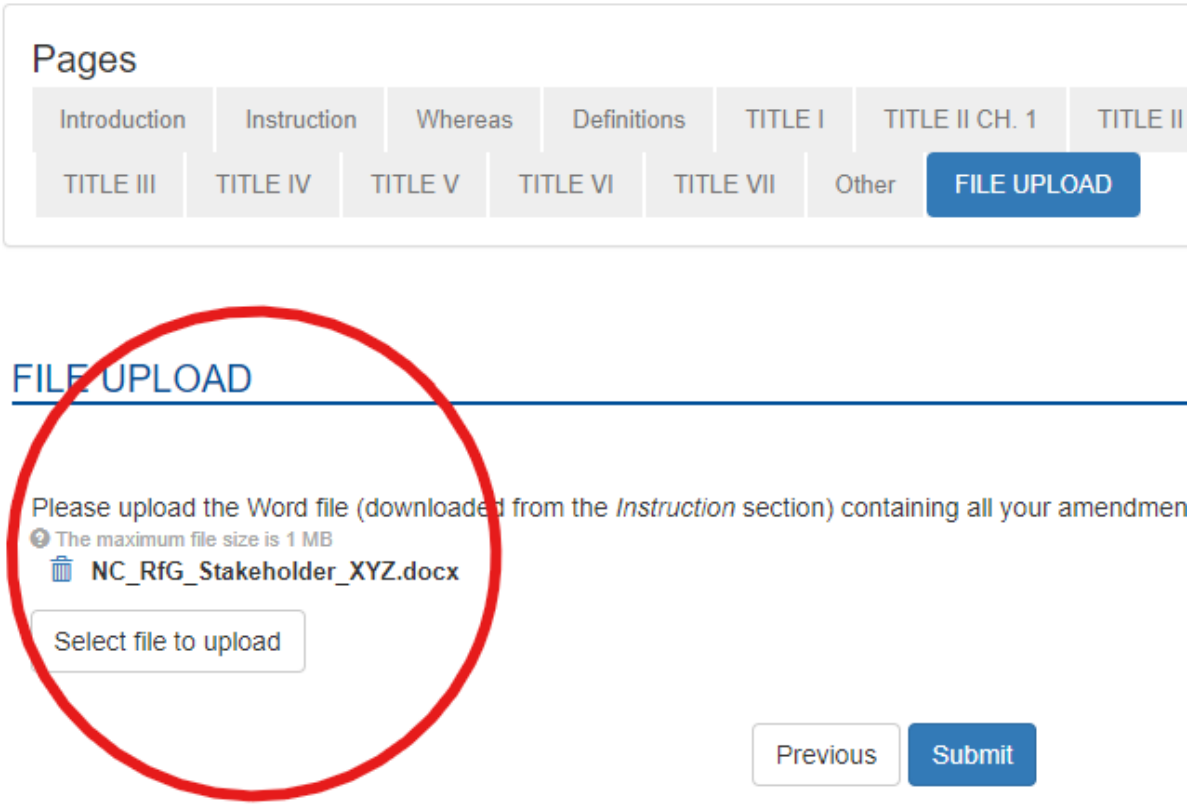
1. Propose an amended wording of the relevant provision, as you provided in the Word file.
2. Provide the motivation/reasoning behind your proposal.
3. Indicate (if any) which other provisions of the NC RfG are impacted and may need to be amended following your proposal.
4. Provide (if any) your proposals for adding new provisions to the relevant section of the Regulation, as you provided in the Word file.
5. Upload figures or tables if necessary; text inputs should be provided directly in the consultation form.

