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European Union Agency for the Cooperation of Energy Regulators

Grid Connection NCs Amendments and the way forward

Grid Connection ESC

15 June 2023

Brussels-MS Teams

Public

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Process on the grid connection network codes amendment

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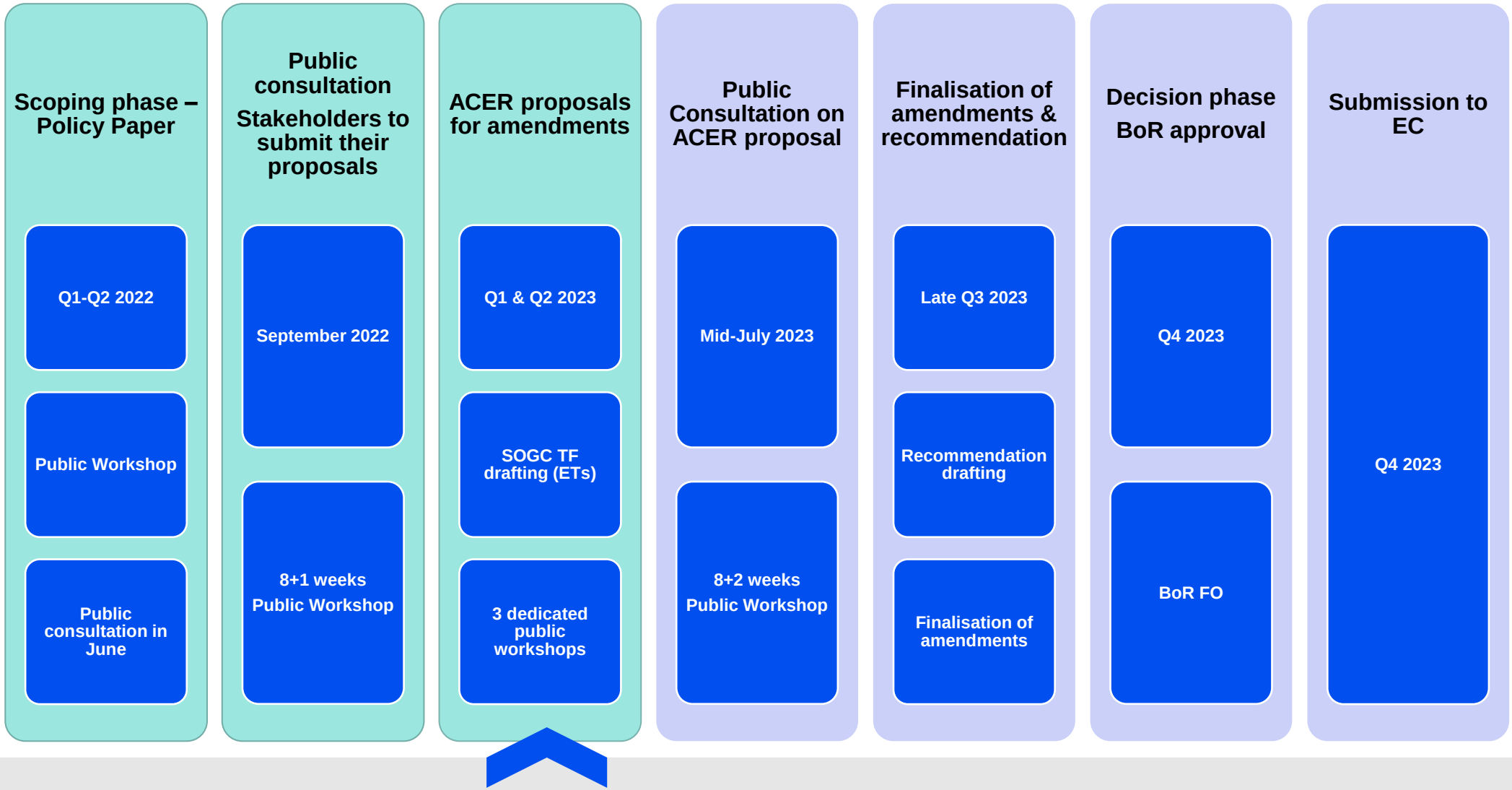
CNC - amendment process



