

# 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')**.

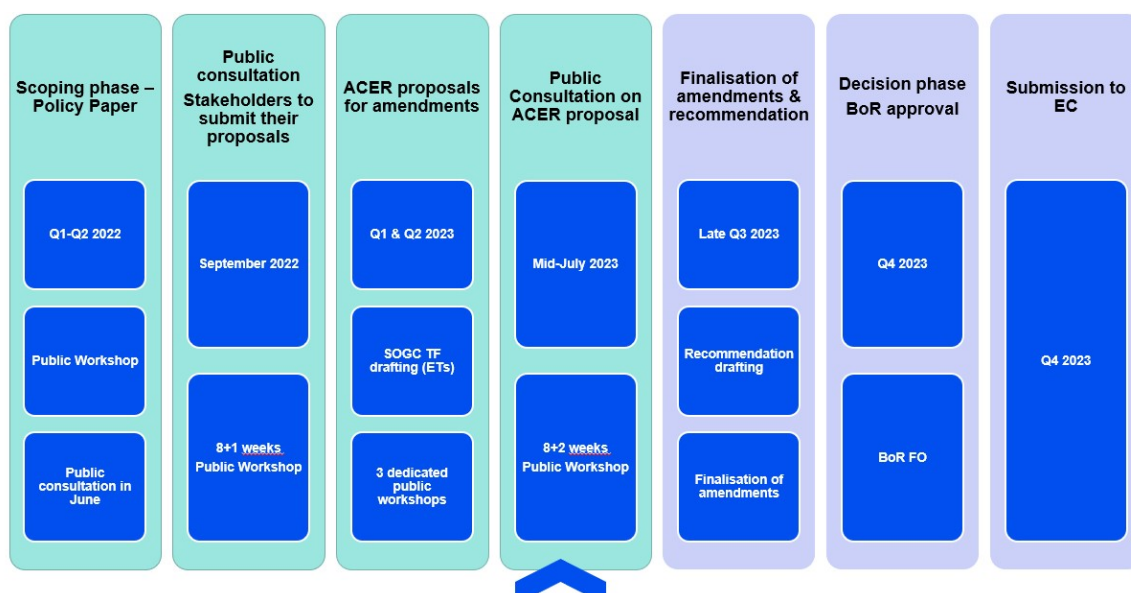
For draft amendments concerning Network Code on Demand Connection ('NC DC'), please go to the respective form: [NC DC](#).

**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.

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## Stakeholder's details

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Find out more how we process your data: <https://www.acer.europa.eu/the-agency/about-acer/data-protection>

\* Name of the stakeholder:

Gunnar KAESTLE

\* Contact person:

[REDACTED]

\* Contact person's email address:

[REDACTED]

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

Germany

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\* 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)

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## Instructions

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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 alternative 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.

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### ***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	

Please upload figures or tables if necessary

 The maximum file size is 1 MB

Select file to upload

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.
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### ***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**

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Please upload your file here

The maximum file size is 1 MB

Only files of the type pdf,doc,docx,odt,txt,rtf are allowed

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**14\_Importance\_of\_choosing\_the\_correct\_reference\_value\_v1-2.pdf**

**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.

Please upload your file

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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

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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)	"subject to transparent, proportionate and non-discriminatory rules" - treating different entities in the same way is also some kind of discriminatory behaviour. See for instance the technical difference between synchronous machines and converter-based generators.	Add as next sentence: However, where discrimination is needed, the principle of proportionality allows to have also rules which discriminate between different technologies and stakeholders.
(3)	During the drafting of RfG's first edition it was pointed out that harmonisation is not the primary goal of the network codes, but to ensure a stable cross-border electric power system.	Add: When possible, for harmonisation of generators and loads the mechanism of European standardisation (CEN/CENELEC) should be used.
(s1)		
(s2)		
(4)		
(5)		
(6)		
(7)		
(8)		
(9)		
		Add to Article 5 on significance also the threshold of 1 kV (e.g. as a discriminator between type A and type B). This allows to topologically make a distinction between these two distribution voltage levels.