Example

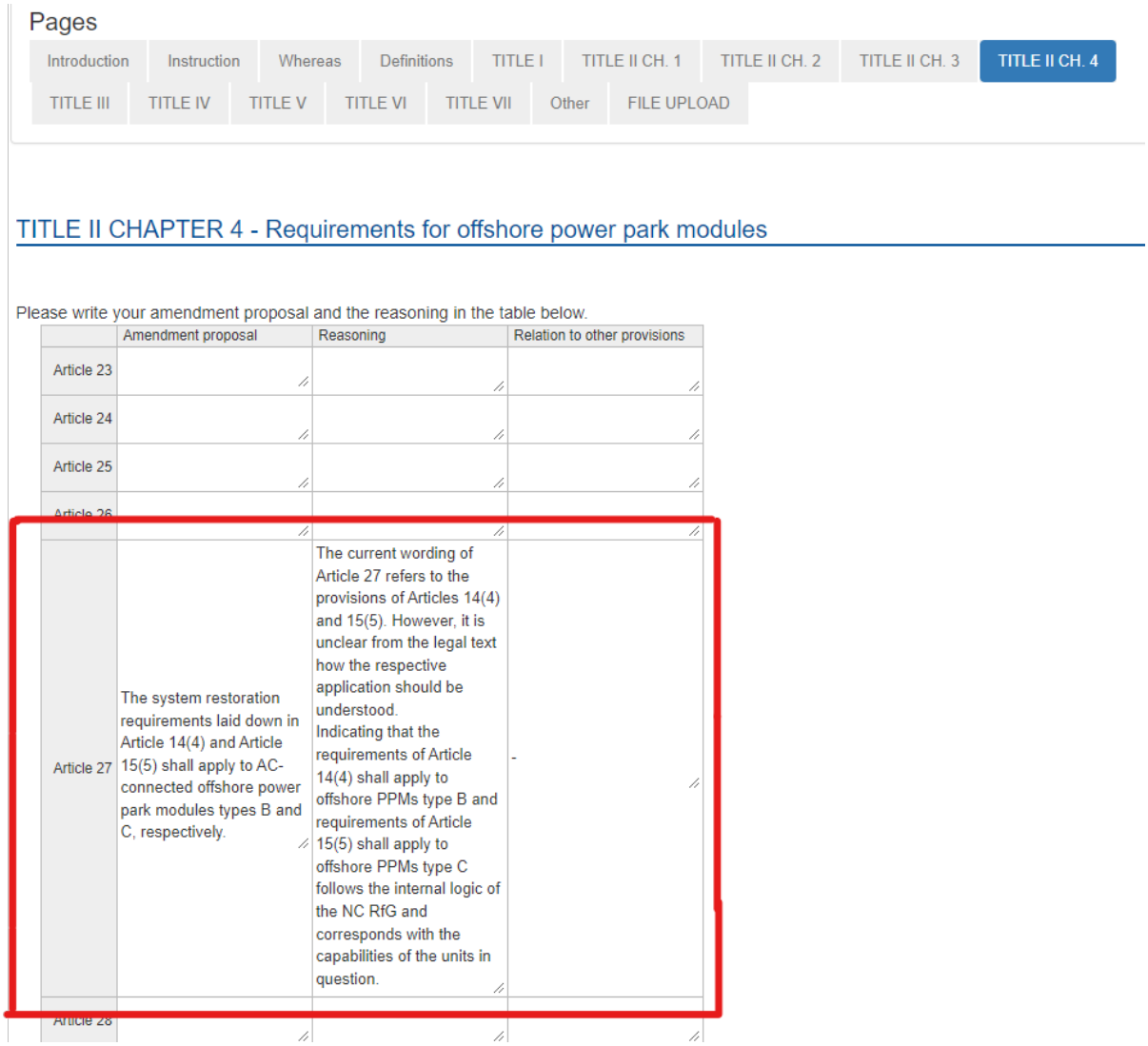
Stakeholder XYZ would like to propose an amendment to Article 27 of NC RfG. In their view, the meaning of the word "respectively" in this article is not clear. Following a two-step process, the stakeholder downloads the Word file from the **Instruction** section, turns on the Track Changes mode and edits the text (first step).



After saving the edited file on their device under the name "*NC_RfG_Stakeholder_XYZ*", the stakeholder uploads it in the **FILE UPLOAD** section.



The stakeholder proceeds to motivate/reason their proposal. As they would like to propose an amendment to Article 27 of NC RfG, they enter **TITLE II CHAPTER 4** Section and insert the proposed amended wording and the reasoning (second step). As the proposed amendment of Article 27 does not affect other provisions, they leave the last column blank.



As the survey is long,
1. you have the possibility to edit your answer after submission. When clicking on "submit", you will be given a contribution ID, which you can then use to access your contribution here. This allows you to proceed in steps.
2. 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 amendment proposal and the reasoning in the table below.

Numbers in the first column correspond with the recitals of the NC RfG Whereas section

	Amendment proposal	Reasoning	Relation to other provisions
(1)			
(2)			
(3)			
(4)			
(5)			
(6)			
(7)			
(8)			
(9)			
(10)			
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(25)			

(26)			
(27)			
(28)			
(29)			
(30)			
(31)			

Please write your amendment proposal and the reasoning in the table below.

	Proposal for new recitals	Reasoning	Relation to other provisions
New recitals			

Definitions (Article 2)

Please write your amendment proposal and the reasoning in the table below.