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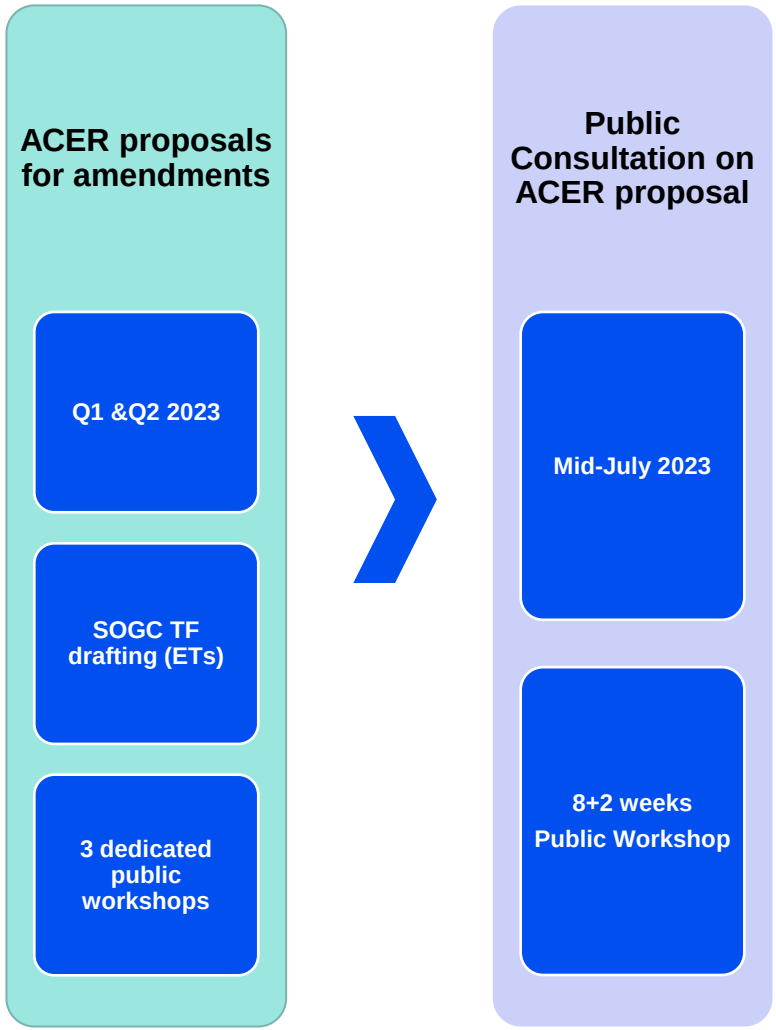
Concluded ACER Public Workshops

- **17 April 2023** – electromobility, power-to-gas demand units and heat-pumps
- **10 May 2023** – rate of change of frequency (RoCoF) and grid forming capabilities
- **11 May 2023** – technical requirements for electricity storage

Materials from ACER Public Workshops:
https://acer.europa.eu/news-and-events/news/registration-open-acers-3-workshops-related-electricity-grid-connection-network-codes

Public consultation on ACER draft proposal



- 10-week long public consultation
- Launch on **17 July**, end on 25 September 2023
- Stakeholders to comment on ACER draft amendment proposals
- On **19 July** ACER organises public workshop to present key proposals (tbc)

NC RfG

NC DC

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ACER indicative draft proposals
for NC RfG amendment

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ACER draft proposals (Requirements for Generators)

Main proposals:

Electromobility

- Proposal based on the material provided for 17 April Public Workshop
- Minor changes to improve clarity

Technical requirements for storage

- Proposal based on the material provided for 11 May Public Workshop
- Minor changes to improve clarity

Pump-storage hydro PGMs

- Proposal based on the Final Report of PSH Expert Group established under GC ESC

GC ESC – Grid Connection European Stakeholder Committee
PSH Expert Group - Requirements for pump-storage hydro power generation modules Expert Group

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ACER draft proposals (Requirements for Generators)

PGMs

Determination of significance

- Proposal based on the Final Reports of MCS Expert Group established under GC ESC
- A-B upper limit for capacity threshold set at **0.5 MW** for Continental Europe SA
- The application of voltage criteria **only above** capacity threshold of 10 MW (TSO may propose to change the threshold within a range of 5 MW and the C-D upper limit for capacity threshold)