(10)

"In view of the different voltage level at which generators are connected and their maximum generating capacity, this Regulation should make a distinction between different types of generators by establishing different levels of requirements." In electrical power engineering the most relevant threshold is 1 kV (threshold between LV and HV AC systems in a broader sense)

The level of 1 kV is an important separator between two different worlds. The gap between 1 kV and 10 kV is much larger than the gap between 20 kV and 400 kV. There are technical reasons for the importance of this 1 kV threshold.

1. Electrical hazards are different in LV and HV.

The main risk in LV is electrical shock, in HV electrical arcing causes a more severe impact: a fault arc causes glaring light, intense heat, and pressure increase in closed rooms.

2. LV and HV are usually different in the type of the line.

Low voltage lines are quite commonly built as a four conductor cable or overhead line (L1-L2-L3-N) while HV is normally a three phase system with no neutral.

3. The workforce licensed to work on LV and HV equipment need different training.

This comprises e.g. special equipment for live line working in the HV grid and training courses to obtain a switching authorisation.

4. Protection strategies differ between LV and HV.

Please compare the HD 60364 series (Low-voltage electrical installations) [5] with EN 50522 (Earthing of power installations exceeding 1 kV a.c) [6].

5. Quite a few National Regulating Authorities refer to grid levels

- Extra High Voltage Lines (Transmission)
- EHV/HV Substation
- High Voltage Lines (Subtransmission)

		<ul style="list-style-type: none"> <li>- HV/MV Substation</li> <li>- Medium Voltage Lines</li> <li>- LV/MV Substation</li> <li>- Low Voltage Lines</li> </ul> <p>6. Line impedance (R/X ratio) differs largely between LV and MV.</p> <p>This has consequences for voltage control strategies. Q(U) reactive power control is well established in HV and EHV and works also in distribution, even at LV in a limited way.</p> <p>Additionally, P(U) control strategies for dispatchable units seem to be useful but rather at LV level only (eg. small CHP engines or battery chargers).</p> <p>7. Useful Fault Ride Through behaviour (FRT) is different in LV and MV.</p> <p>Fast reactive current support during a voltage dip until fault clearance may be useful in MV but not in LV due to different protection concepts.</p>
(**)		
(11)		
(12)		
(13)		
(14)		
(15)		
(16)		
(17)		
(x)		

(18)	<p>Regarding the fault-ride-through capability and different national choices, it is not a matter of RES. Norway has almost 100 % RES in the form of hydro, but these are very similar to the FRT behaviour of synchronous machines driven by thermal power plants.</p> <p>The upper limit for fault-ride-through requirements should be 250 milliseconds. - Most gensets are not able to cope with a 250 ms clearing time. This seems to be more a legal trick to shift responsibility if a protection relay fails and secondary protection is needed, which takes longer.</p>	<p>Remove "such as the level of renewable energy sources ('RES')" as the characteristic of being renewable or not does not matter here. It is the question of a large share of synchronous generators are still online (short circuit power) or converter-based generation.</p> <p>Reduce the 250 ms upper limit to a reasonable value of maximum fault clearing time a synchronous generator has to cope with.</p>
(19)		
(**)		
(20)		
(21)	<p>The principle of state observers should be used, meaning that not all network nodes need a measurement, but only a few selected measurements are needed from which a model based projection on the whole system is performed. This is of special relevance for distribution networks.</p> <p><a href="https://en.wikipedia.org/wiki/State_observer">https://en.wikipedia.org/wiki/State_observer</a></p>	<p>Add:</p> <p>State observers should be used to minimise the efforts to get an appropriate overview, for simple communication in distribution grids 1:N broadcasting systems can help to reduce the overlay costs.</p>

