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Implementation Monitoring Report of the Network Code on Requirements for Grid Connection of Generators

Third edition

December 2020

ACER – European Union Agency for the Cooperation of Energy Regulators
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1. Purpose, scope and data

1.1 Purpose

- (1) This is the third Implementation Monitoring Report ('the Report') of Commission Regulation (EU) 2016/631 of 14 April 2016, establishing a network code on requirements for grid connection of generators ('NC RfG').
- (2) Article 32(1) of Regulation (EU) 943/2019 requires the Agency for the Cooperation of Energy Regulators ('the Agency') to monitor and analyse the implementation of the Network Codes and the Guidelines adopted by the European Commission ('EC'). Furthermore, the Agency shall monitor their effect on the harmonisation of applicable rules aimed at facilitating market integration, as well as on non-discrimination, effective competition and the effective functioning of the market, and report to the EC.
- (3) The primary purpose of the Report is to fulfil the above-mentioned legal obligation. The Report further aims at:
 - o identifying potential challenges in implementing the NC RfG and
 - o recommending concrete actions and best practices that can lead to a more efficient implementation.

1.2 Scope

- (4) The NC RfG entered into force on 17 May 2016. Without prejudice to its Articles 4(2)(b), 7, 58, 59, 61 and Title VI, the NC RfG entered into application on 27 April 2019. Hence, at the date of publication of the Report, all the provisions set in the NC RfG apply.
- (5) The first edition of the Implementation Monitoring Report on the NC RfG¹ was published on 7 November 2017. Its focus was on the status of the implementation of:
 - o The non-binding guidance on implementation (Article 58),
 - o The list of the relevant information for implementation monitoring (Article 59.2),
 - o The criteria for granting derogations (Article 61(1)) and,
 - o The transitional Arrangements for Emerging Technologies (TITLE VI).

¹ European Union Agency for the Cooperation of Energy Regulators, 2017: "First ACER Implementation Monitoring Report of the Network Code on Requirements for Grid Connection of Generators". Available at: https://www.acer.europa.eu/Official_documents/Acts_of_the_Agency/Publication/First%20ACER%20Implementation%20Monitoring%20Report%20of%20the%20Network%20Code%20on%20Requirements%20for%20Grid%20Connection%20of%20Generators.pdf

- (6) The second edition of the Implementation Monitoring Report on the NC RfG² was published on 27 November 2019. The main aspects dealt with the status of the implementation of:
- The determination of significance (banding values) of Power Generating Modules³ ('PGMs') pursuant to Articles 5(2) of the NC RfG and
 - The establishment of the requirements of general application, pursuant to Article 7(1) of the NC RfG.
- (7) In this third edition, the scope of the Report covers the following areas:
- The application of the NC RfG to PGMs based on their classification as *existing* or *new*, pursuant to Article 4 of the NC RfG;
 - The establishment of requirements of general application, pursuant to Title II of the NC RfG;
 - The implementation of the operational notification procedure, pursuant to Title III of the NC RfG;
 - The amendments of contracts and general terms and conditions, pursuant to Article 71(1) of the NC RfG.

1.3 Data

- (8) In order to perform the task of monitoring the NC RfG implementation, the Agency asked 28 National Regulatory Authorities ('NRAs') to fill in a questionnaire, which was circulated on 19 December 2019 to the ACER Electricity Working Group⁴. The survey included detailed questions on the implementation of specific and general NC RfG provisions related to the areas described above in the Scope.
- (9) Among the 28 NRAs, 25 NRAs are from the EU. These are⁵: E-Control (AT), CREG (BE), EWRC (BG), ERO (CZ), BNetzA (DE), DUR (DK), ECA (EE), CNMC (ES), EV (FI), CRE (FR), RAE (GR), HERA (HR), HEA (HU), CRU (IE), ARERA (IT), NERC (LT), ILR (LU), PUC (LV), ACM (NL), URE (PL), ERSE (PT), ANRE (RO), Ei (SE), AGEN-RS (SI) and RONI (SK).
- (10) The Report at this point does not cover Cyprus and Malta. In the case of Cyprus, it has to be noted that the NC RfG does not apply to PGMs connected to the transmission system and distribution systems, or to parts of the transmission system or distribution systems, of the islands of Member States ('MSs') of which the systems are not operated synchronously with either the

² European Union Agency for the Cooperation of Energy Regulators, 2018: "Second ACER Implementation Monitoring Report of the Network Code on Requirements for Grid Connection of Generators". Available at: https://www.acer.europa.eu/Official_documents/Acts_of_the_Agency/Publication/Second%20ACER%20Implementation%20Monitoring%20Report%20of%20the%20Network%20Code%20on%20Requirements%20for%20Grid%20Connectio%20of%20Generators.pdf

³ In accordance with the definition in Article 2(5) of the NC RfG.

⁴ https://www.acer.europa.eu/en/The_agency/Organisation/Working_groups/Pages/default.aspx

⁵ The complete list of abbreviation & country codes is in Annex III.

Continental Europe, Great Britain, Nordic, Ireland and Northern Ireland or Baltic synchronous areas (Article 3 (2)(a) of the NC RfG).

- (11) The questionnaire was sent also to non-EU countries (United Kingdom). In the case of the United Kingdom, the questionnaire was sent to both the Utility Regulator (UR), regulating the electricity, gas, water and sewerage industries in Northern Ireland (UK-NIR), and Ofgem, the independent NRA, regulating the electricity and gas sectors in Great Britain (GB).
- (12) The questionnaire was also sent to NVE-RME, the Norwegian NRA. Norway is an EEA member country, and the process of incorporating the NC RfG into the EEA Agreement is not completed. The act has therefore not yet been implemented in Norwegian law.
- (13) NRAs were given a few opportunities to amend and update their input to the questionnaire with the cut-off date of 6 November 2020.
- (14) All contacted NRAs provided replies to the survey with the exemption of NVE-RME, the Norwegian Regulatory Authority, EWRC (BG) and RAE (GR). Nevertheless, RAE (GR) provided the Agency with two communications⁶ concerning the high-level status of the implementation of the NC RfG. The Agency included the information where relevant throughout the Report. However, since RAE (GR) did not reply to the questionnaire, the Agency is not in a position to provide an exhaustive report on the status of the implementation of the NC RfG in GR.
- (15) The results presented in the Report and the arising conclusions are based on the replies to the questionnaire as provided by the NRAs.

2. Conclusions and recommendations

- (16) In the light of the NRAs' replies and analysis performed for the Report, the Agency has come to the following conclusions and recommendations:

(a) The NC RfG implementation is well on track ...

- (17) The Agency considers that the provisions established in Article 4(2) of the NC RfG, concerning the definition of PGMs as existing or new, have been well implemented. 21 NRAs⁷ out of the 25 responding to the questionnaire confirmed that the deadlines⁸ and requirements in Article 4(2)(a)-(b) of the NC RfG, have been implemented as indicated. ACM (NL) and BNetzA (DE)

⁶ The Agency received the first communication from RAE (GR) on 23 March 2020 and the second on 27 October 2020. Both are email communications and are included in Table 1 of Annex I.

⁷ E-Control (AT), ERO (CZ), DERA (DK), ECA (EE), CNMC (ES), EV (FI), Ofgem (GB), UR (UK-NIR), HERA (HR), CRU (IE), VERT (LT), PUC (LV), HEA (HU), ARERA (IT), ILR (LU), URE (PL), ERSE (PT), ANRE (RO), Ei (SE), AGEN-RS (SI), RONI (SK).

⁸ A PGM already connected to the network before 17 May 2016 is existing (Article 4(2)(a)). Alternatively (Article 4(2)(b)), a PGM is still considered existing if the a final and binding contract concerning the purchase of the main generating plant has been concluded by 17 May 2018.

communicated that that decisions have been adopted in order to extend the deadlines for implementation⁹.

- (18) The Agency monitored the implementation status concerning the definition and approval of the requirements of general application included in Title II of the NC RfG. The implementation of the requirements of general application have been performed in full alignment with the provisions in the NC RfG. In particular, at the end of the implementation process, none of the approved requirements of general application happens to be stricter/looser than the most/least onerous related threshold (as established in the NC RfG)¹⁰. This was confirmed by the answers received from the majority of the inquired NRAs.¹¹
- (19) Moreover, the Agency highlights timely implementation of Article 13(2) of the NC RfG concerning the application of limited frequency sensitive mode - overfrequency (LFSM-O) capabilities. This assessment was evidenced by the answers received from all the 25 responding NRAs. Although CNMC (ES) has not formally approved the requirements of general application yet, CNMC (ES) confirmed the intention of implementing Article 13(2)(a) rather than Article 13(2)(b).
- (20) Similarly, the Agency deems that the implementation of Article 15(2)(d)(vii)¹² of the NC RfG has been completed as pointed out by 22 NRAs with the exception of HERA (HR), CRE (FR) and CNMC (ES).
- (21) The Agency, after having analysed the relevant answers from the 25 responding NRAs, assesses the implementation of Article 15(5)(a)(i) (concerning black start capabilities) and Article 21(2)(a) (concerning synthetic inertia) as duly performed. In fact, all the NRAs communicated that the relevant MSs¹³ or Transmission System Operator ('TSO')¹⁴ have decided to or not to exercise their rights of making the requirements in Article 15(5)(a)(i) and Article 21(2)(a) of the NC RfG mandatory to the relevant PGMs.
- (22) Furthermore, the Agency monitored the implementation of Articles 29(2), 30(3) and 32(6) of the RfG concerning the operational notification procedure of PGMs. The Agency considers the status of the implementation of these articles as well on track.

⁹ ACM (NL) issued a decision to shift the date from when a PGM is to be considered as new to 27 April 2019. The German Parliament decided that PGMs in DE shall be considered as *existing* if they are put into operation by 31 December 2020 and if there has been either a building permit or a permit under the Federal Emission Protection Act granted for them prior to 27 April 2019 or, where such permits are not required, the owner has requested the grid connection for them prior to 27 April 2019.

¹⁰ Moreover, there are no additional binding requirements that refer to a range of values beyond the maximum/minimum thresholds defined in the NC RfG. Finally, no additional requirements concerning voltage/frequency (thus different from those included in the NC RfG) have been implemented in the national regulations.

¹¹ 16 NRA out of the 25 responding i.e. E-Control (AT), DUR (DK), ECA (EE), CNMC (ES), CRE (FR), Ofgem (GB), HERA (HR), VERT (LT), PUC (LV), HEA (HU), ILR (LU), ACM (NL), URE (PL), ANRE (RO), Agen-RS (SI) and RONI (SK).

¹² This article requires TSOs to notify the parameters specified in accordance with points (i), (ii), (iii) and (v) of Article 15(2)(d) to the relevant NRA. These parameters deal with the specific capabilities for PGMs when they provide frequency response through the variation of active power.

¹³ Concerning Article 15(5)(a)(i) of the NC RfG.

¹⁴ Concerning Article 21(2)(a) of the NC RfG.

- (23) Pursuant to the provision in Article 29(2) of the NC RfG, the NRAs were able to indicate publicly available references of the relevant operational notification procedure. The implementation is still not complete according to CRU (IE), Ei (SE) and Agen-RS (SI), although these NRAs expect the completion of the relevant procedures soon.
- (24) Concerning the notification of the permanent decommissioning of a type A PGM in Article 30(3), 19 NRAs¹⁵ out of the 25 responding to the questionnaire provided a reference to the national legislation implementing this provision. Article 32(6) allows MSs to provide that the PGM document (hereafter the 'PGMD')¹⁶ shall be issued by an authorised certifier¹⁷. Only BNetzA (DE) and ANRE (RO) confirmed that the corresponding MS provided that the PGMD is issued by an authorised certifier. So far, other MSs have decided not to exercise their right to apply Article 32(6).
- (25) The Agency monitored the implementation of Article 71(1) of the NC RfG ensuring that all relevant clauses in contracts and general terms and conditions relating to the grid connection of new PGMs are brought into compliance with the requirements of the NC RfG. Based on the collected answers, the Agency ascertains that 21 NRAs¹⁸ (out of 25 NRAs responding to the questionnaire) currently ensure the compliance with the provisions of Article 71(1) of the NC RfG.
- (26) The Agency stresses that effective involvement of stakeholders is essential for the effective implementation of the NC RfG.

(b) ... but full implementation is still outstanding

- (27) The Agency highlights that the situation pictured through the analysis of the collected answers may not facilitate the implementation of a fully harmonised set of rules for grid connection of PGMs. The lack of harmonisation of applicable rules and/or incomplete implementation in some MSs may in turn affect the EU-wide market integration, as well as the non-discrimination, the effective competition and functioning of the market, and prevent an efficient use of the network and resources.
- (28) The adoption of harmonised rules is thus crucial to maintaining security of energy supply, increasing competitiveness and ensuring that all consumers can purchase energy at affordable prices (e.g. avoiding high manufacturing costs due to a larger variety of similar products).
- (29) The Agency has not received feedback from EWRC (BG) which leads the Agency reasonably to assume that the status of the implementation of the NC RfG might be still outstanding. RAE (GR) communicated to the Agency the decision recently taken¹⁹ in order to approve the PGMs'

¹⁵ E-Control (AT), CREG (BE), at regional level, DUR (DK), ERO (CZ), BNetzA (DE), CNMC (ES), CRE (FR), Ofgem (GB), VERT (LT), PUC (LV), HEA (HU), ARERA (IT), ILR (LU), URE (PL), ERSE (PT), ANRE (RO), Ei (SE), AGEN-RS (SI), RONI (SK).

¹⁶ In accordance with the definition in Article 2(10) of the NC RfG.

¹⁷ In accordance with the definition in Article 2(46) of the NC RfG.

¹⁸ E-Control (AT), CREG (BE), ERO (CZ), BNetzA (DE), DERA (DK), ECA (EE), EV (FI), Ofgem (GB), UR (UK-NIR), HERA (HR), CRU (IE), VERT (LT), PUC (LV), HEA (HU), ARERA (IT), ILR (LU), ACM (NL), URE (PL), ANRE (RO), AGEN-RS (SI) and RONI (SK).

¹⁹ RAE (GR) decision 1165/2020, Gov. Gaz. 3757 B (7 September 2020).

banding thresholds²⁰ and the requirements of general application of NC RfG. However, since RAE (GR) did not reply to the questionnaire, the Agency cannot ascertain the status of the implementation of the NC RfG.

- (30) The criteria to define the extent of the modernisation of a plant or the replacement of equipment impacting the technical capabilities of the PGM are important aspects in Article 4(1) of the NC RfG. The Agency deems a publicly available definition of these criteria²¹ to be beneficial for the implementation of the NC RfG, although Article 4(1) of the NC does not mandate the issue of formal decisions from the competent authorities.
- (31) In this context, only five NRAs (E-Control (AT), BNetzA (DE), CRE (FR), ARERA (IT) and ERSE (PT)) reported the adoption of quantitative and qualitative criteria determining the level of modernisation of a plant or the level of equipment replacement that lead to a revision/new connection agreement. In addition, UR (UK-NIR), ANRE (RO) and Agen-RS (SI) communicated the adoption of qualitative criteria. Furthermore, CREG (BE) confirmed the development of quantitative and qualitative criteria to be published. A similar case is reported by CNMC (ES) concerning the development of qualitative criteria.
- (32) A case-by-case approach has been implemented by ERO (CZ), DUR (DK), ECA (EE), NERC (LT), ILR (LU), PUC (LV), Ei (SE) and RONI (SK) when deciding on specific PGMs to be determined as new or existing PGMs.
- (33) Furthermore, the implementation of the provisions laid down in Article 4(2), concerning the determination of PGMs as existing or new, has not been completed yet in FR and BE, as communicated by CRE and CREG, respectively.
- (34) Four NRAs²² confirmed that the implementation of some of the requirements of general application has differed from the provisions included in the NC RfG. Moreover, seven NRAs²³ reported the presence in the corresponding national grid codes of requirements which go beyond those laid down in the NC RfG²⁴. The most recurrent issues concern frequency/voltage-related parameters and in particular the width of the interval of values for which certain capabilities²⁵ apply.
- (35) The Agency highlights that the connection to the network shall not be withheld to a prospective PGFO which complies with all the requirements and capabilities in the NC RfG, but it is notable to comply with requirements included only in national regulations²⁶. As interim solutions concerning, for instance, the application of wider frequency ranges or longer minimum times for operation, TSOs can apply Article 13(1)(a)(ii)-(iii) of the NC RfG, which allows case-by-case

²⁰ In accordance with Article 5 of the NC RfG.

²¹ Adopting qualitative and/or quantitative methods.

²² BNetzA (DE), CREG (BE), CRU (IE), and UR (UK-NIR).

²³ ERO (CZ), BNetzA (DE), EV (FI), ARERA (IT), ERSE (PT), Ei (SE) and UR (UK-NIR).

²⁴ Agen-RS (SI) reported the presence of additional requirements in the national regulation. However their application is subject to the agreement between the TSO and the PGFO in accordance with the provision in Article 13(1)(a)(ii)-(iii) of the NC RfG.

²⁵ E.g. the ability for the PGM to remain connected to the grid when frequency/voltage differ from nominal values.

²⁶ In accordance with the Precedence of European Law.

<https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=LEGISSUM%3AI14548>.

agreements between the TSO and the Power Generating Facility Owner (PGFO)²⁷ on specific additional requirements. It is worth noting the site-specific nature of these provisions since they require an agreement between the TSO and the PGFO. In other words, these provisions do not allow the TSO to extend the application, for example, of wider frequency ranges or longer minimum times for operation to all the relevant PGMs. As long term solutions, NRAs, TSOs and relevant system operators could raise requests for amendments of the NC RfG²⁸. These should be coordinated with the European Network of Transmission System Operators for Electricity (ENTSO-E) and/or the European Commission.

- (36) The requirements laid down in Articles 13(2) and 15(2)(d)(vii)²⁹ are still not fully implemented in ES, due to the missing formal approval of the requirements of general application by the competent authorities. HERA (HR) and CRE (FR) reported that the implementation of Article 15(2)(d)(vii) is still ongoing since the modality of notification pursuant to this Article has not been established yet.
- (37) In accordance with the answers received by ECA (EE), EV (FI), HERA (HR), ACM (NL) and CRU (IE), the implementation of Article 30(3) concerning the permanent decommissioning of type A PGMs is still outstanding. According to CREG (BE), the federal legislation in BE does not envisage the need of a notification of the permanent decommissioning of the type A PGM. The answer provided by UR (UK-NIR) could not be used to determine the status of the implementation of Article 30(3) of the NC RfG in the relevant MS.
- (38) Finally, the implementation of Article 71(1) is still outstanding in FR, ES, SE and PT. This article requires NRAs to ensure that all relevant clauses in contracts and general terms and conditions relating to the grid connection of new PGMs are brought into compliance with the requirements of the NC RfG.
- (39) In general, since the NC RfG fully entered into application on 27 April 2019, the Agency urges a prompt implementation of the provisions monitored in the Report in those MSs where the process is still incomplete. Therefore, the Agency recommends NRAs to perform or promote expeditious implementation of the NC RfG in their MSs.

²⁷ The definition is in accordance with Article 2(7) NC RfG.

²⁸ E.g. in order to extend binding requirements on wider frequency ranges.

²⁹ Article 13(2) refers to the implementation of LFSM-O capabilities, while Article 15(2)(d)(vii) concerns the TSO notification to the relevant NRA of technical parameters regarding the provision of frequency response through active power variation.

3. Defining new or existing power-generating modules

3.1 Objectives

- (41) Pursuant to Article 4(1) of the NC RfG, existing PGMs are not subject to the requirements of the NC RfG. Nevertheless, some exemptions apply; under certain circumstances, existing PGMs may be subject to some or all the provisions of the NC RfG.
- (42) For example, an existing type C or type D³⁰ PGM may have undergone modernisation procedures or replacement of the equipment impacting the technical capabilities of the PGM itself. In these cases, following an initial assessment of the relevant system operator (Article 4(1)(a)(ii) of the NC RfG) and in turn a decision of the NRA³¹ (Article 4(1)(a)(iii) of the NC RfG), these existing units may be requested to revise the existing connection agreement or stipulate a new one and to respect certain requirements of the NC RfG.
- (43) Alternatively, following a public consultation in accordance with Article 10 of the NC RfG and in order to address significant factual changes in circumstances³², the relevant TSO may propose to the relevant NRA, or where applicable, to the MS to extend the application of the NC RfG to existing PGMs. Comprehensive information on the modalities of such procedure are provided in paragraphs 3, 4 and 5 of Article 4 of the NC RfG.
- (44) Furthermore, in order to be considered as existing, a PGM has to be already connected to the network by 17 May 2016, the date of entry into force of the NC RfG (Article 4(2)(a) of the NC RfG). Moreover, as specified in Article 4(2)(b) of the NC RfG, a PGM connected to the network after the entry into force of the NC RfG may still be considered as existing if the PGFO has concluded a final and binding contract for the purchase of the main generating plant by two years after the entry into force of the NC RfG, i.e. by 17 May 2018.
- (45) All the PGMs for which the clauses above do not apply are to be considered as new PGMs and therefore in the scope of application of the NC RfG.
- (46) Finally, the last paragraph of Article 4(2) of the NC RfG still allows the MS to let the NRA determine whether a PGM is to be considered as existing or new.
- (47) Concerning the classification of a PGM as new or existing, the Agency prepared four questions. The first three focus on the criteria adopted to determine the level of modernisation of a plant or the level of replacement of the PGM's equipment. The last question deals with Article 4(2)(b) concerning the conclusion of a final and binding contract for the purchase of the main generating plant.
- (48) The implementation of the provisions of Article 4 of the NC RfG is analysed in the continuation of this Section, while the set of NRAs' responses in full are included in Section 2 of Annex I.

³⁰ The banding values establishing the "type" of PGM are in accordance with Article 5(2) of the NC RfG.

³¹ Or where applicable the MS.

³² Such as the evolution of system requirements including penetration of renewable energy sources, smart grids, distributed generation or demand response.

3.2 Modernisation / replacement criteria for existing type C and type D PGMs

- (49) This section deals with the answers to three questions concerning the definition of relevant criteria to determine up to which extent the modernisation of a plant or the replacement of a PGM's equipment may require the revision of the connection agreement or the stipulation of a new one, pursuant to Article 4(1)(a) of the NC RfG.
- (50) The first question investigates the definition and adoption of qualitative criteria. The second inquires about the presence of quantitative measures. The last one concerns possible decisions reached by NRAs or MSs and that are relevant to the procedures laid down in Articles 4(1)(a)(iii) or 4(1)(b) of the NC RfG.

3.2.1 Qualitative criteria

- (51) Initially, NRAs have been asked to explain whether qualitative criteria, assessing the level of the modernisation or equipment replacement of type C or type D PGMs, were present in the relevant MS.
- (52) The analysis of the collected answers revealed that only 8 out of the 25 responding NRAs have established qualitative criteria³³, whereas other two (CREG (BE) and CNMC (ES)) confirmed the definition of relevant criteria, although the formal implementation is still ongoing. In general, the main criteria include changes to the maximum capacity of the PGM, to the voltage/frequency regulation systems (including the power system stabilizer) and to the protection systems of the plant.
- (53) The remaining 15 out of the 25 responding NRAs have not defined or adopted any qualitative criteria. However, eight³⁴ of these NRAs confirmed that the evaluation of the level of modernisation or equipment replacement can still proceed on a case-by-case basis.

3.2.2 Quantitative criteria

- (54) Additionally, NRAs have been asked to specify if they have adopted quantitative criteria to determine the level of the modernisation or the level of the equipment replacement of type C and type D PGMs possibly leading to a revision of the connection agreement or the stipulation of a new one.
- (55) Amongst the eight NRAs that confirmed the adoption of criteria by answering to the previous question, only five NRAs (E-Control (AT), BNetzA (DE), CRE (FR), ARERA (IT) and ERSE (PT)) reported the adoption of quantitative criteria. These criteria typically deal with the percent changes in the maximum capacity of the PGMs with respect to the levels held before the modernisation process or the equipment replacement. More details concerning the numerical values of the percent changes, which also depend on the nature of the PGM (e.g. synchronous PGM³⁵ or Power Park Module³⁶), are provided in Table 3 in Annex I.

