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ACER draft amendments to the Network Code on Requirements for Generators

Fields marked with * are mandatory.

Introduction

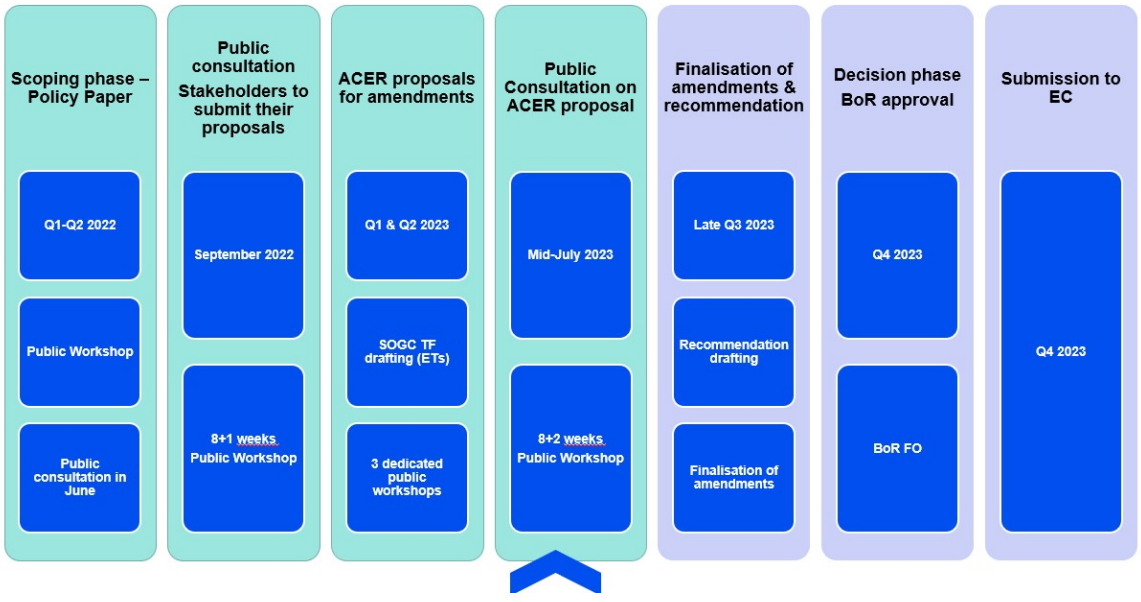
This consultation aims to present ACER's draft amendments to the Commission Regulation (EU) 2016/631 of 14 April 2016 establishing a **Network Code on Requirements for Grid Connection of Generators ('NC RfG').**
For draft amendments concerning Network Code on Demand Connection ('NC DC'), please go to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

EUTurbines

* 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.

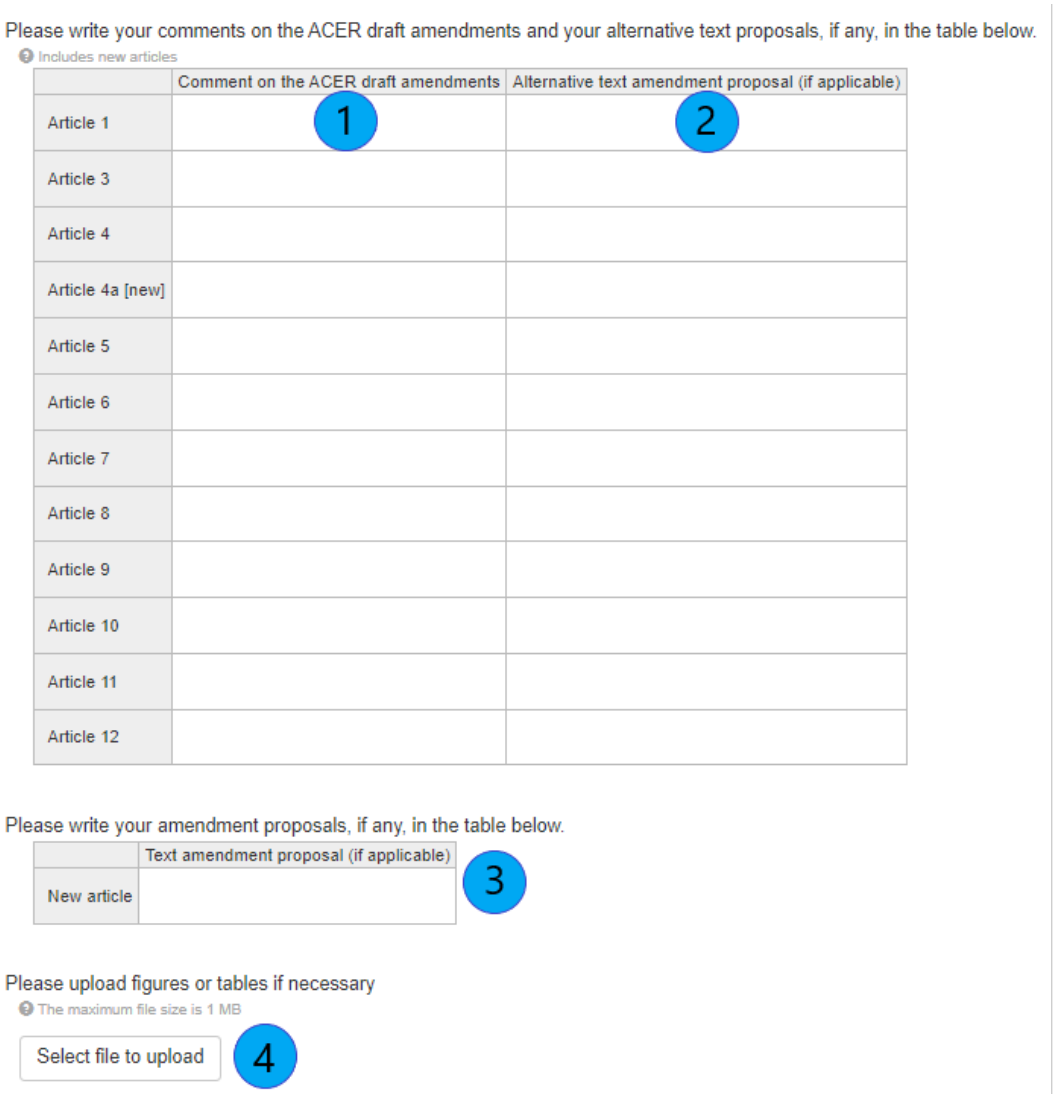
Download ACER draft amendments to the NC RfG here