(22)	<p>During the disturbance of November 2006 (system split) the MV connected wind turbines in Eastern Germany were mostly not equipped with a feed-in management system (SCADA, ripple control, GSM receiver, etc.) However, they had a working over-voltage protection (= P (U) receiver), which can be triggered by the U(P) sender of a voltage controller at the on-load tap changer of the power transformer at the substation.</p>	<p>Add:</p> <p>This includes different versions of digital and analogue communication channels.</p>
(**)		
(23)		
(24)	<p>As voltage control via management of reactive power is only an cross-border issue for transmission (meshed grid) and subtransmission level (partly meshed), the distribution grids are usually radially and there for have a confined cell like structure. Furthermore, it is questionable if reactive power at LV level is able to reach rather far away some point in the transmission network.</p>	<p>Add:</p> <p>Therefore, it is important that the capabilities actually required for efficient system operation be thoroughly assessed, taking into account the voltage level of the point of connection in regard to possible cross-border issues.</p>
(25)	<p>"Synthetic inertia could facilitate further expansion of RES, which do not naturally contribute to inertia."</p> <p>Regarding the RES, this sentence is wrong. It is not the characteristic of being renewable or not, but the typ of the interface (synchronous machine vs inverter). RES in the form of hydropower uses synchronous machines and is contributing to inertia.</p>	<p>Modify:</p> <p>Synthetic inertia could facilitate further expansion of RES, which do not naturally contribute to inertia if current inverter technology is used."</p>

(**)		
(26)	Does it make sense to refer to EN 50540-10	If available, adequate european standards should be used.
(27)		
(28)		
(29)		
(30)		
(31)		
(32)		

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

	Text amendment proposal (if applicable)
New recital	Article 1 has not table entry, this is a comment on Article 1: "and to facilitate Union-wide trade in electricity." not only to facilitate Union-wide trade of electricity, but also the Union-wide trade of power-generating facilities that generate this electricity. This is especially true in DER such as solar systems, wind turbines and CHP units that are needed to fulfill the residual load in an efficient matter, no matter which storage fuel is used in future energy scenarios.

## Definitions (Article 2)

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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)		

<p>Article 2(5)</p>	<p>"‘power-generating module’ means either a synchronous power-generating module or, a power park module" is an enumeration which combines to different types of PGM.</p> <p>(9) ‘synchronous power-generating module’ is a set of machines which cannot be operated independently from each other.</p> <p>Whereas (17) ‘power park module’ or ‘PPM’ is a unit or ensemble of units.</p> <p>With a PGM we can't be sure if the requirements refer to a independently operable unit or a ensemble of units. This ambiguity should be repaired.</p> <p>A generic definition would be much better.</p>	<p>‘power-generating module’ means the smallest set of installations which can generate electrical energy running independently and which can feed this energy into a distribution network</p> <p>specify (9) and (17) as term which inherits features from (5)</p> <p>‘synchronous power-generating module’ means a power-generating module of which the frequency of the generated voltage, the generator speed and the frequency of network voltage are in a constant ratio and thus in synchronism;</p> <p>‘power park module’ or ‘PPM’ means a power-generating module that is either non-synchronously connected to the network or connected through power electronics, and that also has a single connection point to a transmission system, distribution system including closed distribution system or HVDC system</p> <p>consequently, the facility is the aggregation of one or more PGM, no matter which kind of PGM type they are.</p> <p>(6) ‘power-generating facility’ means a facility that converts primary energy into electrical energy and which consists of one or more power-generating modules connected to a network at one or more connection points;</p>
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Article 2(6)		
Article 2(7)	<p>(7) 'power-generating facility owner' means a natural or legal entity owning a power-generating facility;</p> <p>The important legal person is not the owner, but the operator. Operators should talk to operators e.g. Transmission System Operators, and not Transmission System Owners, which could be an Investment or Pension fund. In the same way, the ownership can be shared between different legal persons. The operator is often the same as the owner, but sometimes a dedicated operator is doing the job, see see the case of a joint venture power generating plant</p>	<p>The operator has operating responsibility, where as the owner only provides financial means and decides about long-term strategies. Refer to the operator instead in the whole document:</p> <p>(7) 'power-generating facility operator' means a natural or legal entity operator a power-generating facility;</p> <p>often the operator is the same entity as the owner, but this is not always the case,</p>
Article 2(8)	<p>Please use the definition of the IEV (Electropedia), as there are different types of networks (electric, gas, heat, communication)</p> <p><a href="https://www.electropedia.org/iev/iev.nsf/display?openform&amp;ievref=601-01-02">https://www.electropedia.org/iev/iev.nsf/display?openform&amp;ievref=601-01-02</a></p> <p><a href="https://www.electropedia.org/iev/iev.nsf/display?openform&amp;ievref=732-01-01">https://www.electropedia.org/iev/iev.nsf/display?openform&amp;ievref=732-01-01</a></p>	<p>(12) 'network' means particular installations, substations, lines or cables for the transmission and distribution of electricity. The boundaries of the different parts of this network are defined by appropriate criteria, such as geographical situation, ownership, voltage, etc.;</p>
Article 2(9)		
Article 2(10)		
Article 2(10a)		
Article 2(11)		