³³ E-Control (AT), BNetzA (DE), UR (UK-NIR), CRE (FR), ARERA (IT), ERSE (PT), ANRE (RO) and Agen-RS (SI).

³⁴ ERO (CZ), DUR (DK), ECA (EE), NERC (LT), ILR (LU), PUC (LV), Ei (SE) and RONI (SK).

³⁵ In accordance with the definition in Article 2(9) of the NC RfG.

³⁶ In accordance with the definition in Article 2(17) of the NC RfG.

- (56) It is worth noting that the relevant criteria in FR concern all the PGMs and thus not only Type C and Type D PGMs, i.e. the two categories of PGMs specified in Article 4(1) of the NC RfG.
- (57) Moreover, among the two NRAs (CREG (BE) and CNMC (ES)) whose process to approve modernisation or equipment replacement criteria was confirmed to be still ongoing in the previous section, CREG (BE) reported the development of quantitative measures.
- (58) The remaining NRAs did not adopt any quantitative criteria concerning the modernisation and the equipment replacement of type C and type D PGMs.

3.2.3 Decisions issued

- (59) Furthermore, the Agency inquired the NRAs about the possible issue of decisions in the context of Articles 4(1)(a)(iii) and/or 4(1)(b) of the NC RfG. The question also aimed to highlight whether the decision was actually issued by the NRA or, instead, by the competent entity as designated by the MSs.
- (60) Among the collected answers, only PUC (LV) and Ei (SE) confirmed the issue of a relevant decision. In both cases, the relevant NRA issued the decision. Considering the Ei's decision of 9 September 2019³⁷, the PGM "Spjutmo G1" faced changes to such an extent that a new connection agreement was required. This PGM now falls under the scope of the requirements of the NC RfG.
- (61) Similarly, following the PUC's decision of 16 January 2020³⁸, the PGMs HAN1, HAN 2, HAN3, HAN 4, HAN5 and HAN6, as well as the PGMs GT1, GT2 and AN3 of Plavinas hydroelectric power plant were all modernised to such an extent that new connection agreements were deemed necessary. The decision published by PUC (LV) includes the list of requirements of the NC RfG which are now applicable to the abovementioned PGMs.
- (62) In addition, the answer provided by HEA (HU) does not refer to the issue of decisions which refer to specific PGMs. However, it still refers to a decision involving PGMs that aim to receive national or EU funding support for renewable sites. In fact, it obliges existing owners to meet the applicable requirements of the NC RfG as a general condition to obtain renewable support. This condition applies in case of a modernisation/improvement investment of existing PGM exceeding the 50% of the original investment value. The decision was issued by the Decree of the Ministry of National Development No. 62/2016. (XII. 28).
- (63) CRE (FR) reported³⁹ the publication on 9 June 2020 of the ministerial order defining the requirements of general application and the criteria for modification of a PGM. The publication of the ministerial order was followed by the issue of a decision of CRE (FR) on 16 July 2020

³⁷ Swedish Energy Markets Inspectorate (Ei) / Energimarknadsinspektionen (2019). *Fastställande av bestämmelser för kraftproduktionsmodulen Spjutmo G1 efter mottagen plan om ombyggnad*. Retrieved from: https://www.ei.se/Documents/Projekt/Natkoder/RFG/Beslut_2019_102016.pdf

³⁸ Public Utilities Commission (PUC) / Sabiedrisko pakalpojumu regulēšanas komisija (2020). *PADOMES LĒMUMS, Rīgā, 16.01.2020. Nr.10 (prot. Nr.3, 1.p)*. Retrieved from: https://www.sprk.gov.lv/sites/default/files/cmaa_files/LemumsN010D16012020.pdf

³⁹ Additional information together with the web link to the ministerial order of 9 June 2020 and the CRE (FR) decision of 16 July 2020 are included in Section 1 of Annex I.

concerning only the provisions of the NC RfG in the event of a modification of a PGM, as defined in the ministerial order of 9 June 2020.

- (64) Finally, the remaining NRAs have not issued any decision.

3.3 Purchase of the main generating plant

- (65) Article 4(2)(b) of the NC RfG states that a PGM shall be considered existing if the power-generating facility owner has concluded a final and binding contract for the purchase of the main generating plant by two years after the entry into force of the RfG Regulation (17 May 2018). The Agency inquired NRAs about the implementation of this Article to monitor whether any decisions postponing the timeline in Article 4(2)(b) of the NC RfG had been issued.
- (66) ARERA (IT) specified, by means of the publication of two decisions, that the deadline to transmit the contracts to the relevant system operator was 17 November 2018. However, the final and binding contract for the purchase of machinery had to be completed in line with the NC RfG provisions by 17 May 2018.
- (67) Article 4(2)(b) of the NC RfG has been applied in PL by means of the act issued on 9 November 2018 by the Polish legislator. Specific details on the contents are available through the web-link provided by URE (PL) and included in Annex I.
- (68) CREG (BE) confirmed that it was possible for PGMs connected at federal level (i.e. voltage level at the connection point above 70 kV⁴⁰) to notify the conclusion of the contract until 27 October 2019, although no requests were made. Moreover, concerning regional connections,⁴¹ it was pointed out that the proposal for requirements of general application (submitted on 17 May 2018) has been rejected by regional regulators in November 2019. At present, relevant decisions have been adopted by regional authorities (e.g. in the Flemish region, in the Walloon Region and in the Brussels-Capital Region). More details on the particular decisions among the different regions can be found in Annex I.
- (69) Moreover, it is worth noting that ACM (NL) has extended the deadline laid down in Article 4(2)(b). In fact, on 27 November 2018, ACM (NL) decided to shift this date from 17 May 2018 to 27 April 2019. This decision acknowledged the proposal submitted on 12 June 2018 by the relevant system operators in NL. Furthermore, ACM (NL) has motivated the adoption of such decision as an effective measure to limit the uncertainty on the actual technical requirements that had to be respected by PGM owners.
- (70) Similarly, BNetzA (DE) has specified that the German Parliament postponed the deadline to 30 June 2020 through the adoption of the Article 118(25) German Energy Act. Pursuant to this act, all the PGMs put into operation until 30 June 2020 and for which there has been either a building permit or a permit under the Federal Emission Protection Act granted prior to 27 April 2019 or, where such permits are not required, the owner has requested the grid connection for them prior to 27 April 2019, have to be considered existing and thus they do not have to necessarily comply with the provisions of the NC RfG. The decision was reached as the result of discussions with

⁴⁰ As confirmed by CREG (BE) in the general note accompanying the answers to the questionnaire and included in Section 1 of Annex I.

⁴¹ Characterised by voltage levels at the connection point below or equal 70 kV.

relevant industrial stakeholders, which reported the inability to comply with the RfG requirements without an extension of the deadline. Eventually, the German Parliament amended Article 118(25) of the German Energy Act. The new deadline has been set to 31 December 2020⁴².

- (71) Furthermore, the implementation of the provisions laid down in Article 4(2), concerning the determination of PGMs as existing or new, has not been completed yet in FR, as communicated by CRE (FR).
- (72) The remaining NRAs confirmed that the timeline established in Article 4(2)(b) has been implemented without further extensions and no decisions concerning the application of Article 4(2) have been issued.

3.4 Conclusions and discussion

- (73) The Agency aimed to monitor the implementation status concerning the definition of criteria determining whether PGMs have to be considered as existing or new (as per Article 4 of the NC RfG).
- (74) In general, the implementation of the Article 4 of the NC RfG is still ongoing. Only five NRAs (E-Control (AT), BNetzA (DE), CRE (FR), ARERA (IT) and ERSE (PT)) reported a formal adoption of qualitative and quantitative criteria determining the level of modernisation of a plant or the level of equipment replacement that could lead to a revision/new connection agreement. In addition, only CREG (BE) could confirm the development of qualitative and quantitative criteria to be published.
- (75) The application of a case-by-case approach has been reported by ERO (CZ), DUR (DK), ECA (EE), NERC (LT), ILR (LU), PUC (LV), Ei (SE) and RONI (SK) when deciding on specific PGMs to be determined as new or existing PGMs.
- (76) Finally, the implementation of the NC RfG is successful considering the 2 years transition period after the entry into force of the NC RfG, laid down in Article 4(2)(b). The vast majority of the NRAs have respected the deadline set in Article 4(2). ACM (NL) and German Parliament have extended the deadline, allowing additional time before prospective PGMs have to necessarily comply with the provision of the NC RfG.

⁴² BNetzA (DE) reported that this decision has been adopted due to the Corona virus pandemic.

4. Requirements of general application

4.1 Objectives

- (77) Title II of the NC RfG establishes the technical requirements that each PGM shall comply with in order to be connected to the network. Concerning the requirements of general application it is worth noting that some of them are non-exhaustive, e.g. they are not univocally established through the definition of a single parameter (numerical value or technical capability) applicable in all the MSs. In fact, the NC RfG typically provides upper/lower bounds and each MS can select a value within such interval, following the procedure laid down in Article 7(1) of the NC RfG.
- (78) In this context, the Agency included eight questions in the survey that was circulated with the NRAs. In particular,
- the first and second questions aim to monitor the compliance of the approved non-exhaustive requirements with the ranges of values included in the NC RfG.
 - The third question deals with limited frequency sensitive mode – overfrequency⁴³ ('LFMS-O') capabilities laid down in Article 13(2) of the NC RfG.
 - The fourth and fifth questions concern the requirements and notification procedure laid down in Article 15(2)(d) of NC RfG.
 - The sixth question deals with the black start capability laid down in Article 15(5)(a)(i) of the NC RfG.
 - The seventh question focuses on the synthetic inertia⁴⁴ capability for Power Park Modules⁴⁵ (PPMs) laid down in Article 21(2)(a) of the NC RfG.
 - Finally, the eighth question aims to monitor the existence in the national regulation of further requirements on frequency/voltage which are additional to those already established in the NC RfG.
- (79) The objective of this set of questions is to monitor the correct implementation of TITLE II of the NC RfG by ascertaining if the requirements of general application included have been correctly implemented in the national regulation.
- (80) The implementation of the provisions of Title II of the NC RfG is analysed in the continuation of this Section, while the NRAs' responses in full are included in Section 3 of Annex I.

⁴³ In accordance with the definition in Article 2(37) of the NC RfG.

⁴⁴ In accordance with the definition in Article 2(34) of the NC RfG.

⁴⁵ In accordance with the definition in Article 2(17) of the NC RfG.

4.2 Establishment of requirements of general application within specified ranges

4.2.1 Stricter / looser onerous threshold

- (81) The NRAs have been asked to specify whether, in the approved requirements of general application, any value/condition happens to be stricter/looser than the most/least onerous related threshold (as established in the NC RfG). Moreover, if any value/condition happens to be stricter than the most onerous threshold, NRAs were invited to confirm if this requirement is enforced to all the PGMs or it follows from an agreement between a PGM's owner and the relevant TSO, in accordance, for example, with Article 13(1)(a)(ii)-(iii) of the NC RfG.
- (82) The analysis of the collected answers revealed that four NRAs (CREG (BE), BNetzA (DE), UR (UK-NIR), CRU (IE)) reported mismatches between certain values approved in the national regulation and the corresponding upper/lower bounds set in the NC RfG. The rest of the NRAs confirmed that the approved requirements are aligned with the thresholds specified in the NC RfG.
- (83) It is worth highlighting that the different requirements pointed out by the NRAs are applied to all the relevant PGMs, thus they are not the result of an agreement between the relevant TSO and the PGM owner, in accordance with Article 13(1)(a)(ii)-(iii) of the NC RfG.
- (84) In particular, CREG (BE) reported that looser requirements are applicable to gas turbines and internal combustion engines⁴⁶ whose technical specifications may not allow to follow the default requirements described in Article 15(2)(c) of the NC RfG. Alternatively, the following requirements are applicable considering the PGM's maximum capacity⁴⁷ "Pmax":
- Pmax ≤ 2 MW, at least 1,11% Pmax per second (increasing or decreasing frequency);
 - Pmax > 2 MW, at least 0,33% of Pmax per second (increasing or decreasing frequency).
- (85) Moreover, BNetzA (DE) claimed that the requirements implemented in the national regulation respect the NC RfG provisions for type B and type C PGMs, in relation to the frequency ranges established in Table 2 of Article 13 of the NC RfG. It is shown in the relevant figures provided by BNetzA (DE) that the time period for operation for these units is reduced to 60 second if the voltage falls in the ranges [0.85-0.9] p.u. and [1.10-1.15] p.u. However, there is no reference to voltage ranges and voltage-dependent time periods for operation for type B and C PGMs. In fact, type B and type C PGMs should respect in full Article 13 of the NC RfG and maintain time periods for operation in line with Table 2 and regardless of the voltage levels.
- (86) Requirements on the voltage ranges apply to type D PGMs. In this case, BNetzA (DE) reported differences between the requirements implemented in the national legislation and those set in the NC RfG. In particular, differences are spotted concerning both the width of the relevant voltage ranges and the corresponding time period for operation. Further details can be found in

⁴⁶ The differences apply to both the types of PGs mentioned and whose voltage level is below or equal 70 kV.

⁴⁷ In accordance with the definition in Article 2(16) of the NC RfG.

the corresponding answer in Section 3 of Annex I, which also refers to the figures provided by BNetzA (DE) and included in Annex II.

- (87) Similarly, in accordance with Table 2 of Article 13 of the NC RfG, the time period for operation in the frequency range [48.5 – 49.0] Hz shall be specified by the TSO but not less than 90 minutes. However, UR (UK-NIR) affirmed that the current Northern Ireland Grid Code requires a 60 minutes time period operation for the same range of frequency. Moreover, no explanations were provided by UR (UK-NIR) for having implemented settings different from those in the NC RfG.
- (88) Finally, CRU (IE) confirmed that the implementation of the frequency ranges is not fully aligned with the provisions of the NC RfG since the national grid code widens the first and last frequency interval compared to the values in Table 2 of Article 13 of the NC RfG. In particular, the lowest value of the first interval is 47 Hz instead of 47.5 Hz, whereas the highest value of the last interval is 52 Hz instead of 51.5 Hz. CRU (IE) includes the TSO's reasoning concerning this change. In justifying these discrepancies with the NC RfG, the TSO stated that the modifications to the NC RfG requirements are essential for the operational security of the transmission system.

4.2.2 Additional binding requirements

- (89) Furthermore, NRAs were asked to provide information whether in the national regulation on grid connection for relevant system users, there is one or more additional binding requirements that refer to a range of values beyond the maximum/minimum thresholds defined in the NC RfG.
- (90) The analysis of the collected answers showed that four NRAs (ERO (CZ), BNetzA (DE), UR (UK-NIR) and Agen-RS (SI)) reported the presence of additional binding requirements that refer to a range of values beyond the maximum/minimum thresholds defined in the NC RfG. Additional binding requirements are not present in any of the other respondents.
- (91) Moreover, it is worth pointing out that ERO (CZ) confirmed the implementation of requirements relative to an additional frequency range, since a time period for operation of 20 seconds has been approved for the range [47 - 47.5] Hz. In addition, BNetzA (DE) confirmed that type A PGMs shall fulfil requirements regarding the Fault Ride Through ('FRT') capability. Additionally, type A and/or type B PGMs shall fulfil requirements regarding LFSM-U capability⁴⁸.
- (92) Concerning UR (UK-NIR), the Grid Code in Northern Ireland requires PGMs to remain connected to the network between 47 - 47.5 Hz for 20 seconds, and between 51.5 - 52 Hz for 60 minutes. These requirements involve frequency ranges which are wider than those set in the NC RfG for the relevant synchronous area.
- (93) Finally, Agen-RS (SI) stated that additional requirements may apply⁴⁹. However these are not directly applicable to all the PGMs and are instead subject to the agreement between the TSO and the PGFO in accordance with the provision in Article 13(1)(a)(ii)-(iii) of the NC RfG.

⁴⁸ Detailed explanations of these additional requirements can be found in BNetzA's answer included in the Section 3.1.2 of the Annex I.

⁴⁹ Extended information about these additional requirements can be found in Agen-RS' answer in the Section 3.1.2 of the Annex I.

4.3 Limited Frequency Sensitive Mode – Overfrequency (LFSM-O) capabilities

- (94) Article 13(2) of the NC RfG allows the relevant TSO to choose between two different modalities for type A PGMs to provide LFSM-O capabilities. The two implementations are described in paragraphs 2(a) and 2(b) of Article 13 of the NC RfG, respectively. The Agency asked the NRAs to confirm which option has been implemented.
- (95) Considering the collected answers, only NERC (LT) reported that Article 13(2)(b) is applicable in the corresponding MS. The decision to apply Article 13(2)(b) was motivated in LT by a study of a consultant which demonstrated the need for PGMs to ensure active power response against changes to frequency. The study focused on the isolated operation mode of the Baltic electricity system.
- (96) Agen-RS (SI) reported that Article 13(2)(b) is not applicable to the new PGMs (i.e. those that fall under the scope of NC RfG). However, similar capabilities are applicable to existing PGMs whose capacities are in line with those of type B, C and D PGMs. The request of such capability is part of the relevant system defence plan. The detailed answer received from Agen-RS (SI), which is included in Section 3.2 of Annex I, also provides the frequency thresholds for the automatic disconnection of the units.
- (97) The remaining NRAs reported the implementation of Article 13(2)(a).

4.4 Notification of parameters specified as general requirements

- (98) Article 15 of the NC RfG provides a comprehensive list of the general requirements for type C PGMs. In particular, paragraph (2)(d) deals with the capabilities when the frequency sensitive mode⁵⁰ ('FSM') is operating.
- (99) In this context, Article 15(2)(d)(vii) of the NC RfG establishes that the parameters specified by the relevant TSO in accordance with points (i), (ii), (iii) and (v) shall be notified to the relevant regulatory authority. In order to monitor the correct implementation of the NC RfG, the Agency included two questions in the survey circulated with the NRAs. The first inquires about the modalities of the notification; the second focuses on the date of the notification.
- (100) The analysis of the collected answers to the two questions concerning Article 15(2)(d) of the NC RfG is presented in the next two subsections, respectively.

4.4.1 Modalities of the notification

- (101) Most of the NRAs⁵¹ confirmed that the parameters included in Article 15(2)(d)(vii) are already part of the national Grid Connection Codes⁵². In other words, since these parameters are already implemented in the national law, no further specific modalities of notification have been envisaged. It is worth highlighting that a public consultation has been conducted by the Swedish

⁵⁰ In accordance with Article 2(36) of the NC RfG.

⁵¹ CREG (BE), ILR (LU), HEA (HU), ERO (CZ), ECA (EE), ANRE (RO), DUR (DK), Ofgem (GB), ARERA (IT), NERC (LT), PUC (LV), ACM (NL), ERSE (PT), Ei (SE) and Agen-RS (SI).

⁵² Detailed information concerning these answers can be found in Section 3.3.1 of the Annex I.

Energy Market Inspectorate (between 12 July 2018 and 23 August 2018), as reported by Ei (SE).

- (102) Moreover, the requirements of general application, including the parameters referred to in Article 15(2)(d)(vii), are publicly available at the webpages of most of the NRAs; three NRAs, (HERA (HR), CRE (FR) and CNMC (ES)), reported that the publication of these parameters in their grid codes is still pending, but it is envisaged to happen soon.
- (103) BNetzA (DE) stated that, since there are no specific legal provisions on the modalities of the notification under Article 15(2)(d)(vii) NC RfG, the TSOs may choose the form of the notification. The modality of this notification shall be simple, expedient and expeditious.
- (104) EV (FI) reported that the relevant TSO and DSOs have established a working group to handle the coordination of the NC RfG, and relevant TSO has organised conferences and public events about the requirements of the NC RfG. UR (UK-NIR) and CRU (IR) confirmed that the relevant TSO requested derogation from some of the provisions in Articles 15(2)(d)(i), (ii) and (iii) of the NC RfG.
- (105) URE (PL) confirmed that the notification procedure is being carried out as part of the approval process of requirements of general application and any changes can be notified in accordance with their national administrative procedure⁵³. E-Control (AT) answered that the specifications were (re)defined and consulted by the TSO and the NRA during the process of establishing a new national grid code.
- (106) Finally, RONI (SK) reported that all modalities of the notification are in accordance with Article 15(2)(d)(vii) and included in three national decisions.

4.4.2 Date of notification

- (107) The analysis of the collected answers revealed that CNMC (ES) could not conclude the notification of the parameters because the approval of the ministerial order, publishing the requirements of general application, is still in progress.
- (108) Most of the NRAs reported that the notification was executed in 2018, except for UR (UK-NIR), where the notification of the proposals for Article 15(2)(d)(vi)-(iii) and (v) was received on 17 October 2019. In this case, SONI (the TSO in UK-NIR) sought derogations on elements of Article 15(2)(d)(i), (ii) and (iii), citing errors concerning parts of (i) and (ii). UR received these derogation requests on 18 December 2019. UR has indicated that these submissions do not meet the requirements of Article 63 of the NC RfG. At the moment, UR expects to receive re-submissions.
- (109) In general, the process of notification of the proposal of the referred-to parameters is the same that led to the notification of the proposal of all the requirements for general application.

⁵³ Polish Code of Administrative Procedure, publicly available under the address: <http://prawo.sejm.gov.pl/isap.nsf/download.xsp/WDU19600300168/U/D19600168Lj.pdf>

4.5 Black start capabilities

- (110) Pursuant to Article 15(5)(a)(i) of the NC RfG, black start capability is not mandatory without prejudice to the MS's right to introduce relevant obligatory rules in order to ensure system security. Hence, the Agency asked the NRAs whether the MS exercised its right to include black start capability as a mandatory requirement for relevant PGMs to comply with.
- (111) Among the 25 NRAs that answered this question, only four NRAs (HEA (HU), ARERA (IT), PUC (LV) and RONI (SK)) made the provision of black start a mandatory capability to comply with. The remaining NRAs declared that the MS did not exercise its right to introduce such obligatory rule in order to ensure system security.
- (112) According to the national operational code approved by HEA (HU), black start capabilities are mandatory for power plants above 500 MW (except for nuclear power plants). ARERA (IT) referred to Annexes A.10 and A.19 of the national network code, where the technical requirements of the power plants/groups with black-start capability and the methods for providing the service, as well as the service test methods, are described.
- (113) Similarly, PUC (LV) refers to the Annex 7 of the national network code where it is possible to find detailed requirements for type C and type D PGMs in the context of black start capability. Finally, RONI (SK) requested mandatory provision of black start capability only to those PGMs for which this modality is possible, in accordance with Article 15(5)(a)(iii).

4.6 Synthetic inertia

- (114) The requirements set in Article 21 of the NC RfG refer only to PPMs. In this context, as stated in paragraph (2)(a) of the same Article, the relevant TSO has the right to require the provision of synthetic inertia from PPMs during very fast frequency deviations. In line with this provision, the Agency inquired the NRAs whether types C and type D PPMs have been requested to provide synthetic inertia. Moreover, the NRAs were also asked about the inclusion of the operating principle of control system installed to provide synthetic inertia and the associated performance parameters in the proposal for the requirements of general application.
- (115) ERO (CZ) and ECA (EE) reported that the relevant TSOs exercised their right to request the provision of synthetic inertia from relevant PPMs. However, the two NRAs specified that the actual provision of synthetic inertia is currently not needed in their networks. In addition, the resolution approved by NERC (LT) provides that the TSO has the right to require the synthetic inertia capabilities. It is worth noting that the TSO does not currently adopt synthetic inertia requirements in LT.
- (116) Moreover, these three NRAs did not provide information relevant to the operating principle of control systems installed to provide synthetic inertia and the associated performance parameters.
- (117) PUC (LV) confirmed that the national grid code⁵⁴ requires type C PPMs to be able to provide synthetic inertia during very fast frequency deviations. Moreover, the operating principles of the

⁵⁴ Paragraphs 19.1.1 of Annex 7 <http://likumi.lv/doc.php?id=257943>

control systems installed to ensure synthetic inertia and the related performance parameters have been agreed with the TSO.

