

RECOMMENDATION No 01/2024
OF THE EUROPEAN UNION AGENCY
FOR THE COOPERATION OF ENERGY REGULATORS

of 19 December 2024

on reasoned proposals for amendments to Commission Regulation (EU) 2016/1447 of 26 August 2016 establishing a network code on requirements for grid connection of high voltage direct current systems and direct current-connected power park modules

THE EUROPEAN UNION AGENCY FOR THE COOPERATION OF ENERGY REGULATORS,

Having regard to Regulation (EU) 2019/942 of the European Parliament and of the Council of 5 June 2019 establishing a European Union Agency for the Cooperation of Energy Regulators¹, and, in particular, Article 3(1) thereof,

Having regard to Regulation (EU) 2019/943 on the internal market for electricity², and, in particular, Articles 59(2)(a) and 60(3) thereof,

Having regard to the outcome of the public consultation,

Having regard to the outcome of the consultation with ACER's Electricity Working Group,

Having regard to the favourable opinion of the Board of Regulators of 18 December 2024, delivered pursuant to Article 22(5)(a) of Regulation (EU) 2019/942,

Whereas:

I. INTRODUCTION

- (1) During the Grid Connection Stakeholders Committee meeting in September 2022, the European Commission invited ACER to initiate the process to prepare reasoned proposals for amendments to the grid connection network codes, namely Commission Regulation (EU) 2016/631 of 14 April 2016 establishing a network code on requirements for grid connection of generators (hereinafter: the RfG Regulation)³, Commission Regulation (EU) 2016/1388 of 17 August 2016 establishing a network

¹ OJ L158, 14.6.2019, p. 22.

² OJ L 158, 14.6.2019, p. 54–124

³ OJ L 112, 24.4.2016

code on Demand Connection (hereinafter: the DC Regulation)⁴ and Commission Regulation (EU) 2016/1447 of 26 August 2016 establishing a network code on requirements for grid connection of high voltage direct current systems and direct current-connected power park modules (hereinafter: the HVDC Regulation)⁵.

- (2) On 19 December 2023, ACER issued Recommendation No 03/2023 on reasoned proposals for amendments to Commission Regulation (EU) 2016/631 of 24 April 2016 establishing a network code on requirements for grid connection of generators and Commission Regulation (EU) 2016/1388 of 17 August 2016 establishing a network code on demand connection (hereinafter: ACER Recommendation 2023).
- (3) The amendment of the HVDC Regulation is justified on two grounds. Firstly, it aims to ensure an overall consistent approach to requirements for grid connection resulting from ACER Recommendation 2023. Secondly, it is mandated by the high penetration of HVDC systems as well as converter-based Power Park Modules (PPMs), creating new system needs. More specifically, substantial growth in generation capacity of isolated offshore Alternating Current (AC) networks (hereinafter: the AC hubs) expected in the near future should not be ignored as these AC hubs will connect large scale offshore wind power generation and large-scale industrial demand (electrolysers) along with electricity storage and other demand facilities. In this framework, system security, reliability and cost-effective system design and system operation involve also HVDC systems and offshore PPMs.

II. PROCEDURE

- (4) In accordance with Article 60(3) of Regulation (EU) 2019/943 on the internal market for electricity (hereinafter: the Electricity Regulation) and Article 14 of Regulation (EU) 2019/942, ACER conducted a public consultation from 17 June until 8 September 2024 to gather stakeholders' views on the ACER draft amendment proposals on the HVDC Regulation. The evaluation of responses to the public consultation is detailed in Annex 3 to this Recommendation.
- (5) In addition to the public consultation, ACER held one public webinar with stakeholders (24 June 2024), with the purpose to present the proposed amendments and assist stakeholders in providing informed feedback to the public consultation. The webinar focused on the specific new amendments, namely regarding: the introduction of new system users and corresponding technical requirements, significant modernisation, rate-of-change-of-frequency withstand capability, grid forming capability, simulation models and voltage and frequency ranges.
- (6) Throughout the procedure, ACER engaged with interested stakeholders in the review of the amendments in order to ensure that they had sufficient opportunity to express their views and concerns. Further, ACER proactively engaged with representatives of

⁴ OJ L 223, 18.8.2016

⁵ OJ L 241, 8.9.2016

the relevant European stakeholders' associations, on the proposed amendment concerning system passivity of HVDC systems.

- (7) ACER's Electricity Working Group (hereinafter: AEWG) was consulted from 20 November to 28 November 2024 and provided its advice on 2 December 2024.
- (8) In its advice, the AEWG endorsed the draft ACER Recommendation on reasoned proposals for amendments to Commission Regulation (EU) 2016/1447 of 26 August 2016 establishing a network code on requirements for grid connection of high voltage direct current Systems and direct current connected power park modules.
- (9) On 18 December 2024, ACER's Board of Regulators issued a favourable opinion, pursuant to Article 22(5)(a) of Regulation (EU) 2019/942, on the proposed HVDC Regulation.