Article 2(12)	<p>Please use the definition of the IEV (Electropedia), as there are different types of networks (electric, gas, heat, communication)</p> <p><a href="https://www.electropedia.org/iev/iev.nsf/display?openform&amp;ievref=601-01-02">https://www.electropedia.org/iev/iev.nsf/display?openform&amp;ievref=601-01-02</a></p> <p><a href="https://www.electropedia.org/iev/iev.nsf/display?openform&amp;ievref=732-01-01">https://www.electropedia.org/iev/iev.nsf/display?openform&amp;ievref=732-01-01</a></p>	(12) 'network' means particular installations, substations, lines or cables for the transmission and distribution of electricity. The boundaries of the different parts of this network are defined by appropriate criteria, such as geographical situation, ownership, voltage, etc.;
Article 2(13)		
Article 2(14)	operators should talk to operators, the owner can be a different legal entity	(14)'connection agreement' means a contract between the relevant system operator and either the power-generating facility operator, demand facility operator, distribution system operator or HVDC system operator, which includes the relevant site and specific technical requirements for the power-generating facility, demand facility, distribution system, distribution system connection or HVDC system;
Article 2(15)	Don't use enumeration in definitions, as one item on the list may have been forgotten. Use a generic description instead.	(15)'connection point' means the reference point on the electric power system where the grid user's electrical facility is connected, as identified in the connection agreement or determined by other appropriate means, where an agreement is not required;
Article 2(16)		
Article 2(17)		
Article 2(18)		
Article 2(19)		
Article 2(20)		

Article 2(21)		
Article 2(22)	<p>There is a difference between frequency (of any kind of oscillation) and the power frequency of a power system (e.g. 0 Hz ; 16,6 Hz ; 50 Hz ; 60 Hz ; 400 Hz ; etc.), see <a href="https://www.electropedia.org/iev/iev.nsf/display?openform&amp;ievref=601-01-05">https://www.electropedia.org/iev/iev.nsf/display?openform&amp;ievref=601-01-05</a></p>	<p>(22)'power frequency' means the frequency of electric power systems expressed in hertz that can be measured in all parts of the synchronous area under the assumption of a consistent value for the system in the time frame of seconds, with only minor differences between different measurement locations. Its nominal value is 50Hz;</p>
Article 2(23)	<p>Don't use a definition to give the requirements. A definition shall be most general and not include requirements on how to use this definition.</p>	<p>(23)'droop' means the ratio of a steady-state change of frequency to the resulting steady-state change in active power output, expressed in percentage terms. The change in frequency is expressed as a ratio to nominal frequency and the change in active power expressed as a ratio to a power reference value;</p>
Article 2(24)		
Article 2(25)		
Article 2(26)		
Article 2(27)		
Article 2(28)		
Article 2(29)	<p>Low voltage is a defined term in AC power systems, meaning voltage up to 1 kV, see 50549-1/-2. Here, the term "under voltage" below a certain threshold is correct. Eg. if the voltage dips in a 400 kV about 5% this means 20 kV which is much more than low voltage.</p>	<p>(29)'fault-ride-through' means the capability of electrical devices to be able to remain connected to the network and operate through periods of under voltage at the connection point caused by secured faults;</p>
Article 2(30)		