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

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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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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)	Synchronous compensators and flywheels are essential solutions to keep inertia to present level, contribute to short circuit power level and voltage regulation. It is recommended to mandate TSOs to include non exhaustive requirements for the deployment of Synchronous Compensator eventually associated to flywheels. Manufacturers of such equipment need harmonized specification to develope appropriate product (eg synchronous compensators using existing generating unit). Synchronous compensator are the cheapest solution for inertia and short circuit level preservation (see also publication "The benefits of implementing Synchronous Compensators in grids with high penetration of Renewables"), even compared to storage system or Grid Forming converter (which are today much more defined in the present RfG draft).	(s1)Equally, electricity storage plays a key role in the system as different energy storage technologies have a dual behaviour of being able to consume electricity from or inject electricity into the grid at different times and scales. For this reason, and due to the specific characteristics of storage and impact on the system, it is necessary to introduce requirements for the grid connection of electricity storage modules. The requirements on electricity storage are considered to be the same as those on power generation modules unless explicitly stated otherwise in this Regulation. In the case of electrical equipment such as synchronous compensators (if synchronous compensator can provide active power, then RfG requirements may apply unless differently defined in national regulation), flywheels and regenerative braking systems which do not fall onto the definition of a power generating module or electricity storage module, the relevant system operator shall define the technical requirements that apply.
(s2)		

(4)		
(5)		
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(18)		
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(**)		
(20)		
(21)		
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(**)		
(23)		
(24)		
(25)		

(**)	System Operator had (and still have) to study ways to preserve system inertia as requested by SOGL art 38 and 39. We consider this new additional requirements not fair for PGMs, as previous recital (25) states clearly that past ROCOF should have been preserved. System needs shall serve and be aligned with generation and demand needs, therefore proposal for new requirements for PGMs shall be properly discussed with generating unit manufacturer and technical limitations properly taken in consideration. Today there are possibilities to keep system inertia to an appropriate level and these shall be properly taken in consideration and deployed. In the past there were too much resources and emphasis dedicated to studies system with high renewable generation and almost no study on how to preserve inertia, short circuit and voltage control. Appropriate grid supporting services shall be supported by appropriate economical incentives and market tools. This shall not be a reason to add requirements on PGMs, rather than to have an efficient and economical way to deal with the criticalities.	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 of converted-based technologies, power-generating modules shall support the system robustness by providing system services (eg inertia, short circuit contribution and voltage control capabilities) according to their capabilities. These contributions shall be intended in addition to appropriate countermeasure to be deployed by System Operators to ensure frequency stability, preserving a minimum defined level of local and global inertia, and voltage stability.
(26)		
(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)		
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)		
Article 2(17)		
Article 2(18)		

Article 2(19)	This definition is already used for Hydro power plant, respectively PGU/PGM. These can apply to other PGU and PGM technologies that can operate as synchronous compensator when they do not generate active power ("prime mover" is off). Note that "prime mover" is not defined in RfG. The update of this definition is needed in light of future markets targeting inertia and reactive power (eg in Germany, see Roadmap Systemstabilität chapter F2. Marktliche Beschaffung von „Trägheit der lokalen Netzstabilität“ – Erarbeitung eines Beschaffungskonzeptes inkl. Bechaffungshorizonte und ggf. Regionaliät, already in work to be completed by 2025).	'synchronous compensation operation’ means the operation of an alternator without prime mover or a PGU that is not generating active power, to regulate voltage dynamically by production or absorption of reactive power, to provide inertia to the system and to provide short circuit contribution to the system
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)		
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Article 2(61)		
Article 2(62)		

Article 2(63)		
Article 2(64)		
Article 2(65)		
Article 2(66)		
Article 2(67)		
Article 2(68)	To avoid misinterpretation, we understand this definition to be referred to consuption that can be controlled (otherwise the "less" shall be changed in "and")	'maximum controllable consumption capacity' means the maximum continuous active power which a demand unit or electricity storage module can consume, less any demand or losses associated solely with facilitating the operation of that demand unit or electricity storage module, as specified in the connection agreement or as agreed between the relevant system operator and the demand facility owner or power-generating facility owner, or determined by other appropriate means, where an agreement is not required.
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	(76) “power generating unit” or “PGU” means an aggregation of components converting a primary source of energy into electricity at the unit’s terminals, which is synchronously connected to a network or which is either non-synchronously connected to the a network or connected through power electronics. (77) “component” means any hardware element or software element having an impact on the electrical characteristics and /or operation of a power generating unit or a power-generating module. (78) ‘PGU family’ means a group of PGUs from the same manufacturer with equivalent characteristics to the representative unit which has undergone conformance tests (tested unit), in terms of electrical performance. PGU family members may differ in power and voltage from the representative unit. The extent of the PGU family will be defined within the compliance scheme. (79) ‘Component family’ means a group of components from the same manufacturer with equivalent characteristics to the representative component which has undergone conformance tests (tested component), in terms of electrical performance. The extent of the component family will be defined within the compliance scheme. (80) ‘compliance scheme’ means a compliance verification programme provided by the relevant system operator which shall specify all evaluation and assessment measures to be taken, e.g. equipment certificates, tests, technical documentation and/or simulations, aimed to demonstrate the compliance of a PGM with the specified requirements during the operational notification process. The compliance scheme shall provide detailed information on the specified requirements or provide unambiguous references to relevant technical documents and standards. The compliance scheme may specify the format of the statement of compliance as well as further procedural information for embedding the statement of compliance in the operational

	notification process. Where equipment certificates are applied within the compliance scheme the scheme shall include or provide a reference to a certification scheme. The applied equipment certificates must be valid for the specific equipment installed within the PGM which a connection request has been made. (81) ‘specified requirements’ are provisions on power generation units, power generation modules or their components and which need to be fulfilled. (82) ‘Statement of conformity’ means an attestation based on a conformity assessment that the fulfilment of specified requirements has been successfully

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 th

Includes new articles

	Comment on the ACER draft amendments	Alt
Article 1		
Article 3	MSs did public consultations on topics that has a crossborder relevance (e.g. ROCOF or frequency related topic, which has been consulted in Germany in German, in Poland in Polish, in Spain in Spanish). There are many consultation in many countries frequently overlapping. Without the use of an English version it is not possible to appropriately and efficiently address such topics (for example Public consultation on exhaustive requirements took place in parallel in many MSs in different languages and in some countries no contribution had been provided by manufacturers). Finally, requirements and compliance process are relevant for the safety of the system, they shall be reasonably well understood by specialists, who do not always speak the MS national language.	3.4 and by sha En Sta of t "Tr
Article 4	Art 7 states that MSs shall have a proposal for non exhaustive requirements after 2 years the entry into force of this regulation. Therefore new plants (after two years) have no clue of the new requirements they shall respect. This is not acceptable. New requirements can be applicable to plants where contractual agreement has been signed after at least 1 year of the publication of the new requirements (not the draft proposal). This point had been already highlighted during GC ESC and during EUTurbines public workshop (also to ENTSOE).	4.2 cor pur yea and rec in a
		1. I mo the be aut In c coc and