	Amendment proposal	Reasoning	Relation to other provisions
Article 2(1)			
Article 2(2)			
Article 2(3)			
Article 2(4)			
Article 2(5)			
Article 2(6)			
Article 2(7)			
Article 2(8)			
Article 2(9)			
Article 2(10)			
Article 2(11)			
Article 2(12)			
Article 2(13)			
Article 2(14)			
Article 2(15)			
Article 2(16)			
Article 2(17)			
Article 2(18)			
Article 2(19)			
Article 2(20)			
Article 2(21)			
Article 2(22)			
Article 2(23)			
Article 2(24)			
Article 2(25)			
Article 2(26)			

Article 2(27)			
Article 2(28)			
Article 2(29)			
Article 2(30)			
Article 2(31)			
Article 2(32)			
Article 2(33)			
Article 2(34)			
Article 2(35)			
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)			
Article 2(49)			
Article 2(50)			
Article 2(51)			
Article 2(52)			
Article 2(53)			
Article 2(54)			
Article 2(55)			

Article 2(56)			
Article 2(57)			
Article 2(58)			
Article 2(59)			
Article 2(60)			
Article 2(61)			
Article 2(62)			
Article 2(63)			
Article 2(64)			
Article 2(65)			

Please write your amendment proposal and the reasoning in the table below.

	Proposal for new definitions	Reasoning	Relation to other provisions
New definitions	Article 2(67) as suggested by the EG Storage: Electricity storage module' is a power generating module which can inject and consume active power to and from the network irrespective to whether it is independently connected to the transmission or distribution network or as part of a power park module sharing a single connection with other power generation modules or demand	The amendments suggested by the EG do not clarify how requirements will apply for PPMs combining generation and storage. Will the suggested requirements by the EG apply at the single connection point of the PPM to the network or for the generation and storage module separately? If for instance the storage module is directly connected to the network and can directly consume or inject active power to it but at a certain moment it is consuming power generated by the generation module within the same Type C PPM but at the single connection point the PPM is injecting power to the network, will the requirements of Article 15(2)(c)(vi) for the PPM as a whole?	

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TITLE I - General provisions

Please write your amendment proposal and the reasoning in the table below.

	Amendment proposal	Reasoning	Relation to other provisions
Article 1			
Article 3			
	Application to existing power-generating modules 1. Existing power-generating modules are not subject to the requirements of this Regulation, except where: (a) a type C or type D power-generating module has been modified to such an extent that its electrical and grid-dynamic interaction have materially altered. In these cases and prior to carry out a modification: i) power-generating facility owners who intend to undertake the modernisation of a plant or replacement of equipment affecting the electrical characteristics of the power-generating module shall notify their plans to the relevant system operator in advance; ii) if the relevant system operator considers that the extent of the modernisation or replacement of equipment is material, in respect of any of the criteria in paragraph 1.c below, , the system operator shall		

Article 4	notify the relevant regulatory authority or, where applicable, the Member State; and iii) the relevant regulatory authority or, where applicable, the Member State shall decide which requirements of this Regulation shall apply and if the existing connection agreement needs to be revised or replaced; or (b) a regulatory authority or, where applicable, a Member State decides to make an existing power-generating module subject to all or some of the requirements of this Regulation, following a proposal from the relevant TSO in accordance with paragraphs 3, 4 and 5. (c) For the purposes of this article a material alteration will be defined according to these parameters: i) A percentage increase above the existing maximum capacity (Pmax) of the PGM to be defined by the relevant system operator; or ii) A percentage deviation from the existing required reactive capability of the PGM to be defined by the relevant system operator in coordination with the relevant TSO; or	Recommended amendment by the EG Criteria for Significant Modernisation		

	iii) A change in frequency stability and active power management capabilities to be defined by the relevant TSO. 2. For the purposes of this Regulation, a power-generating module shall be considered existing if: (a) it is already connected to the network on the date of entry into force of this Regulation; or (b) the power-generating facility owner has concluded a final and binding contract for the purchase of the…… …… …….. 8. Where component parts or units of an existing power generating module are replaced or new parts or units added to an existing power generating module, those new or replacement parts or units should, to the extent applicable: a. Be compliant with the requirements of this Regulation; b. Not be a limitation on the eventual compliance of the power generating module should compliance be required with this Regulation in accordance with this article; and			

	c. Immediately contribute the requirements of this Regulation pro rata compared to the power generating module as appropriate (e.g. reactive power, frequency response etc). to the future compliance of that power generating module for the possibility that compliance with this Regulation is required in the future. 9. Paragraph 8 does not apply to maintenance activities or to recognized spart parts, whether or not those parts are purchased new at the time of their incorporation in the power generating module.		
	Article 5 Determination of significance 3. Proposals for maximum capacity thresholds for types B, C and D power-generating modules shall be subject to approval by the relevant regulatory authority or, where applicable, the Member State. In forming proposals the relevant TSO shall coordinate with adjacent TSOs and DSOs and shall conduct a public consultation in accordance with Article 10. A proposal by the relevant TSO to change the thresholds shall not be made sooner than three years after the previous proposal.		