III. LEGAL GROUNDS FOR THE PRESENT RECOMMENDATION

- (10) In the framework of the Grid Connection Stakeholders Committee in September 2022, the Commission invited ACER to initiate the process to prepare reasoned proposals for amendments to the grid connection network codes.
- (11) The HVDC Regulation (like the RfG Regulation and the DC Regulation) is a network code, relating to the area of 'network connection rules' under Article 59(2)(a) of the Electricity Regulation, whose scope is specified as including rules on the connection of transmission-connected demand facilities, transmission-connected distribution facilities and distribution systems, connection of demand units used to provide demand response, requirements for grid connection of generators, requirements for high-voltage direct current grid connection, requirements for direct current-connected power park modules and remote-end high-voltage direct current converter stations, and operational notification procedures for grid connection.
- (12) Article 60 of the Electricity Regulation defines a process for the amendment of network codes within the areas listed in Article 59(1) thereof, with ACER having a formal role for the proposal of such amendments.
- (13) According to the first sentence of Article 60(3) of the Electricity Regulation, ACER may make reasoned proposals to the Commission for amendments, explaining how such proposals are consistent with the objectives of the network codes set out in Article 59(3) of the same Regulation. Article 59(3) of the Electricity Regulation does not refer explicitly to objectives and states that the Commission should establish a priority list every three years, identifying the areas to be included in the development of network codes. Instead, subsequently, Article 59(4) and (11) of the Electricity Regulation do define objectives for the development of network codes, namely contribution to market integration, non-discrimination, effective competition, and the efficient functioning of the market. Accordingly, the reference in Article 60(3) of the Electricity Regulation to the objectives of Article 59(3) of that Regulation should be read together with Article 59(4) and (11) of the same Regulation and in light of the objectives listed therein.

Therefore, these objectives are also relevant for the amendments proposed in this Recommendation (as detailed in the reasons provided in Annex 2).

- (14) According to the second sentence of Article 60(3) of the Electricity Regulation, where ACER considers an amendment proposal to be admissible and where it proposes amendments on its own initiative, ACER should consult all stakeholders in accordance with Article 14 of Regulation (EU) 2019/942. Pursuant to Article 14(1) of Regulation (EU) 2019/942, ACER, in the process of proposing amendments of network codes under Article 60 of the Electricity Regulation, has to *‘extensively consult at an early stage market participants, transmission system operators, consumers, end-users and, where relevant, competition authorities, without prejudice to their respective competence, in an open and transparent manner, in particular when its tasks concern transmission system operators’*.
- (15) Finally, according to Article 3(1) of Regulation (EU) 2019/942, ACER may, upon a request of the European Parliament, the Council or the Commission, or on its own initiative, provide an opinion or a recommendation to the European Parliament, the Council and the Commission on any of the issues relating to the purpose for which it has been established.
- (16) As indicated by Articles 59(2)(a) and 60(3) of the Electricity Regulation, ACER’s contribution to the amendment of network codes concerns issues relating to a purpose for which ACER has been established.

IV. MAIN FINDINGS

- (17) ACER found that amendments to the HVDC Regulation would be required in the areas set out in paragraphs (18) to (29). In line with the Commission’s request to prepare reasoned proposals for amendments to the grid connection network codes and taking into account the outcome of the consultation with the relevant stakeholders, ACER has proposed those amendments in Annex 1 to this Recommendation for the reasons detailed in Annex 2 to this Recommendation explaining how such proposals are consistent with the objectives in Article 59(4) of the Electricity Regulation⁶.

Amendments to the HVDC Regulation

- (18) For the general provisions, ACER proposes amendments to definitions, the inclusion of new definitions, the replacement of the term ‘DC connected PPMs’ with ‘asynchronously connected PPMs’ and the expansion of scope of application to asynchronously connected demand facilities, asynchronously connected power-to-gas demand units and asynchronously connected electricity storage modules. ACER proposes amendments to the regulatory aspects, including the introduction of the possibility to establish different topology dependent requirements of general application for HVDC systems with more than two alternating current (AC) buses and more than two HVDC converter stations where HVDC converter stations are connected to

⁶ Due to the numerous and extensive amendments, ACER proposes that the HVDC Regulation is repealed.

different voltage levels or geographical locations. By introducing the notion of the ‘isolated AC network’, ACER proposes that the Member States have the flexibility to apply some or all of the requirements of the HVDC Regulation to HVDC systems, asynchronously connected power park modules, asynchronously connected demand facilities, asynchronously connected power-to-gas demand units or asynchronously connected electricity storage modules, connected to the transmission system and distribution systems or to parts of the transmission system, or distribution systems, of islands of Member States the systems of which are not operated synchronously with either the Continental Europe, Nordic, Ireland and Northern Ireland or Baltic synchronous area, following the procedure provided in national rules. ACER also proposed the introduction of the criteria constituting a ‘significant modernisation’.