Article 4a [new]	There should be an obligation for TSOs to reach out to stakeholder for feedbacks. During EG CSA there were high divergencies between TSOs and Stakeholders. Therefore there shall be an appropriate stakeholder requests. Significant modernization shall be a modification to an existing unit. Extension of installation by adding units shall not substantially impacts existing units. A deviation of 5% to 10% can be reasonable to account for swapped components. Range can vary for different technologies and power generating unit size (not so easy to answer to the request) This is an alternative to art 4a(3). We consider that only the requirements could be eventually applicable to the component uograded. Added points (e), (f), (g), (h), (i) which are considered all very important. See additional bullet (f) in paragraph 2.	wit 2. T tak (a) cap wh mo mo def diff tec Wh mo ge ap (b) cap wh mo mo def rea po ge mo (c) de ma res su ge (d) po mo act pa inc (e) a s ge (f) re (g) mo an co the (h) po mo mo

		tim (i) big imp eva
Article 5		
Article 6	Synchronous condenser and flywheels are stabilizing element for the grid and need to be addressed at least in their expected basic behaviour. Minimum requirements for synchronous compensator. Detailed requirements to be developed by system operator in cooperation with stakeholders not later than 2 years time from the publication of the present document. Synchronous compensator are needed to ensure minimum system inertia, short circuit contribution and enhance voltage control. Synchronous compensator can be part of PGMs, therefore relevant to RfG.	Ap mo mo in t sto ass equ and 8. I and def ma mu Sta be rec 18
	IGDs are owned and prepared only by ENTSO-E without an appropriate consensus process; they cannot be compared to European standards that have to be approved by the technical committee of European MSs and where all stakeholders can contribute and attend meetings. It could be interesting to have the ESC EG final documents as the relevant document where stakeholders can jointly contribute. The proposed sentence seems to point out that local needs can rule for the overall system needs. We disagree on such approach. Derogation process can be used by TSOs for	7.3 (e) acc (f) ma tec (g) Eu rule (h) nee tec rec mo wh cor inc 7.7 dec me

Article 7	specific cases and specific cases shall not trigger unnecessary requirements to the rest of the system. Local needs shall eventually trigger local requirements, not system requirements. The text can be improved based on the above comments. The introduction of any new requirements need due time for the manufacturers for redesign and adaptation. This shall be duly considered. (See also proposal to change in art 4: the risk is that contract will be signed two months after the entry into force of the regulation and requirements will be defined later than 32 months after the entry into force of the regulation according art 7. This is not acceptable.) Compliance Scheme is absolutely relevant for industry including eventual use of Equipment Certificate.	under paragraph 1 and 2 to be necessary, the requirements provided for in paragraphs 3 to 8 shall apply to the proposed amendment. System operators and TSOs proposing an amendment shall take into account the legitimate expectations, if any, of power-generating facility owners, equipment manufacturers and other stakeholders based on the initially specified or agreed requirements or methodologies. In general, the application of any amended requirements shall not be due before at least 1 year after its final and official publication; longer period can be possible based on consultation within interested parties, including plant facility owner and manufacturers. 7.10. The relevant system operator or TSO shall submit a proposal for a detailed compliance scheme updated including the use of equipment certificate, for approval by the designated entity within 18 months from the entry into force of this Regulation to be finalized 6 months later at the latest. The Member State may provide for a shorter time. In this case, the Member State shall communicate the shorter time period to the European Union Agency for the Cooperation of Energy Regulators (ACER). The RSO and TSO shall coordinate the details of the compliance scheme with relevant stakeholders including manufacturers.
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	

Please upload figures or tables if necessary

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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)	Proposal from EUTurbines to reflect present status of 2Hz/s, 0.5sec requirement as defined in European Std EN 50549, with the exception of Type D for which 1Hz/s, 0.5sec is applicable (see proposal to art 19(4)(b)). It is recommended to have a maximum time of 30min associated to a single event for frequency between 47.5Hz-48.5Hz and 51Hz-51.5Hz. 30 minutes associated to a single event is considered already a pretty long time (nowhere else such long time associated to large frequency deviation are present). As a general note, after multiple events the manufacturer can advice for specific inspection and maintenance activities. A maximum frequency of 52.5 is not acceptable. Product standard for synchronous generators (IEC 60034) are not considering such high frequency deviation. It is therefore recommended to use 51.5Hz as upper frequency limit value. However it is considered fair that if a generating unit can accept higher frequency than the proposed, this capability shall not be withold. Finally note that the proposed ROCOF profile and values for SPGMs were present in the first IGD and even in such IGD it was recognized an upper frequency limit of 51.5Hz.	(i) a synchronous power-generating module shall be capable of staying connected to the network and operate at rates-of-change-of-frequency up to the following values: • ±2,0 Hz/s over a period of 0,5 s, If a synchronous power generating module cannot fulfil the requirements above, then it shall document its capabilities. TSOs shall then carry out a detailed system study to verify real system needs at the point of connection and eventually define and implement appropriate countermeasures. Table 2 - time period for operation Continental Europe: To be specified by each TSO, but not less than 30 minutes - Ireland and northern ireland: 47,5 Hz-48,5 Hz 30 minutes 51,0 Hz-51,5 Hz 30 minutes - Baltic: 47,5 Hz-48,5 Hz 30 minutes (d) A power generating module or power generating unit shall not unreasonably withhold wider frequency and time duration if their technology permits it. In such a case they need to state their capabilities. Frequency limits in table 2 are considered at rated voltage. Combined frequency and voltage variation can result in different requirements; applicable European product technical standard shall apply in such cases.

Article 13(3)	The present functionality has been introduced without previous discussion and consensus. Block signal function leaves open too many interpretation and therefore is not acceptable (it should have been properly defined during ESC discussions). It is proposed an analog signal from system operator with higher priority than the LFSM-O as alternative and as proposed in the past RfG for LFSM-U or to remove the functionality (not properly detailed). Control priorities shall be clearly defined in the RfG. In addition too many signals can create mistakes during critical operation.	(e) the initial delay time Tid (Figure XX) by the power-generating module shall not be intentionally delayed. The initial time delay of the power generating unit active power response will only be the result of the process time including the controller. (g) the power-generating module shall be capable of operating stably during LFSM-O operation. When LFSM-O is active, the LFSM-O setpoint will prevail over any other active power setpoints from the power plant facility which would result in an increase of power above the LFSM-O setpoint. The power generating module shall be able to receive and react on an external active power output from the relevant system operator. The step response time capability, Tresp in Figure XX, for active power decrease in case of increasing frequency, shall be as fast a technically feasible.
Article 13(4)		
Article 13(5)		
Article 13(6)		
Article 13(7)		
	It is recommended for synchronization to use Lower and Upper frequency and voltage limits defined for unlimited time operation. When it comes to higher voltage and/or lower frequencies, the transient torque resulting from false synchronization may exceed the mechanical withstand capability of the shaft line	