Article 5	4. Power-generating facility owners shall assist this process and provide data as requested by the relevant TSO. 5. Where power generating modules subject to this regulation are modified such that their maximum capacity or the voltage level of their connection point crosses the threshold from which a power generator module is of type B, C and D, those power generating modules must then comply with the requirements of this Regulation applicable to the type within which the maximum capacity or voltage level of their connection point now lies. 6. If, as a result of modification of the thresholds, a power-generating module qualifies under a different type, the procedure laid down in Article 4(3) concerning existing power-generating modules shall apply before compliance with the requirements for the new type is required.	Recommended amendment by the EG Criteria for Significant Modernisation	
Article 6			
Article 7			
Article 8			
Article 9			
Article 10			
Article 11			

Article 12			

Please write your amendment proposal and the reasoning in the table below.

	Proposal for new articles in this section	Reasoning	Relation to other provisions
New articles			

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TITLE II CHAPTER 1 - General Requirements

General requirements for type A power-generating modules

Please write your amendment proposal and the reasoning in the table below.

	Amendment proposal	Reasoning	Relation to other provisions
Article 13(1)			
Article 13(2)			
Article 13(3)			
Article 13(4)			
Article 13(5)			
Article 13(6)			
Article 13(7)			

Please write your amendment proposal and the reasoning in the table below.

	Proposal for new provisions in this section	Reasoning	Relation to other provisions
New provisions			

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General requirements for type B power-generating modules

Please write your amendment proposal and the reasoning in the table below.

	Amendment proposal	Reasoning	Relation to other provisions
Article 14(1)			
Article 14(2)			
Article 14(3)			
Article 14(4)			
Article 14(5)			

Please write your amendment proposal and the reasoning in the table below.

	Proposal for new provisions in this section	Reasoning	Relation to other provisions
New provisions			

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General requirements for type C power-generating modules

Please write your amendment proposal and the reasoning in the table below.

	Amendment proposal	Reasoning	Relation to other provisions
Article 15(1)			
Article 15(2)	(d) (i) the power-generating module shall be capable of providing active power frequency response in accordance with the parameters specified by each relevant TSO within the ranges shown in Table 4. In specifying those parameters, the relevant TSO shall take account of the following facts: - in case of overfrequency, the active power frequency response is limited by the minimum regulating level. For electricity storage modules, the active power frequency response may be limited by the minimum regulating level or maximum consumption capacity, or the maximum energy content that the electricity storage module can store or as agreed between the power generating facility and the TSO irrespective to whether the electricity storage module is independently connected to the transmission or distribution network or within a power park module sharing a single network connection with other power		

	generating modules of lower energy content or export power capacity - in case of underfrequency, the active power frequency response is limited by maximum capacity, and, in case of electricity storage modules, also by the maximum consumption capacity or maximum energy content of the electricity storage module or as agreed between the power generating facility and the TSO irrespective to whether the electricity storage module is independently connected to the transmission or distribution network or within a power park module sharing a single network connection with other power generating modules or demand of lower energy content or maximum consumption capacity	Amendments suggested by EG storage. The electricity storage module export or import capacity to and from the network or should not be limited by the export/import capacity of other power generating modules or demand within the same power park module.	
Article 15(3)			
Article 15(4)			
Article 15(5)			
	General requirements for type C power generating modules c. with regard to the 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 properly 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 manufacturers intellectual property; 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. Member States may require that such verification be carried out by an authorised certifier; (ii) the Synchronous PGM simulation models provided by the power generating facility owner shall contain the following sub-models, depending on the existence of the individual			

components:

- alternator and prime mover,
- speed and power control,
- voltage control, including, if applicable, power system stabiliser ('PSS') function and excitation control system,
- power-generating module protection models, as agreed between the relevant system operator and the power-generating facility owner,

(iii) For the purpose of electromechanical dynamic simulations (RMS simulation studies) of power park modules, the relevant system operator or the relevant TSO shall have the right to specify the power park modules simulation model requirements, either encrypted RMS model (with accurate representation) or generic model (with limitations). Without prejudice to the Member State's rights to introduce additional requirements, the simulation models of the power park modules provided by the power generation facility owner shall:

a) in the case that encrypted detailed RMS models are accepted by the relevant TSO, manufacturer specific models (e.g., DLL based models) should be also acceptable

	and models shall be valid for the specified operating range and all control modes of the power-generating facility; The RSO shall specify necessary information to ensure that both the provided model and the interface 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 encryption (for example use of source code, the model structure and the signal interfaces). b) 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; c) as alternative, be open-source generic model for cross border network stability studies (limitations of generic model shall be acknowledged); d) 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); e) include the relevant protection function models; (iv) For the purpose of time domain electromagnetic transient (EMT) simulations of power park modules, the relevant system operator or the relevant TSO shall have the right to specify the power park module model requirements. Without prejudice to the Member State's rights to introduce additional requirements, the models shall contain the following: a) be valid in the frequency range 0.2 Hz – 2500 Hz for relevant interaction studies. The validity of the PPM model shall be ensured for the given frequency range at the connection point; b) be valid for specified operating range and control modes of the PPM in both the positive and in the negative phase sequence; c) reproduce the detailed response of the power-generating module and its control blocks			