Significant modernisation

- Clarification of the rules on significant modernisation
- Definition of **coherent criteria** across Member State (such as an increase of Pmax, change in frequency stability, change of components)
- TSO should develop proposals for defining significant modernisation and applicable requirements

GC ESC – Grid Connection European Stakeholder Committee
Continental Europe SA – Continental Europe Synchronous Area
Pmax – maximum capacity
MCS Expert Group - Mixed customer sites Expert Group

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ACER draft proposals (Requirements for Generators)

Requirements for type A PGMs

type A

- Proposal based on the Final Report of BftA Expert Group established under GC ESC
- Requirement to equip PGM with a communication interface to enable ***reduction*** of active power (previously: *ceasing* active power output)
- Addressing **new system needs**:
  - fault-ride through capability (SPGMs – non-mandatory, PPMs – mandatory),
  - voltage control system (mandatory),
  - reactive power capability (non-mandatory),
  - grid-forming capability (non-mandatory)

GC ESC – Grid Connection European Stakeholder Committee
BftA Expert Group – Expert Group Baseline for Type A PGMs

SPGMs – synchronous power-generating modules
PPMs – power park modules

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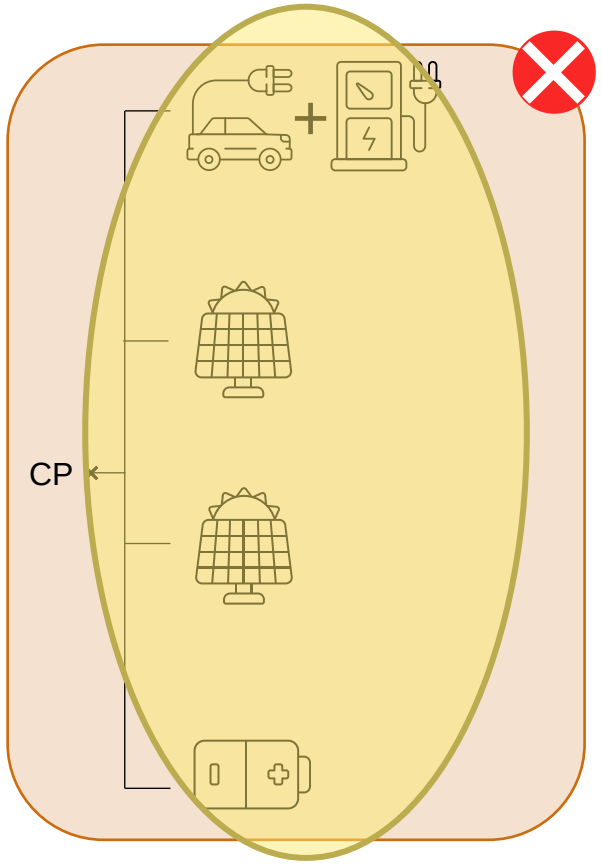
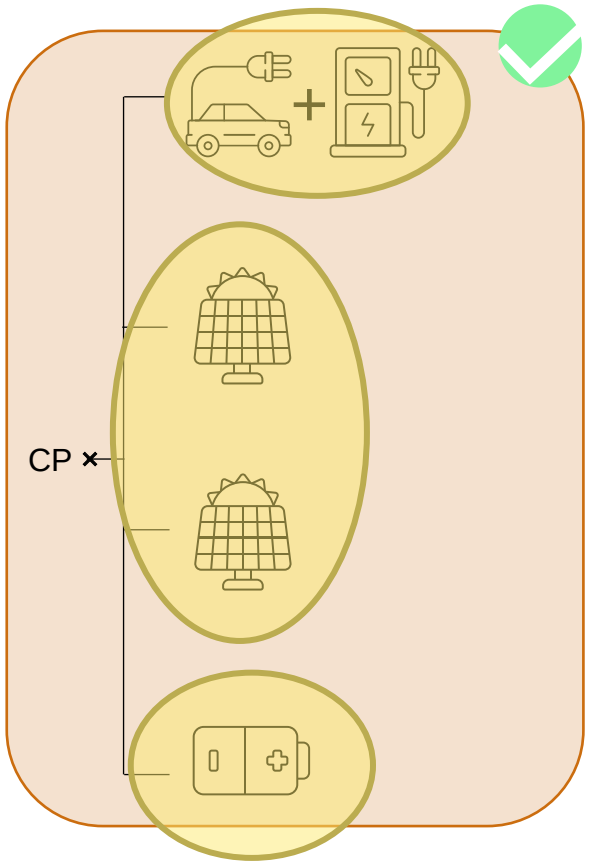
MCS