- (118) All the other NRAs could not confirm that the relevant TSOs have requested the mandatory provision of synthetic inertia from all the relevant PPMs, following the application of Article 21(2)(b) of the NC RfG. Nonetheless, most of the NRAs recognised the importance of providing synthetic inertia during fast frequency deviations.
- (119) For instance, ERSE (PT) confirmed that although the relevant TSO did not request the mandatory provision of synthetic inertia, any PGM⁵⁵ that comes with such capability must be able to provide synthetic inertia during very fast frequency deviations. The proposals for implementing this requirement must be in accordance with the technological possibilities of the PGM and the relevant network operator would assess the possibility and conditions for the application of this requirement.
- (120) CNMC (ES) communicated that synthetic inertia will be implemented as a non-mandatory, but recommended, requirement. ANRE (RO) reported that Article 111 of the ANRE order 208/2018 (concerning type D PPM) acknowledges the possibility to provide synthetic inertia if the relevant PPMs are already equipped with the necessary control systems.
- (121) Finally, it has been also mentioned by some NRAs (e.g. Agen-RS (SI), E-Control (AT)) that the provision of such capability could be the result of an agreement between the relevant system operator and the owner of the PPM.

4.7 Additional requirements concerning frequency / voltage

- (122) Finally, the Agency asked the NRAs to specify whether, concerning the subject matters of the requirements in TITLE II of the NC RfG and focusing only on those concerning frequency/voltage issues, any additional requirements, thus different from those included in the NC RfG, had been implemented in the national regulation on grid connection for relevant system users.
- (123) Considering the collected answers, five NRAs (BNetzA (DE), EV (FI), ARERA (IT), ERSE (PT) and Ei (SE)) declared that additional requirements different from those included in the NC RfG have been implemented in their national regulations.
- (124) In fact, BNetzA (DE) extended the application of the requirements of general application to all the storage technologies, whilst Article 3(2)(d) of the NC RfG limits the scope of application of the NC RfG to pump-storage PGMs. EV (FI) sets additional requirements concerning the voltage control and the power quality. The detailed answer of EV (FI) is included in Section 3 of Annex I and provides relevant web links and further insights.
- (125) Moreover, ARERA (IT) confirmed the inclusion of additional requirements for PPMs. In addition to the under-voltage ride-through capability (UVRT), ARERA also defined the over-voltage ride-through capability (OVRT). In addition, the Italian NRA excluded PPMs from the application of Article 13(4) of the NC RfG. Hence, for these units, any active power reduction from maximum

⁵⁵ According to the answer provided by ERSE (PT), it is not possible to infer whether this capability is limited to type C PPMs (Article 21(2)(a) of the NC RfG) and type D PPMs (Article 22 of the NC RfG), or extended to any other PPM included in lower categories (type B/A).

output due to under-frequency is not admissible, with ad hoc exemptions defined in the Operational Agreement.

- (126) Similarly, Ei (SE) included additional requirements concerning PPMs concerning Article 13(2)(g) of the NC RfG, and other requirements related to Article 14(3)(a)(v)⁵⁶ of the NC RfG. Moreover, requirements for type D PPM laid down in a list of Articles⁵⁷ of the NC RfG are also extended to type B and type C in accordance with the preceding Swedish secondary legislation (for existing PPM).
- (127) Finally, ERSE (PT) confirmed that the relevant national legislation requires that type A PGMs with maximum capacity of 15 kW or higher shall demonstrate fault-ride-through capability. Note that the NC RfG does not make the compliance with this capability mandatory for type A PGMs. In fact, this capability is limited to type B, C and D PGMs.⁵⁸ Furthermore, after consulting national stakeholders, ERSE (PT) defined two variants of the U-Q/Pmax diagram in Figure 8 of Article 21(3)(c) of the NC RfG. The possibility to comply with the second variant is only allowed to some technologies and only during a time-limited transitional period.
- (128) Concerning the answers of the remaining NRAs, no additional requirements have been implemented.

4.8 Conclusion and discussion

- (129) The Agency monitored the implementation status concerning the definition and approval of the requirements of general application included in Title II of the NC RfG.
- (130) The Agency reached the following conclusions after having analysed the relevant questions included in the survey circulated with the NRAs:
- The implementation of the requirements of general application in the national regulations was not always conducted in full alignment with the provisions of the NC RfG. In fact, CREG (BE), BNetzA (DE), UR (UK-NIR) and CRU (IE) reported the application of certain requirements which result being looser/stricter compared to the values indicated in the NC RfG⁵⁹. On the other hand, the rest of the NRAs confirmed that the implementation of the requirements of general application did not deviate from the provisions laid down in the NC RfG.
 - ARERA (IT), BNetzA (DE), Ei (SE), ERO (CZ), ERSE (PT), EV (FI) and UR (UK-NIR) reported that the relevant national regulations envisage the application to certain PGMs

⁵⁶ Comprehensive information are available in the corresponding answer in the Section 3.6 of the Annex I.

⁵⁷ Articles 16(2)(a)(i), 16(2)(b), 16(4)(d) and 19(2)(a)-(b).

⁵⁸ In PT, PGMs, whose maximum capacities are above 0.8 kW and below 1 MW, are considered as type A PGMs.

⁵⁹ BNetzA (DE) takes the view that it is not forbidden under the NC RfG to apply stricter requirements. BNetzA (DE) argues that the NC RfG aims at establishing harmonised rules for grid connection for power-generating modules in order to ensure system security and in order to facilitate the integration of renewable electricity sources (Recital 3 of NC RfG). Both aims are enhanced by the stricter measures applied in DE. BNetzA (DE) argues that furthermore, Union-wide trade in electricity (Recital 3 of NC RfG) is not hampered by more stringent rules for generators.

of additional requirements, which are not present in the NC RfG but still require the compliance with frequency/voltage capabilities⁶⁰.

- The requirements included in Article 13(2) of the NC RfG have been duly implemented by all the NRAs. All the NRAs have communicated the application of one of the two modalities concerning the LFMS-O capabilities. In particular, only NERC (LT) confirmed the implementation of the requirements laid down in Article 13(2)(b), whereas all the other NRAs opted for the implementation of Article 13(2)(a) of the NC RfG. The intention of implementing Article 13(2)(a) was also confirmed by CNMC (ES) that has not yet formally approved the requirements of general application.
- Article 15(2)(d)(vii) of the NC RfG establishes that the parameters specified by the relevant TSO in accordance with points (i), (ii), (iii) and (v) shall be notified to the relevant regulatory authority. The analysis of the collected answers revealed that the implementation of this provision is well on track since the notification of the above-mentioned parameters was part of the process leading to the approval of the requirements of general application in the MS. Delays are indicated by CNMC (ES) since the approvals of the ministerial orders, publishing the requirements of general application, are still in progress. The implementation of Article 15(2)(d)(vii) is still pending in HR and FR.
- Article 15(5)(a)(i) of the NC RfG has been successfully implemented by all the responding NRAs. In fact, NRAs have decided to or not to require mandatory provision of black start capabilities to the relevant PGMs. In particular, only 4 MSs exercised their right to introduce mandatory rules concerning black start capabilities.
- Similarly, the implementation of Article 21(2)(a) has been properly completed. In particular, in 4 MSs (CZ, EE, LT and LV) the relevant TSOs have exercised the right to make the provision of synthetic inertia from relevant PPMs mandatory. In all the other cases, the relevant TSOs did not exercise this right, thus all type C/D PPMs should not necessarily demonstrate the ability to provide synthetic inertia.

⁶⁰ Agen-RS (SI) reported the presence of additional requirements in the national regulation. However their application is subject to the agreement between the TSO and the PGFO in accordance with the provision in Article 13(1)(a)(ii)-(iii) of the NC RfG.

5. Operational notification procedure

5.1 Objectives

- (131) Title III establishes the operational notification procedure for connection of new PGMs. In accordance with the general provisions in Article 29 of the NC RfG, the PGFO shall demonstrate to the relevant system operator that it has complied with the requirements set out in Title II of the NC RfG by successfully completing the operational notification procedure for connection of each PGM described in Articles 30-37 of the NC RfG.
- (132) On the other hand, the relevant system operator shall clarify and make publicly available the details of the operational notification procedure.
- (133) In this context, the Agency included three questions in the survey that was circulated with the NRAs. The first question relates to Article 29(2) NC RfG. NRAs were asked to provide the publicly available reference of the details of the operational notification procedure.
- (134) The second question relates to Article 30(3) of NC RfG. The Agency inquired the NRAs about the national legislation for notification by the PGFO of the permanent decommissioning of the type A PGM to the relevant system operator or the competent authority of the MS.
- (135) Finally, the third question deals with Article 32(6) of the NC RfG. The Agency asked the NRAs whether the MS has provided that the PGMD⁶¹ is issued by an Authorised Certifier⁶².
- (136) The implementation of the provisions of Title III of the NC RfG is analysed in the continuation of this Section, while the NRAs' responses in full are included in Section 4 of Annex I.

5.2 Notification for connection

- (137) The analysis of the answers provided by CRU (IE), Ei (SE) and Agen-RS (SI) showed that the operational notification procedure in the relevant MSs has not been implemented in the national grid codes yet. However, the three NRAs pointed out that the definition of the notification procedures is ongoing and in line with the NC RfG provisions. Moreover, they are expected to be approved soon.
- (138) The remaining NRAs provided public references (also in form of web links) to the relevant operational notification procedures.

5.3 Notification of permanent decommissioning of type A PGMs

- (139) As stated in Article 30(3) of the NC RfG, the PGFO shall ensure that the relevant system operator or the competent authority of the MS is notified about the permanent decommissioning of a type A PGM in accordance with national legislation. The Agency requested NRAs to provide insights about the national legislation for such notification.

⁶¹ In accordance with the definition in Article 2(10) of the NC RfG.

⁶² The definition of Authorised Certifier is in Article 2(46) of the NC RfG.

- (140) It is worth mentioning that three NRAs (ECA (EE), HERA (HR) and ACM (NL)) did not indicate a national legislation relevant to the notification of the decommissioning of a type A PGM. Moreover, CRU (IE) explained that such notification is going to be implemented soon in national legislations.
- (141) EV (FI) reported the lack of a specific legislation concerning the notification of the permanent decommissioning of type A PGMs. However, it is worth noting that EV (FI) verifies the terms of connection service for TSO and the notification of the permanent decommissioning of the type A PGM by the power-generating facility owner. Thus, the notification process is mandatory for both the TSO and the connected PGM by means of a contract with the TSO.
- (142) CREG (BE) specified that the federal legislation⁶³ does not envisage a notification by the PGFO due to the permanent decommissioning of the type A PGM. At regional⁶⁴ level, this procedure is defined following technical rules approved by the regional regulators. When a type A PGM is permanently decommissioned, a written notification must be addressed within 15 working days following the decommissioning.
- (143) UR (UK-NIR) refers to the national grid code and reports the presence of a three years notice period prior to decommissioning of PGMs with installed capacity above 50 MW. However, the answer is not pertinent to the question since PGMs of such capacity are not defined as type A in UK-NIR. In fact the threshold above which PGMs are considered as type B units is 0.1 MW in Ireland and Northern Ireland, pursuant to the provisions in Table 1 of Article 5 of the NC RfG.
- (144) The remaining NRAs provided the reference, also by means of relevant web links, to the national legislation implementing this provision.
- (145) For example, E-Control (AT) reported that the national grid code states that power-generating facility owners have to inform the relevant system operator of the permanent decommissioning of type A PGMs. Furthermore, a centralized database, which contains data about all PGMs (type-A PGMs included), is present in DK. It is a legal requirement upon connection to register a PGM in the database, as well as report any changes about the PGM. The legal obligation to report changes includes the situation of permanent decommissioning.

5.4 PGMD issued by authorised certifier

- (146) Pursuant to Article 32(6) of the NC RfG, a MS may provide that the PGMD⁶⁵ shall be issued by an authorised certifier. The Agency asked the NRAs if this Article had been applied by the relevant MS.
- (147) Only BNetzA (DE) and ANRE (RO) confirmed that the corresponding MS provided that the PGMD is issued by an Authorised Certifier. In particular, ANRE (RO) specified that this requirement is foreseen into ANRE order no. 51/2019, art.12 (2) (e). BNetzA (DE) explained

⁶³ Applicable to voltage levels at the connection point above 70 kV.

⁶⁴ Voltage levels at the connection point lower or equal to 70kV.

⁶⁵ Article 2(10) NC RfG: power-generating module document or PGMD means a document provided by the power-generating facility owner to the relevant system operator for a type B or C power-generating module which confirms that the power-generating module's compliance with the technical criteria set out in this Regulation has been demonstrated and provides the necessary data and statements, including a statement of compliance.

that the “Federal Ordinance on the Verification of Electro Technical Features of Energy Systems” of June 2017 determines the certification and validation of power plants.

- (148) It is worth noting that, although there is not a formal application of Article 32(6) of the NC RfG in the relevant MSs, ERSE (PT) and RONI (SK) envisage the possibility that the PGMD can be issued by an authorised certifier. The remaining NRAs confirmed that this Article has not been applied by the relevant MS.

5.5 Conclusion and discussion

- (149) The Agency monitored the implementation of three Articles of the RfG concerning the operational notification procedure. The three Articles are 29(2), 30(3) and 32(6).
- (150) Article 29(2) of the NC RfG requires the relevant system operator to clarify and make publicly available the details of the operational notification procedure. The analysis of the answers included in the questionnaire revealed that the implementation of this article is well on track. Most of the NRAs indicated publicly available references to the operational notification procedure. The implementation is still not complete in IE, SE and SI according to the corresponding NRAs, although these expect the completion of the relevant procedures soon.
- (151) Similarly, the implementation of Article 30(3) of the NC RfG concerning the notification of permanent decommissioning of type A PGMs is well on track in the majority of the MSs. Four NRAs (ECA (EE), EV (FI), HERA (HR) and ACM (NL)) could not indicate the reference to a national legislation, whereas CRU (IE) envisages a prompt implementation of Article 30(3) of the NC RfG. Differences in the notification process are reported by CREG (BE) depending on the type of connection i.e. at federal or regional level. The answer provided by UR (UK-NIR) could not be used to determine the status of the implementation of Article 30(3) of the NC RfG in the relevant MS. The remaining⁶⁶ NRAs provided the reference, also by means of relevant web links, to the national legislation implementing this provision.
- (152) Finally concerning the implementation of Article 32(6) of the NC RfG, it is possible to conclude that most MSs did not provide that the PGMD shall be issued by an Authorised Certifier, with the sole exception of two NRAs (BNetzA (DE) and ANRE (RO)).

⁶⁶ With the exception of UR (UK-NIR) whose answer does not refer to type A PGMs and thus out of scope.

6. Relevant clauses in contracts and general terms

6.1 Objectives

- (153) Article 71 of NC RfG regulates the amendment of contracts and general terms and conditions. According to this provision, regulatory authorities shall ensure that all relevant clauses in contracts and general terms and conditions relating to the grid connection of new PGMs are brought into compliance with the requirements of the NC RfG.
- (154) The Agency sought feedback from NRAs concerning the relevant clauses in contracts and general terms.
- (155) The implementation of the provisions of the Article 71 of the NC RfG is analysed in the continuation of this Section, while the NRAs' responses in full are included in Section 5 of Annex I.

6.2 Modalities adopted

- (156) Concerning Article 71(1) of the NC RfG, the Agency asked the NRAs to explain the modalities adopted to ensure that all relevant clauses in contracts and general terms and conditions relating to the grid connection of new system users are brought into compliance with the requirements of the relevant regulation.
- (157) The analysis of the collected answers revealed that CRE (FR) and CNMC (ES) have not implemented any specific modality to implement Article 71(1). Similarly, Ei (SE) reported that the development of a specific modality has not started. However Ei (SE) plans to supervise this process which is expected to start by the end of 2020.
- (158) In the case of PT, the process to ensure the compliance of all contracts with the NC RfG is still ongoing. In fact, ERSE (PT) stated that this issue will be addressed in an ongoing review project that will ensure that all relevant clauses in contracts, general terms and conditions relating to grid connection of new generator modules are adapted to the requirements of the NC RfG.
- (159) The remaining NRAs confirmed that they ensure that all relevant clauses in contracts and general terms and conditions comply with the NC RfG. Further insights on the specific modalities adopted can be found in Section 5 of the Annex I.

6.3 Conclusion and discussion

- (160) The implementation of Article 71(1) is well on track in most of the MSs. In fact, it can be highlighted that most of the NRAs (21 out of 25) currently ensure that all relevant clauses in contracts and general terms and conditions relating to the grid connection of new system users are brought into compliance with the requirements of the relevant regulation.
- (161) However, although at different stages, the implementation is still ongoing in FR, ES, SE and PT.

Annex I: NRAs' responses to the questionnaire

1. Overview

- (1) This annex includes the responses in full received from the NRAs to each question of the survey on the implementation monitoring of the NC RfG. Text in red font is added by the Agency for the sole purpose of clarification.
- (2) The questionnaire was circulated on 19 December 2019 and NRAs were asked to submit their answers by 12 March 2020. The report is based on the answers given by the NRAs and submitted by 6 November 2020⁶⁷.
- (3) It is worth noting that E-Control (AT), CREG (BG) and ERSE (ES) provided a general introductory note before answering all the questions. The relevant notes are included in the table below (Table 1). This table also include the communications received from RAE (GR) in order to motivate the missed-submission of the answers to the questionnaire sent by the Agency.
- (4) The Agency highlights the communication received from CRE (FR) on 16 September 2020 concerning:
 - the publication on 9 June 2020 of the ministerial order⁶⁸ defining the requirements of general application and the criteria for modification of a PGM, and
 - the decision⁶⁹ of CRE (FR) on 16 July 2020 concerning only the provisions of the NC RfG applying in the event of a modification of a PGM as defined in the ministerial order of 9 June 2020.
- (5) The approval of the abovementioned ministerial order and, in turn, the decision of CRE (FR) provided additional information concerning certain answers submitted⁷⁰ by CRE (FR) when responding to questionnaire circulated by the Agency. In fact, the answers reported by CRE (FR) and included in Table 2-5 and Tables 8-10 were referring to only a prospective publication of the ministerial order.

⁶⁷ NRAs were given an opportunity to further submit their answers, or to amend and update their initial inputs.

⁶⁸ La Ministre de la transition écologique et solidaire, Arrêté du 9 juin 2020 relatif aux prescriptions techniques de conception et de fonctionnement pour le raccordement aux réseaux d'électricité, version en vigueur au 16 septembre 2020.

Available at: <https://www.legifrance.gouv.fr/loda/id/JORFTEXT000042032189/2020-09-16/#:~:text=r%C3%A9seaux%20d%C3%A9lectricit%C3%A9-,Arr%C3%AAt%C3%A9%20du%209%20juin%202020%20relatif%20aux%20prescriptions%20techniques%20de,raccordement%20aux%20r%C3%A9seaux%20d%C3%A9lectricit%C3%A9>

⁶⁹ Commission de Régulation de l'énergie, Délibération N. 2020-184 de la CRE du 16 juillet 2020, portant décision relative aux installations, réseaux et systèmes faisant l'objet de modifications au sens des articles 4 des règlements (UE) 2016/631, 2016/1388 et 2016/1447 de la Commission.

Available at: <https://www.cre.fr/Documents/Deliberations/Decision/installations-reseaux-et-systemes-faisant-l-objet-de-modifications-au-sens-des-articles-4-des-reglements-ue-2016-631-2016-1388-et-2016-1447-de>

⁷⁰ On 8 May 2020 via email communication.

- (6) The Agency adopted the most up-to-date information provided by CRE (FR) when compiling the Report. Finally, CRE (FR) did not communicate modifications to the answers in Table 2-5 and Tables 8-10. For completeness, the Agency included a note at each of these tables to highlight the changes introduced by the publication of the ministerial order and the decision of CRE (FR).

(7) Table 1: General notes and marks.

MS	General note
AT	<p><i>Please find the relevant links accordingly:</i></p> <p><i>Austrian national grid code (TOR Technical and organisational rules)</i></p> <p><i>https://www.e-control.at/recht/marktregeln/tor</i></p> <p><i>There are 4 documents that are applied to generation requirements (type A-D):</i></p> <ul style="list-style-type: none"> <i>• Type A: https://www.e-control.at/documents/1785851/1811582/TOR+Erzeuger+Typ+A+V1.0.pdf/6342d021-a5ce-3809-2ae5-28b78e26f04d?t=1562757767659</i> <i>• Type B: https://www.e-control.at/documents/1785851/1811582/TOR+Erzeuger+Typ+B+V1.0.pdf/a9a7e5ae-5842-caa9-d2c0-93be4b6e0802?t=1562757801048</i> <i>• Type C: https://www.e-control.at/documents/1785851/1811582/TOR+Erzeuger+Typ+C+V1.0.pdf/345d283b-6017-f58f-64fe-96029d31ba24?t=1562757831308</i> <i>• Type D: https://www.e-control.at/documents/1785851/1811582/TOR+Erzeuger+Typ+D+V1.0.pdf/ae8394df-60aa-5a4f-738e-a6df14a72541?t=1562757862259</i> <p><i>Text covering provisions originating from RfG (quotes) are to be shown in grey(mirrored), while specific national requirements are black. This methodology guaranties all national stakeholders to have one single document covering all requirements (European and National).</i></p> <p><i>Austrian requirements of general application</i></p> <p><i>https://www.ris.bka.gv.at/GeltendeFassung.wxe?Abfrage=Bundesnormen&Gesetzesnummer=20010590&FassungVom=2024-04-26</i></p>
BE	<p><i>In Belgium the federal regulator, CREG, is competent for the transmission grid (grid >70 kV).</i></p>

	<i>The regional regulators, BRUGEL, CWaPE and VREG, are competent for local transmission and distribution (grids ≤ 70 kV). If relevant, different answers are given for the federal and regional voltage levels</i>
ES	<i>A Ministerial Order setting these requirements is under process of approval and expected to be adopted by the end of the first quarter of 2020. Any provided information upon this point 2 is based on the requirements that were established on the version of that ministerial order that was subjected to public consultation. Please, bear in mind that some changes could be arise from the approbation process, so provided information must be taken with all due reservations.</i>
GR	<p>First communication of RAE (GR) of 23 March 2020:</p> <p><i>The Regulator in Greece is expecting proposals with the revised general requirements for the three codes from the TSO and hopefully proceed with the approval shortly after. In other words we are approaching the complete implementation of the three codes.</i></p> <p>Second communication of RAE (GR) of 27 October 2020:</p> <p><i>The Greek NRA (RAE) has taken all the decisions required by the three NC (RfG, DCC, HVDC). Hence in Greece we have approved</i></p> <ol style="list-style-type: none"> <i>1) RAE Decision for RfG, Thresholds and Requirements for General Applications (both in one decision): 1165/2020 (Gov. Gaz. 3757 B, 7 Sept. 2020)</i> <i>2) RAE Decision for DCC, Requirements for General Applications: 1166/2020 (Gov. Gaz. 3698 B, 3 Sept. 2020)</i> <i>3) RAE Decision for HVDC, Requirements for General Applications: 1167/2020 (Gov. Gaz. 3762 B, 7 Sept. 2020)</i> <i>4) RAE Decision Derogations for RfG, DCC, HVDC (common criteria for the three): 778/2018 (Gov. Gaz. 4643 B, 18 Oct. 2018)</i> <i>5) We skipped the decision for the emerging technologies in RfG since we missed the time intervals described in the Regulation.</i>

2. Defining new or existing power-generating modules

2.1 Modernisation/replacement of existing PGM

2.1.1 Qualitative criteria

- (8) **Q.1.a. Power Generating Modules (PGMs) defined as “existing” are not subject to the requirements of the NC RfG, unless the exemptions in Article 4(1)(a)-(b) apply. Explain what are the modernisation/replacements criteria adopted to determine if the connection agreement of a type C or type D PGM must be revised or if a new one is needed.**