Article 2(31)		
Article 2(32)		
Article 2(33)		
Article 2(34)		
Article 2(35)		
Article 2(36)	An important feature is that FSM is a proportional controller. "in such a way that it assists with the recovery to target frequency;" also applies to the differential behaviour of synthetic inertia. This definition is not suited to differentiate between a P and D behaviour.	proportional to ROCOF means differential frequency response:  'frequency sensitive mode' or 'FSM' means the operating mode of a power-generating module or HVDC system in which the active power output changes proportionally to the rate of change in system frequency, in such a way that it assists with the recovery to target frequency;
Article 2(37)	This is a propotional response, no I or D controller.	(37)'limited frequency sensitive mode — overfrequency' or 'LFSM-O' means a power-generating module or HVDC system operating mode which will result in a proportional active power output reduction in response to a change in system frequency above a certain value;
Article 2(38)	This is a propotional response, no I or D controller.	(38)'limited frequency sensitive mode — underfrequency 'LFSM-U' means a power-generating module or HVDC system operating mode which will result in a proportional active power output increase in response to a change in system frequency below a certain value;
Article 2(39)		
Article 2(40)		

Article 2(41)		
Article 2(42)		
Article 2(43)		
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Article 2(46)		
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Article 2(54)		
Article 2(55)		
Article 2(56)		
Article 2(57)	The slope is a feature in all linear graphs, not only in a Q(U) characteristic curve. Could also be P(U) or I(U).	(57)'Q/U slope' means the ratio of the change in voltage, based on reference 1 pu voltage, to a change in reactive power in-feed from zero to maximum reactive power, based on maximum reactive power;
Article 2(58)	Is the 'offshore grid connection system' an AC or DC connection? Or can it be both? DC transmission systems are part of the HVDC Network Code	'offshore grid connection system' means the complete AC interconnection between an AC offshore connection point and the AC onshore system at the onshore grid interconnection point;
Article 2(59)		
Article 2(60)		
Article 2(61)		

Article 2(62)		
Article 2(63)		
Article 2(64)		
Article 2(65)		
Article 2(66)		
Article 2(67)		
Article 2(68)		
Article 2(69)	V1G and V2G are not very well known abbreviations. For better reading call a spade a spade.	(69) 'electric vehicle with a unidirectional charger' means the vehicle that is powered, fully or in part, with electricity and can only withdraw electricity from the grid.
Article 2(70)	V1G and V2G are not very well known abbreviations. For better reading of the whole document call a spade a spade.	(70) 'electric vehicle with a bidirectional charger' means the vehicle that is powered, fully or in part, with electricity and is equipped with technology enabling the vehicle to provide electricity to the grid.
Article 2(71)	<p>V1G and V2G are not very well known abbreviations. For better reading of the whole document call a spade a spade.</p> <p>What kind of electrical wirings are not deemed part of an EVSE? It has certainly some wiring, or do you mean the connecting cable between EV and the EVSE?</p>	(71) 'unidirectional EV supply equipment' means the infrastructure necessary to safely conduct electrical energy from the electricity supply grid to the electric vehicle with only load behaviour. Electrical wirings are not deemed part of an electric vehicle supply equipment.

