

NC RfG DC Recommendation:

Annex 5 – Reasoning to proposed amendments to the DC Regulation

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1. INTRODUCTION

- (1) In the context of system security, the networks and the system users should be considered as one entity from a system engineering point of view. Therefore, relevant technical requirements for the grid users when connecting to the network should be specified to guarantee secure system operation. The connection network codes aim at the harmonisation of these requirements across the EU to an extent that will facilitate the internal electricity market and foster the large-scale integration of renewable generation and demand. Due to this interdependence between the connection network codes and in order for appropriate requirements to be introduced to system users, ACER has prepared amendments not only to Regulation 2016/631 of 14 April 2016 (the ‘RfG Regulation’) but also to Regulation (EU) 2016/1388 of 17 August 2016 establishing a network code on demand connection (the ‘DC Regulation’), with the aim to align them also with recent technological advancements and changes in the electric power and transport sectors within the framework of the efforts leading toward decarbonisation.
- (2) While the current structure of the DC Regulation remains (including reference to definitions of the RfG), amendments as well as new articles were introduced in the attempt to address the impacts of new developments in the electric power and transport sectors such as electric vehicles, power-to-gas units and heat pumps.
- (3) The proposed amendments to the DC Regulation are assessed against the objectives of the network codes as set out in Article 59 (2) and (4) of the Regulation (EU) 2019/943 of the European Parliament and of the Council on the internal market for electricity (‘Electricity Regulation’).

2. TITLE I GENERAL PROVISIONS

- (4) Following Protocol 1 to the EEA Agreement¹ (No 8 and 9), it is agreed that references to territories and to nationals of Member States for the purposes of the Agreement is to be understood to references also to the territories of the Contracting Parties (EU and EEA countries) and the nationals of the EFTA States.
- (5) The changes recommended to the DC Regulation subsequently led to the changes in the definitions, either for clarity reasons (i.e. transmission connected facility) or for accommodating the new provisions; a set of definitions has been introduced or amended (demand unit, demand unit document, power-to-gas demand unit, V1G electric vehicle, V1G electric vehicle supply equipment, heat pump, minimum technical operational level, limited frequency sensitive mode).
- (6) The scope of application of the DC Regulation (Article 3) is extended to include new electric vehicles and associated supply equipment that can only withdraw electricity from the grid (V1G) that do not fall within the definition of electricity storage module (as included in the RfG Regulation), heat pumps and power-to-gas demand units with maximum consumption capacity higher than 800W at any voltage level. Further, it is expressly stated that electricity storage modules and pump-storage power generating modules that have both generation and charging/pumping mode, demand facilities, demand facilities that are part other frequencies than

¹ <https://www.efta.int/sites/default/files/documents/legal-texts/eea/the-eeaagreement/Protocols%20to%20the%20Agreement/protocol1.pdf>

50Hz and demand facilities that are part of an off-grid system do not fall within the scope of the DC Regulation. In this framework, Article 5 is also amended accordingly.

- (7) According to Article 4(1) of the DC Regulation, existing transmission-connected demand facilities, existing transmission-connected distribution facilities, existing distribution systems and existing demand units that are or can be used by a demand facility or a closed distribution system to provide demand response services to a relevant system operator or relevant TSO are not subject to the requirements of the proposed DC Regulation. However, the DC Regulation is not prescriptive as to the criteria for which a modification must be considered as requiring a substantial revision of the connection agreement, nor what is regarded as a substantial revision. With the proposed new Article 4(a), significant modernisation is based on specified criteria, that the relevant TSOs should take into account when developing a proposal for defining significant modernisation. The proposal is subject to public consultation and approval by the relevant regulatory authority or, where applicable, the Member State, thus increasing the transparency and leaving no room for interpretation and avoiding legal uncertainty.
- (8) According to Article 6(4) and in order to allow for a swift implementation of the requirements provided by the DC Regulation, Member States may set a shorter time period for system operators to submit a proposal for part or all the relevant requirements and/or methodologies, communicating their decision to ACER. In paragraph 7, the proposed amendments clarify that not only system operators but also the NRAs or designated entity may propose amendments to requirements and methodologies provided in the Regulation.
- (9) In Article 10(1) of the DC Regulation, and in order for stakeholders' engagement to be expanded during consultation, ACER proposes an amendment to paragraph 1, so as to require ACER in co-operation with ENTSO-E and EU DSO Entity to organise shareholders involvement regarding the requirements for grid connection of all entities subject to the provisions of the DC Regulation pursuant to Article 10(2).