Article 13(8)	of turbo generator units. In addition 47.5Hz seems a very low value. No definition of observation time is provided. Observation time corresponds to the time before the synchronization as a rolling time window. Big generating unit has limitation on using faster gradients to increase power at 1st synchro. In general it is recommended to use low gradient down to 10%Pref or lower. Note the wording is taken from the IGDs. We do not recommend to use IGDs as reference document but instead using EN std. It is not clear when the gradient is applicable, if for the first ramp after synchronization or also during normal operation.It is proposed a text as if the ramp is applicable after synchronization. Wording has been added to qualify the time for which the gradient is applicable. Note operational ramp rate definition shall be added. Amend synchronizing condition with the one as indicated in art 13 (9)	8 (b) Frequency range of 49 Hz ≤ f ≤ 51 Hz; (c) Adjustable observation time: from 0 to 300 s; (d) Adjustable limitation of the gradient of active power increase ≤ 10 % of Pmax/min just after the paralleling of the generating unit and up to reach the Pmax or for an equivalent period of time; and , (e) Synchronizing conditions as stated in article in 13(9).

Article 13(9)	We recommend same voltage range applicable in case of normal condition also for autonomous reconnection. Reduced to 1.05, in fact for HV system above 220kV, the unlimited voltage interval is 0.9-1.05 (see table Table XX.2). We recommend to use the lower limited value. It is recommended for synchronization to use Lower and Upper frequency and voltage limits defined for unlimited time operation. When it comes to higher voltage and/or lower frequencies, the transient torque resulting from false synchronization may exceed the mechanical withstand capability of the shaft line of turbo generator units. In addition 47.5Hz seems a very low value. Big generating unit has limitation on using faster gradients to increase power at 1st synchro. In general it is recommended to use low gradient down to 10%Pref or lower. Note the wording is taken from the IGDs. We do not recommend to use IGDs as reference document but instead using EN std. It is not clear when the gradient is applicable, if for the first ramp after synchronization or also during normal operation.It is proposed a text as if the ramp is applicable after synchronization. Note operational ramp is missing.	9. Within the capability defined in paragraph (8), the default settings for an autonomous connection 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: — Continental Europe: 49 Hz ≤ f ≤ 51 Hz — Other synchronous areas 49 Hz ≤ f ≤ 51 Hz (c) Minimum observation time: 60 s; (d) Maximum gradient of active power increase ≤ 10 % of Pmax/min just after the paralleling of the generating unit and up to reach the Pmax set point or for an equivalent period of time (e) Condition on voltage phase angle difference measured on each side of the circuit breaker: $\Delta\theta < 10°$ (f) Condition on the voltage magnitude difference measured on each side of the circuit breaker: $\Delta U < 0.04$ pu; and (g) Condition on the frequency difference measured on each side of the circuit breaker: $\Delta f < 0{,}2$ Hz Autonomous connection is allowed unless specified otherwise by the relevant system operator in coordination with the relevant TSO.

Article 13(10)	For small generating unit, reactive and power factor control are typically requested as control modes (unlike constant terminal voltage). Viceversa, costant terminal Voltage control seems more applicable as Power Generating Unit terminals (at Power generating module terminals Q, PF and Q(U) are often the typical control modes). Seems applicable also to PPMs.	10. The power generating module shall be equipped with voltage control that can provide constant terminal voltage, reactive power or power factor control 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 importing or exporting active power;
Article 13(11)		
Article 13(12)		120. With regard to voltage stability, unless otherwise provided in this Regulation, the power-generating module shall be capable of staying connected to the network and operate continuously within the range of 0,8585 pu - 1,1 pu at the connection point should that be at or below 400V. Conversely, the power-generating module shall be capable of staying connected to the network and operate continuously within the range of 0,9 pu - 1,1 pu at the connection point should that be above 400V and below 110 kV
Article 13(13)	Manufacturers involvement is a sine qua non requirement	13. With regard to weather-related hazards, the relevant system operator or TSO may specify weather hazards resilience requirements based on the cost-benefit analysis undertaken in accordance with Article 39. Those requirements shall reflect the specificities of generation technologies as discussed involving manufacturers as well as the geographical and climatic particularities of each Member State

Article 13(14)		

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)		2. The Type B power-generating module shall fulfil the following requirements relating to voltage stability: (a) with regard to voltage ranges of 110 kV and above: (i) unless otherwise provided in this Regulation, a power-generating module shall be capable of staying connected to the network and operating within the ranges of the network voltage at the connection point, expressed by the voltage at the connection point related to the reference 1 pu voltage, and for the time periods specified in Tables XX.1 and XX.2 or, for rated voltages not included in the tables and above voltage level 110 kV as specified by the relevant system operator in coordination with the relevant TSO, but in any case not exceeding the upper limits defined in the Table XX.1 and XX.2; (ia) the values specified in the table are not to be considered at PGU terminals;, step-up transformer equipped with OLTC is installed in plants connected to the HV system. (ii) the relevant TSO may specify shorter periods of time during which power-generating modules shall be capable of remaining connected to the network in the event of simultaneous overvoltage and underfrequency or simultaneous undervoltage and overfrequency taking into consideration typical

	ENTSO-E justified large voltage deviation from std since OLTC is installed on plant connected to HV system. The requirement shall be properly adapted to typical product standard capabilities (IEC 60034), if OLTC is not mandatory (as originally requested in 2016 revision). Otherwise that would be an unreasonable burden to Type B generating unit. For rotating machines (motor and generators), V-F characteristic is indicated in IEC 60034	expected V-F characteristic of the power generating unit technologies; (iii) notwithstanding the provisions of paragraph (i), the relevant TSO in Spain may require power-generating modules to be capable of remaining connected to the network in the voltage range between 1,05 pu and 1,0875 pu for an unlimited period for voltage level above 300kV; (iv) for the 400 kV grid voltage level (or alternatively commonly referred to as 380 kV level), the reference 1 pu value is 400 kV; for other grid voltage levels, the reference 1 pu voltage may differ for each system operator in the same synchronous area; (v) the relevant TSOs in the Baltic synchronous area may require power-generating modules to remain connected to the 400 kV network in the voltage range limits and for the time periods that apply in the Continental Europe synchronous area; (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.