Article 15(6)	during balanced and unbalanced AC network faults in the valid frequency range; d) include the power plant level control and the power plant relevant functionalities if applicable; e) include the frequency dependence of the lines and/or cables in the power-generating facility; f) represent the Power Plant Module transformers model including saturation, resistors, filter, breaker and AC arrester in the valid frequency; g) include all the relevant protection function models for the relevant interaction studies; h) 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 the frequency range that the model is valid); i) be encrypted. The RSO together with the plant owner (and PGM technology manufacturer) shall specify necessary information to ensure that both the provided model and the interface will be applicable by the RSO in the relevant national regulatory		Article 52

framework, while preserving the confidentiality surrounding manufacturers intellectual property.
(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 point of interconnection to the grid. Without prejudice to the Member State's rights to introduce additional requirements, the following requirements shall apply:
a) The impedance model of the power-generating facility shall be requested at least in the range 5.0 Hz - 2500Hz;
b) The relevant system operator or the relevant TSO together with the plant owner (and PGM technology manufacturer) shall have the right to request the calculation of the impedance model of the power-generating facility to be preferably numerically (using the EMT model) or optional analytically (using transfer function) or both;

	c) The relevant system operator or the relevant TSO shall have the right to request the impedance profile of the power-generating facility at the connection point through the whole operating range and control modes of operation; d) The impedance model of the power-generating facility shall be provided for both the positive and for the negative phase sequence; e) The power-generating facility owner shall take into account the influence of the power-generating module control and measurement system as other parts of the power-generating module which influences the output impedance in the specified frequency range; f) The power-generating facility owner shall specify and justify simplifications made in the calculation of the impedance model. (vi) the request by the relevant system operator referred to in point (i) and (ii) shall be coordinated with the relevant TSO. The RSO shall specify necessary information to ensure that both the provided model and the interface will be			

	applicable by the RSO in the relevant national regulatory framework, while preserving the confidentiality surrounding manufacturers intellectual property. It shall include: - the format in which models are to be provided, - an estimate of the minimum and maximum short circuit capacity at the connection point, expressed in MVA, as an equivalent of the network; (vii) the power-generating facility owner shall provide recordings of the power-generating module's performance to the relevant system operator or relevant TSO if requested. The relevant system operator or relevant TSO may make such a request, in order to compare the response of the models with those recordings; (viii) with regard to the installation of devices for system operation and devices for system security, if the relevant system operator or the relevant TSO considers that it is necessary to install additional devices in a power-generating facility in order to preserve or restore system operation or security, the relevant			

	system operator or relevant TSO and the power-generating facility owner shall investigate that matter and agree on an appropriate solution; (ix) the relevant system operator shall specify, in coordination with the relevant TSO, minimum and maximum limits on rates of change of active power output (ramping limits) in both an up and down direction of change of active power output for a power-generating module, taking into consideration the specific characteristics of prime mover technology; (x) earthing arrangement of the neutral-point at the network side of step up transformers shall comply with the specifications of the relevant system operator or relevant TSO.		

Please write your amendment proposal and the reasoning in the table below.

	Proposal for new provisions in this section	Reasoning	Relation to other provisions
New provisions			

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General requirements for type D power-generating modules

Please write your amendment proposal and the reasoning in the table below.

	Amendment proposal	Reasoning	Relation to other provisions
Article 16(1)			
Article 16(2)			
Article 16(3)			
Article 16(4)			

Please write your amendment proposal and the reasoning in the table below.

	Proposal for new provisions in this section	Reasoning	Relation to other provisions
New provisions			

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

Requirements for type B synchronous power-generating modules

Please write your amendment proposal and the reasoning in the table below.

	Amendment proposal	Reasoning	Relation to other provisions
Article 17(1)			
Article 17(2)			
Article 17(3)			

Please write your amendment proposal and the reasoning in the table below.

	Proposal for new provisions in this section	Reasoning	Relation to other provisions
New provisions			

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Requirements for type C synchronous power-generating modules

Please write your amendment proposal and the reasoning in the table below.

	Amendment proposal	Reasoning	Relation to other provisions
Article 18(1)			
Article 18(2)			

Please write your amendment proposal and the reasoning in the table below.