3. TITLE II CONNECTION OF TRANSMISSION-CONNECTED DEMAND FACILITIES, TRANSMISSION-CONNECTED DISTRIBUTION FACILITIES AND DISTRIBUTION SYSTEMS

3.1 General Requirements (Chapter 1)

3.1.1. Short circuit requirements

- (10) Article 14 of the DC Regulation provides short-circuit requirements for the connection of transmission-connected demand facilities, transmission-connected distribution systems. As not all transmission network elements should be considered by the relevant TSO to specify the maximum short circuit current at the connection point, the proposed amendment provided only for the relevant transmission network elements.
- (11) Further, the requirements of Article 14 provide a legal basis for relevant TSOs to deliver to the transmission-connected demand facility owner or the transmission-connected distribution system operator an estimate of the minimum and maximum short-circuit currents contribution to be expected at the connection point as an equivalent of the network. However, as both sides of the connection point (TSO and the owner or the distribution system operator) are influencing the respective other side in terms of short circuits, a bidirectional information exchange is proposed.

- (12) The DC Regulation in Article 14 paragraphs 3 to 9 provide the procedure to be followed after an unplanned event and before a planned event regarding the threshold for the maximum short-circuit current. However, these provisions relate to operational planning and not to the connection capabilities. The content of these provisions has the same scope as Title 1, Chapter 3 in Regulation 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation (the ‘SO Regulation’) governing requirements on short-circuit management.
- (13) ACER therefore proposes that paragraphs 3 to 9 of Article 14 are removed from the DC Regulation and are instead integrated into PART III, Title 1, Chapter 3 of the SO Regulation. ACER has expanded these provisions in order for changes to the maximum short-circuit current following an unplanned or before a planned event to be included. This merge provides a simpler and more transparent legal framework regarding these requirements.

3.1.2. Reactive power requirements

- (14) Article 15 of the DC Regulation provides reactive power requirements for the connection of transmission-connected demand facilities and transmission-connected distribution systems. However, these requirements are defined as shares of the maximum capacity, which means that the capability to stay within a rectangular area in the P-Q plane is requested. For clarity reasons, ACER recommends that the expression of the power factor in the brackets is removed, so as to remove the risk of the requirement not being coherently implemented in every situation.
- (15) Additionally, as the wording ‘import/export’ has led to confusion during implementation in several Member States where import or export could depend on their discretion, such as an import considered from the distribution grid is an export seen from the transmission grid. To improve the overall clarity of the requirements, ACER therefore proposes to remove the wording ‘import/export’ and replace it with ‘consumption/infeed’ throughout the DC Regulation.
- (16) Furthermore, to improve clarity and ensure legal certainty as regards paragraph 2 of Article 15 regarding reactive power, ACER proposes appropriate changes to the relevant provisions of Article 15.

3.1.3. Demand connection and demand disconnection

- (17) Article 19 of the DC Regulation provides requirements for transmission-connected demand facilities and transmission-connected distribution systems related to low frequency demand disconnection functional capabilities. To improve legal certainty, ACER proposed to clarify the terms used regarding the functional capabilities for low frequency demand disconnection in paragraph (1)(c).
- (18) With regard to requirements related to disconnection or reconnection of a transmission-connected demand facility or a transmission-connected distribution system, there is currently not sufficient clarity as to what a ‘TSO request’ in paragraph 4 refers to. To ensure legal certainty, ACER finds it beneficial to be more specific improving the wording of paragraph (c) of Article 19(4).

3.1.4. Simulation models

- (19) Article 21 of the DC Regulation provides requirements for transmission-connected demand facilities and transmission-connected distribution systems related to simulation models. To improve clarity, ACER recommends a more precise description of the model requirements to be introduced. Furthermore, as the content and format of simulation models with regard to frequency domain simulations is important to be included, ACER proposed the relevant amendment of paragraph 3(c). ACER also recommends the amendment of paragraph 5 as only TSOs should

specify the requirements of the performance of the recordings for transmission-connected system users, in coordination with relevant system operators.