Article 14(3)	1.3Un 0.1s may be an issue, depending on the reference system (eg Type B distribution), it is difficult to define possible issues on the main components.. This value can also lead generating unit auxiliaries to trip and the PGU to get off the grid. 1.2Un, 60s seems to be an unjustified long requirement. It is recommended to have requirements based on real phenomena and associated duration. Please provide technical explanation for such a long requirement. Refer also to OVRT requirement curve as shown in european std EN 50549-2 (1.25Un, 100ms -> 1.2Un, 5sec -> 1.15Un, 60 sec) Please modify the diagram to show the full voltage profile before and after the fault, and add the following comment (as for Low Voltage Ride Through profile p.47): The diagram represents the UPPER limit of a voltage-against-time profile of the voltage at the connection point, expressed as the ratio of its actual value and its reference 1 pu value before, during and after a fault. Note that Overvoltage Ride Through is considered a Fault Ride Through. No controllability associated to normal operation is expected during OVRT/Fault Ride Through condition.	4.3 (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.
		4. Theype B power-generating modules shall fulfil the following requirements relating to system restoration: (a) the use of autonomous connection function

Article 14(4)	It is not clear how the statement translates into a requirement	shall be subject to prior authorisation by the relevant system operator and to the reconnection conditions specified by the relevant TSO, which shall be specified in the connection agreement;the relevant TSO shall specify the conditions under which a power-generating module is capable of reconnecting to the network after an incidental disconnection caused by a network disturbance; and (b) within the capability defined in Article 13(7), the relevant TSO, in coordination with the relevant system operator, shall specify the settings for an autonomous connection. If no settings are specified, the default settings for an autonomous connection of Article 13(8) shall apply.installation of automatic reconnection systems shall be subject both to prior authorisation by the relevant system operator and to the reconnection conditions specified by the relevant TSO. (c) The power-generating module shall be equipped with a communication interface (input port) in order to reduce, without undue delay, active power output following an instruction being received at the input port. The electricity storage modules shall be capable of modulating, without undue delay, active power output and input following an instruction being received at the input port. in case of change in the network leading to the minimum short-circuit level as defined in the connection agreement, the PGM shall be able to ensure robustness to its control system.
		(d) with regard to information exchange: (i) power-generating facilities shall be capable

Article 14(5)	The information are stored on protection device or power meters or specific device used for oscilloperturbography. In case of fault, recordings of the event are collected on dedicated file (not exchangable in real time). These file are normally locally downloaded. They are normally shared by mail or cloud (many times they are too big to be shared by mail). So communication as proposed is not viable. In addition the expectation is that the same available data are provided by RSO and TSO to the plant facility owner in the same format (also RSO and TSO have equipments that permit to collect such information).	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 Title 2 of Regulation (EU) 2017/1485; (ii) power-generating facilities shall be capable of exchanging real time data for metering with the relevant system operator or the relevant TSO; (iii) if required by the relevant system operator power-generating facilities shall be able to provide fault recording for the following parameters: — voltage, — active power, — reactive power, and — frequency; (iv) the settings of the fault recording equipment, including triggering criteria and the sampling rates shall be agreed between the power-generating facility owner and the relevant system operator in coordination with the relevant TSO; (v) the RSO and TSO may request to access data collected during fault event by electricity quality monitoring, including protection device when applicable, from the power generating facility owner. The power generating facility owner may request to access data collected during the fault event by the RSO and TSO with the same level of details.. The data exchanged shall be rough data and limited in such a manner to not require non disclosure agreement among parties. The power generating facility owner and RSO and TSO will define how the collected data will be exchanged.

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	Text amendment proposal (if applicable)
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)		

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 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)		
	Editorial mistake: the LFSM-U threshold shall be frequency below 50Hz. Table XXX shows only positive deadband. The present functionality has been introduced without previous discussion and consensus. Block signal function leaves open too many interpretation and therefore is not acceptable (it should have been properly defined during ESC discussions). In case of	(i) the power-generating module shall be capable of activating the provision of active power frequency response at a frequency threshold and with a droop specified by the relevant TSO in coordination with the TSOs of the same synchronous area as follows: — the frequency threshold shall be 50Hz-Δf1, where Δf1 is defined in Table X, — the droop settings shall be in the range 2-12 %. This is represented graphically in Figure 4; (ii) the actual delivery of active power frequency response in LFSM-U mode shall be capable of taking into account, if applicable: — ambient conditions when the response is to be triggered, — the operating conditions of the power-generating module, in particular limitations on operation near maximum capacity at low frequencies and the respective impact of ambient conditions according to paragraphs 4 and 5 of Article 13, and — the availability of the primary energy sources. — an external signal allowing the relevant system operator to block the LFSM-U mode in real-time.

Article 15(2)	active power signal due to congestion from system operator, it is already foreseen that such signal override the LFSM-U characteristic. In addition too many signals can create mistakes during critical operation. We expect to be described technical capabilities, meaning that real requirements may be larger as it serves for system stability. The deadband for FSM can go down to 0. That means that just after connection to the grid and reaching the Pmin, the FSM will be active. Once active FSM will be prevailing above other logic, but that would prevent any dispatchability of the generating unit. It shall be clearly indicated that either in case of transient condition to the setpoint the FSM is not active or the FSM; is just a bias of the active power setpoint (like a normal speed droop logic). Df1 is applicable for LFSM. It can be eventually understood as the threshold for which FSM can be applicable and after which LFSMs logic apply. For the sake of clarity when using exactly the ramp rate as described, in the real world, the active power output will follow the characteristic oscillating around it. Therefore the curve shall be target characteristic. 5sec, including 2s time delay seems unreasonably fast for specific generating unit technology. The requirement shall not be deemed to exclude	(iii) the start of active power increase (initial delay time Tid (Figure XX)) by the power-generating module shall not be intentionally delayed. Any unintentional delay shall be as short as possible.; (iv) in LFSM-U mode the power-generating module shall be capable of providing a power increase up to its maximum capacity; (v) stable operation of the power-generating module during LFSM-U operation shall be ensured. (vi) The step response time capability Tresp (Figure XX) for LFSM-U shall be as fast as technically feasible and as described below: — For SPGM: less or equal to 5 min for an active power setpoint change of 20% maximum power, — For PPM: less or equal to 10 s for an active power setpoint change of 50% maximum power. If the response time is greater than stated above, the power-generating facility owner shall justify the higher response times, providing technical evidence to the relevant TSO. (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 and Table X. The FSM shall correspond to a bias to active power output setpoints (or it shall not be applicable during change in setpoint condition). In specifying those parameters, the relevant TSO shall take account of the following facts: ... table X: Definition of Δf1 as activation threshold

	generating technologies from connecting to the grid.	used for FSM, LFSM-O and LFSM-U (explanation for Figure 1 and, 4 and 5) this threshold corresponds also to the deactivation of FSM logic when Figure 6: Pmax is the maximum capacity to which ΔP relates. ΔP is the change in active power output from the power-generating module. The power-generating module has to provide active power output ΔP up to the point ΔP1 in accordance with the times t1 and t2 with the values of ΔP1, t1and t2 being specified by the relevant TSO according to Table 5. t1 is the initial delay. t2 is the time for full activation. The curve shall be intended as a target lower limit characteristic. Table 5: Target Maximum admissible choice of full activation time t 2, unless longer activation times are allowed by the relevant TSO for reasons of system stability and PGM technology capabilities; 30 seconds
Article 15(3)[deleted]		
Article 15(3)		
		(iv) a power-generating module with black start capability shall be able to synchronise within the frequency limits laid down in point (a) of Article 13(2) and within the voltage limits laid down in Article 14 (2); black start sequence shall be agreed between RSO and Power Generating Facility owner to avoid incorrect operation (v) a power-generating module with black start