Mixed-Customer Sites

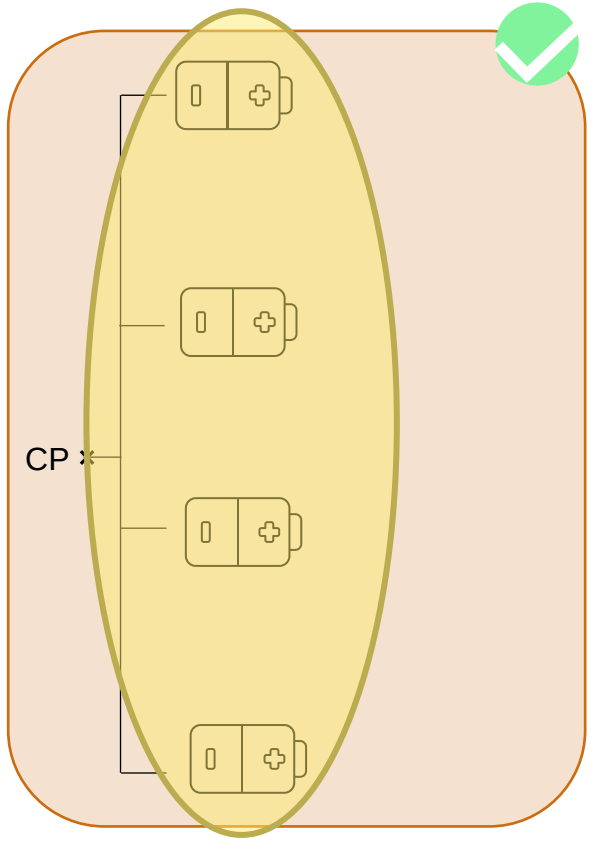
New recital to tackle units of different classes behind a single connection point



Not a single PPM



Three separate PPMs



One PPM (ESM)

NB! Storage integrated to a PPM, used solely for the purpose of meeting the requirements should be considered as part of such module while its capacity should not count towards the PPM capacity.

ESM – electricity storage module
PPM – power park module
CP – connection point

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RoCoF withstand capability

Type A, B, C and D PPMs

1) Staying connected to the network and operating at:

- ±4,0 Hz/s over a period of 0,25 s,
- ±2,0 Hz/s over a period of 0,5 s,
- ±1,5 Hz/s over a period of 1 s, and
- ±1,25 Hz/s over a period of 2 s;

2) Staying connected to the network and operating at the sequence defined by the frequency against time profiles

Type A, B, C and D SPGMs with Pmax < 400 MW

Staying connected to the network and operating at:

- ±2,0 Hz/s over a period of 0,5 s,
- ±1,5 Hz/s over a period of 1 s,
- ±1,25 Hz/s over a period of 2 s;

Type D SPGMs with Pmax ≥ 400 MW

Staying connected to the network and operating at:

±1,0 Hz/s over a period of 0,5 s

RoCoF – rate of change of frequency
Pmax – maximum capacity

SPGMs – synchronous power-generating modules
PPMs – power park modules

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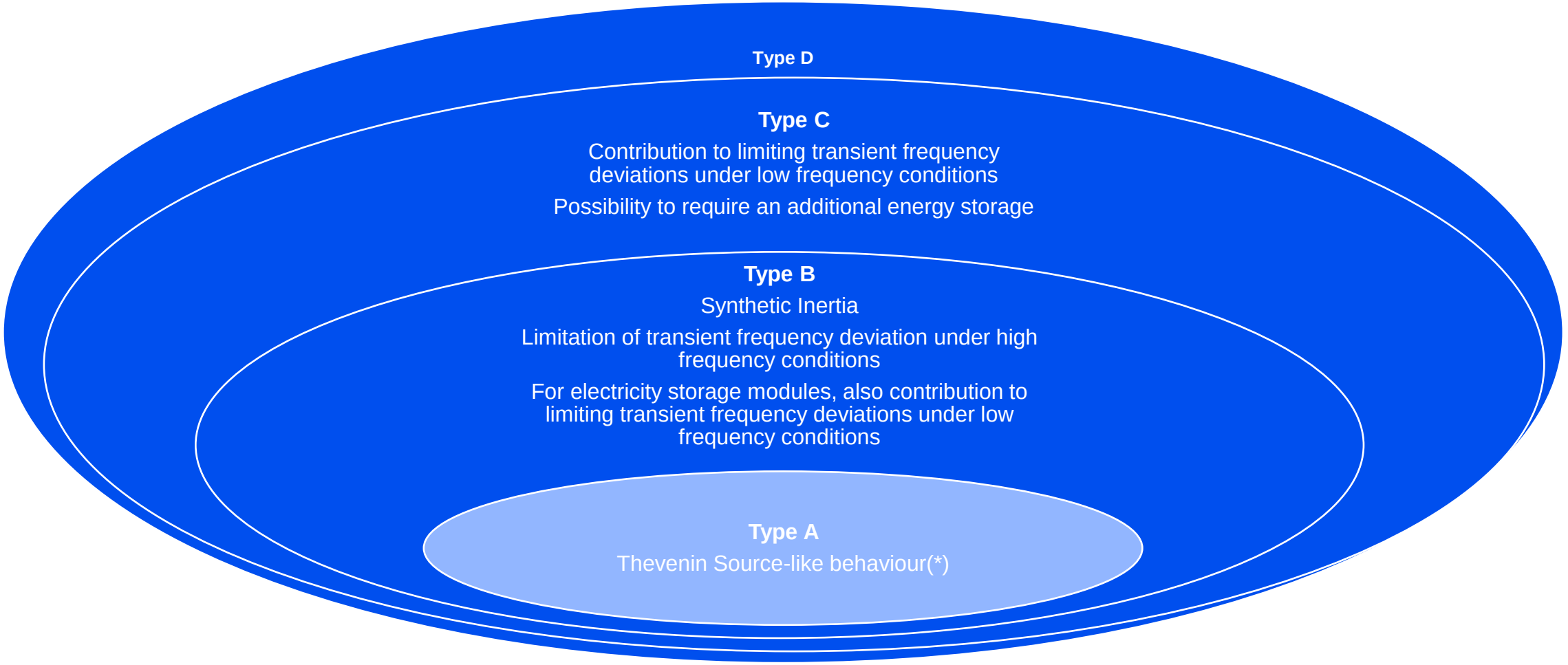
Grid forming capabilities



(*) the instantaneous AC voltage characteristics of the internal Thevenin source shall be capable of not changing its amplitude and voltage phase angle while voltage phase angle steps or voltage magnitude steps are occurring at the connection point.

Mandatory requirements

Non-mandatory requirements

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Grid forming capabilities

Selected provisions based on input following the 10 May Public Workshop:

Type A and B PPMs	The relevant system operator may specify that the activation of grid forming mode is subject to necessary adaptations to the system operator's network and operating and maintenance procedures
PPMs with Pmax <10 MW	The power park module shall have the capability to activate or deactivate grid-forming mode
All PPMs	The relevant system operator in coordination with the TSO shall specify the temporal parameters of the dynamic performance regarding voltage control

PPMs – power park modules
Pmax – maximum capacity

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ACER indicative draft proposals
for NC DC amendment

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Electromobility/demand units – applicability of NC DC

Electromobility

Heat pumps

P2G

Power-to-Gas demand units

V1G EVs and associated unidirectional EV supply equipment

> 0,8 kW capacity at all voltage levels

heat pumps,

power-to-gas demand units

> 0,8 kW capacity at all voltage levels

New Article in NC DC – exhaustive requirements:

- Frequency and voltage ranges
- RoCoF withstand capability
- LFSM-UC
- FRT (for V1G EVs and associated unidirectional EV supply equipment and power-to-gas demand units)

0,8 kW – capacity threshold follows the current NC RfG determination of significance rules