- (19) For the general requirements for HVDC connections, ACER proposes amendments to general requirements for the rate-of-change-of-frequency withstand capability at the connection point, the introduction of voltage phase angle jump withstand capability, a requirement for passivity of HVDC systems and grid forming capability, amendments to fast frequency control capability, frequency control, short circuit contribution during faults, fault ride through capability, HVDC system robustness, priority ranking of protection and control and changes to protection and control schemes and settings.
- (20) For requirements for asynchronously connected PPMs and remote-end HVDC converter stations, ACER proposes the expansion of the requirements to asynchronously connected demand facilities, asynchronously connected power-to-gas demand units and asynchronously connected electricity storage modules.
- (21) More specifically, ACER proposes the frequency stability requirements, reactive power and voltage requirements to apply to asynchronously connected power park modules, asynchronously connected demand facilities, asynchronously connected power-to-gas demand units and asynchronously connected electricity storage modules. ACER also proposes the introduction of new articles on fault-ride-through capability and overvoltage ride through capability of power-to-gas demand units and grid forming capability of asynchronously connected PPMs and asynchronously connected electricity storage modules. ACER proposes amendments to control requirements, network characteristics, protection requirements, power quality and general system management requirements applicable to asynchronously connected power park modules, asynchronously connected electricity storage modules and asynchronously connected demand facilities. ACER also proposes amendments to frequency stability requirements, reactive power and voltage requirements, network characteristics and power quality for remote-end HVDC converter stations.
- (22) Regarding information exchange and coordination, ACER proposes amendments to the operation of HVDC systems, parameters and settings and simulation models.
- (23) For operational notification procedure for connection, ACER proposes the expansion of the relevant provisions to new asynchronously connected demand facilities, new

asynchronously connected power-to-gas demand units and new asynchronously connected electricity storage modules.

- (24) For compliance monitoring, ACER proposes amendments to common provisions for compliance testing and for compliance simulation to apply to asynchronously connected demand facilities, asynchronously connected power-to-gas demand units and asynchronously connected electricity storage modules. ACER recommends amendments so that the responsibility to comply with the requirements of the HVDC Regulation applies also to asynchronously connected demand facility owners, asynchronously connected power-to-gas demand unit owners and asynchronously connected electricity storage module owners. ACER finds it necessary to amend the tasks of the relevant system operator to apply also to asynchronously connected demand facility, asynchronously connected power-to-gas demand unit and asynchronously connected electricity storage module and to their respective owners, as appropriate.
- (25) For compliance testing, ACER proposes the expansion of the relevant provisions to asynchronously connected demand facilities, asynchronously connected power-to-gas demand units and asynchronously connected electricity storage modules. Further, ACER proposes the introduction of a new provision to cover compliance testing with regard to Limited Frequency Sensitive Mode - Underfrequency Consumption (LFSM-UC) of an asynchronously connected power-to-gas demand unit.
- (26) For compliance simulations, new provisions are introduced to cover compliance simulations for HVDC systems with regard to grid forming capability, fast frequency control capability, rate-of-change-of-frequency capability, fast recovery from DC faults, voltage phase angle jump capability and HVDC system passivity. ACER proposes the expansion of the relevant provisions to asynchronously connected power-to-gas demand units and asynchronously connected electricity storage modules. ACER also proposes adjustments for alignment purposes with RfG 2.0. Further, new provisions are introduced to cover compliance simulations with regard to post fault active power recovery and fault-ride-through capability of an asynchronously connected power-to-gas demand unit and grid forming capability of an asynchronously connected power park module and asynchronously connected electricity storage module.
- (27) For the monitoring of implementation, ACER proposes amendments to update the monitoring process in accordance with the Electricity Regulation.
- (28) ACER proposes the introduction of new final provisions.
- (29) ACER proposes amendments to Annexes I to VIII,

HAS ADOPTED THIS RECOMMENDATION:

ACER recommends to amend Commission Regulation (EU) 2016/1447 of 26 August 2016 establishing a network code on requirements for grid connection of high voltage direct current systems and direct current-connected power park modules for the reasons explained in Annex 2.

This Recommendation is addressed to the European Commission.

Done at Ljubljana, on 19 December 2024.

- SIGNED -

*For the Agency
The Director*

C. ZINGLERSEN

Annexes:

Annex 1 – Proposed amended HVDC Regulation

Annex 1a – Proposed amended HVDC Regulation in tracked changes as compared to
the current HVDC Regulation

Annex 2 – Reasons for the proposed amendments to the HVDC Regulation

Annex 3 – Evaluation of responses to the public consultation