	A PGM with black start capability shall be able to connect to a black busbar (a busbar without voltage). Voltage control is expected to be active only when the generating unit is not in parallel to the grid. When not interconnected to the grid there could be multiple units in operation together that use reactive power load sharing mode instead of voltage droop control mode. Black start and houseload operation (and "industrial islands") are "engineered" operative condition for which the best solution is defined depending on site and operative conditions. "parallel operation" can be easily misunderstood for operation interconnected to the grid. It is recommended to delete the adjective "parallel" The control modes of the Power Generating Units is engineered/defined in advance so that to achieve the more effective solution. It seems this part is covered in art 14(a)(v) Remove LFSM, island operation can be also islanding of an industrial operation, which is not necessarily LFSM as active power control mode.	capability shall be capable of automatically regulating the voltage at the connection point or in the plant facility to limit the magnitude of voltage changes caused by connection of demand, when the PGM is still not interconnected to the grid; ... (b) (iv) power-generating modules shall be able to operate stably in during island operation, as specified in point (c) of paragraph 2 and Article 13(3); (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. The transition can require control mode change. The method for detecting a change from interconnected system operation to island operation shall be agreed between power generating facility owner and the relevant system operator and it can rely on switchgear position signals. The RSO and TSO shall be able to identify the status of its grid and associated connections. (vi) power-generation module shall be capable to regulate active power between houseload operation level and minimum stable operating level for a minimum operation time. The minimum operation time shall be specified by the relevant system operator in coordination with the relevant TSO, taking into consideration the specific characteristics of prime mover or PGM technology.

Article 15(4)	There should be no obligation unless requested to operate with LFSM logic in such plants (where typically the island mode operation is engineered). The majority of island mode operation consist of transition of a Power generating facility from inetrconnected to the grid to island operation. The originally proposed text does not reflect such reality. This should include intentional island operation, which consist of separating a power generating facility (eg industrial plant, cogeneration, etc.) from the grid for example in case of adverse weather forecasted condition. For big system split the definition of grid status shall be part of DSO, RSO and TSO duty. In the present RfG there is plenty of requirements associated to remote real time control which shall be based on such information. Control mode switch can be defined as required (master slave operation..) in cooperation with DSO, RSO and TSO. Maybe prime mover is not defined in the RfG. The adjective "quick " shall be better defined.. It can be interpreted as well for long period of time (hours), which is not necessarily appropriate. 15min is proposed in line with the following art 14(4)(ii) It is common practice to use the position signals of the main circuit breaker of the power generating plant. Weather this belongs to the system operators or plant facility owner, this shall be not considered relevant and eventually subject to agreements among parties. In case there is a circuit breaker	(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 quick re-synchronisation, in less than 15min, in line with the protection strategy agreed between the relevant system operator in coordination with the relevant TSO and the power-generating facility; (ii) a power-generating module with a minimum re-synchronisation time greater than 15 minutes after its disconnection from any external power supply must be designed to trip to houseload from any operating point in its P-Q-capability diagram. In this case, the identification of houseload operation must notmay be based alsosolely on the position signals of the system operator's switchgearsystem operator's switchgear position signals; (vi) a power-generating module with black start capability shall at least: — be capable of frequency control when connecting demand and when PGM is still not interconnected to the grid, — be capable of frequency control during the system restoration phase, , ,. Frequency control mode shall be defined in the system restoration procedure and process. Frequency control is limited to load acceptability by the generating unit which shall be previously agreed between RSO and Power

	belonging to the grid/system operator and a power generating plant circuit breaker, it is expected that in case the first open, it will command open the Power generating facility one.	Generating Facility Owner; — control frequency in case of overfrequency and underfrequency within the whole active power output range between minimum regulating level and maximum capacity as well as at houseload level; however load acceptability shall be previously agreed between RSO and the Power Generating Facility owner and it is typically function of the type of demand to be connected and of the PGM loading status, — be capable of operation of a few power-generating modules within one island, as defined in the island condition of operation, and — Automatic control voltage during the system restoration phase when the Power Generating Module is not interconnected to the grid;
		(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 manufactures intellectual property. The power-generating facility owner shall ensure that the models provided have been verified against

Article 15(5)	Model validation could be needed to be carried out at plant site. The model is not necessarily a given before connecting the generating unit to the grid. The process shall allow for such eventuality. There is no library for main electrical protection model in main simulation software. What can be provided as accompanying document are protection settings as set on the protections. This can be used to create function in the model that trigger the behaviour, to be done by system operator. Manufacture simulation model proprietary information shall be properly protected! This same comment shall be considered extended to the complete document, whether or not explicitly indicated in the following. These values may come from the system operator or they belong to short circuit study. These values are not deliverable of a dynamic simulation study or information related to the PGM model. For synchronous generators, reactances are used for detailed analysis. Finally Scc or Icc and X/R representation is grid specific and does not properly represent a synchronous generator contribution. We recommend to remove or better clarify.	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; when the test shall be carried out at the Plant Facility, the relevant system operator shall cooperate and not unduly delay the verification of the model through tests. (ii) the synchronous power-generating module 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 settings, as agreed between the relevant system operator and the power-generating facility owner; The power generating module simulation models shall be structured as such that Proprietary Information are not disclosed, for example by using encrypted model; Manufacturer non disclosure agreement shall be undersigned by DSO, RSO and TSO so that performance capabilities cannot be disclosed. .. (vi) the request by the relevant system operator referred to in points (i) and (ii) shall be coordinated

	It is the task of the PGM to ensure capabilities of complying with the requirements. However, it is not reasonable that manufacturers invest in model validation with any simulation software on the market, including keeping the model updated. In fact, many simulation softwares have yearly release and this concept would transform manufacturers in IT department (with yearly fee of each licence, dedicated personnel, revalidation etc.). There is a real need for having system operator to force simulation software to be as much as compatible within each other and providing consistent equivalent results.	with the relevant TSO. It shall include: — the format in which models are to be provided, — the provision of documentation on a model's structure and block diagrams, (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) the relevant system operator shall adopt simulation software which can accept simulation model defined in other simulation software in common use; such simulation software shall be compatible with previous versions of the same software and ensure seamless performance of the simulation model. ... (e) 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 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, during normal operation;