	Proposal for new provisions in this section	Reasoning	Relation to other provisions
New provisions			

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Requirements for type D synchronous power-generating modules

Please write your amendment proposal and the reasoning in the table below.

	Amendment proposal	Reasoning	Relation to other provisions
Article 19(1)			
Article 19(2)			
Article 19(3)			

Please write your amendment proposal and the reasoning in the table below.

	Proposal for new provisions in this section	Reasoning	Relation to other provisions
New provisions			

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TITLE II CHAPTER 3 - Requirements for power park modules

Requirements for type B power park modules

Please write your amendment proposal and the reasoning in the table below.

	Amendment proposal	Reasoning	Relation to other provisions
Article 20(1)			
Article 20(2)			
	Article 20 (3) (v) With regards to damping of active power oscillations generated by (offshore)	Network Code and grid code requirements around the topic of damping of active power oscillations generated by offshore power park modules is raising more and more attention and concerns within the power system industry (especially system operators with growing share of offshore power park modules). Concerns are that existing oscillation modes being present in the power system (e.g. inter-area oscillations) are amplified by active power oscillations generated by PPMs. Active power oscillation damping needs are a result of the fact that the mechanical system of the wind turbine is not 100% stiff where wave and wind misalignments (as a natural behavior) results in certain movements. Active damping of tower movements has been best practice for the last decades to save cost	

Article 20(3)	power park modules: • Active power oscillations measured and averaged over 1 minute with frequencies of 0.1Hz – 2 Hz shall not exceed the least restrictive of: o +/-1% of actual active power production, that can extend to +/-2% at national/regional level if the relevant TSO agrees based on the needs in its respective area of control o +/-0.5% of offshore power park module rated power, that can extend to +/-1% at national /regional level if the relevant TSO agrees based on the needs in its respective area of control o -/+ 1MW • Active power oscillations that exceed the limits defined above shall be damped to be within the limits within 180s • Requirement applies within the voltage ranges and time periods for operation laid down in Article 25 (table 10) • The requirement is demonstrated in normal, stable conditions in the transmission grid and after an event outside the offshore power park modules. In case of repeated events the acceptable levels shall be reached	and tower steel. Active tower damping can reduce the amount of needed steel in the range of 100 – 300 tons. With today's steel prices, this equals to cost reduction at more than 500 kEUR per tower for state-of-the-art offshore WT's. Reducing the amplitude of allowed damping active power will significantly increase the costs of hardware of power park units and even asking for "NO" active power oscillation will technically be very complex or almost impossible without additional equipment at WPP level. Giving some room will also allow the industry to develop technically solutions. The given amendment proposal is based on upcoming Energinet requirements. Note: Even though this is specifically made for offshore power park modules it is in principle also relevant for ON PPMs as "NO" active power oscillation will technically be very complex or almost impossible!! Furthermore, it is to be noted that compliance verification of such	

	within 180s after the last event.	requirements is very complex as it is challenging to reflect the natural behavior and its impact to the control response in power system simulation models. For the specific wording: - measured and averaged over 1 minute: there needs to be a measurement duration provided to evaluate compliance, if a very small measurement duration could be chosen, compliance could probably never be reached - 0.1Hz - 2.0 Hz: upper range needed to limit scope. Otherwise this could be translated to harmonics, even if not intended. • +/- 1 MW: cancellation effects can only be relied upon on larger wind power plants, wind turbines installations with only a couple of turbines need a broader tolerance band. An absolute minimum value ensures that.	

Please write your amendment proposal and the reasoning in the table below.

	Proposal for new provisions in this section	Reasoning	Relation to other provisions
New provisions	Article 20 (4) ENTSO-E proposal for new article on grid-forming	We recommend that requirements are set for PPM type C and D as a basis instead of type A that is the suggested proposal by ENTSO-E. A part of the requirements set for Type C and D could then be applied for Type A and B PPMs.	

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Requirements for type C power park modules

Please write your amendment proposal and the reasoning in the table below.

	Amendment proposal	Reasoning	Relation to other provisions
Article 21(1)			
Article 21(2)			
Article 21(3)	(f) with regard to power oscillations damping control, if specified by the relevant system operator or the relevant TSO a power park module shall be capable of activating contribution to damping of low frequency electromechanical oscillations in a frequency range specified by the relevant system operator in coordination with the relevant TSO. (i) The voltage and reactive power control characteristics of power park modules must not adversely affect the damping of power oscillations. 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		Article 55 (7)

	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 2.0 Hz inclusive.		

Please write your amendment proposal and the reasoning in the table below.