EVs – electric vehicles
FRT – fault-ride through capability
RoCoF – rate of change of frequency
LFSM-UC – limited frequency sensitive mode – underfrequency (consumption)

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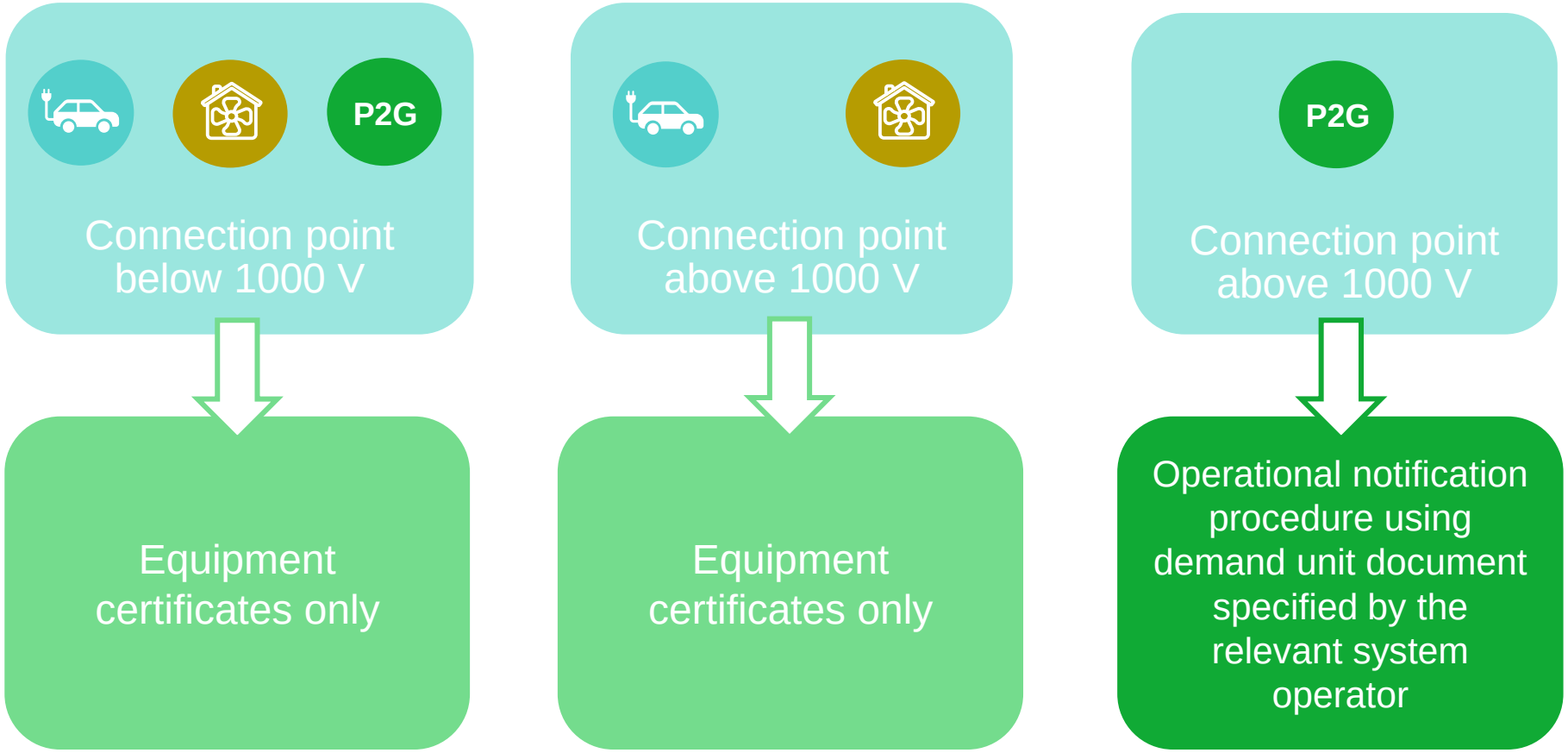
Electromobility/demand units – NC DC compliance



1000 V – voltage criterion follows the current NC DC approach to the compliance rules

(see Articles 32 and 33)

P2G – power-to-gas

Thank you.
Any questions?

The contents of this document do not necessarily reflect the position or opinion of the Agency.

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