Article 2(72)	<p>V1G and V2G are not very well known abbreviations. For better reading of the whole document call a spade a spade.</p> <p>"Generation and demand" are not the correct semantic pairs: supply and demand are terms from macroeconomics, production and consumption from microeconomics, and generators and loads are technical pairs.</p>	(72) 'bidirectional EV supply equipment' means the infrastructure necessary to conduct electrical energy safely from the electricity supply grid to the electric vehicle and from the electric vehicle to the electricity supply grid with both generation and load behaviour. Electrical wirings are not deemed part of an electric vehicle supply equipment.
Article 2(73)		
Article 2(74)	<p>This seems to be an inconsistency: According to (73) a park consists of at least 3 units, whereas (74) a park already begins with a single units. A "park" sounds like a cluster of units.</p>	(74) 'V2G electrical charging park' means the installation that has a single connection point to the relevant network and where three or more V2G electric vehicles can be simultaneously connected.
Article 2(75)	<p>Distribution system operators shall talk to EV charging park operators. We don't need a mixup between operators and owners. The operatorship is important here.</p>	(75) 'Electrical charging park operator' ....

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

	Text amendment proposal (if applicable)
New definition	

Please upload figures or tables if necessary

The maximum file size is 1 MB

## TITLE I - General provisions

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

Includes new articles

	Comment on the ACER draft amendments	Alternative text amendment proposal (if applicable)
Article 1		
Article 3		
Article 4		
Article 4a [new]		
Article 5	<p>The differentiation between 1 kV and 1 MV is missing. Whereas recital (10) reads: "In view of the different voltage level at which generators are connected and their maximum generating capacity, this Regulation should make a distinction between different types of generators by establishing different levels of requirements." See also Framework Guidelines On Electricity Grid Connections, FG-2011-E-001, page 8.</p> <p>Article 5 (Determination of significance) reads in paragraph 1: "Power-generating modules shall comply with the requirements on the basis of the voltage level of their connection point and their maximum capacity according to the categories set out in paragraph 2."</p> <p>So far the only voltage level addressed is 110 kV. This structural feature of the Network Code RfG does not allow to address separate voltage levels in distribution networks (LV+MV) in a topologically specific manner. This granularity might be needed to solve issues in distribution network such as unintentional islanding, as here a one-size-fits all solution has not been found yet, which satisfies all different network</p>	<p>Article 5</p> <ul style="list-style-type: none"> <li>- paragraph 2(a) maximum capacity of 0,8 kW or more and a connection point up to 1 kV (type A);</li> <li>- paragraph 4. Remove the paragraph, as the voltage level is an important topological information also for PGMs which are smaller than 10 MW.</li> </ul>

	<p>infrastructures which have been erected in different countries, regarding e.g. protection schemes, earthing principles, etc. See also EN 50549-1 (LV) and EN 50549-2 (MV), which are similar, but differ in a few important aspects.</p> <p>The proposal is to distinguish also between LV and MV, or distribution level (up to 36 kV as some Belgian MV lines) and above. The voltage level as topology information then can allow to introduce specific new features to chosen voltage lines, which means all grid users at this given line follow the same requirements. This is an important unification in the case of horizontal splits and electric islands.</p>	
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	

Please upload figures or tables if necessary

The maximum file size is 1 MB

## TITLE II CHAPTER 1 - General Requirements

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**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)	<p>Article 13(2)(b) A differentiation between large gensets (expressed in a large inertia constant) and smaller gensets (expressed with a smaller inertia constant) is needed. With smaller generator connected to the MV level, the inertia constant is rather low, that means the synchronous generator is capable of providing extra power while the frequency is decreasing, without slipping because of the polar wheel angle getting too large.</p> <p>The test curves in Figures XX.a and XX.b cover only the PPM requirements, what is with SPM? The test curve does not fit to the clause (ii): after 0,25s @ 4 Hz/s plus 0,5s @ 2 Hz we have arrived at 0,75 s @ 52 Hz, not after 1 s. This is confusing as well as the dotted lines in between.</p> <p>The kinks on the curve would not happen in real life, and this is also not complying to the general principle of bumpless control action.</p>	<p>Differentiate between large (1 Hz/s) and small (2 Hz/s) SPGs, where the threshold in between is determined by the inertia constant.</p> <p>Only ask for the most stringent requirement:</p> <ul style="list-style-type: none"> <li>- 1 Hz/s @ large SPM</li> <li>- 2 Hz/s @ small SPM</li> <li>- 4 Hz/s @ PPM</li> </ul> <p>Regarding the duration, say the maximum time intervall at a given start point at lowest frequency up to the highest frequency and vice versa is required.</p> <p>If a test curve is needed, introduce a blank one without any reference to the requirements in (ii)</p>