(162) Table 2: Qualitative modernisation/replacement criteria

MS	Answer
AT	<p><i>In the grid code (TOR Erzeuger) a significant change is to be defined as changes of the electrical characteristics that effect grid connection in a way that is different than what was defined in the connection agreement and/or that could have consequences to network operations.</i></p>
BE	<p><i>Federal level (grids >70kV):</i></p> <p><i>According to article 162, §2, of the new Belgian federal grid code the TSO has to develop these criteria, submit them to the NRA for advice, and publish the criteria on its website. At this moment the NRA is developing these criteria in consultation with representatives of the stakeholders. As yet the criteria are not finalised but we expect that this will be done in the near future.</i></p> <p><i>Regional level (grids <=70kV):</i></p> <p><i>Art. 2.2.52 §3 of the Technical Rules for the Distribution System for Electricity in the Flemish Region (link to document: https://www.vreg.be/sites/default/files/document/trde_2019.pdf) defines that the distributions system operators in collaboration with the transmission system operator formally propose, after a public consultation, the modernisation/replacements criteria when a connection agreement of a relevant system user must be revised or if a new one is needed, to the regulatory authority (VREG for the Flemish Region) who has to approve these.</i></p> <p><i>A public consultation is ongoing to implement a similar rule in the Technical Rules for the Local Transmission system for electricity in the Flemish Region (part of the high voltage network which is regulated by the Flemish regulator). The relevant system operator must formally propose the above mentioned criteria.</i></p> <p><i>The article 4.1 is in force by itself. No additional predefined criteria were established in Wallonia at this time because this case was not yet submitted to regulator by RSO. It needs to be mentioned that all connection of PGM of type C and D generator must to be done on TSO-grid. Regional regulator is only competent for connexions on level 70 kV (and under).</i></p> <p><i>This is similar for the Brussels-Capital region.</i></p>
BG	<p><i>No reply</i></p>
CZ	<p><i>According to our understanding of the NC RfG, these articles do not prescribe a requirement for either the system operator or the NRA to have a prescribed set of modernisation/replacement criteria in place. Each and every situation has to be evaluated on its own.</i></p>
DE	<p><i>If components or system parts are replaced by a modification or modernization and if this replaces 50 % of the total connected active power agreed for the grid connection point (based on all components or system parts at the time of initial commissioning), this is always considered a significant change.</i></p> <p><i>(VDE-AR-N 4110 (“TAR medium voltage”), Chapter 1, page 14 and VDE-AR-N-4120 (“TAR high voltage”), Chapter 1, page 12 and page 13)</i></p>

DK	<p><i>DUR will address the assessment of modernisation as a matter of legal interpretation of the connection agreement. The assessment will be based on the desired technical changes (e.g in MW or Mvar) and the reasoning for the desired change. This will be compared to the original connection agreement and to the reasoning from the RSO to set the general values for connection in the first place. DUR has not set predetermined quantifiable values in terms of deciding on the question of substantially modernisation.</i></p>
EE	<p><i>According to our opinion those NC RfG articles do not foresee a requirement for either the system operator or the NRA to have a prescribed set of modernisation/replacement criteria in place. Each situation has to be evaluated on its own.</i></p>
ES	<p><i>A Royal Decree that establishes these criteria is under administrative processing and expected to be approved by the end of first quarter of 2020. Below it is explained what was included on the version that was subjected to public consultation. Please, bear in mind that some changes could be arise from the approbation process so that provided information must be taken with all due reservations.</i></p> <p><i>They will be considered as modifications that will require substantially revising the connection agreement those that meet any of the following conditions:</i></p> <ul style="list-style-type: none"> <i>a) Modification implies an increase of more than 20% of PGM power.</i> <i>b) Modification entails replacement or modernization of the equipment that constitutes main generating plant when it affects a percentage greater than 70% of PGM power.</i> <p><i>On both cases, the cumulative nature of the substitutions or modernizations will be taken into account.</i></p>
FI	<p><i>All features that affect the fulfilment of the technical requirements for power generating facilities. More fully described in TSO grid code specification document under the heading 6.2.</i></p> <p><i>Link to the document: https://www.fingrid.fi/globalassets/dokumentit/en/customers/grid-connection/grid-code-specifications-for-power-generating-facilities-vjv2018-.pdf</i></p>
FR	<p><i>The ministerial order approving the requirements of general application that should be published in the coming weeks will define a list of criteria for which the connection agreement of a type C ou D PGM must revise its connection agreement. These provisions also apply to type A and B units. The provisions of the NC RfG that have to be applied when the criteria are met will be defined by CRE after the ministerial order is published. As the ministerial order project is known by operators, CRE has already carried out a public consultation about the requirements that CRE intend to apply.</i></p> <p><i>Updated information provided by CRE (FR)</i></p> <p><i>The ministerial order defining the requirements of general application and the criteria for modification has been published on 9 June 2020. CRE issued a decision on 16 July 2020 concerning only the NC RfG requirements applicable in the event of a modification of a PGM, as defined in the ministerial order of 9 June 2020.</i></p>
GB	<p><i>If a PGM undertakes a “Substantial Modification” then the PGM is considered to no longer be an “existing” user. A “Substantial Modification” is defined as “a modification in relation to modernisation or replacement of the User’s Main Plant and Apparatus which</i></p>

	<i>impacts its technical capabilities, which following notification by the User to the Company, results in a substantial amendment to the Bilateral Agreement.”</i>
UK-NIR	<i>This topic was presented to the SONI Grid Code Review Panel and was consulted in 2019. http://www.soni.ltd.uk/media/documents/SONI-Grid-Code-Consultation-Cover-Note-July-2019.pdf SONI submitted their Grid Code RfG and Housekeeping Modification on the 17th October 2019, these modifications have been publicly consulted upon by the TSO and have been reviewed at the NI grid code review panel. They were submitted to the UR for approval and approved on 14th Feb 2020. A copy of the of the PPM Setting Schedule RfG Changes and SONI Grid Code RfG changes can be found at http://www.soni.ltd.uk/how-the-grid-works/grid-codes/</i>
GR	<i>No reply</i>
HR	<i>At the moment, there are no specific modernisation/replacements criteria defined, however if a new connection agreement is needed for e.g. due to increase in nominal connection power, merging or division of couple billing metering points, changes of the technical design of the connection, etc.. calls for a revision of the PGM requirements.</i> <i>There were no request for modernisation/replacements of the type C or type D PGMs.</i> <i>According to TSO, criteria for revision of existing connection agreement for type D is not defined yet, but could include: increase of PGM type D nominal power, connection of additional unit to point of common coupling of existing PGM type D, exchange of PGM type D generator, exciter or inverter type, change of PGM type D nominal voltage.</i>
HU	<i>There are no specific criteria adopted as these procedures were not yet executed, also the Regulation itself lays down the basic procedural steps and regulatory aspects.</i>
IE	<i>This issue has not yet been addressed by EirGrid. The TSO and DSO are currently working on a consultation to determine what constitutes a substantial modification, and therefore require a new connection agreement. This topic was presented to the Grid Code Review Panel in Q4 2019, the consultation is expected soon.</i>
IT	<i>The Italian Regulatory Authority, approving the proposal of the Italian TSO (Terna S.p.A.) and according to Article 4 (1)(a) of the NC RfG, has provided that the NC RfG applies also for “existing” PGMs subject to significant modifications, partial or total rebuilding of the power plant.</i> <i>The user shall notify the TSO of planned modification to allow the TSO to assess its significance.</i> <i>The changes automatically considered significant are:</i> <i>a. for synchronous generators: (i) the replacement of the alternator, (ii) the renewal of voltage and/or frequency regulation systems, (iii) the renewal of the control and protection systems of the power plant, (iv) modification/replacement of components related to the thermal or hydraulic cycle (e.g. burners, boiler parts, hydraulic lines, turbine, etc.);</i> <i>b. for power plants: (i) the replacement of a number of wind turbines or inverters with a power of at least 10% of the efficient power, (ii) the renewal of power plant control systems.</i>

	<i>For other types of changes, within 60 days the notification receipt, TSO verifies the impact of the modernisation on technical performance and then assess its significance.</i>
LT	<p><i>Currently, NERC has not established modernisation/replacements criteria adopted to determine if the connection agreement of a relevant system user must be revised or if a new one is needed. We consider that such criteria should be determined on case by case basis when NRA receives the proposal for exemption. Currently, we have not received such proposals.</i></p> <p><i>Regarding Order of the Minister of Energy New connection agreement is required if the PGM is replacing the equipment (AVR, governor system, boiler regulating system) impacting the technical capabilities. Once the new agreement is established, the RfG requirements are mandatory.</i></p> <p><i>(https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/TAIS.428001/asr_paragraph_71.16)</i></p>
LU	<i>Nothing defined. On a case by case basis.</i>
LV	<p><i>The modernisation/replacements criteria have not been adopted. The NRA assesses the application of the requirements of the NC RfG to existing power-generating modules on a case-by-case basis. The TSO whenever it is aware of the modernisation/replacements of existing PGM, turns to the NRA requesting to take a decision on application of the requirements of the NC RfG. The NRA evaluates the justifications provided by both the TSO and the owner of PGM.</i></p> <p><i>The main criteria, when NRA decides that connection agreement must be revised or a new one is needed, is determination of the impact of modernisation to the transmission system.</i></p> <p><i>The NRA assesses the reasons for modernization, whether the upgrade or significant modernisation of PGM will change the module's performance, how it will affect the security of the transmission system.</i></p>
NL	<i>N/A</i>
PL	<p><i>No precise modernisation criteria have been adopted.</i></p> <p><i>TSO in cooperation with DSOs prepared rules/procedure on how to proceed with modernisation/replacements under NC RfG. By TSO the principles developed have been included in a document "Procedura objęcia istniejącego modułu wytwarzania energii wymogami NC RfG w przypadku modernizacji lub wymiany - Przewodnik". This document is publicly available on TSO's website: www.pse.pl/dokumenty in bookmark: Kodeksy Sieci --> NC RfG --> Modernizacja istniejących PGM typu D</i></p> <p><i>An example for DSO can be seen at the link: https://www.operator.enea.pl/operator/dla-domu/05.09.2019/procedury-pozwolen-na-uzytowanie---nc-rfg/procedura-modernizacji-nc-rfg-z-zalacznikami.pdf</i></p>
PT	<i>It was published the Decree n.º 73/2020, on 16th January (https://dre.pt/application/file/a/130251735), with the non-exhaustive requirements for grid connection of generators. In that decree it is established the situations where the RfG applies to existing generators.</i>
RO	<i>The modernisation/replacements criteria are:</i>

	<p><i>For SPGM</i></p> <ul style="list-style-type: none"> - Replacement of SPGM or voltage regulator type modification (including excitation systems), speed governor, power system stabilizer, synchronous synchronous and transitory reactances, modification of P-Q diagrams including new compensation devices, speed and voltage controllers if these modifications allow fulfillment of requirements derived from R931/2016 (technical norme approved by ANRE). - Capacity modification of SPGM, i.e. increasing of maximum capacity (at least 10% C category and 5% D category). - Passing from C category to D category. <p><i>For PGM/PPM</i></p> <ul style="list-style-type: none"> - Modernisation/replacement of an element from componence of a PGM i.e. : synchronous/asynchronous generator, which operating asynchronous with electronic network to which is connected by electronic power, passing to generating way „stall control” - class II or „double feed” - class III, to generating way full convertor - class IV, replacement/modernisation of photovoltaic pannels, of component inverters, if these modifications allow fulfillment of requirements derived from R931/2016 (technical norme approved by ANRE). - Modification of capacity of PGM/PPM (partially or totally), which are leading to maximum capacity (at least 10% C category and 5% D category). - Passing from C category to D category. - Replacement of PGMs or increasing of the no. of PGMs which are leading to increase maximum capacity with 10% for PPM capacity (C type) or with 5% in D type situation, modification of P-Q diagrams including new compensation devices, speed and voltage controllers if these modifications allow fulfillment of requirements derived from R931/2016 (technical norme approved by ANRE).
SE	<p>No criteria are adopted, only one case has been decided upon by the NRA so far (the requirements are handled case by case), but the NRA is considering whether to adopt criteria or not.</p>
SI	<p>Criteria are established in national grid code for transmission system and national grid code for distribution system. In general new connection agreement is required when extent of modernisation impacts operational limits and technical characteristics of the PGM's given in existed connection agreement.</p>
SK	<p>The individual criteria are not specified. The TSO will deal with each request individually, and if the need to change the connection contract is assessed, it will submit a request to the URSO to decide on the necessary changes to the contract.</p> <p>At DSO level connection agreement must by revised if during modernisation was changed installed power and thus change of reserved capacity is required.</p>

2.1.2 Quantitative criteria

(163) **Q.1.b. Specify if there are any quantitative measures to determine the extent of the modifications brought to the PGM, above which the connection agreement must be substantially revised. If yes, describe them and provide links to relevant decision(s). Besides the criteria mentioned in Article 4(1)(a)-(b), are there other criteria adopted to assess the level of modernisation of a plant or replacement of equipment? If yes, provide exhaustive insights and links to a relevant decision(s).**

(164) Table 3: quantitative modernisation/replacement criteria

MS	Answer
AT	<p>Some Examples (not binding) are described in the grid code (TOR Erzeuger):</p> <ul style="list-style-type: none"> • Changes of maximum capacity bigger than 15% • Change of the generator and excitation modules • Change of the inverter • Additional PGMs at one power generation facility. • Change of voltage level
BE	<p>The modernisation/replacement criteria to determine if the connection agreement of a relevant system user must be revised or if a new one is needed, are in development. This is being discussed with representatives of the stakeholders within the Workgroup Belgium Grid. A public consultation is foreseen later on this year.</p> <p>https://www.elia.be/-/media/project/elia/elia-site/ug/wg-belgiangrid/20200204_wg-belgian-grid/modernisation_ug_04_02_2020finalpptxv3.pdf</p> <p>We expect that the criteria will contain quantitative measures to determine the extent of the modifications brought to the PGM, above which the connection agreement must be substantially revised. For example, certain thresholds of increase in nominal power of a PGM will trigger the need for a partial or full modernisation.</p>
BG	<i>No reply</i>
CZ	<p>Since we did not issue a decision please refer to our answer to the question a). Nevertheless, the TSO (ČEPS) is currently preparing some criteria and as far as we know it will be part of the TSO Grid Code.</p>
DE	<p>A change or replacement of generating units shall be considered a substantial change if the change or replacement causes the electrical characteristics of these appliances to deviate from the original state (before the change). Substantial changes can be:</p> <ul style="list-style-type: none"> - Change of the agreed connected active power or the agreed connected apparent power; - deterioration of the system perturbations in such a way that the system perturbations that were present at the time of the original grid connection test violated the valid system perturbations limits; - modification of the protection concept;

	<p>- modifications of the electrical infrastructure (such as power transformers or medium-voltage cable connections, conversion, extension or dismantling of a transfer station).</p> <p>A simple replacement of generation units of the same type or technically equivalent types or components of more recent construction (e.g. replacement of a PV inverter by an equivalent PV inverter), for example due to a defect, is not a significant change as long as it is ensured that the electrical behaviour does not deteriorate. This also applies if more than 50 % of the total connected active power agreed for the grid connection point (based on all components or system parts at the time of initial commissioning) is substituted.</p> <p>(VDE-AR-N 4110 (“TAR medium voltage”), Chapter 1, page 14 and VDE-AR-N-4120 (“TAR high voltage”), Chapter 1, page 12 and page 13)</p>
DK	DUR has not set predetermined quantifiable values in terms of deciding on the question of substantially modernisation.
EE	We have not issued a specific decision since it is a part of TSO connection conditions, which are approved by us (NRA).
ES	No.
FI	None.
FR	<p>The criteria are :</p> <ul style="list-style-type: none"> - Change of the type of the unit, or - Increase in connection power by more than 10% of a PPM, or - Increase in connection power by more than 20% of a synchronous power generating module (30% or more for hydro power plant with at least 3 units), or - Change of an “essential” element of the unit (rotor and stator). <p>These criteria have been the subject of a public consultation.</p> <p>CRE organized a public consultation (from December 12, 2019 to January 12, 2020) to decide on the provisions of the NC RfG that have to be applied when the criteria described before are met. CRE will published its decision after the ministerial order publication.</p> <p>Updated information provided by CRE (FR)</p> <p>The ministerial order defining the requirements of general application and the criteria for modification has been published on 9 June 2020. CRE issued a decision on 16 July 2020 concerning only the NC RfG requirements applicable in the event of a modification of a PGM, as defined in the ministerial order of 9 June 2020.</p>
GB	There are no quantitative measures.

UK-NIR	No, see 1 (a).
GR	<i>No reply</i>
HR	<i>No, there are no specific quantitative measures.</i>
HU	<i>Not applicable.</i>
IE	No, see 1 (a).
IT	<i>The quantitative measures to determine the extent of the modifications are the same described at the previous letter a. The previous quantitative measures are defined in the National Grid Code (Chapter 1, Section C) which was approved by Italian Regulatory Authority with resolution 592/2018/R/eel.</i>
LT	<i>No quantitative measures are applied above which define when the connection agreement must be substantially revised. Please refer to point 1.a.</i>
LU	No.
LV	<i>There are no quantitative measures adopted to determine the extent of the modifications. Each PGM modernization case is evaluated by the NRA individually.</i>
NL	<i>None.</i>
PL	<i>No quantitative measures have been applied.</i>
PT	<i>See link in topic a.</i>
RO	<i>It was no case and it was no decision.</i>
SE	<i>No quantitative measures are used, and no other criteria are adopted.</i>
SI	<i>No quantitative measures and additional criteria are given.</i>
SK	<p><i>There are no quantitative measures. PPS will take a measure for every request individually.</i></p> <p><i>On DSO level:</i></p> <ul style="list-style-type: none"> <i>-change of the reserved capacity of equipment for electricity generation and generator replacement (for rotating machines), resp. panels and inverters.</i> <i>-changes in the voltage level at which electricity generating installations are connected to the distribution system - this has a direct effect on the change in the classification of the source according to the RfG.</i>

2.1.3 Decisions issued

- (9) **Q1.c. Has the regulatory authority or, where applicable the Member State, issued any decision in accordance with Article 4(1)(a)(iii) and/or Article 4(1)(b)? If yes, provide a link (preferably a web link) to such decision.**

(10) Table 4: Decisions issued concerning existing/new PGMs.

MS	Answer
AT	No.
BE	<i>Federal level (grids >70kV): No, until now no demands are made to the NRA for the federal level. Regional level (grids <=70kV): For the Flemish Region there aren't any decisions in accordance with Article 4(1)(a)(iii) and/or Article 4(1)(b). The same for the Walloon Region and for the Brussels-Capital Region.</i>
BG	<i>No reply</i>
CZ	<i>There is currently no decision as of yet (10th of March 2020) and we do not expect any at the moment.</i>
DE	No.
DK	No.
EE	<i>There is currently no decision foreseen in near future.</i>
ES	No.
FI	No.
FR	<i>This decision will be issued by CRE shortly after the ministerial order publication. <i>Updated information provided by CRE (FR)</i> The ministerial order defining the requirements of general application and the criteria for modification has been published on 9 June 2020. CRE issued a decision on 16 July 2020 concerning only the NC RfG requirements applicable in the event of a modification of a PGM, as defined in the ministerial order of 9 June 2020.</i>
GB	<i>Neither the regulatory authority or the Member State has issued any decision in accordance with Article 4 (1)(iii) or Article 4(1)(b).</i>
UK-NIR	No, see 1 (a).
GR	<i>No reply</i>
HR	No.
HU	<i>There was no such decision adopted yet. Except for producers who aimed to get National or EU funded (future) renewable support – for investment, operation – (e.g. feed in tariff or feed in premium in the future tenders/auctions or procedures) must comply with Decree of the Ministry of National Development No. 55/2016. (XII. 21.) on the technical requirements for renewable energy installations benefitting from support for acquisition and maintenance (HU: 55/2016. (XII. 21.) NFM rendelet a megújuló energiát termelő berendezések és rendszerek beszerzéséhez és működtetéséhez nyújtott támogatások igénybevételének műszaki követelményeiről) entered into force on 02.01.2017 last amended on 09.11.2017, applicable for RES support procedures after entry into force, for new investments, oblige PGM owners to meet the respective</i>

	<p>requirements of the NC RfG as a general condition to obtain RES support. It also obliges existing owners to meet the respective requirements of the NC RfG as a general condition to obtain RES support in case of a modernization/improvement investment of existing PGM exceeding the 50% of the original investment value (in order to keep or increase capacity). This later is described in Decree of the Ministry of National Development No. 62/2016. (XII. 28) on restrictions for the support of renewable electricity and on criteria for tendering procedures for the premium tariff (HU: 62/2016. (XII. 28) NFM rendelet a megújuló energiaforrásból származó villamos energia termelési támogatás korlátairól és a prémium típusú támogatásra irányuló pályázati eljárásról) entered into force on 01.01.2017, last amended on 01.01.2018 that Introduces definitions and establishes conditions for bidding procedures targeting renewable energy plants with a higher capacity than 1 MW.</p> <p>Link for the decree: http://njt.hu/cgi_bin/njt_doc.cgi?docid=199453.345912 http://www.res-legal.eu/search-by-country/hungary/sources/t/source/src/ministerial-decree-no-552016-xii-21/</p> <p>https://net.jogtar.hu/jogszabaly?docid=a1600062.nfm http://www.res-legal.eu/search-by-country/hungary/sources/t/source/src/ministerial-decree-no-622016-xii-28/</p>
IE	No, see 1 (c).
IT	No.
LT	No decisions based on Article 4(1)(a)(iii) or Article 4(1)(b) have been made.
LU	No.
LV	On 16th January 2020 board of NRA has issued/took decision on existing PGMs in accordance with Article 4(1)(a)(iii). https://www.sprk.gov.lv/sites/default/files/cmaa_files/LemumsN010D16012020.pdf
NL	None.
PL	No such decision has been issued.
PT	<p>See link in topic a.</p> <p>Clarification provided by the NRA upon the Agency's request:</p> <p>It is specified, in article 3 of Decree n.º 73/2020, the conditions were an existing generator has to comply with RfG requirements, accordingly to his significance. Any change to those conditions, imply a new connection agreement. Article 4(1)(a)(iii) and/or Article 4(1)(b) may be included in those criteria, even though that can be considered an ad hoc procedure (for which we haven't specified a procedure), analysed and decided case-by-case. Up to present, no decisions have been adopted under this framework.</p>
RO	NO.
SE	Yes, there is one decision as of February 2020 (one decision is also appealed to the Administrative Court). Link https://www.ei.se/Documents/Projekt/Natkoder/RFG/Beslut_2019_102016.pdf

SI	No decision issued yet.
SK	NO

2.2 Purchase of the main generating plant

- (11) **Q.1.d. Has the second paragraph of Article 4(2)(b), concerning the determination of PGM as existing or new, been applied in your Member State? If yes, provide more insights on the outcomes, the name of the entity that issued the decision and specify the circumstances referred to in this paragraph, based on which the decision was issued. In addition, if available, provide a web-link as reference to the decision.**

(165) Table 5: Transition period for the purchase of the main generating plant.