3.2 Operations Notification procedure (Chapter 2)

3.2.1. Interim operational notification and final operational notification

- (20) Article 24 of the DC Regulation provides requirements for transmission-connected demand facility owner or transmission-connected distribution system operator in order for an interim operational notification to be issued by the relevant TSO. Following the introduction of new types of demand units, such as VIG electric vehicle supply equipment, power-to-gas demand units and heat pumps, ACER recommends relevant amendments so as to be clarified that the detailed technical data to be provided shall also include information regarding these new types of demand.
- (21) Furthermore, in Article 25 of the DC Regulation on final operational notification, ACER recommends that as regards the data and study review, the transmission-connected demand facility owner or transmission-connected distribution system operator must also submit to the relevant TSO an updated version of the applicable technical data, simulation models and studies proving compliance of electric vehicles and associated VIG electric vehicle supply equipment, power-to-gas demand units and heat-pumps.

4. TITLE III CONNECTION OF DEMAND UNITS USED BY A DEMAND FACILITY OR A CLOSED DISTRIBUTION SYSTEM TO PROVIDE DEMAND RESPONSE SERVICES TO SYSTEM OPERATORS

4.1 Operational notification procedure (Chapter 2)

4.1.1. General provisions

- (22) Following the introduction of new demand units, such as VIG electric vehicle supply equipment, power-to-gas demand units and heat pumps, ACER recommends appropriate amendments to Article 31, in order to be clear that the provisions of said Articles apply only to demand units providing demand response and not to all demand units.

4.1.2. Procedures for demand units within a demand facility or a closed distribution system connected at a voltage level of or below 1000V and Procedures for demand units within a demand facility or a closed distribution system connected at a voltage level above 1000V

- (23) In line with the amendment proposal of Article 31 mentioned above, ACER recommends appropriate amendments to Articles 32 and 33, in order to be clear that the provisions of these articles apply only to demand units providing demand response and not to all demand units. Furthermore, the Demand Response Unit Document (DRUD) is proposed to be removed and replaced by with the Demand Unit Document (DUD).

5. NEW TITLE CONNECTION OF V1G ELECTRIC VEHICLES AND ASSOCIATED V1G ELECTRIC VEHICLE SUPPLY EQUIPMENT, POWER-TO-GAS DEMAND UNITS AND HEAT PUMPS

5.1 General requirements (Chapter 1)

5.1.1 Specific provisions for V1G electric vehicles and associated V1G electric vehicle supply equipment, power-to-gas demand units and heat pumps

- (24) The EU electricity system is going through an ambitious transformation towards carbon neutrality. Demand units, such as V1G electric vehicle supply equipment, power-to-gas demand units and heat pumps, are expected to be connected to the electricity system en masse. Therefore, it is imperative that these devices support the system during network disturbances. Thus, ACER proposes the introduction of a new Article X under a new Title in the DC Regulation on frequency and voltage-related requirements in order to allow for the efficient decarbonisation of the electric power and transport systems.
- (25) During major disturbances in the network, caused for example, by the system splits, a large shortage/surplus of power occurs, resulting in a fast change of frequency. In this case, to prevent a total system collapse, currently there is automatic disconnection of part of the load, causing a partial black-out of the system. This automatic activation of the Low Frequency Demand Disconnection (LFDD) constitutes the last defence line to prevent a total black-out of the system. However, in the future, it is envisaged that technical issues related to the existing LFDD-schemes will emerge. Historically, LFDD disconnects demand to restore frequency, but due to increased distributed generation and the location of LFDD-devices, along with demand, distributed generation resources could also be disconnected. Consequently, the effectiveness of LFDD is expected to be reduced. ACER finds it beneficial and necessary to recommend in Article XX that certain demand units support system frequency by limiting their actual demand in response to a large drop in the frequency, without negative consequences for the grid user, so as to be possible that activation of LFDD is prevented and thus the risk of system blackouts/brownouts is reduced as well.
- (26) ACER recommends the introduction of a new Article XX including specific provisions for V1G electric vehicles and associated V1G electric vehicle supply equipment, power-to-gas demand units and heat-pumps regarding frequency and voltage, such as the capability of operating across frequency and voltage ranges, rate of change of frequency (RoCoF) withstand capability, limited sensitive frequency mode for underfrequency for consumption (LFSM-UC) and fault-ride-through (FRT) capability. The proposed requirements, facilitating electromobility, are harmonised due to the mobile nature of the electric vehicles, implying that they must be designed to comply with one single set of parameters, regardless of the Member States where they are charging. Its application also extends to power-to-gas demand units and heat pumps. The applicable requirements shall reflect the use of the underlying technology and inherent features to promote further integration of these units to the network.
- (27) ACER proposes new provisions in paragraphs 6 and 7 on the fault-ride-through (FRT) capability and high voltage ride-through capabilities, applicable to power-to-gas demand units, with the aim to prevent an unintentional disconnection and shutdown of electrolysis facilities and thus a threat to system stability in the event of short-term voltage dips or increases. In addition, a lack of requirements for the post-fault active power recovery would lead to restart times of electrolyzers measured in minutes, while the generation plants and the HVDC systems feed in their full active