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	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)	We wonder why this wording is not present in art 14. Hence, we also wonder if the values in Table XX-1 and XX2 can be enlarged.	2. With regard to voltage stability and without prejudice to Article 14(2), the relevant system operator in coordination with the relevant TSO shall define voltages at the connection point at which type D power-generating module is capable of automatic disconnection. The terms and settings for automatic disconnection shall be agreed between the relevant system operator and the power-generating facility owner.
Article 16(3)	See previous similar comment. There is no need to consider multiple contemporary event to prove robustness.	3. (a) (i) power-generating modules, when operating above their minimum stable operating level, shall be capable of staying connected to the network and continuing to operate stably after the power system has been disturbed by faults. That capability shall be in accordance with a voltage-against-time profile at the connection point for fault conditions specified by the relevant TSO. Table 7.1.1: Minimum unlimited voltage specified in Article 14(2)
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)	It is recommended to add boundary limits of the expected reactive power capability. They shall not exceed Type C/D limits and in general they shall be defined based on typical capabilities associated to technologies. The sentence .. Shall be equipped with ... The voltage contro system shall include at least:... Can be replaced by .. Shall be equipped with an AVR. The AVR shall include at least: For small generating unit, reactive and power factor control are typically requested as control modes (unlike constant terminal voltage). Viceversa, costant terminal Voltage control seems more applicable as Power Generating Unit terminals (at Power generating module terminals Q, PF and Q(U) are often the typical control modes). Seems applicablealso to PPMs. The PGM shall be able Q and PF control (and others). The wording seems to point to have the generating unit operating only in voltage control. Recommended to re-check the sentence to include appropriate controllabilities. Operating range shall be better qualified: active power, reactive etc.	. Type B synchronous power-generating modules shall fulfil the following additional requirements relating to voltage stability: (a) with regard to reactive power capability, the relevant system operator shall have the right to specify the capability of a synchronous power-generating module to supply and absorb reactive power; The capability limits shall in no case exceed limits as specified for Type C and Type D and in general their definition shall take in consideration typical values for the technology. (b) with regard to voltage control, type B synchronous power-generating modules shall be equipped with a voltage control system that can provide constant alternator terminal voltage at a selectable setpoint. reactive power and power factor control without instability over the entire operating range of the synchronous power-generating module. The voltage control system shall include at least: (i) an underexcitation limiter to prevent the automatic voltage regulator (‘AVR’) from reducing the alternator excitation to a level which would endanger angular stability; (ii) an overexcitation limiter, to ensure that the alternator excitation is not limited to less than the maximum value that can be achieved, whilst ensuring that the synchronous power-generating module is operating within its design limits.
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)	Reactive power requirements is specified at the Point of Common Coupling (connection point) therefore it is not clear what the requirement is addressing. PGU capabilities normally consider reactive power associated to the equipment installed in the Power Generating Facility. The article soe also not clarify who has to provide what. We recommend either to draft the art with more clarity or delete it.	point a deleted (b) with regard to reactive power capability at maximum capacity: (i) the relevant system operator in coordination with the relevant TSO shall specify the reactive power provision capability requirements in the context of varying voltage. For that purpose the relevant system operator shall specify a U-Q/Pmax-profile within the boundaries of which the synchronous power-generating module shall be capable of providing reactive power at its maximum capacity. The specified U-Q/Pmax profile may take any shapeshall have the shape similar to the one described in Fig 7, having regard to the potential costs of delivering the capability to provide supply reactive power production at high voltages and absorb reactive power consumption at low voltages;

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)	Voltage control system is synonimous of AVR. based on experience damping capability between 0.1 and 0.3 is difficult to be tuned an demonstrated, therefore EUTurbines recommends a frequency range between 0.3 and 1Hz. Note that the recommended range is in line with UK requirements where the topic has been deeply investigated. System studies to tune the PSS are based on input data provided by TSOs PSS provides very limited contribution on small units, but it adds a lot to the complexity of the architecture and settings of the system.	2. Type D synchronous power-generating modules shall fulfil the following additional requirements in relation to voltage stability: (a) equipped with an Automatic Voltage Regulator having: (i) an underexcitation limiter to prevent the AVR from reducing the alternator excitation to a level which would endanger angular stability; (ii) an overexcitation limiter to ensure that the alternator excitation is not limited to less than the maximum value that can be achieved, whilst ensuring that the synchronous power-generating module is operating within its design limits; (iii) a PSS function to attenuate power oscillations. The PSS shall have the capability to damp inter-area power oscillations in the frequency range of, at least, 0,3– 1,0 Hz. The relevant TSO shall have the right to request and approve the tuning of the PSS by the power-generating facility owner to damp the inter-area oscillation mode based on frequency ranges and system information specified by the relevant TSO in coordination with adjacent TSO or TSOs. The relevant TSO shall have right to request the tuning of the PSS by power-generating facility owner to damp the local oscillation mode, in which the synchronous power-generating modules is oscillating against the grid, which is represented as an infinite grid or with the characteristics as provided by the relevant TSO. The TSO shall define a lower limit active power threshold for which the PSS is requested, but not below 20 MW.

Article 19(3)		
Article 19(4)	Recommended to remove Type D threshold and make the requirement applicable for all Type D units. Based on simulation criteria, higher ROCOF can lead to technical issues, as presented during GC ESC presentation and multilateral meetings with ACER, ENTSOE, VGBE and Euroelectric.	4. With regard to frequency stability: (a) requirement laid down in Article 13(2)(b) shall not apply to a synchronous power-generating modules; (b) synchronous power-generating modules shall be capable of staying connected to the network and operate at rate-of-change-of-frequency up to ±1,0 Hz/s over a period of 0,5 s; (c) if the rate-of-change-of-frequency is used for loss of mains protection, the relevant system operator, in coordination with the relevant TSO, and in agreement with Power Generating Facility owner shall specify the threshold of this rate-of-change-of-frequency-type loss of mains protection.