MS	Answer
AT	No.
BE	<p><i>Federal level (grids >70kV):</i> Article 35, §8, of the new Belgian federal grid code made it possible to apply the third paragraph of Article 4(2)(b), and has fixed the specified circumstances under which the regulatory authority may determine whether power-generating modules are to be considered existing or new. However, the possibility to introduce a demand ended at 27 October 2019 and no demand was made.</p> <p><i>Regional level (grids <=70kV):</i> The Belgian TSO/DSOs have introduced their proposal for requirements of general application on the 17th of May 2018 (2 years after the EIF of the RfG) and the regional regulators have refused this proposal in November 2019. Hence, there was a situation with a period of uncertainty for installation owners as to the requirements they had to comply with.</p> <p>The second paragraph of Article 4(2)(b) has been applied in the Flemish Region. As advised by the regulatory authority, VREG in the Flemish Region, there is an article, Article 15.3.5/21, implemented in the Flemish legislation that gives to the regulatory authority the possibility to decide whether installations are to be considered as existing or new.</p> <p>On the date of the entry in force of the NC RfG the relevant system operators had proposed for the first time general requirements but there were rejected by the regulatory authorities. To avoid uncertainty about the requirements applied to new generators, the determination of generators as existing or new entered into force two months after the general requirements have been finally approved by the regulatory authority. [link to decision: https://www.vreg.be/nl/document/besl-2019-06]</p> <p>For the Walloon Region: The article 4.2 has been applied by the decision of CWaPE (25 oct 2018) to avoid uncertainties and ensure security of investment (see: DECISION). In the Brussels-Capital region, BRUGEL has taken decision 91 , based on article 4.2.b in order to provide a clear frame for installation owners linking the date from which installations were considered to be “new” with the approval of the requirements of general application. All installations to be connected later than 2 months after the</p>

	approval (i.e. 1 November 2019) of the requirements of general application are considered “new”.
BG	<i>No reply</i>
CZ	<i>No, the second paragraph of Article 4(2)(b) has not been applied in the Czech Republic, as the Member state did not provide this.</i>
DE	<p>Yes. The German Parliament, the Bundestag, has adopted Article 118(25) of the German Energy Act, which states that:</p> <p><i>“Power-generating modules within the meaning of the RfG shall be considered existing, if they are put into operation until 30 June 2020 and there has been either a building permit or a permit under the Federal Emission Protection Act granted for them prior to 27 April 2019* or, where such permits are not required, the owner has requested the grid connection for them prior to 27 April 2019*.</i></p> <p><i>The power-generating module owner may abstain from being determined as an existing PGM owner.”</i></p> <p><i>* 27 April 2019 = Date of application of RfG according to Article 72(2) RfG.</i></p> <p>http://www.gesetze-im-internet.de/enwg_2005/___118.html</p> <p><i>The reason for the adoption of this provision was that the industry had argued convincingly towards the German lawmaker that the “extension of the deadlines” provided for in the RfG is necessary in order to be able to be compliant with the technical provisions of the RfG. The German law maker therefore extended the rules for the protection of existing installations. This has been done in such a way that the borderline between old plants (no application of the new requirements under the RfG) and new plants (application of the new requirements under the RfG) has been extended by the provision in Art. 118 (25) of the German Energy Act.</i></p> <p><i>Clarification provided by the NRA:</i></p> <p><i>German parliament has meanwhile once more extended until 31 December 2020 due to the Corona Pandemic Crisis.</i></p>
DK	<i>DUR has not monitored the use of this article.</i>
EE	<i>No, the second paragraph of Article 4(2)(b) has not been applied.</i>
ES	<i>No.</i>
FI	<i>No.</i>
FR	<p><i>TSO apply to new PGM requirements that should not be jeopardized with the publication of the forthcoming order.</i></p> <p><i>Updated information provided by CRE (FR)</i></p> <p><i>The ministerial order defining the requirements of general application and the criteria for modification has been published on 9 June 2020. CRE issued a decision on 16 July</i></p>

	<i>2020 concerning only the NC RfG requirements applicable in the event of a modification of a PGM, as defined in the ministerial order of 9 June 2020.</i>
GB	<i>This has not been applied in GB.</i>
UK-NIR	<i>No, see 1 (a).</i>
GR	<i>No reply</i>
HR	<i>No. Until this day, TSO has not received any notification from power-generating facility owner of PGM type D regarding consideration of the PGM as an existing PGM.</i>
HU	<i>That was not applied in Hungary. Answer for 1. c) might be considered here as well.</i>
IE	<i>No see 1(d).</i>
IT	<i>Yes. Considering the provisions of the NC RfG, the Italian Regulatory Authority resolutions 384/2018/R/eel and 592/2018/R/eel and the conclusion of the technical group of the European Regulatory Authority responsible for assessments on the implementation of the NC RfG, the deadline of 17th November 2018 within which to transmit the contracts to the relevant system operator and to TSO is to be considered non-binding. However, it remains binding for classification as existing plant for the application of the NC RfG, the deadline of 17th May 2018 within which the final and binding contract for the purchase of machinery must be completed. More information was provided by the Italian Regulatory Authority with its press release dated 13th February 2019, available on its website at https://www.arera.it/it/comunicati/19/190213.htm.</i>
LT	<i>Article 4(2)(b) has not been applied.</i>
LU	<i>No.</i>
LV	<i>No.</i>
NL	<ul style="list-style-type: none"> • <i>On 12 June 2018 the grid operators in the Netherlands requested ACM to shift the date from when a power-generating module is to be considered as new to 27 April 2019.</i> • <i>On 27 November 2018 ACM decided to shift this date from 17 May 2018 to 27 April 2019.</i> • <i>The reason why ACM shifted the date was the uncertainty under owners of power-generating modules and suppliers about the technical requirements which they should comply with.</i>
PL	<i>Yes, it has been applied through art. 1(4) of act of November 9th, 2018 amending Energy Law and some other acts. The amending act has been issued by Polish legislator and it is publicly available under the address: http://prawo.sejm.gov.pl/isap.nsf/download.xsp/WDU20180002348/O/D20182348.pdf</i>
PT	<i>No.</i>
RO	<i>ANRE was solicited to explain content of article 4 (2) (b) into one case only (requirement of clarification), when both relevant DSO and PGM owner asked ANRE (checking condition of art. 4 (2) (b) in their case when the power-generating facility owner has concluded a final and binding contract for the purchase of the main generating plant by two years after the entry into force of the Regulation. It wasn't necessary to issue a decision.</i>

SE	No decisions so far, the NRA has published FAQ, but no “specified circumstances”.
SI	Not applied yet.
SK	NO

3. Requirements of general application

3.1 Establishment of requirements of general application

3.1.1 Stricter / looser onerous threshold

- (166) **Q.2.a. Specify whether, in the approved requirements of general application, any value/condition happens to be stricter/looser than the most/least onerous related threshold (as established in the NC RfG). Provide justification for each of such cases.**
- (167) **If any value/condition happens to be stricter than the most onerous threshold (as established in the NC RfG), confirm if this requirement is enforced to all the PGMs or it follows from an agreement between a PGM’s owner and the relevant TSO, in accordance, for example, with Article 13(1)(a)(ii)-(iii).**

(168) Table 6: Stricter/looser onerous thresholds

MS	Answer
AT	https://www.ris.bka.gv.at/GeltendeFassung.wxe?Abfrage=Bundesnormen&Gesetzesnummer=20010590&FassungVom=2024-04-26
BE	Regional level (grids <=70kV): Limited frequency sensitive mode – under frequency (LFSM-U) [Art. 15(2)(c)]: Looser requirements are applicable for gas turbines and internal combustion engines whose technical specifications do not allow to follow the default requirements as described in Art. 15-2 (c). The following alternative requirements are applicable: - If $P_{max} \leq 2$ MW, at least 1.11% P_{max} per second (increasing or decreasing frequency); - If $P_{max} > 2$ MW, at least 0.33% of P_{max} per second (increasing or decreasing frequency).
BG	No reply
CZ	The question is not clear for us. In the example, NC RfG is prescribing minimum time periods for the frequency range between 47.5 Hz and 51.5 Hz. Possible time periods for operation beyond these thresholds is not an issue of NC RfG and is not, at least from our point of view, part of the requirements of general application. Based on the abovementioned, a situation which you describe is not possible as everything we approved should be within these thresholds.
DE	In relation to Table 2 in Article 13: In the entire frequency range from 47,5 Hz to 51,5 Hz and at voltages in the range from 85 % U_c to 115 % U_c (rms values of the chained voltage) at the grid connection point,

	<p>the PGMs of Typ B and Typ C shall be capable in quasi-stationary operation to maintain a grid parallel operation according to the minimum time requirements according to Figure 4. Quasi-stationary operation is defined by a voltage gradient of < 5 % rpm and a frequency gradient of < 0,5 % fn/min.</p> <p><i>See Figure 2 in the Annex II</i></p> <p>dauernd = permanent Hence, the thresholds are identical to the ones listed in Table 2 in Article 13 NC RfG as far as it concerns PGMs of Typ B and Typ C. (VDE-AR-N 4110, Chapter 10.2.1.2) However, they differ with regard to PGMs of Typ D: Over the entire frequency range from 47,5 Hz to 51,5 Hz and at voltages in the range from 93,5 kV to 127 kV (rms values of the chained voltage), PGMs of Typ D connected to the high voltage grid shall be capable in quasi-stationary operation to maintain a grid parallel operation according to the minimum time requirements according to the figure below. Quasi-stationary operation is defined by a voltage gradient of < 5 % rpm and a frequency gradient of < 0.5 % fn/min.</p> <p><i>See Figure 3 in the Annex II</i></p> <p>Netzspannung = mains voltage dauernd = permanent (VDE-AR-N 4120, Chapter 10.2.1.2) In the entire frequency range from 47.5 Hz to 51.5 Hz and at voltages in the range from 0,85 pu to 1,1 pu or 1,15 pu (rms values of the concatenated voltage) the PGMs of Typ D connected to the extra high voltage grid shall be capable in quasi-stationary operation to maintain a grid parallel operation according to the minimum time requirements according to Figure 4. Quasi-stationary operation is defined by a voltage gradient of < 0,05 pu/min and a frequency gradient of < 0,5 % fn/min.</p> <p><i>See Figure 4 in the Annex II</i></p>
DK	All requirements approved is within any pre-given interval / value. DUR has not granted any derogation from fixed intervals or values given in the RfG regulation.
EE	<p>The approved requirements of general application, any value/condition is widest related threshold (but not wider as established in the NC RfG).</p> <p><i>See Figure 10 in the Annex II</i></p>
ES	No additional requirements are established.
FI	There are no exceptions.
FR	No stricter/looser requirement than the most/least onerous related threshold established in the NC RfG has been proposed.
GB	All requirements of general application comply with the RfG.
UK-NIR	The RfG states that the operation time in the frequency range of 48.5 – 49.0 Hz shall be specified by the TSO but not less than 90 minutes. The current NI Grid Code requirement in this frequency range is 60 minutes. The proposed parameter of 90 minutes is the closest allowable to the current Grid Code Requirement. Please note the

	<p>Grid Code in Northern Ireland also requires power-generating modules to remain connected to the network as follows</p> <ul style="list-style-type: none"> • between 47-47.5 Hz for 20 seconds • and between 51.5 -52 Hz for 60 minutes” .
GR	<i>No reply</i>
HR	<i>In the approved requirements of general application none of the values exceeds max/min thresholds.</i>
HU	<i>There are no such cases. We attach the defined parameters (also in English).</i>
IE	<i>The Republic of Ireland’s frequency ranges span from 47Hz to 52Hz, as opposed to 47.5Hz to 51.5Hz. The TSO’s reasoning for this is that, while acknowledging that these requirements exceed RfG frequency ranges requirements, “Code requirements and are essential for the operational security of the Transmission System” .</i>
IT	<i>The frequency ranges are the same of NC RfG. However, it is not permitted to limit the performance of the power-generating module if it is able to operate in wider frequency ranges; where applicable, such features agreed with PGM by Operational Agreement.</i>
LT	<i>All the requirements are within the threshold range described in the general application.</i>
LU	<i>No – The requirements were checked to be in line with RfG before approval.</i>
LV	<i>No. In the approved requirements of general application all value/conditions have been determined in the allowed corridor. Requirements are not reduced or increased and applied as set out in the Articles of the Regulation. Requirements are enforced to the current PGMs and it follows from an agreement between a PGM’s owner and the relevant TSO.</i>
NL	<i>None.</i>
PL	<i>There are no such cases.</i>
PT	<i>No.</i>
RO	<p><i>It doesn’t exceed European regulation.</i></p> <p><i>For A type PGM, connected to LV and MV, was introduced conditions stipulated in standard EN 50549-1,2:2019:</i></p> <p><i>Synchronous generator , A type, has to operate continuously in the range (0.9-1.1.) Un, if it is connected to the LV and in the range (0.85-1.1.) Un if it is connected to MV.</i></p> <p><i>See Figures 24 and 25 in the Annex II</i></p> <p><i>This condition was necessary due to the absence of LVRT fulfilment for PGM – A type in requirements of R631/2016.</i></p>
SE	<i>N/A, please see the answer in 2.h.</i>
SI	<p><i>Requirements of general application, established by TSO and approved by NRA, are within the ranges under NC RfG.</i></p> <p><i>Site specific requirements under NC RfG were not established by TSO and are not approved by NRA. Site specific requirements are subject of agreement between TSO and PGFO (power generation facility owner).</i></p>
SK	<i>NO</i>

3.1.2 Additional binding requirements

(169) **Q.2.b. Concerning the requirements of general application established in the NC RfG, specify if, in the national regulation on grid connection for relevant system users, there is one or more additional binding requirement that refers to a range of values beyond the maximum/minimum thresholds defined in the NC RfG? Provide justification for each of such cases.**

(170) Table 7: Additional binding requirements

MS	Answer
AT	<i>There is no alternative requirement setting for relevant system users regarding the RfG in the national grid code.</i>
BE	<p><i>Federal and regional levels: Voltage control requirements for SPGM type C: For new type C Synchronous Power Generating Modules (SPGM), stricter requirements than foreseen by the NC RfG are applied (similar to the requirements for type D in Art. 19(2)(b)). These more strict requirements were already applicable to existing units of type C before the introduction of NC RfG. The requirements for voltage control for new type C units are in line with the current provisions in the applicable Federal and regional grid codes (TRPV, RTTR and RTTL) [4, 7-8-9] for which regards the functionalities and parameter settings of the automatic voltage regulator with regard to steady-state voltage and transient voltage control and the specifications and performance of the excitation control system. The functionality shall include:</i></p> <ul style="list-style-type: none"> <i>- bandwidth limitation of the output signal to ensure that the highest frequency of response cannot excite torsional oscillations on other power-generating modules connected to the network;</i> <i>- an underexcitation limiter to prevent the AVR from reducing the alternator excitation to a level which would endanger synchronous stability;</i> <i>- an overexcitation limiter to ensure that the alternator excitation is not limited to less than the maximum value that can be achieved whilst ensuring that the synchronous power-generating module is operating within its design limits;</i> <i>- a stator current limiter;</i> <i>- a Power System Stabilizer (PSS) function to attenuate power oscillations, requested by the relevant TSO (i.e. the activation and tuning of the PSS function will be agreed depending on the connection point, size and the characteristic of the SPGM).</i>
BG	<i>No reply</i>
CZ	<p><i>The system operators (of which there is more than 200 DSOs) have their own so called Grid Codes, which are approved by ERÚ. These contain a lot of other requirements for system users, which are well beyond this questionnaire. Nevertheless, for example, within these Grid Codes (at least for some DSOs) we approved for the range 47 – 47.5 HZ (which is not covered by NC RfG) operation for 20s. The TSO has the requirements of general application within their Grid Code and the 3</i></p>

	<p>regional DSOs have the requirements of general application within their own Grid Codes.</p>
DE	<p><i>Type A power-generating modules – Fault Ride Through (FRT) behaviour</i> <i>Type A power-generating modules shall fulfil requirements regarding the FRT capability.</i> <i>Technical Justification:</i> <i>From a technical perspective, the FRT behaviour (passing through short-term voltage dips) of Type A power-generating modules - in addition to its importance for local network security - has meanwhile attained a cross-border significance which could not be foreseen at the time of drafting the NC RfG. The capacity installed in low and medium voltage by means of RES plants almost tripled or doubled between 2009 and 2015 (see Figures 1 and 2 below). The system relevance of these plants has thus increased significantly since 2009.</i> <i>The technical necessity of the requirement to maintain system stability is elaborated, among others, in the FNN studies "Behaviour in case of failure" of the Delft University of Technology (TU Delft). Results of the study in brief are:</i> <i>-The so-called dynamic grid support supports the local voltage during and after a short voltage dip and contributes significantly to system stability</i> <i>-This supporting effect occurs especially in grids with high penetration rates of renewable energies.</i> <i>-In the simulation it was also found that even in the medium-voltage grid a complete dynamic grid support (remaining on the grid and active feeding of reactive and active current) brings a supporting effect. The TU Delft points out that this would require a considerable adaptation of the protection concepts in the medium-voltage grid. The study is available here:</i> https://www.vde.com/resource/blob/825646/8222b967552812c5f439c384cdcba901/vde-fnn-studie-fehlerfall-ppt-data.pdf.</p> <p><i>See Figures 5 and 6 in the Annex II</i></p> <p><i>Legal justification:</i> <i>It is permissible for the minimum technical requirements, as national provisions of a network code pursuant to Article 5 of Directive 2009/72/EC, to make the connection of Type A power-generating modules dependent on FRT capability.</i> <i>For in-depth legal reasoning see the legal opinion given by Attorney-at-law Dr. Marco Garbers (LL.M. Cornell) (Law Firm: Heuking Kühn Lüer Wojtek) on behalf of the designated entity VDE FNN and supported by BNetzA, to be found under this link:</i> https://www.vde.com/resource/blob/1709784/008a7797a6e36650016b54daa44eba30/hotspot-themen---technische-und-juristische-hintergruende-data.pdf</p> <p><i>Type A and Type B power-generating modules – LFSM-U-capability</i> <i>Type A and or B power-generating modules shall fulfil requirements regarding the LFSM-U capability.</i> <i>Technical Justification:</i> <i>The aim of the participation of low and medium-voltage generation plants in frequency support at underfrequency is to minimize load shedding in the distribution grids and thus to maintain the high quality of supply in Germany. The technical capabilities for frequency support are generally already available in the generation plants today.</i> <i>Legal justification:</i> <i>It is permissible for the minimum technical requirements under a national scheme to require the connection of type A and/or type B power-generating modules sets from the</i></p>

	<i>LFSM-U capability. For in-depth legal reasoning see the legal opinion given by Attorney-at-law Dr. Marco Garbers (LL.M. Cornell) (Law Firm: Heuking Kühn Lüer Wojtek) on behalf of the designated entity VDE FNN and supported by BNetzA, to be found under this link: https://www.vde.com/resource/blob/1709784/008a7797a6e36650016b54daa44eba30/hotspot-themen---technische-und-juristische-hintergruende-data.pdf</i>
DK	<i>No additional requirements for grid connection coming from (additional) national regulation.</i>
EE	<i>The TSO has the requirements of general application within their Grid Code.</i>
ES	<i>No additional requirements are established</i>
FI	<i>There are no additional requirements.</i>
FR	<i>Concerning the requirements of general application, no additional requirement has been proposed.</i>
GB	<i>As part of this process, we did not introduce new requirements that go beyond the maximum/minimum thresholds defined in the RfG</i>
UK-NIR	<i>Same answer as 2(a).</i>
GR	<i>No reply</i>
HR	<i>In the approved non-exhaustive requirements, there are no additional binding parameters that refers to a range of values beyond the maximum/minimum thresholds defined in the NC RfG.</i>
HU	<i>There are no such cases.</i>
IE	<i>Same answer as 2(a).</i>
IT	<i>In the national regulation on grid connection for relevant system users there aren't any additional binding requirements than expected by NC RfG. However, it is not permitted to limit the performance of the power-generating module if it is able to operate in wider frequency ranges; where applicable, such feature is agreed with PGM by Operational Agreement.</i>
LT	<i>No additional binding requirements that refers to a range of values beyond the maximum/minimum thresholds.</i>
LU	<i>No. In case of inconsistency between RfG requirements and national regulation on grid connection a general sentence was added in the approval of the general requirements stating that in case of discrepancy the RfG (and DCC) requirements prevail. "En cas de conflit entre les exigences techniques acceptées par le règlement E15/01/ILR du 9 janvier 2015 portant acceptation des conditions techniques de raccordement au réseau haute tension exploité par Creos Luxembourg S.A. ou le règlement E09/35/ILR du 15 décembre 2009 portant acceptation des conditions techniques de raccordement aux réseaux moyenne tension pour le territoire du Grand-Duché de Luxembourg et les présentes exigences techniques applicables conformément au règlement (UE) 2016/631 du 14 avril 2016, ces dernières prévalent." <u>Source</u> : http://legilux.public.lu/eli/etat/leg/rilr/2019/03/21/a212/jo</i>
LV	<i>Not relevant.</i>

NL	None.
PL	NC RfG established a superordinate requirements in this area and thus new PGMs have to be compliant with requirements of this code. In case of any discrepancy between NC RfG and national regulations in this area, requirements of NC RfG prevail.
PT	No.
RO	No, it is not the case.
SE	No, please see the answer in 2.h
SI	<p>Additional binding requirement in National regulation, that are beyond thresholds defined in the NC RfG requirements of general application, are not binding for PGFO. Those requirements are subject to connection agreement as site specific requirements.</p> <p>Clarification provided by the NRA upon the Agency's request:</p> <p>If we take into consideration IGD on frequency ranges (https://eepublicdownloads.blob.core.windows.net/public-cdn-container/clean-documents/Network%20codes%20documents/NC%20RfG/IGD_Frequency_ranges_final.pdf): »In relation to the increased withstand capability stated in NC RfG article 13(1)(a)(ii): Preserving or restoring system security, as mentioned in article 13(1)(a)(ii), should cover black-start restoration schemes as well as operation of local transmission system areas (such as countries or national regions) which have a higher risk of being operated in a system split mode a wider withstand capabilities could enhance the system stability. Therefore, an agreement with a power generating facility owner must focus on wider withstand capabilities than those specified in article 13(1)(a)(ii).</p> <p>For this reason, TSO have to consider additional requirements if:</p> <ol style="list-style-type: none"> 1. Local power system needs as well as operation of local transmission system areas which have a higher risk of being operated in a system split mode and wider withstand capabilities could enhance the system stability (e.g. black start capability or wider frequency ranges are needed to preserve or restore local system security in Severno-primorska region (loop) - local transmission system area). 2. PGM capabilities are able to support power system stability and restoration in such a case, e.g. capabilities dependent on type of HPP and differ significantly if HPP is of bulb type with long penstock or Kaplan type with short penstock.
SK	no

(171)

3.2 Limited Frequency Sensitive Mode – Overfrequency (LFSM-O) capabilities

(172) **Q.2.c. Concerning Article 13(2)(a)-(b), specify which LFSM-O capabilities are applied in your Member State? If capabilities described in Article 13(2)(b) apply, specify:**

- (173) • the frequency threshold which identifies the uniform distribution for the automatic connection/disconnection of type A PGMs,
- (174) • the type of supporting evidence brought to the attention of the relevant regulatory authority, in cooperation with power generating facility owners, to demonstrate the limited cross-border impact and the retention of the same level of operational security in all system states?EWRC (BG) and RAE (GR) did not reply to the question.

(175) Table 8: LFSM-O capabilities.