power after a few seconds after the fault. This gap of active power of several GWs could lead to large frequency excursions and endanger the system stability.

5.2 Operational notification procedure (Chapter 2)

5.2.1 General, provisions, procedures for V1G electric vehicles and associated V1G electric vehicle supply equipment, power-to-gas demand units and heat pumps within a demand facility or a closed distribution system connected at voltage level of or below 1000V and above 1000V

- (28) ACER proposes to introduce new articles to cover the specific operational notification procedure for V1G electric vehicles and associated V1G electric vehicle supply equipment, power-to-gas demand units and heat-pumps. According to Article XX+1,2, for V1G electric vehicles and associated V1G electric vehicle supply equipment, power-to-gas demand units connected at a voltage level of or below 1000 V and heat-pumps, ACER proposes the possession of equipment certificates proving compliance with the DC Regulation. As these devices are mass-market produced, ACER finds it beneficial to apply a simple operational notification procedure.
- (29) In regard to the power-to-gas demand unit within a demand facility or a closed distribution system connected at a voltage level above 1000V, in new Article XX+3, ACER recommends that a demand unit document (DUD) is required regarding the operational notification procedure.

6. TITLE IV COMPLIANCE

6.1 General Provisions (Chapter 1)

6.1.1. Responsibility of the demand facility owner, the distribution system operator and the closed distribution system operator

- (30) As the scope of application of the DC Regulation (Article 3) is extended to include electric vehicles and associated supply equipment (V1G) that do not fall within the definition of electricity storage module, heat pumps and power-to-gas demand, ACER proposes the amendment of Article 34(1) to expand its application accordingly.

6.2 Compliance Simulation (Chapter 3)

6.2.1. Compliance simulations for transmission -connected distribution systems

- (31) With regard to the reactive power capability simulation of a transmission-connected distribution system, ACER proposes amendments to Article 43(1) in order to ensure consistency with the relevant amended provisions of Article 15 of the DC Regulation.

7. TITLE VI NON-BINDING GUIDANCE AND MONITORING OF IMPLEMENTATION

7.1. Monitoring

- (32) ACER proposes to amend Article 57 to align the monitoring process with the provisions of the Electricity Regulation.

8. TITLE VII FINAL PROVISIONS

- (33) ACER proposes to introduce a new Article 58a, in order to provide legal certainty and clarity regarding the repeal of the DC Regulation.
- (34) In paragraph 2 of the newly introduced Article 58a, ACER proposes that Regulation (EU) 2016/1833 should continue to apply to transmission-connected demand facilities, transmission-connected distribution facilities, distribution systems, including closed distribution systems and demand units which fall within its the scope of application at the entry into force of this Regulation.

10. ANNEX I

- (35) ACER proposes the amendment of Annex I, referred to in Article 12 of the DC Regulation, related to general frequency requirements for transmission-connected demand facilities, transmission-connected distribution facilities and distribution systems, to update the relevant table following Great Britain's exit from the EU. Further, the recommended amendment aims at increasing system resilience as the proposed amendment delays the tripping of load during an over-frequency transient and therefore prevents further aggravation of the emergency situation. This is due to the fact that, in case of system split, frequency in the over-frequency island can transiently overshoot before it is stabilised to a lower value. If, during that transient, all load is tripped due to transient over-frequency, there will be a black out, even if it would have been possible to stabilize the frequency.

11. ANNEX II

- (36) ACER proposes the amendment of Annex II, referred to in Article 13(1) of the DC Regulation, related to voltage ranges and time periods. More specifically, ACER acknowledges the need to amend the voltage ranges, while maintaining sufficient levels of system robustness. Particularly it is deemed necessary to amend the upper limit of the voltage range as this constitutes an unjustifiably onerous requirement for system users connected at 400 kV network level.