	Proposal for new provisions in this section	Reasoning	Relation to other provisions
	Article 21 (5) New article proposal from ENTSO-E for grid-forming requirements. BELOW WE PROVIDE SOME COMMENTS ON THE RECENTLY PRESENTED PROPOSAL BY ENTSO-E: (a) Within the power park module existing design limits, the power park module shall be capable of behaving at its connection point as a voltage source behind an internal impedance (Thevenin source), during the normal operating conditions (non-disturbed grid conditions) and (including voltage, frequency and voltage phase angle disturbance). The Thevenin source is characterized by its voltage amplitude, voltage phase angle, frequency and internal impedance. (b) (i) the instantaneous AC voltage characteristics of the Thevenin source according to paragraph (a) shall be capable of not changing its amplitude and voltage phase angle while voltage phase angle steps or voltage magnitude steps (in positive and in negative sequence) are occurring at the connection point (grid side). The		

	positive and the negative sequence current exchanged between the power park module (power park module side) at the connection and AC grid shall flow naturally according to grid and converter impedances (ii) the relevant system operator shall specify a minimum time dependent current profile for which the grid forming capability of the power park module is required. (c) During the disturbance period (voltage magnitude, frequency and voltage phase angle disturbance) and after the first instant, (i) The internal voltage magnitude and voltage phase angle of the power park module shall be adapted according to a predefined dynamic performance. (ii) The power park module active and reactive current adjustment shall always respect the minimum and maximum power park module capability and existing design limits (iii) The TSO may specify additional requirements in the case that current limitation is necessary (iv) The power park module shall be capable of stable and smooth transition when reaching the power park module current limits, without interruption, in a continuous manner and returning to the behaviour	(a) The considered times for: - “after a grid disturbance”, what is considered as t=0 - “quasi-immediately”, the elapsed time within which response will be required must be defined in the legal text of the EU Network Code RfG and DCC and not be left to national/TSO/DSO variation to ensure cost-effectiveness and accelerated new grid-forming technology development.

New provisions	described in paragraph (b) (ii) as soon as the limitations are no more active (d) The required energy to deliver the minimum capability in paragraph (a) to (b) shall be ensured through the whole active power operating range of power park module (e) The required dynamic performance of the power park module for the paragraphs (a) to (d) and its associated performance parameters shall be specified by the relevant TSO (f) The relevant TSO shall have the right to request grid forming capability at its connection point as listed in (a) to (e). After a transitional period of maximum 3 years after entering into force, a type C shall be capable of providing grid forming capability requirements at its connection point. Member States shall have the right to shorten this transitional period based on system needs and urgency. (i) If applicable according to Article 15.4.(b), the power park module shall be capable of supporting system survival by means of stable and smooth transition towards and from island mode of system operation (islanding), without interruption, in a continuous manner performing the	(b) “voltage phase angle steps” and “voltage magnitude steps” need to be defined in the legal text of the EU Network Code RfG and DCC in terms of time so over which time period the steps should be calculated. Ideally b(i) should be replaced or supported by a diagram as the one attached where the green, red and blue lines specify different options for the expected reactions by the different assets/technologies. Additionally, the terms “predefined dynamic performance”, “stable and smooth transition”, “island mode” should be defined in the legal text of the EU Network Code RfG and DCC and not be left to national/TSO/DSO variation. Both the decision for a transitional period of 3 years and the decision to shorten this period if necessary should be supported and make reference to a cost-benefit analysis, deployed and financed by the relevant system operator or national energy authority or by a third-party on their behalf and supported with consultations of relevant stakeholders at national level, to justify the respective time period choices.

needed active and reactive power adjustments

(ii) The relevant system operator may specify that a study is required (including its scope) in order to ensure that no adverse control interactions occur during the normal operating conditions (non-disturbed grid conditions), quasi immediately after a grid disturbance, during grid fault conditions and during the post fault operation where voltage and frequency profiles have returned to normal operating conditions.

(iii) If grid forming capability as prescribed in (a) to (e) is requested and if specified by the relevant system operator, in coordination with the relevant TSO, the power park module shall be capable of limiting the transient frequency deviation both in low and/or high frequency regimes. In that case the relevant TSO shall specify the contribution to inertia.

(iv) During the transitional period of maximum 3 years after entering into force and if specified by the relevant system operator, in coordination with the relevant TSO, the power park module shall be capable of limiting the transient frequency deviation both in low and/or high frequency regimes. The following shall apply:

	- The power park module shall be capable of rapidly adjusting the active power injected to or withdrawn from AC grid within its rated power, the contribution is limited only by the maximum energy content of the electricity storage module or primary energy source of the power-generating module. This active power adjustment shall be performed proportional to the measured RoCoF. - When the frequency has recovered, the operating point of the power park module shall return to its pre-disturbance active power value.		

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Requirements for type D power park modules

Please write your amendment proposal and the reasoning in the table below.