MS	Answer
AT	<p><i>In general requirements are applied in accordance with RfG, with some supplements described in RfG Anforderungs Verordnung article 5:</i></p> <p><i>For Types A-D</i></p> <ul style="list-style-type: none"> • Frequency threshold must be adjustable between 50,2 Hz and 50,5 Hz • The droop setting must be adjustable between 2% and 12% • If there is not other specification by the grid operator the threshold setting should be 50,2 Hz and the droop setting should be 5% <p><i>For Types A</i></p> <p><i>If Type A PGMs are not able to fulfil these requirements they have to disconnect within the frequency range 50,2 Hz and 51,5 Hz to be defined by the grid operator according to their cascading scheme.</i></p> <p>See Figure 1 in the Annex II</p>
BE	<p><i>Federal level (grids >70kV):</i></p> <p><i>The following requirements are common for all PGM:</i></p> <ul style="list-style-type: none"> • The droop setting is 5 % and selectable within the range 2% and 12%; • Frequency activation threshold 50.2 Hz; • Dead time: by default as fast as technically possible (no intentional delay), specific provisions could be applicable in agreement with the TSO; • Once the minimum regulating level is reached, the operation mode shall be continued at the same level (no further decrease for further frequency increase). <p><i>The following requirements are for SPGM:</i></p> <ul style="list-style-type: none"> • Pref is the maximum power; • Step response time for power increase: ≤ 5 minutes for an increase of active power of 20 % Pmax (a slow reaction is not applicable in the case of an increase shortly –few second- following a decrease phase); • Step response time for power decrease: ≤ 8 seconds for a decrease of active power of 45% Pmax; • Settling time for power increase: ≤ 6 minutes for an increase of active power (a slow reaction is not applicable in the case of an increase shortly –few second- following a decrease phase); • Settling time for power decrease: ≤ 30 seconds for a decrease of active power. <p><i>The following requirements are for PPM:</i></p> <ul style="list-style-type: none"> • Pref is by default the actual active generation (at the moment of activation). Pref can be alternatively defined as Pmax expected to operate mostly at or near maximum capacity (example for offshore wind farms connected to Transmission Network); • Step response time for power increase: <ul style="list-style-type: none"> - For wind generation: ≤ 5 seconds for an increase of active power of 20 % Pmax (at operating points below 50% of maximum power a slower reaction may apply,

	<p>nonetheless, the response time shall be as fast as technically feasible and not more than 5s);</p> <ul style="list-style-type: none"> - For the rest: ≤ 10 seconds for an increase of active power of 50 % Pmax; • Step response time for power decrease: ≤ 2 seconds for a decrease of active power of 50 % Pmax; • Settling time for power increase: ≤ 30 seconds for an increase of active power; • Settling time for power decrease: ≤ 20 seconds for a decrease of active power. <p>Automatic disconnection and reconnection as described in article 13(2)(b) are not allowed by default.</p> <p>Regional level (grids ≤ 70kV):</p> <p>The droop setting is 5 % and selectable within the range 2% and 12%. The frequency activation threshold is 50.2 Hz.</p> <p>Automatic disconnection and reconnection as referred in 13(2)(b) is not allowed by default.</p>
<p>BG</p>	<p><i>No reply</i></p>
<p>CZ</p>	<p>The LFSM-O capabilities are applied according to 13 (2) a, therefore point b) does not apply. Capabilities are also set according to point c) and d).</p> <p>The default value for the connection to the grid is the threshold 50,2 Hz and the droop setting of 5 %.</p> <p>Nevertheless, the thresholds of 50,2 – 50,5 Hz and 4 – 10% for droop setting are generally applicable and the power generating modules have to be able to operate in these.</p>
<p>DE</p>	<p>LFSM-O capabilities in the meaning of Article 13 (2) (a) NC RfG are applied.</p> <p>In the case of target value specifications by third parties (e.g. direct marketing) and in network security management is the new setpoint with the customer's plant performance gradients listed below, related to the mains connection point. A conversion of these power gradients directly at the generation units is sufficient to meet the requirement.</p> <p>The following power gradients are necessary for increasing and reducing the effective power output of generation plants (minimum technical performance or 5 % P_{Amax} 100 % P_{Amax}) as well as energy supply and of the energy consumption for storage (5 % P_{Amax} ↔ 100 % P_{Amax}) must be observed:</p> <ul style="list-style-type: none"> - not faster than with 0.66 % P_{Amax} per s; - not slower than with 0.33 % P_{Amax} per s. In the case of setpoint specifications by third parties, generation systems may react more slowly to performance increases. This should not be slower than with 4 % P_{Amax} per minute. <p>NOTE The above performance gradients do not apply to the provision of primary control power, since they are not setpoints set by third parties.</p> <p>Other technically justified performance gradients (e.g. for hydroelectric power plants with level maintenance, dependent of technical grid requirements) are permissible in agreement with the grid operator.</p> <p>It is necessary to ensure that the increase or reduction in output of the customer's system runs smoothly and thus to realize a behaviour as linear as possible. The setpoint setting by third parties is to be implemented at the level of the individual customer system or by the sum of all systems controlled by a third party (e.g. by equal distribution of the active power to be switched off or on over a total time of ≥ 2.5 min).</p> <p>In the case of generation systems with combustion engines, in the event of a reduction of the active power output for set values below the minimum continuous technical power of the internal combustion engine, the maximum permissible operating times must be taken into account. For a power below the minimum technical performance of the</p>

internal combustion engine and exceeding the permissible operating time the internal combustion engine may disconnect from the mains.

The generating plant must have a logical interface (input port) that allows it - independent of the above mentioned power gradients - to output active power within 5 s after a corresponding signal from the network operator has been received.

The interface for network security management may be used for this purpose.

According to Articles 13 and 13a of the German Energy Act, the network operator is entitled to temporarily limit the active power output at any time or to demand the temporary shutdown of the plant.

(VDE-AR-N 4105, Chapter 5.7.4.1)

In the case of overfrequency, a surplus of generation capacity is matched by a deficit of reference load. Therefore, all generation units and storages must be able to handle overfrequency up to a maximum of 51.5 Hz to the active power operating point (see Figures 14 and Figure 15).

See Figure 7 in the Annex II

Figure 14 - Active power adjustment of generation units of types 1 (synchronous) and 2 (asynchronous) in case of over- and underfrequency with a static of 5 % and frequency limits of 49,8 Hz and 50,2 Hz for the beginning of the active power adjustment.

See Figure 8 in the Annex II

Figure 15 - Active power adjustment of accumulators at overfrequency with a static of 5 or for underfrequency with a static of 2 % and frequency limits of 49,8 Hz and 50.2 Hz for the start of active power adjustment.

For generation units, the frequency value for the start of this frequency-dependent active power feed-in must be adjustable between 50.2 Hz and 50.5 Hz. If the network operator does not otherwise, the start must be set to 50.2 Hz. The statics of the frequency-dependent active power feed shall be adjustable from 2 % to 12 %. This corresponds to a Performance gradients ranging from 16,67 % of Pref per hertz ($s = 12\%$) to 100 % of pref per hertz ($s = 2\%$). Provided that unless otherwise specified by the network operator, a gradient of 40 % of Pref per Hertz ($s = 5\%$) (see figure 14).

For storage tanks, the active power generated must be reduced with a gradient of 40 % of PEmax per Hertz ($s = 5\%$) or to increase it (see Figure 15).

It follows that the generating unit or the storage unit is located in the frequency range between 50.2 Hz (unless otherwise specified by the grid operator for generation units) and 51,5 Hz with respect to of their maximum possible active power feed permanently on and off the frequency characteristic ("Driving on the characteristic curve").

At grid frequencies $f > 51.5$ Hz, the generation units and storage units must be disconnect from mains (see Figure 14 and Figure 15).

The reduction of the active power output must be maintained at least until the minimum technical power take place. A further reduction below the technical minimum performance is permissible. Thereby a stable operation of the generating unit shall be ensured.

(VDE-AR-N 4105, Chapter 5.7.4.3)

DK

In Denmark art. 13(2)(a) apply. Threshold for DK1(CE) 50,2 Hz, DK2(Nordic) 50,5 Hz. Droop for DK1 SPG 5 % PPM 5 %. For DK2 SPG 4 % PPM 4 %.

EE	<p>The LFSM-O capabilities are applied according to 13 (2) a, therefore point b) does not apply. The default value for the connection to the grid is the threshold 50,2 Hz and the drop setting of 5 %.</p>
ES	<p>Article 13(2) (a) applies. Capabilities described in Article 13(2)(b) were not considered, therefore article 13(2)(b) do not apply. Ministerial Order subjected to public audience that develops this requirement is fully aligned with the “ENTSO-E guidance document for national implementation for network codes on grid connection”</p> <p>Capabilities: - $\Delta f_1 = 0,2$ (50,2 – 50) Hz. - $S_2 = 5\%$.</p> <p>In case PGM is type C or D, static characteristic of the response in LFSM-O, as defined in Regulation (EU) 2016/631, shall be accumulate to the static characteristic of the response in LFSM as defined in ministerial order. In LFSM-O response speed required in active power will depend upon technical characteristics and capabilities of PGM.</p> <p>Response is characterized by the following variables: - $\Delta f = f - 50$ - $\Delta P = P - P_{Pref}$</p> <p>Response speed shall be define by the following time parameters:</p> <ul style="list-style-type: none"> • Initial delay (t_a). which is as short as possible considering that: <ul style="list-style-type: none"> - If it is over 2 s, the power-generating facility owner shall justify the delay, providing technical evidence to TSO - If PGM is type C or D, it will be shorter or equal to time for response activation in LFSM as it will be defined in ministerial order (2s for PGM with inertia or synthetic inertia; 500 ms in case of PGM without inertia or synthetic inertia). • Response time (t_r): time to reach 90% of the ΔP expected response when occurring a Δf deviation of frequency. • Establishment time (t_e): time to lay within an error band lower that $\pm 5\%$ of the ΔP expected response when occurring a Δf deviation of frequency. <p><i>See Figure 11 in the Annex II</i></p> <p><u>Time parameters</u></p> <p>In case of active power reduction during frequency increase when LFSM-O is activated: <i>See Figure 12 in the Annex II</i></p> <p>In case active power increases during frequency decrease when LFSM-O is activated: <i>See Figure 13 in the Annex II</i></p> <p>For active power changes greater than previously setout, t_r and t_e will be as short as possible.</p>

FI	Capabilities described in Article 13(2)(a) are applied.
FR	<p>For the application of article 13(2)(a), the threshold should be 50.2Hz when the order will have been published.</p> <p>Updated information provided by CRE (FR)</p> <p>The ministerial order defining the requirements of general application and the criteria for modification has been published on 9 June 2020.</p>
GB	<p>-Frequency threshold which identifies the uniform distribution for the automatic connection/disconnection of type A PGMs:</p> <ul style="list-style-type: none"> • Default frequency threshold: 50,4Hz • Selectable frequency threshold: 50,2 - 50,5Hz • Default drop: 10% <p>-No evidence was brought to our attention to demonstrate a negative cross-border impact.</p>
UK-NIR	<p>See Figure 14 in the Annex II</p> <ul style="list-style-type: none"> • Frequency Threshold <p>In SONI SPGM's do not operate in LFSM-O for the provision of FCR; these generators operate in FSM mode. LFSM-O is exclusively used in NI by PPM's operating in emergency action mode and resource following mode. The current threshold specified in the WFPS setting schedule is 50.15Hz, the proposal is to adopt the minimum permissible threshold value in RFG of 50.2Hz..</p> <p>Droop Settings</p> <p>The SONI Grid Code requires a droop setting for PPM's of between 2 - 20% (CC.S2.1.5.2 & CC.S2.2.5.2) and gas turbines are required to operate on a 4% droop (CC.S1.1.5.2 & CC.S1.2.4.2). The proposal is to adopt the RFG frequency droop range of between 2 - 12%. The existing Grid Code requirement for Gas turbines lies within this range and aligns with the default droop setting used across the island of Ireland which is 4%.</p>
GR	No reply
HR	Article 13(2)(a) is implemented with frequency threshold 50,2 Hz and droop 5%.
HU	<p>Capabilities described in Article 13(2)(b) are not applied. (please refer to the attached table).</p> <p>See Figure 17 in the Annex II</p>
IE	<p>See Figure 19 in the Annex II</p> <ul style="list-style-type: none"> • Frequency Threshold <p>CC.8.2.1 of the current Grid Code and DPC4.1.1 of the current Distribution Code states that the normal operating frequency range is between 49.8 Hz and 50.2 Hz. Under WFPS 1.5.3.2 and depending on operating mode active power response may not be required when the frequency is within this range. The RfG states that the frequency threshold shall be between 50.2 Hz and 50.5 Hz. Therefore, the existing frequency threshold of 50.2 Hz is allowable under the RfG and will be retained.</p>

	<p>Droop Settings <i>Selected parameters are per as our Grid Code today. The current Grid Code allows for a number of different droop ranges, depending on technology type. However, the default in all cases is a droop setting of 4%, regardless of technology type. By adopting a standard of 4%, as the default, it will ensure compliance with the RfG whilst maintaining a consistent droop setting to all generation types. A droop parameter is a new requirement in the Distribution Code. The droop setting for distribution connected generators will align with the existing droop settings for transmission connected PGMs.</i></p>
IT	<p><i>The automatic disconnection and reconnection of power-generating modules of Type A at randomized frequencies is not foreseen.</i></p>
LT	<ul style="list-style-type: none"> • Frequency Threshold: The automatic disconnection of power-generating modules is permitted at randomized frequencies, from 50,2 to 50,5 Hz if the maximum capacity of the unit is less than 10 kW. The frequency threshold is determined randomly by the DSO. • A consultant has been hired to conduct a study and demonstrate the limited cross-border impact and the retention of the same level of operational security in all system states. <p><i>Clarification provided by the NRA</i></p> <p><i>The decision to apply Article 13(2)(b) was motivated in LT by a study of a consultant which demonstrated the need for ability of power generation modules to ensure the active power response to the frequency change, paying attention to the isolated operation mode of the Baltic electricity system.</i></p>
LU	<ul style="list-style-type: none"> - Adjustable ranges for frequency threshold and droop; default values: 50.2 Hz and 5%. - Capabilities described in Article 13(2)(b): N/A
LV	<p><i>Specified in point 4 of Annex 7 to national Grid Code in Electricity Sector (Grid Code) (for A type – point 6).</i> <i>The frequency threshold from 49,8 Hz to 50,05 Hz at least 60s.</i> <i>No proposal for the requirements of general application in connection to Article 13(2)(b) from TSO side. Most of generators connected to TSO are of C and D type.</i></p> <p><i>See Figure 23 in the Annex II</i></p>
NL	<p><i>The LFSM-O frequency threshold is 50.2 Hertz</i></p> <p><i>As to the type of supporting evidence to demonstrate the limit cross-border impact and the retention of the same level of operational security: N/A</i></p>
PL	<p><i>LFSM-O capability described in art. 13(2)(a) had been applied. Disconnect type A PGM instead of providing LFSM-O capability it is not allowed.</i></p>
PT	<p><i>It applies the capabilities described in point (a).</i></p>
RO	<ul style="list-style-type: none"> - In Romania it is applied requirements foreseen in art. 13 (2) (a) and it is respected IGD - Automatic connection/reconnection and admissible rate of change of active power (Voltage range at the grid connection point: $0.9 \text{ pu} \leq U \leq 1.1 \text{ pu}$; and Frequency range: $47.5 \text{ Hz} \leq f \leq 51.0 \text{ Hz}$; and Adjustable observation time: from 0 to 300 s; Adjustable limitation of the gradient of active power increase $\leq 20 \%$ of $P_{\text{max/min}}$). - It is not respected requirement foreseen in art. 13 (2) (b) where is specified: (b) instead

	<i>of the capability referred to in paragraph (a), the relevant TSO may choose to allow within its control area automatic disconnection and reconnection of power-generating modules of Type A at randomised frequencies, ideally uniformly distributed, above a frequency threshold, as determined by the relevant TSO (...).</i>
SE	<i>The frequency threshold is set to 50,5 Hz and the droop settings is set to 8 %. As to the capabilities described in Article 13(2)(b): N/A</i>
SI	<i>Concerning Article 13(2)(a)-(b) in NC RfG for new PGMs: - Article 13(2)(a) LFSM-O capabilities applies to all new PGMs and is mandatory requirement, - Article 13(2)(b) does not apply for new PGMs in Slovenian control area. As measures in System defence plan article 13(2)(b) applies to existing PGMs type B, C, D (SGU acc. to NC ER) in Slovenian control area: • the frequency threshold which identifies the uniform distribution for the automatic disconnection of existing PGMs type B, C, D connected to DSO/CDSO networks and DF connected to transmission system are 50,3 Hz, 50,5 Hz, 50,7 Hz, 50,9 Hz, 51,1 Hz, 51,3 Hz, 51,5 Hz.</i>
SK	<i>according 13(2)(a)</i>

3.3 Notification of parameters specified as general requirements

3.3.1 Modalities of the notification

(176) **Q.2.d. What are the modalities of the notification in accordance Article 15(2)(d)(vii) applicable in the national regulatory framework? Include reference to national regulations and/or relevant web link(s).**

(177) Table 9: Modalities of the notification

MS	Answer
AT	<i>The specifications were (re)defined and consulted by the TSO and the national regulatory authority during the process of establishing a national new grid code. (TOR Erzeuger)</i>
BE	<i>Federal level (grids >70kV): The parameters in accordance with point (i) are defined in the connection agreement of which the model has to be approved by the NRA. The parameters in accordance with points (ii), (iii) and (v) of Article 15(2)(d) are directly defined in article 83, §9, of the Belgian federal grid code: http://www.ejustice.just.fgov.be/mopdf/2019/04/29_1.pdf#Page26 Regional level (grids <=70kV): No specific modalities have been defined at the level of regional regulatory framework.</i>
BG	<i>No reply</i>
CZ	<i>We considered Article 15 (2) (d) to be among the requirements for general application. Therefore these were also a part of the document approved by ERÚ, which has been approved on the 26th of October 2018 (the decision was amended due to a factual mistake on the 21st of December) and which is applicable from the 27th of April 2019. The plan is to include this document within the existing TSO Grid Code (work is currently</i>

	<p>ongoing).</p> <p>As all these requirements are part of the same document, we did not think it was necessary to have a specific document just for this issue and therefore the modalities of notification were the abovementioned.</p> <p>The decision of ERÚ can be found here - http://www.eru.cz/cs/-/rozhodnuti-o-schvaleni-obecne-pouzitelnych-pozadavku-dorucenych-spolecnosti-ceps-a-s-podle-ustanoveni-cl-7-odst-1-narizeni-komise-eu-2016-1719-ze-dne-, nevertheless we have to mention that it is only available in the Czech language.</p> <p>The decision was based on a standard national procedure and on NC RfG.</p>
DE	<p>According to Article 10 of the German Administrative Procedure Act, the administrative procedure is not bound to certain forms, unless there are specific legal provisions governing the form of the procedure. The provision explicitly states that It shall be simple, expedient and expeditious.</p> <p>http://www.gesetze-im-internet.de/vwvfg/_10.html</p> <p>Since there are no specific legal provisions governing the modalities of the notification under Article 15(2)(d)(vii) NC RfG, the TSOs may choose the form of the notification.</p>
DK	<p>FSM for DK1(CE) Activation interval 0-200 mHz Droop 2-12 % Deadband around 50Hz – 0,02 Hz Frequency insensitivity 10 mHz.</p> <p>Initial response no later than 2 sec. Full activation time no more than 30 sec. Request of at least a linear response. Requirement of at least 15 minutes full activation.</p> <p>FSM for DK2(Nordic) Activation interval 0-500 mHz Droop 2-12 % Deadband around 50Hz – 0,02 Hz Frequency insensitivity 10 mHz.</p> <p>Initial response no later than 2 sec. Full activation time no more than 30 sec. Request of at least a linear response. Requirement of at least 15 minutes full activation.</p> <p>DUR decision on approval: https://forsyningstilsynet.dk/media/5297/afgoerelse.pdf</p>
EE	<p>We considered Article 15 (2) (d) to be among the requirements for general application. Therefore these were also a part of the document approved by ECA decision, which has been approved on the 08th of November 2018.</p> <p>ECA decision can be found here - https://www.konkurentsiamet.ee/sites/default/files/lisa_1_rfg_siseriiklikult_maaratavad_satted_final.pdf , (only in Estonian language).</p>
ES	<p>Ministerial Order is going to specify default parameters which must be applied unless otherwise indicated by TSO. Therefore, no notification is needed.</p>
FI	<p>Paragraphs: 11.3.3.3, 11.3.3.4, 11.3.4 and 11.3.4.2</p> <p>Link to the document: https://www.fingrid.fi/globalassets/dokumentit/en/customers/grid-connection/grid-code-specifications-for-power-generating-facilities-vjv2018-.pdf</p>

	<p>Link to the decision: https://energiavirasto.fi/documents/11120570/12862808/P%C3%A4%C3%A4t%C3%B6s+Fingrid+Oyjn+voimalaitosten+j%C3%A4rjestelm%C3%A4teknisten+vaatimusten+vahvistamisesta/730b1c0c-12ee-23a8-29c4-f0224f24c82a/P%C3%A4%C3%A4t%C3%B6s+Fingrid+Oyjn+voimalaitosten+j%C3%A4rjestelm%C3%A4teknisten+vaatimusten+vahvistamisesta.pdf?version=1.1</p> <p>Notification or confirmation process is described below under question 4. a.</p>
FR	<p>The parameters will be defined in the ministerial order. In any case, the specified parameters will be integrated in the TSO's technical reference documentation which is approved by the regulator (CRE) after stakeholders consultation. For the parameters that must be able to be reselected repeatedly, no modality of notification is yet established.</p> <p><i>Updated information provided by CRE (FR)</i></p> <p><i>The ministerial order defining the requirements of general application and the criteria for modification has been published on 9 June 2020.</i></p>
GB	<ul style="list-style-type: none"> • Nominal system frequency: 50 Hz • Active Power as a percentage of Maximum Capacity: 10% • Frequency response insensitivity: ± 15 mHz • Frequency response insensitivity as a percentage of nominal frequency: $\pm 0.03\%$ • Frequency response deadband: 0mHz • Selectable droop: 3-5% • Max admissible full activation time: ≤ 10s <p>Time period for the provision of full active power frequency response: Primary Response – Deliverable in 10 seconds and sustainable for a further 30 seconds. Secondary Response deliverable in 30 seconds and sustainable for 30 minutes. High Frequency Response deliverable in 10 seconds and sustainable thereafter.</p> <p>These are outlined in the Grid Code - https://www.nationalgrideso.com/document/33821/download</p> <p><i>Clarification provided by the NRA upon the Agency's request:</i></p> <p>The implementation of ENCs technical requirements and specification of GB specific parameters was carried out using GB Grid Code modification process. The notification and implementation against Article 15(2)(d)(vii) has taken effect via the relevant TSO (NGET in our case at the time) raising Grid Code modifications which, amongst several other items, included their selection of parameters from the ranges as set out in Article 15(2)(d)(vii). The Authority acting as 'relevant regulatory authority' had approved these modifications containing the parameters chosen by the relevant TSO. The parameters specified by the relevant TSO under Article 15(2)(d)(vii) and approved by the Authority are contained in GB Grid Code provisions ECC.6.3.7.3.3. (https://www.nationalgrideso.com/document/162271/download)</p>

	<i>For notifying any future changes to the specification of these parameters the relevant TSO (now NGESO) will raise a Grid Code modification, which will be consulted with the stakeholders and then approved by the Authority. Hope this explains the modalities followed by GB for notification and compliance against these requirements.</i>
UK-NIR	<i>Parts of articles 15(2)(d)(i), (ii) and (iii) are subject to derogation requests from the TSO, while other details of their proposals for these articles are listed in 2 (e).</i>
GR	<i>No reply</i>
HR	<i>TSO has requested approval of the non-exhaustive parameters from the NRA. https://www.hops.hr/page-file/7MRs6n69vKouUQjq0HWly0/connection-network-codes/RfG_zajtjevi_odobreno.pdf Non-exhaustive parameters and general requirements are being implemented in the amended grid codes and are in the final stage of approval from NRA.</i>
HU	<i>They are included in the attached table (forming an integral part of the approved requirements of general application).</i>
IE	<i>Parts of articles 15(2)(d)(i), (ii) and (iii) are subject to derogation requests from the TSO (links in e-mail), while other details of their proposals for these articles are listed in 2 (e). The TSO's proposal for 15 (2)(d)(iv) was: <i>See Figure 20 in the Annex II</i></i>
IT	<i>The parameters are defined in the National Grid Code (Chapter 1, Section C) which was approved by Italian Regulatory Authority with resolution 592/2018/R/eel.</i>
LT	<i>No legal act is established imposing the necessity to additionally notify the NRA regarding the approved parameters. After public consultation, parameters have been internally approved by TSO (by internal corporative decision, as requested by national NRA) and then submitted to NRA for final approval. Here you can find the final, NRA approved, parameters: TSO page: https://www.litgrid.eu/index.php/energetikos-sistema/es-tinklo-kodeksai/prijungimo-kodeksai/3675 NRA page: https://www.regula.lt/Docs/nutarimas_2018_323.pdf#search=O3e%2D323</i>
LU	<i>Modified national electricity law 1 August 2007 - Article 8 - Technical requirements.</i>
LV	<i>Prior to the inclusion of conditions in the Grid Code , TSOs have agreed at regional level on the basic conditions to be respected by facility owners. Conditions have also been consulted. The requirements of general application have been specified in point 14 of Annex 7 to Grid Code.</i>
NL	<i>Implemented by amending the Dutch technical codes on 21 December 2018. Link: https://zoek.officielebekendmakingen.nl/stcrt-2018-72073.html</i>
PL	<i>The TSO has conducted a consultation process from September 15, 2017 r. to December 31, 2017 r. - more information about this process is available here https://www.pse.pl/rfg</i>
PT	<i>The proposal was discussed between TSO and relevant DSO, then within high level group. After that, there were two meetings with stakeholders representative of the</i>

	<p>various areas of the sector affected by RfG, including associations. In the end it was made a public consultation, even not being mandatory.</p>
RO	<p>CNTEE Transelectrica organised workshops before send general requirements to ANRE and received observations. After this process OTS send ANRE general requirements and these was posted on ANRE site for public consultations. See :</p> <p>for order 72/2017 (SPGM): -https://www.anre.ro/ro/energie-electrica/legislatie/documente-de-discutie-ee1/coduri-paneuropene/regulamentul-ue-nr-631-2016-nc-rfg/proiect-de-norma-tehnica-privind-cerintele-specifice-necesare-racordarii-fiecarui-tip-de-generatoare-sincrone-conditii-tehnice-de-racordare-la-retelele-electrice-de-interes-public-pentru-generatoarele-sincrone&page=2</p> <p>for order 208/2018 (PPM, it was 2 public consultations managed by ANRE, phase I and phase II): - https://www.anre.ro/ro/energie-electrica/legislatie/documente-de-discutie-ee1/coduri-paneuropene/regulamentul-ue-nr-631-2016-nc-rfg/proiect-de-norma-tehnica-privind-cerintele-tehnice-de-racordare-la-retelele-electrice-de-interes-public-pentru-module-generatoare-centrale-cu-module-generatoare-si-centrale-formate-din-module-generatoare-offshore-situate-in-larg-faza-ii&page=1</p> <p>for order 214/2018 (order no. 72 modified according to the IGD approved in 2018): https://www.anre.ro/ro/energie-electrica/legislatie/documente-de-discutie-ee1/coduri-paneuropene/regulamentul-ue-nr-631-2016-nc-rfg/proiect-de-ordin-privind-modificarea-ordinului-anre-nr-72-2017-pentru-aprobarea-normei-tehnice-privind-cerintele-tehnice-de-racordare-la-retelele-electrice-de-interes-public-pentru-grupurile-generatoare-sincrone&page=1</p> <p><i>Clarification provided by the NRA:</i></p> <p>NOTE – For A type PGM (till 1 MW in Romania) within mixed customer sites (with generation, demand and storage eventually), with injection or no injection into distribution electrical network, there are asked by 228/2018 ANRE order , modified by 132/2020 ANRE order, the same requirements from R631/2016: https://www.anre.ro/ro/energie-electrica/legislatie/prosumatori</p>
SE	<p>The Swedish Energy Market Inspectorate conducted a public consultation between the 12th of July 2018 and the 23th of August 2018. Reference to the call for public consultation: https://www.ei.se/sv/nyhetsrum/nyheter/nyheter-2018/15-augusti-samrad-om-foreskrifter-enligt-eu-forordningen-rfg/</p>

SI	Public consultation of the proposal has been conducted at NC portal: https://www.agencrs.si/izvajalci/elektrika/kodeksi-omrezja/posvetovanja-o-predlogih-odlocitev . After public consultation final proposal has been submitted to NRA.
SK	RONI assessed impact on others stakeholders and did not find any impact on the stakeholders and any inconsistency with network code.