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

	Text amendment proposal (if applicable)
New provision	

Please upload figures or tables if necessary

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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)		
Article Y(6)		
Article Y(7)		
Article Y(8)		

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)		
Article 20(3)		
Article 20(4)		

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)		
Article 21(2) [deleted]		
Article 21(2)		
Article 21(3)		
Article 21(4)		

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)		

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		
Article 25		
Article 26		
Article 27		
Article 28		

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		2. The relevant system operator shall clarify and make publicly available the details of the operational notification procedure which shall include the compliance scheme. 3. the compliance scheme shall address the use of equipment certificates of PGU and component. 4. The compliance scheme should refer to applicable international or European standards if available. 5. The power-generating facility owner shall notify the relevant system operator or the competent authority of the Member State about the permanent decommissioning of a power-generating module in accordance with national legislation. The relevant system operator shall ensure that such notification can be made by third parties, including aggregators. 6. The relevant system operator shall ensure that the commissioning and decommissioning of power-generating modules can be notified electronically.
Article 30		
Article 30a [new]		
Article 30b [new]		
Article 31		
Article 32		
Article 33		
Article 34		

Article 35		
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	We keep considering the need for this article which received consensus from participants to EUTurbines workshop	7. In the frame of compliance testing, when the system operator requires proof of compliance of specific requirements, it shall establish a procedures permitting generating units to be connected to the grid with the purpose of conducting such tests and verifications, including certification test process when requested.
Article 42	We keep considering the need for this article which received consensus from participants to EUTurbines workshop	2. (d) allow the use of alternative or same set of tests carried out in a different facility provided that those tests are efficient and suffice to demonstrate that a power-generating module complies with the requirements of this Regulation.
Article 43		
Article 44		
Article 45		
Article 46		
Article 47		
Article 48		
Article 49		
Article 50		
	Verification, also through simulation, shall be aimed to prove compliance to previously stated requirements.	

Article 51	This lines can imply control modes not foreseen in previous chapter of the RfG and it can lead to logics different from what described in previous chapters. What is "close loop control" and when is "stability compliance of LFSM-O" is not in fact previously described. Compliance simulation shall not become an indirect requirements to something not defined in previous chapters. Remove the sub article. This control mode is not defined in previous chapter within the RfG. Verification, also through, simulation shall be aimed to prove compliance to previously stated requirements, complaince simulation shall not become indirect requirements. Remove the sub article. It is not clear what the aim of this verification and compliance against which acceptance criteria. The appropriate settings shall be defined and are function of the condition of the point of connection. There could be the situation that specific settings (very fast settings) are requested to be set on very weak grid leading to instability. The instability cannot be considered a non compliance, since the setting request is by itself is not correct. Compliance simulation shall not become an indirect requirements to something not defined in previous chpaters. In addition this leaves a level of national creative freedom on a too	2. With regard to the LFSM-O response simulation the following requirements shall apply: (a) the power-generating module's capability to modulate active power at high frequency in accordance with Article 13(3) shall be demonstrated by simulation; (b) the simulation shall be carried out by means of high frequency steps and ramps reaching minimum regulating level; (c) the simulation shall be deemed successful in the event that: (i) the simulation model of the power-generating module is validated against the compliance test for LFSM-O response described in Article 44(2); and (ii) compliance with the requirement set out in Article 13(3) is demonstrated. 3. With regard to the reactive power capability simulation, the following requirements shall apply: ... 6. With regard to the simulations on the system restoration requirement in paragraph (c) of Article 14(4), the power-generating module shall demonstrate its technical capability to operate stably in case of a step change of external short-circuit power at the connection point defined by

	delicate topic. Remove the sub article. This shall be eventually treated through appropriate EG and not introduced in present regulation without any appropriate technical vetting. In Short circuit studies, the worst case scenario is the one verified. It is not common practice to validate capabilities considering a change in the Scc. It is also complex to assess properly such phenomena. Remove sentence and keep present recognized common practice, Again this proposal was not properly technically vetted.	the relevant system operatorminimum short circuit level as defined in the connection agreement.
	Verification, also through simulation, shall be aimed to prove compliance to previously stated requirements. This lines can imply control modes not foreseen in previous chapter of the RfG and it can lead to logics different from what described in previous chapters. What is "close loop control" and when is "stability compliance of LFSM-U" is not in fact previously described. With a given load gradient of 20%Pref in 5min for LFSM-U for PGM there is a stability compliance for very, very small load steps only. Compliance simulation shall not become an indirect requirements to something not defined in previous chpaters. Remove the sub article. The requirements points to verification that can	

Article 52	be extremely ccomplex and leave a too high level of freedom of interpretation and as such they are not acceptable. Specified simulation capability and expectations are not reflected in the control logics as described in any of the previous chapters. Verification also through simulation shall be aimed to prove compliance to previously stated requirements, complaince simulation shall not become indirect requirements. Island operation and system restoration are operational mode that need appropriate agreement, analysis and engineering. Simulation cannot provide evidence on how the units is expected to operate in any possible scenario as it seems to be expected. Note that FSM is not considered as an operational control mode for operating an island in stable conditions with a load gradient of for example 2%Pref in 30s! Definition of damping and small-signal stability is missing, but this terminology is needed to understand the requirements (and implication). FSM can not be used as a missing system requirement which for networks which are less stable due to lack of inertia. We are also wondering how a network in island operation is planned to reconnect to the rest of the network.	delete point 2(d) (a) the power-generating module's performance during island operation referred to in the conditions set out in point (b) of Article 15 (4) shall be demonstrated by RMS simulation;
Article 53		
Article 54		
Article 55		
Article 56		

Article 57		
Article 58		
Article 59		

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

	Text amendment proposal (if applicable)
	Article 43a Common Provisions on Equipment Certificates 1. In the case that the compliance scheme specified by the RSO provides for the use of equipment certificates issued by an authorised certifier in the context of Title III and/or Title IV, the equipment certificates shall comply with the following provisions: a) Any equipment certificate shall be based on the certification scheme as specified in the compliance scheme. b) The equipment certificates are classified into PGU certificates, and component certificates and PGM certificates. The equipment certificates shall demonstrate the conformity with the specified requirements as defined in the compliance scheme by applying the respective evaluation and assessment measures according to the certification scheme c) Specified requirements referred to within equipment certificates may be defined by the requirements as set out in Title II, provided by a national implementation under this Regulation, by relevant internationally recognized European standards and/or alternative schemes that may also be applicable.

New article	2. RSOs shall accept equipment certificates issued by authorized certifiers of any Member States whose accreditation is given by the respective national affiliate of the European cooperation for Accreditation (‘EA’). 3. RSOs may accept equipment certificates that provide a statement of conformity with respect to specified requirements others than the requirements at national level implemented under this Regulation according to the provisions of Article 7 (1), i.e. the RSOs’ national grid codes. In such case, the RSO shall specify the acceptance conditions within the compliance scheme, as well as which additional information needs to be provided in order to demonstrate the compliance of the equipment with the established requirements at national level implemented under this Regulation. 4. The compliance scheme defined by the RSO may define as eligible those equipment certificates where the statement of conformity covers only selected specified requirements (e.g. FRT, LFSM, etc.). These will be used within the compliance scheme required by the RSO. 5. RSOs may accept equipment certificates for PGU and/or components which belong to a family to the extent defined within the compliance scheme, required by each RSO, under which the assessed PGU and/or component is certified. This subset of PGUs and/or components shall comply

	with the definition for PGU family, if not otherwise defined in the compliance scheme.

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TITLE V - Derogations

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

	Comment on the ACER draft amendments	
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

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