Article 13(3)	<p>In figure 1 the text should be moved to the paragraph below. If there is a choice between to different P_ref, there is no defined system answer. This scenario can cause a cascading system split after a first frequency excursion because of extra transits in a disturbed system.</p> <p>(g) The power generating module shall be able to receive and react on an external signal allowing the relevant system operator to block active power LFSM-O mode in real-time.</p>	<p>Use as default P_ref = actual power output at the time the frequency crosses the LFSM-O threshold.</p> <p>(g) This sentence is an non-proportionate requirement for type A generators. It should be shifted to type B, where a digital communication channel is not techno-economical problem. The issue of decreasing power in an area with low power production should be healed by the n-1 security assessment and fast secondary control (I behaviour) which is also responsible to balance the connecting lines between balancing areas.</p>
Article 13(4)		
Article 13(5)		
Article 13(6)		
Article 13(7)	<p>A logic interface may comprise the overvoltage protection system, which can be triggered by the DSO's voltage regulator in an emergency. "communication interface" may imply a costly digital communicataion channel, which as a high cost to effect ration.</p>	<p>keep logic interface (input port) or say signal interface (input port) as these are the most generic umbrella terms.</p>
Article 13(8)		
Article 13(9)		
Article 13(10)		
Article 13(11)		
Article 13(12)		
Article 13(13)		



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)		

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 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)		
Article 14(3)		
Article 14(4)		
Article 14(5)		

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

	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)		
Article 15(2)		
Article 15(3)[deleted]		
Article 15(3)		
Article 15(4)		
Article 15(5)		

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

	Text amendment proposal (if applicable)
New provision	

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**General requirements for type D power-generating modules**

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

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

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

	Text amendment proposal (if applicable)
New provision	

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

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

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

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

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

	Text amendment proposal (if applicable)
New provision	

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**Requirements for type B synchronous power-generating modules**

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

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

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

	Text amendment proposal (if applicable)
New provision	

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**Requirements for type C synchronous power-generating modules**

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

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

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

	Text amendment proposal (if applicable)
New provision	

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**Requirements for type D synchronous power-generating modules**

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

Includes new paragraphs

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

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

	Text amendment proposal (if applicable)
New provision	

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## TITLE II CHAPTER 3 - Requirements for power park modules

---

**[NEW]** Requirements for type A power park modules

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

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

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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

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

Includes new articles

	Comment on the ACER draft amendments	Alternative text amendment proposal (if applicable)
Article 29		
Article 30		
Article 30a [new]		
Article 30b [new]		
Article 31		
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

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

	Comment on the ACER draft amendments	Alternative text amendment proposal (if applicable)
Article 40		
Article 41		
Article 42		
Article 43		
Article 44		
Article 45		
Article 46		
Article 47		
Article 48		
Article 49		
Article 50		
Article 51		
Article 52		
Article 53		
Article 54		
Article 55		
Article 56		
Article 57		
Article 58		
Article 59		

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

	Text amendment proposal (if applicable)
New article	

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## TITLE V - Derogations

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

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

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

	Text amendment proposal (if applicable)
New article	

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**[DELETED] TITLE VI - Transitional arrangements for emerging technologies**

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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]		



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

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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

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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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