3.3.2 Date of notification

(178) **Q.2.e. When did the relevant TSO notify the parameters in accordance with points (i), (ii), (iii) and (v) of Article 15(2)(d)?**

(179) Table 10: Date of notification

MS	Answer
AT	During the process of drafting the new national grid code. The parameters were publicly available from the beginning of the first consultation process.
BE	Federal level (grids >70kV): The TSO didn't have to notify the parameters since they are defined in the federal grid code or in the connection agreement. Regional level (grids <=70kV): The relevant TSO has defined the parameters of points (i) and (iii) in the proposal of requirements of general application for the NC RfG (included in the proposal and not separately notified).
BG	No reply
CZ	See our answer above. These parameters were part of the document approved by ERÚ on the 26th of October 2018 (21st of December 2018 for the amended decision). It was sent to us by the TSO on the 12th of October 2018.
DE	On the 19 October 2018.
DK	On the 18. May 2018 as a part of the request for approval of the general requirements for generators.
EE	Please see our answer above. These parameters were part of the document approved by ECA decision, which has been approved on the 08th of November 2018
ES	See answer to question 2.d)
FI	16.5.2012 <i>Clarification provided by the NRA upon the Agency's request:</i> The date should be 16.5.2018. That must be a mistake if it says 2012.
FR	Cf. above (integrated in the technical documentation) <i>Updated information provided by CRE (FR)</i>

	<i>The ministerial order defining the requirements of general application and the criteria for modification has been published on 9 June 2020.</i>
GB	20-Feb-18
UK-NIR	<p>The UR received the following proposals relating to the above articles on 17/10/2019:</p> <p><i>See figures 15 and 16 in the Annex II</i></p> <p>SONI have sought derogations on elements of 15(2)(d)(i), (ii) and (iii) citing errors for parts of (i) and (ii). The UR received these derogation requests on 18 Dec 2019. The UR has indicated that these submissions do not meet the requirements of Article 63 and we are yet to receive re-submissions.</p>
GR	<i>No reply</i>
HR	NRA has approved TSO's proposal of non-exhaustive requirements of all types of power park modules" on the 15th of November 2018 which included non-exhaustive parameters in accordance with points (i), (ii), (iii) and (v) of Article 15(2)(d).
HU	<p>Included in the attachment. It was published on TSOs website on 20 November 2018.</p> <p>https://www.mavir.hu/web/mavir/magyarazo-dokumentumok https://www.mavir.hu/documents/10258/228657016/RfG_param%C3%A9terek_MEKH_j%C3%B3v%C3%A1hagy%C3%A1s_ut%C3%A1n_HU_EN_2018-11-17_magyar%C3%A1zattal.xlsx/6944ccea4-8dd9-b9cf-8ee7-a4894a9ce966</p>
IE	<p>The CRU received the following proposals relating to the above articles on 16 May 2018:</p> <p><i>See Figures 21 and 22 in the Annex II</i></p> <p>EirGrid have sought derogations on elements of 15(2)(d)(i), (ii) and (iii) (attached to e-mail), citing errors for parts of (i) and (ii) and the added difficulty of increasing RES-E and SNSP levels if part of (iii) was implemented. The CRU received these derogation requests on 14 June 2019. The CRU responded in September 2019 requesting further detail on these derogations and are yet to receive re-submissions.</p>
IT	The FSM parameters are defined in the National Grid Code (Chapter 1, Section C).
LT	Initial submission of parameters issued was on 17th May 2018. National NRA requested amendments and asked for parameters to be internally approved by TSO. Accordingly, TSO amended the parameters, internally approved the parameters and repeatedly submitted parameters to the NRA on 24th September 2018.
LU	Parameters notified by TSO on 27 April 2018, amended on 8 November 2018, and approved by ILR on 14 November 2018 in their latest version (22 October 2018 as notified on 8 November 2018).
LV	By submitting the requirements of general application to NRA for approval and for inclusion into the Grid Code (Annex 7).
NL	On 17 May 2018.
PL	TSO notified it by submission of the requirements of general application (on 14th of May 2018).
PT	Those values were published by decree (referred in point 1.a).

RO	<i>The parameters and requirements specified in accordance with points (i), (ii), (iii) and (v) of article (15) (2) (d) are contained into the ANRE orders no. 72/2017, no. 208/2018 and no. 214/2014 (orders which represent implementation of R631/2016 (exhaustive and non-exhaustive parameters). 1) TSO are notifying the mentioned parameters on its website after technical conditions for connection are issued (DSO or TSO) - usual or 2) according to the Energy Law 123/2013, art. 59 (3) where is required like ANRE to monitor TSO activity, TSO prepares a report with these parameters.</i>
SE	<i>The TSO submitted the parameters to Ei on the 17th of May 2018 (Eis ref. no 2018-101711), and they were notified by Ei on the 5th of December 2018, https://www.ei.se/Documents/Publikationer/foreskrifter/EI/EIFS_2018_2.pdf</i>
SI	<i>Requirements of general application under Article 15(2)(d), established by TSO, were notified to the NRA as part of approval process acc. to NC RfG (Article 7) for requirements of general application.</i>
SK	<i>10.05.2018 accordance article 7(4)</i>

3.4 Black start capabilities

- (180) **Q.2.f. Considering Article 15(5)(a)(i), black start capabilities are not mandatory. Did the Member State exercise its right to introduce obligatory rules in order to ensure system security? Include the reference to such decision.**

(181) Table 11: Black start capabilities.

MS	Answer
AT	No.
BE	<i>Federal level (grids >70kV): No, the member state didn't introduce specific rules in order to make black start capabilities mandatory. However, if the market does provide sufficient black start capabilities to cover the black start needs, the government can impose volumes and prices for the provision of black start services. Regional level (grids <=70kV): This right was not exercised by the Member State. There is already a voluntary black-start service in place for generators connected to the transmission network. No additional requirements have been defined in the current General Requirements.</i>
BG	<i>No reply</i>
CZ	<i>No, the Member state did not exercise its right to introduce obligatory rules, nevertheless the TSO organizes a tender for ancillary services of which one is black start capability and for this reason the TSO has some requirements for this (and some of the requirements are those from RfG but they are not the only requirements for producers in the tender).</i>
DE	<i>For Type B and Type C PGMs, the black start capability of the generating plant or unit does not constitute a minimum requirement. If desired, the type and scope are to be agreed individually between plant and grid operators.</i>

	<p><i>(VDE-AR-N 4110, Chapter 10.2.1.5 in conjunction with Article 19 (4) and Article 49 (2) of the German Energy Act)</i></p> <p><i>For Type D PGMs, the black start capability of the generating plant or unit does not constitute a minimum requirement. However, at the request of the system operator, the operator of a synchronous power-generating module unit shall submit an offer for the black start capability. The network operator may request such an offer if it considers that the system safety in its control area is jeopardized due to the apparent lack of black start capabilities.</i></p> <p><i>(VDE-AR-N 4120, Chapter 10.2.1.5 and VDE-AR-N 4130, Chapter 10.2.1.5 in conjunction with Article 19 (4) and Article 49 (2) of the German Energy Act)</i></p> <p><i>Besides that, under Article 13d of the German Energy Act, the TSOs may apply to the BNetzA to declare a plant relevant for system security because of its black start capability, if that plant would otherwise be decommissioned by the power-generating facility owner. If granted by the BNetzA, the power-generating facility owner is obliged to maintain the plant outside of the energy market and for system security measures only.</i></p>
DK	<i>No.</i>
EE	<i>No.</i>
ES	<p><i>No obligatory rules is introduced in the ministerial order subjected to public audience. Nevertheless, a maximum 15 minutes time for starting from shutdown without any external electrical energy supply is set out for those PMGs types C and D with black start capability.</i></p> <p><i>No reference to decision can be provide since, as stated before, ministerial order has not been approved yet.</i></p>
FI	<i>No requirements. Based on voluntary agreement.</i>
FR	<i>No obligatory rules have been introduced.</i>
GB	<i>No. Black Start is a service that is procured from generators, it is not obligatory.</i>
UK-NIR	<p><i>SONI made no mention of this in their RfG submission.</i></p> <p><i>The operational response to a widespread electricity outage is detailed in the Power System Restoration Plan (PSRP). The Blackstart Emergency Communications Plan (BCECP) has been designed to complement this in the event of a widespread electricity system blackout. SONI does a regular Blackstart Emergency Comms Plan exercise.</i></p> <p><i>The Proposal Document of the rules for suspension and restoration of market activities for Northern Ireland in accordance with the requirements of Article 36(1) and the specific rules for imbalance settlement and settlement of balancing energy in case of suspension of market activities for Northern Ireland, in accordance with Article 39(1) Both in accordance the Commission Regulation (EU) 2017/2196 establishing a network code on electricity emergency and restoration was submitted in 18/12/2018.</i></p>
GR	<i>No reply</i>
HR	<i>No. Black start capabilities are not mandatory.</i>

HU	<p>Yes we did. Black start capabilities are obligatory for power plants above 500 MW (except for nuclear power plants). These rules are parts of the national operational code which is approved by HEA (please see the first edition with approval decision from HEA).</p> <p>http://www.mavir.hu/documents/10258/217792706/%C3%9Czemi+szabalyzat_M1-20120327_v%C3%A9gl.pdf/814da308-ba79-437e-a126-a02d7348df9c http://www.mavir.hu/documents/10258/217792539/M0_MEH+891_2011+sz.+hat%C3%A1rozata+az+%C3%9Czemi+Szab%C3%A1lyzat+elfogad%C3%A1s%C3%A1r%C3%B3l.pdf/27d10ef6-ab0f-4bc6-a471-3dedc1ddd11b</p>
IE	<p>EirGrid made no mention of this in their submission. This is their approach as per their consultation on their System Restoration Plan:</p> <p>“EirGrid has contracts with several generators around the country (mainly hydro generators) that can start without an external supply. These are called black start generators. If EirGrid deems that it needs more black start generation in an area, then it can contract for that generation. EirGrid does not propose to change this approach at present”.</p>
IT	<p>The Italian Regulatory Authority, approving the proposal of the Italian TSO (Terna S.p.A.) – in particular, Chapter 1.C of Terna’s Network Code –, has provided that, based on the needs of the transmission network and according to procedures established in the Dispatching Rules (Chapter 4 of the Terna’s Network Code), a synchronous generation group can be selected by the TSO to participate in the power supply of the electrical system with the black-start service. The identification and choice of groups are made on the basis of their location on the network and their technical characteristics (present or implementable through adjustments):</p> <ol style="list-style-type: none"> significance of the power values of the individual group and of the power plant to which it belongs; quick start capability in the absence of external power; ability to synchronize over a wide range of frequency and voltage; ability to operate in parallel with other generation groups within an island (isolated transmission network portion generally characterized by low short circuit power values); amplitude of the reactive power capability curves; ability to regulate the frequency on a separate network within narrow limits of variability and also against the connection of loads of significant size with respect to the size of the group; ability to regulate the voltage within restricted limits of variability and also against the connection of reactive loads of significant size with respect to the capability of the group, which generate sudden voltage variations, and to launch voltage on the lines that make up the restart lines. <p>The technical requirements of the power plants/groups with black-start capability and the methods for providing the service are described in Annex A.10 (“Restore plan of the national electricity system”) of the Terna’s Network Code and the service test methods are reported in Annex A.19 (“Requirements for the verification of the performance of the production units for the restart of the electrical system”) of the Terna’s Network Code.</p>
LT	Member state have not stated its position regarding this issue
LU	No.
LV	The requirements of general application regarding black start capability for type C and D PGM have been specified in point 16 of Annex 7 to Grid Code.

NL	The TSO has published additional specifications for black start capabilities on their website. Link : https://www.tennet.eu/fileadmin/user_upload/SO_NL/BS-SO-TRS_15-001_Productinformatie_herstelvoorziening.pdf
PL	In Poland, in context of black start capability, art. 15.5(a)(i) of NC RfG (which states that black start capabilities are not mandatory) applies and thus the requirement concerning black start capabilities will be set individually after taking into account type of facility and connection point with regard to operational security. Conditions of providing black start service will be defined in line with agreement according to art. 4(4) NC ER (therefore type C PGM will have to meet the black start capabilities from NC RfG).
PT	It was decided not to include specifications about this topic. RfG code concede, to Member States, the right to define mandatory rules to ensure network safety. This topic will be analysed again in the ongoing revision of transport and distribution network framework.
RO	According to the art. 47 (c) (i) from ANRE order no. 72/2017, modified by order 214/2018, it is specified black-start capabilities are not mandatory but could be required in some situations by TSO in order to ensure system security, if it consider it is necessary. These requirements could be done in stage of issuing connection technical conditions by system operators.
SE	No, there are no obligatory rules.
SI	No.
SK	Yes only for PGM's for which is it possible accordance article 15 (5)(a)(iii) mentioned by in above mentioned decisions.

3.5 Synthetic inertia

- (12) **Q.2.g. Did the relevant TSO exercise its right to require types C/D power park modules to provide synthetic inertia, in accordance with Article 21(2)(a)? If so, were the operating principle of control systems installed to provide synthetic inertia and the associated performance parameters included in the proposal for the requirements of general application submitted by the relevant TSO to the regulatory authority or competent entity? If these have been proposed separately, provide exhaustive reference.**

(182) Table 12: Synthetic inertia.

MS	Answer
AT	No, except for the described (national grid code) possibility to have a bilateral agreement between TSO and power-generating facility owner.
BE	This right was not exercised by the TSO. Synthetic inertia functionality is currently not required for types C/D power park modules.
BG	<i>No reply</i>
CZ	The TSO did exercise its right to require these power park modules to provide synthetic inertia. Nevertheless, it also specified that the provision of systemic inertia is currently not required in the Czech electricity grid and that there will be an assessment of required inertia according to art. 39 of SO GL within 2 years after EIF of SO GL.

	<i>The operating principles of control systems and the associated performance parameters were not included in the proposal for the requirements of general application submitted to ERÚ nor were they submitted separately as of yet (7th of January 2019).</i>
DE	No.
DK	No.
EE	<i>The TSO did exercise its right to require these power park modules to provide synthetic inertia. Nevertheless, it also specified that the provision of systemic inertia is currently not required in Elering (TSO) grid.</i>
ES	<i>Synthetic inertia will be implemented as a non-mandatory (but recommended) requirement. TSO proposal about requirements of general application included both principles of control system and performance parameters, and was included in the version of ministerial order that was subjected to public consultation.</i>
FI	No requirements.
FR	<i>The TSO did not require types C and D PPM to provide synthetic inertia.</i>
GB	<i>No the TSO did not exercise this right.</i>
UK-NIR	<i>No, the TSO's proposal stated that this ability is non-mandatory and can be agreed on a case by case basis within System Services Contracts.</i>
GR	<i>No reply</i>
HR	<i>No, but TSO has the right to specify that the PPMs type D should be capable of providing synthetic inertia during very fast frequency deviations, because synthetic inertia prevents system frequency from experiencing sudden changes which can in turn cause significant stability issues.</i>
HU	<i>It is not defined (non-mandatory), please check the details in the attachment. See Figure 18 in the Annex II</i>
IE	<i>The TSO's proposal: Not mandatory - can be agreed on a case by case basis with System Services Contracts</i>
IT	<i>The Italian TSO (Terna S.p.A.) only defines the possibility of providing synthetic inertia, without specifying particular details or the operating principle of control systems installed.</i>
LT	<i>Power park modules shall be capable of providing synthetic inertia during very fast frequency deviations. The operating principle and parameters of the control system have not been installed.</i>
LU	No.
LV	<i>The requirements of general application have been specified in point 19.1 of Annex 7 to Grid Code.</i>
NL	<i>For the time being no additional regulation is applicable for the provision of synthetic inertia by PPM.</i>
PL	<i>TSO did not exercise the right to require provision of synthetic inertia.</i>
PT	<i>No. However, any PGM that comes with this capability must be capable of provide synthetic inertia during very fast frequency deviations, in order to contribute to maintaining the security and stability of the National Electric System. The proposals for</i>

	<i>implementing this requirement, must be according to the technological possibilities of the respective equipment and the relevant network operator assesses the possibility and conditions of application of this requirement.</i>
RO	<i>In the art. 111 from ANRE order 208/2018 (regarding D type) it is specified it is checked possibility to supply syntetic inertia (if control systems are already present into PGM). In this case OTS will establish parameters. These parameters will be known in the phase of issuing connection technical conditions by system operator (TSO).</i>
SE	<i>There are no requirements to provide synthetic inertia.</i>
SI	<i>The relevant TSO shall have the right to specify that power park modules be capable of providing synthetic inertia during very fast frequency deviations. As this is site specific requirement under NC RfG, therefore it is subject of agreement between TSO and PGFO. Starting from NC RfG application (27.4.2019) no PPMs were connected to transmission system.</i>
SK	<i>no</i>

3.6 Additional requirements concerning frequency / voltage

- (13) **Q.2.h. Concerning the subject matters of the requirements in TITLE II of the NC RfG and focusing only on those concerning frequency/voltage issues , specify if additional requirements, thus different from those included in the NC RfG, have been implemented in the national regulation on grid connection for relevant system users. If any, provide motivations.**

(183) Table 13: Additional requirements concerning frequency/voltage.

MS	Answer
AT	<i>There is no alternative requirement setting for relevant system users regarding the RfG in the national grid code.</i>
BE	<i>No additional requirements have been implemented.</i>
BG	<i>No reply</i>
CZ	<i>The national legislation does not contain such issues. However, if you consider the Grid Codes of relevant system operators as a part of national regulation, certain requirements concerning frequency and voltage issues are part of these Grid Codes. The Grid Codes are primarily the responsibility of the system operators and they can propose in them any requirements that are not against the law or which do not create an imbalance in the market.</i>
DE	<i>While Article 3(2)(d) NC RfG exludes the applicability of the NC RfG to storage devices except for pump-storage power-generating modules, the requirements in the German VDE technical rules apply also to all kinds of storage devices. The motivation behind it is to enhance the positive role that storage devices can play in the management of feature-dependent RES, which increasingly are being integrated into the electricity system.</i>
DK	<i>no different or additional requirements are implemented. Frequency and voltage requirements for generators are regulated by the RfG.</i>
EE	<i>There are no such additional requirements.</i>

ES	<p>There are no such additional requirements.</p> <p>Ministerial order subjected to public audience that develops this requirement is fully aligned with the “ENTSO-E guidance document for national implementation for network codes on grid connection”.</p>
FI	<p>There are some additional requirements for the voltage control since more detailed requirements were needed. Requirements are fully described in the paragraph 13.</p> <p>For wind power etc. the answer can be found under the paragraph 18.</p> <p>Power quality is described under the 10.4.4. This was missing from the NC RfG.</p> <p>Link to the document: https://www.fingrid.fi/globalassets/dokumentit/en/customers/grid-connection/grid-code-specifications-for-power-generating-facilities-vjv2018-.pdf</p>
FR	<p>No additional requirements regarding frequency/voltage issued have been introduced.</p>
GB	<p>As part of this process, we did not introduce new requirements. We amended existing requirements to comply with the RfG.</p>
UK-NIR	<p>See 2(a)</p>
GR	<p><i>No reply</i></p>
HR	<p>No.</p>
HU	<p>No additional requirements are there.</p>
IE	<p>See 2(a)</p>
IT	<p>In line with the connection technical requirements in force before the NC RfG entry into force, at national level for the frequency/voltage issues two additional requirements were foreseen:</p> <p>a. for Power Park Modules (PPMs), it's not applicable Article 13(4) of NC RfG. This means that, for PPMs, it is not admissible any active power reduction from maximum output due to underfrequency, except in case of proven technical limits through an ad hoc agreement in the Operational Agreement. Please consider that the stakeholders during the TSO's consultation of NC RfG implementation didn't make comments on these aspects;</p> <p>b. for PPMs, it has been defined also the over-voltage ride-through capability (OVRT) in addition to the under-voltage ride-through capability (UVRT). The Italian technical standards (both Grid Code and Norma CEI 0-16) and international standard (es. CLC/TS 50549-1 and -2 version 2015, EN 50549-1 and -2) already foresaw these requirements for MV and HV connections.</p>
LT	<p>No additional requirements have been implemented.</p>
LU	<p>No additional requirements were implemented in the national regulation on grid connection for relevant system users.</p>
LV	<p>No additional requirements have been implemented.</p>
NL	<p>N/A</p>
PL	<p>Additional requirements concerning frequency/voltage issues (the ones not included in NC RfG) are specified in system operator's grid code (TSO's or relevant DSOs) and apply to existing units. For new PGMs NC RfG requirements apply.</p>
PT	<p>There are two references:</p> <p>i. Establishment of threshold at 1 MW for type A/B generators, was a compromise that</p>

	<p>comes with an additional requirement for type A generators, i.e., generators with maximum capacity of 15 kW or higher must have the capability to support fault-ride through.</p> <p>ii. In Portugal, we had several meetings with stakeholders, exchange of email and a public consultation regarding RfG requirements in general. Specifically, article 21(3)(c) has generated a lot of discussion. So, we defined two variants for P-Q/P_{máx} diagram, being the variant 2 only allowed for some technologies and during a transitional period.</p>
RO	No, it is not the case.
SE	<p>Yes. Regarding article 13(2)(g) (Ei's req 3 kap 6 §): Power park modules should retain their ability to regulate regardless of the level of production, when possible. This is done by setting the reference value of the active power to the maximum continuous active power, and by doing so the reference value for active power will be the same for all types of power modules. Regarding article 14(3)(a)(v) (Ei's req 3 kap. 12 §): We add: "Ten seconds after occurrence of a fault, the voltage in the connection point is presumed to be back at 90 percent".</p> <p>Regarding article 16(2)(a)(i) (Ei's req 3 kap. 18 §), 16(2)(b) (Ei's req 4 kap. 1 §), 16(4)(d) (Ei's req 4 kap. 3 §) and 19(2)(a)-19(2)(b) (Eis req 4 kap. 4, 5, 7 §§): The requirements are extended to not only apply for type D but also type B and C (with one exception, Eis req 4 kap. 7 §, is only applicable for type C). The extensions of the requirements to type B and C has to do with the preceding Swedish secondary legislation (for existing power modules).</p>
SI	Requirements of general application, established by TSO and approved by NRA, are within the ranges under NC RfG.
SK	URSO did not identify additional requirements, which are different from those included in the NC RfG

4. Operational notification procedure

4.1 Notification for connection

- (14) **Q.3.a. Provide the public reference to the details of the operational notification procedure in accordance with Article 29(2).**

(184) Table 14: Notification for connection.