	Amendment proposal	Reasoning	Relation to other provisions
Article 22			

Please write your amendment proposal and the reasoning in the table below.

	Proposal for new provisions in this section	Reasoning	Relation to other provisions
New provisions			

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TITLE II CHAPTER 4 - Requirements for offshore power park modules

Please write your amendment proposal and the reasoning in the table below.

	Amendment proposal	Reasoning	Relation to other provisions
Article 23			
Article 24			
Article 25			
Article 26			
Article 27			
Article 28			

Please write your amendment proposal and the reasoning in the table below.

	Proposal for new articles in this section	Reasoning	Relation to other provisions
New articles			

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TITLE III - Operational notification procedure for connection

Please write your amendment proposal and the reasoning in the table below.

	Amendment proposal	Reasoning	Relation to other provisions
Article 29			
Article 30			
Article 31			
Article 32			
Article 33			
Article 34			
Article 35			
Article 36			
Article 37			
Article 38			
Article 39			

Please write your amendment proposal and the reasoning in the table below.

	Proposal for new articles in this section	Reasoning	Relation to other provisions
New articles			

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TITLE IV - Compliance

Please write your amendment proposal and the reasoning in the table below.

	Amendment proposal	Reasoning	Relation to other provisions
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 (2). With regard to the LFSM-U response simulation the following requirements shall apply: (a) the power-generating module's capability to modulate active power at low frequencies in accordance with point (c) of Article 15(2) shall be demonstrated by RMS simulation; 3. With regard to the FSM response simulation the following requirements shall apply: (a) the power-generating module's capability to modulate active power over the full frequency range in		

Article 52	accordance with point (d) of Article 15(2) shall be demonstrated by RMS simulation; 4. With regard to the island operation simulation the following requirements shall apply: (a) the power-generating module's performance during island operation referred to in the conditions set out in point (b) of Article 15(5) shall be demonstrated by RMS simulation; 5. With regard to the reactive power capability simulation the following requirements shall apply: (a) the power-generating module's capability to provide leading and lagging reactive power capability in accordance with the conditions set out in points (b) and (c) of Article 18 (2) shall be demonstrated by simulation in the outer corners of the U-Q/Pmax diagram. In addition two simulations of the executed tests shall be performed with the real grid voltage and load points during the tests; (b) the simulation shall be deemed successful if the following conditions are fulfilled: (i) the simulation model of the			

	power-generating module is validated against the compliance tests for reactive power capability as far as these tests were accommodated (grid voltage deviations) and allowed by the RSO described in Article 45(7); and (ii) compliance with the requirements of points (b) and (c) of Article 18(2) is demonstrated.		
Article 53			
Article 54			

Article 55	Compliance simulations for type C power park modules. (7) (a) the model of the power park module shall demonstrate that it can contribute to damping of low frequency electromechanical oscillations in accordance with point (f) of Article 21(3); (b) the simulation shall be deemed successful in the event that if the following conditions are cumulatively fulfilled: (i) the power park module is capable to contribute to damping of low frequency electromechanical oscillations within a frequency range specified by the relevant system operator or the relevant TSO; 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 either based on a relevant test network or by analysis of phase shift between input and output quantities. (c) compliance laid down in point (f) of Article 21(3) is demonstrated.		Article 21 (3)
Article 56			
Article 57			

Article 58			
Article 59			

Please write your amendment proposal and the reasoning in the table below.

	Proposal for new articles in this section	Reasoning	Relation to other provisions
New articles			

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TITLE V - Derogations

Please write your amendment proposal and the reasoning in the table below.

	Amendment proposal	Reasoning	Relation to other provisions
Article 60			
Article 61			
Article 62			
Article 63			
Article 64			
Article 65			

Please write your amendment proposal and the reasoning in the table below.

	Proposal for new articles in this section	Reasoning	Relation to other provisions
New articles			

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TITLE VI - Transitional arrangements for emerging technologies

Please write your amendment proposal and the reasoning in the table below.

	Amendment proposal	Reasoning	Relation to other provisions
Article 66			
Article 67			
Article 68			
Article 69			
Article 70			

Please write your amendment proposal and the reasoning in the table below.

	Proposal for new articles in this section	Reasoning	Relation to other provisions
New articles			

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TITLE VII - Final provisions

Please write your amendment proposal and the reasoning in the table below.

	Amendment proposal	Reasoning	Relation to other provisions
Article 71			
Article 72			

Please write your amendment proposal and the reasoning in the table below.

	Proposal for new articles in this section	Reasoning	Relation to other provisions
New articles			

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Other additional provisions

Please write your amendment proposal and the reasoning in the table below.

	Proposal for new provisions	Reasoning	Relation to other provisions
Other new provisions			

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