MS	Answer
AT	<p>Every single DSO and TSO has to publish their General Conditions according to Article 47 of the Austrian Energy Act and approved by the National Regulatory Authority. Each General Condition refers to the binding national grid code jointly drafted, consulted by the network operators (TSOs and DSOs) and published by the national regulatory authority.</p> <p>The requirements of the operational notification procedure is described in chapter 7 of the national grid code.</p>
BE	<p>Federal level (grids >70kV):</p> <p>The details of the operational notification procedure are given in articles 171 to 179 of the Belgian federal grid code:</p> <p>http://www.ejustice.just.fgov.be/mopdf/2019/04/29_1.pdf#Page26</p>

	<p>Regional level (grids <=70kV): For generators connected to the distribution network the procedure is defined in the following technical rules: Synergrid C10/11 (English version: http://www.synergrid.be/download.cfm?fileId=Technical_prescription_C10-11_ed2-1_20190901_tekst_EN.pdf&language_code=FRA).</p> <p>For generator connected to the high voltage network: https://www.elia.be/nl/klanten/aansluiting/aansluiten-op-ons-netwerk/connection-request-form</p>
BG	No reply
CZ	<p>It is the responsibility of each system operator to clarify and make publicly available the details of the operational notification procedure. There are currently more than 250 system operators within the Czech Republic. These details are not approved by ERÚ.</p> <p>Nevertheless, we can provide you with public reference to the 3 “main” regional DSOs and their websites where they outline the details (however all are in Czech).</p> <p>For E.ON Distribuce https://www.eon-distribuce.cz/sites/default/files/2019-07/POSTUP%20P%C5%98IPOJEN%C3%8D%20VM%20_%20V%C3%9DROBNY%20K%20DS.pdf</p> <p>For ČEZ Distribuce https://www.cezdistribuce.cz/cs/pro-zakazniky/potrebuji-vyresit/detailni-postup-o-prvnim-paralelnim-pripojeni-vyrobnny-k-distribucni-soustave-a-jejim-uvedeni-do-provozu.html</p> <p>For PREdistribuce https://www.predistribuce.cz/cs/potrebuji-zaridit/vyrobci/pripojeni-vyrobnny-k-distribucni-soustave/</p>
DE	<p>There are 4 TSOs and more than 880 DSOs operating the grid in Germany. Every single one of them has to publish their General Grid Connection Conditions according to Article 19(1) of the German Energy Act, including the operational notification procedures, in the Internet. Here you may find e.g. the General Grid Connection Conditions and the operational notification procedures of Germany's largest DSO, Westnetz GmbH: https://iam.westnetz.de/fuer-bauherren/ihr-weg-zum-netzanschluss and https://iam.westnetz.de/fuer-bauherren/ihr-weg-zum-netzanschluss/mittelspannung.</p>
DK	<p>https://en.energinet.dk/media/8E0B3705A5FB437F9B5F201FBFF633DF.pdf?la=en&hash=6BCED01C4DCF075BA99BC440663C9D7AF295AE9F</p> <p>Clarification provided by the NRA upon the Agency's request, due to inaccessibility of the link:</p> <p>Tab the picture below to open the document the Danish TSO has published.</p> <p>See and tab on figure 9 in the Annex II</p>
EE	https://www.elering.ee/liitumistingimused-0
ES	In accordance to Spanish regulation framework, distribution network companies are also distribution system operators of their networks. This means there are 333 distribution system operators in Spain and therefore 333 relevant system operators.

	<p>Royal Decree referred on point 1.a) of this questionnaire will regulate some general common aspects of the operational notification procedure and also some more specific ones depending on whether PGM are connected to either transmission or to distribution networks. This is going include list of information that must be provide in each step of the operational notification procedure</p> <p>Spanish TSO provides information about procedure in: https://www.ree.es/es/actividades/acceso-conexion-y-puesta-en-servicio/puesta-en-servicio</p> <p>No other public references are known.</p>
FI	<p>Described fully under the 6. Same link as above.</p>
FR	<p>http://clients.rte-france.com/lang/fr/clients_producteurs/services_clients/P_raccorder_installation.jsp</p>
GB	<p>These are outlined in the Grid Code - https://www.nationalgrideso.com/document/33821/download</p>
UK-NIR	<p>The TSO in Northern Ireland has had a system of operational notifications for many years. The existing process is considered broadly compliant but some amendments to the naming conventions to fully align are under-way. These are expected to be in place before the next Grid Code Review Panel on the 2nd of June 2020.</p>
GR	<p><i>No reply</i></p>
HR	<p>Publicly available operational notification procedures for PGMs can be found at the following links: https://www.hops.hr/en/network-connection https://www.hops.hr/prikljucenjaobrasci http://www.hep.hr/ods/pristup-mrezi/167</p>
HU	<p>https://www.mavir.hu/web/mavir/villamosenergia-termelo-berendezesek-halozati-csatlakozasanak-eljarasrendje <u>On this page (pdf files) you will find a general description and separate information on rules and procedures for type A; B; C; D PGMs.</u></p>
IE	<p>This has not been implemented yet, however it is expected to be incorporated into the next iteration of the Grid Code, expected to be approved before June.</p>
IT	<p>Chapter 1.A of Terna's Network Code https://download.terna.it/terna/Capitolo_Sezione%201A_8d787c86647a8d1.pdf, in particular, Section 1A.7.5.bis.1 for EON, Section 1A.7.5.bis.2 for ION, Section 1A.7.5.bis.3 for FON and Section 1A.7.5.bis.4 for LON.</p>
LT	<p>https://www.litgrid.eu/uploads/files/dir519/dir25/dir1/4_0.php. Please note that the procedure is only available in Lithuanian language.</p>
LU	<p>The operational notification procedure is publicly available under the following link: https://www.creos-net.lu/index.php?id=383. (same for small to big producers).</p>
LV	<p>For connection of the new PGMs generating facility owner must comply with the requirements of the NC RfG and the national rules "Regulation on Connection to the System to Electricity Producers" issued by the Regulator.</p>

NL	https://www.netbeheernederland.nl/_upload/Files/Regulering_20_be262dab6d.pdf
PL	<p>For TSO procedure and its details was published on TSO's website: http://www.pse.pl/dokumenty in bookmark: Kodeksy Sieci -> NC RfG -> Pozwolenia na użytkowanie dla nowych PGM typu D</p> <p>Regarding distribution systems - procedures for different types of PGMs are prepared and published – as an example see one of the DSO's (Enea Operator Sp. z o.o.) website https://www.operator.enea.pl/dladomu/uslugidystrybucyjne/kodeksy-sieci</p>
PT	<p>After the production license has been issued, to start the construction of a new generator module, the TSO, during the connection process, informs the requirements that the generator module must meet and details about the operational communication and compliance verification procedure. These include the need for simulations and tests to verify compliance with the required requirements.</p> <p>The general lines of the “Operational Communication Procedure for Connection” established in the RfG will be further detailed in the scope of the ongoing transport and distribution network framework review project, which is coordinated by DGEG.</p>
RO	<p>In ANRE order no. 51/2019 Relevant System Operator (RSO) has to establish content of PGMD –PGM Documents (a model is contained into ANRE order no 51/2019 and could be used) and RSO has obligation to publish on internet these requirements. –art 19 (1) etc.</p>
SE	<p>No documents for the operational notification procedure have been published yet by the DSOs (they are working with this (updating their handbook) and temporarily they handle cases by using the Finnish document VJV2018). The TSO (Svenska kraftnät) are only concerned regarding type D, and they have a process, but it is not yet adjusted to the process in the RfG. Work is ongoing to develop the entire process for the connection procedure in accordance with the RfG.</p>
SI	<p>Not implemented yet in national grid code for transmission system. Implemented in the draft national code for distribution system (not approved/published yet). See attached document SONDSEE-draft.docx, chapter XVI.</p>
SK	<p>For TSO https://www.sepsas.sk/Dokumenty/TechnickePodmienky/2020/01/20/TP-Dok_N_2020_upr.pdf</p> <p>public references for one DSO: Notification procedure in accordance with RfG, resp. also in accordance with the primary legislation of the Slovak Republic by Act no. 251/2012 on energy and Act no. 309/2009 on the support of RES (especially § 4, §4a, §4b, §5) is listed in the following documents:</p> <ul style="list-style-type: none"> - PDS operating rules: https://www.vsds.sk/mdoc/dso.B6000.A/doc/PP_VSD_2019.pdf - technical conditions of PDS: https://www.vsds.sk/edso/domov/technicke-info/technicke-podmienky - process of source connection: https://www.vsds.sk/mdoc/dso.B6000.A/doc/Proces_pripojenia_zariadeni_na_vyrobu_el_ektriny2019.pdf - notification of MZE connection, resp. LZ up to 10 kW: https://www.vsds.sk/mdoc/dso.B6000.A/doc/Oznamenie_o_prevadzke_maleho_zdroja2

019.pdf	<p>- protocol from technical inspection and functional tests of sources (for sources with the exception of MZE and LZ up to 10 kW): https://www.vsd.ssk/mdoc/dso.B6000.A/doc/Protokol_uvedenie_zdroja_do_prevadzky.pdf and https://www.vsd.ssk/mdoc/dso.D1100.A/doc/Funkcne_skusky_zdroja.pdf</p>
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4.2 Notification for permanent decommissioning of Type A PGMs

(185) **Q.3.b. Concerning Article 30(3), specify the national legislation for notification by the power-generating facility owner of the permanent decommissioning of the type A PGM to the relevant system operator or the competent authority of the Member State.**

(186) Table 15: Notification for permanent decommissioning.

MS	Answer
AT	<p><i>No reply</i></p> <p><i>Clarification provided by the NRA upon the Agency's request:</i></p> <p>Operators of generation facilities with a capacity of more than 20 MW are obliged to notify the TSO and the regulatory authority as early as possible, but at least 12 months in advance, of any temporary or permanent decommissioning of their generation facilities or parts of their generation facilities.</p> <p>https://www.ris.bka.gv.at/GeltendeFassung.wxe?Abfrage=Bundesnormen&Gesetzesnummer=20007045</p> <p>article 66 (2a)</p> <p><i>Clarification provided by the NRA:</i></p> <p>The national grid code (TOR) states that power-generating facility owner have to inform the relevant system operator of the permanent decommissioning of type A PGMs.</p> <p>(chapter 7, TOR Type A)</p> <p>https://www.e-control.at/documents/1785851/1811582/TOR+Erzeuger+Typ+A+V1.0.pdf/6342d021-a5ce-3809-2ae5-28b78e26f04d?t=1562757767659</p>
BE	<p>"Federal level (grids >70kV): The federal legislation doesn't foresee a notification by the power-generating facility owner of the permanent decommissioning of the type A PGM.</p> <p>Regional level (grids <=70kV): This procedure is defined in chapter 5 of the following technical rules (approved by the regional regulators): Synergrid C10/11 (English version: http://www.synergrid.be/download.cfm?fileId=Technical_prescription_C10-11_ed2-1_20190901_tekst_EN.pdf).</p>

	<i>When a power-generating module is permanently decommissioned, the DSU, or a by the DSU mandated third party, must notify the DSO in writing. This notification must be done within 15 working days following the decommissioning.</i> "
BG	<i>No reply</i>
CZ	<i>At the very least, there is the Energy Act according to which the owners of power generating modules have to provide the system operators with information necessary for the operation of the transmission/distribution system. Additionally, the public notice no. 79/2010 (which is available only in Czech) deals with operational security (where owners of power generating modules have to inform the transmission and distribution system operators of the permanent decommissioning of generators in general).</i>
DE	<i>The BNetzA has established and operates an electronic directory with energy industry data (Marktstammdatenregister ("Market Master Data Register")). The Market Master Data Register serves to</i> <ol style="list-style-type: none"> <i>1. improve the availability and quality of energy industry data in support of the purpose and objectives for the persons acting in the energy supply system and for the competent authorities to perform their statutory duties,</i> <i>2. to reduce the effort required to fulfil reporting obligations under energy law and</i> <i>3. to present the transformation of the energy supply system transparently to the public.</i> <i>The Market Master Data Register shall – among others – contain the following data on companies and installations in the electricity sector, in particular data on generating units and their operators, including their commissioning and decommissioning. The Market Master Data Register can be accessed here: https://www.marktstammdatenregister.de/MaStR The relevant legislation is laid down in Article 111e of the German Energy Act and in the Market Master Data Register Ordinance (Marktstammdatenregisterverordnung ("MaStRV"), to be found here: http://www.gesetze-im-internet.de/enwg_2005/_111e.html https://www.gesetze-im-internet.de/mastrv/BJNR084210017.html</i>
DK	<i>In Denmark a database on structural data on PGMs is being run. The decommissioning of a type A PGM will lead to changes in this database. The database is operated by the Danish State (Danish Energy Agency). The DSOs have the obligation to keep data up-to-date in relation to PGMs connected to their grid. The Danish TSO has a granted access to the database as well.</i> <i>Clarification provided by the NRA:</i> <i>In Denmark we have a centralized database which contains data about all PGMs (type-A PGMs included). It is a legal requirement upon connection to register a PGM in the database, as well as report any changes about the PGM. The legal obligation to report changes includes the situation of permanent decommissioning.</i> <i>This means that Denmark has a system in place, which allow (and obliges) any facility owner to report a permanent decommissioning of his PGM.</i>
EE	<i>This principle (former § 24) has been removed from current Electricity Market Act.</i>

ES	Royal Decree 1955/2000 of 1 December on the Transmission, Distribution, Marketing, and Supply of Electricity and the Authorisation Procedure for Electricity Generation Plants (Title VII; Chapter IV): https://www.boe.es/buscar/act.php?id=BOE-A-2000-24019
FI	<p>No national legislation. Same in the RfG. Described under the 6.4.1-6.4.3 in the same document above.</p> <p><i>Clarification provided by the NRA:</i></p> <p>We do not have a specific legislation for notification of the permanent decommissioning of the type A PGM. The legislation only concerns the PGMs that are of size 1 MVA or bigger.</p> <p>But according to our legislation our authority verifies the terms of connection service for TSO and the notification of the permanent decommissioning of the type A PGM by the power-generating facility owner is stated and described in the terms of TSO. Our authority has already verified these terms and the notification process is thus obligatory for the TSO and also for the party connected to the network through a contract with the TSO.</p>
FR	No notification is made to the regulatory authority. The system operator is notified.
GB	<p>This is outlined in the Grid Code and Distribution Code: https://www.nationalgrideso.com/document/33821/download</p> <p><i>Clarification provided by the NRA upon the Agency's request:</i></p> <p>Under paragraph 20.4 of G99 of the Distribution Code, generators are required to notify DNOs about decommissioning of a Power Generating Module. https://www.energynetworks.org/assets/files/ENA_EREC_G99_Issue_1_Amendment_6_(2020).pdf</p>
UK-NIR	There are rules in the Grid Code which require a three-year notice period prior to intended decommissioning for all units above 50MW installed capacity.
GR	<i>No reply</i>
HR	No.
HU	DSO Business Code (point 5.7) – also approved by HEA. https://www.eon.hu/content/dam/eon/eon-hungary/documents/hatarozatok-szabalyzatok-aram/EED/H2674_2019_EED_elo_usz_torzs.pdf
IE	This has not been implemented yet, however it is expected to be incorporated into the next iteration of the Grid Code, expected to be approved before June.
IT	The “Testo Integrato Connessioni Attive” (Active Connections Integrated Text– Annex A to resolution ARG/elt 99/08 of Italian Regulatory Authority), at the Article 36novies, regulates the methods of communication of the permanent decommissioning of a unit or a power plant that the producer must carry out in the “Gestione Anagrafica Unica Degli Impianti” system (management of the single register of power plants, named GAUDÌ system). GAUDÌ system is managed by the Italian TSO (Terna S.p.A.) and through the same GAUDÌ system the permanent decommissioning of a unit or a power plant is communicated to the relevant network operator (DSO or TSO).

LT	<i>National legislation Rules for Authorization of activities in the electricity sector (Veiklos elektros energetikos sektoriuje leidimų išdavimo taisyklės) paragraph 25 - 27 implies if any changes occur in the power generating capabilities, the power plant representative must inform the TSO about the changes.</i>
LU	<i>Modified national electricity law 1 August 2007 - Section III Obligations of producers.</i>
LV	<i>Notification on the permanent decommissioning have been included in Grid Code (Article 26, point 4 and 5). According of the Grid Code network user has the owing responsibilities to agree with the system operator regarding the procedure for disconnection of the electrical installation, if the electrical installation of the system participant is intended to be permanently disconnected from the electricity system; or disconnect or permit disconnection of electrical installation or part thereof from the electricity system at the request of the system operator, in compliance with a court decision, in an emergency situation in the electricity system, in case of threat to the stable operation of the electricity system or in agreement with the system operator.</i>
NL	<i>Not specified</i>
PL	<i>No special legislation is required. Such a notification to the appropriate system operator is required based on distribution grid code, stating that the date and manner of handing over equipment for renovation or decommissioning should be agreed with the relevant DSO, regardless of PGM type.</i>
PT	<i>It is issued in decree referred in point 1.a. Furthermore, it can be addressed in ongoing review project.</i>
RO	<i>These requirement is foreseen into ANRE order 51/2019, art. 8.</i>
SE	<i>Yes, the notification is done according to the secondary legislation SvKFS 2013:2 (Affärsverket svenska kraftnäts föreskrifter och allmänna råd om elberedskap), link https://www.svk.se/siteassets/om-oss/foreskrifter/svkfs-2013-2.pdf .</i>
SI	<i>The permanent decommissioning of power-generating modules type A (Type A PGM) is in the national legislation regulated by the following acts: Decree on waste (Official Gazette of the Republic of Slovenia, Nos. 37/15 in 69/15) and Decree on waste electrical and electronic equipment (Official Gazette of the Republic of Slovenia, Nos. 55/15, 47/16, 72/18 in 84/18 – ZIURKOE).</i>
SK	<i>PGM's have to inform URSO accordance §10, §6(5) the Act 251/2012 §10 and §21(1)(j) 250/2012</i>

4.3 PGMD issued by authorised certifier

- (15) **Q.3.c. Has the Member State provided that the PGMD is issued by an authorised certifier in accordance with Article 32(6)?**

(187) Table 16: PGMD issued by authorised certifier.

MS	Answer
AT	No.

	<p><i>Clarification provided by the NRA upon the Agency's request:</i></p> <p><i>Further explanation: The Austrian grid code states, that the PGMD shall be provided by the power-generating facility owner to the relevant system operator according to 32(1).</i></p>
BE	<i>No, the Member State has not provided this option. The PGMD is provided by the relevant system operator.</i>
BG	<i>No reply</i>
CZ	<i>Not to our knowledge, MS is not synonymous with the NRA and we have no information that this was provided.</i>
DE	<p><i>Yes. The "Federal Ordinance on the Verification of Electro Technical Features of Energy Systems" („Verordnung zum Nachweis von elektrotechnischen Eigenschaften von Energieanlagen (abbreviation: NELEV))“ of June 2017 determines the certification and validation of power plants. It explicitly refers to the discretion granted to the Member States under Article 32(6) RfG which allow the Member States to require that the power-generating module documents shall be issued by an authorized certifier and that the verification of the simulation models against the results of compliance tests be carried out by authorized certifiers.</i></p> <p><i>Under this ordinance, power-generating facility owners shall verify to the relevant system operator the compliance of the facility with the minimum technical standards laid down in the RfG-compliant national law.</i></p> <p><i>The ordinance states that the power-generating module documents for Type B und Type C shall be issued by an authorized certifier.</i></p> <p><i>The ordinance further states that the verification of the simulation models for the behaviour of power-generating modules of Type C and Type D shall be carried out by an authorized certifier.</i></p> <p><i>The most important standardized certification program has been established by the FGW. The certifying under the new grid connection rules may take place, because the new certification in the "Technical Directive No 8 of the FGW" ("Technische Richtlinie Nr. 8 der FGW", abbreviation: FGW-TR8) has recently been published (https://wind-fgw.de/produkt/zertifizierung-der-elektrischen-eigenschaften-von-erzeugungseinheiten-und-anlagen-am-nieder-mittel-hoch-und-hoehchstspannungsnetz/).</i></p>
DK	<i>No.</i>
EE	<i>We have no information that this was provided.</i>
ES	<i>No.</i>
FI	<i>No. Described fully under the 6 (same document as above).</i>
FR	<i>No, it has not.</i>
GB	<i>No.</i>
UK-NIR	<i>Northern Ireland has yet to establish an authorised certifier.</i>

GR	<i>No reply</i>
HR	No.
HU	No.
IE	<i>Republic of Ireland has yet to establish an authorised certifier.</i>
IT	No.
LT	<i>There is no authorised certifier. The certificates issued by the manufacturer are approved.</i>
LU	No.
LV	No.
NL	N/A
PL	No.
PT	<i>If it is necessary to establish that the “Generator Module Document” can be issued by an authorized certifier in place of the owner of the generating installation, the issue can be dealt with as already mentioned in the scope of the ongoing review project. This case is part of the set of “Operational Communication Procedure for Connection” themes that will be further detailed.</i>
RO	<i>These requirement is foreseen into ANRE order no. 51/2019, art.12 (2) (e).</i>
SE	<i>No, there is no such decision, and no authorised certifier for Sweden.</i>
SI	No.
SK	<i>No. URSO would like to ask you to provide a certification scheme developed under the RFG Regulation whereby a Member State could accredit a national institution for a certification body.</i>

5. Relevant clauses in contracts and general terms

- (16) **Q.4.a. Concerning Article 71(1) of the NC RfG, explain the modalities adopted to ensure that all relevant clauses in contracts and general terms and conditions relating to the grid connection of new system users are brought into compliance with the requirements of the relevant regulation.**

(188) Table 17: Relevant clauses in contracts and general terms.

MS	Answer
AT	See answer 3a
BE	<i>Federal level (grids >70kV): According to article 4, §1, of the new Belgian federal grid code the NRA has to approve, among others, the model connection agreement and access agreement and their modifications. The relevant articles of these contracts will be adapted after an in-depth review in the coming months.</i>

	<p><i>Regional level (grids <=70kV):</i></p> <p><i>With respect to grid connection, the relevant modalities and requirements are described in the General requirements, drafted by the grid operator and approved by the competent regulator in 2019. Relevant articles in the connection contract will be adapted during an in-depth review of the existing connection contract.</i></p> <p><i>For the Brussels-Capital Region, relevant articles in the connection contract will be adapted during the ongoing in-depth review of the regional grid codes of which the model of the connection contract is an annex.</i></p>
BG	<i>No reply</i>
CZ	<i>The general principle applicable is that connection agreements refer to the Grid codes of relevant system operators and these contain the requirements of general application.</i>
DE	<p><i>Under Article 19(1) of the German Energy Act, the connection contracts refer to or mirror the technical rules of the designated entity VDE FNN, the VDE-AR-N 4105, 4110, 4120, 4130, which in turn implement the NC RfG.</i></p> <p>http://www.gesetze-im-internet.de/enwg_2005/_19.html</p>
DK	<i>DUR has approved the general terms and conditions for grid connection pursuant to RfG. DUR has monitored that these requirements are public available and a procedure for grid connection has been published by the Danish TSO as well. This procedure refers to the RfG. Any party can complain pursuant to RfG art. 7(8). DUR has not received any complaints.</i>
EE	<i>The general principle applicable is that connection rules refer to the connection conditions of relevant system operators and these contain the requirements of general application.</i>
ES	<i>New regulation about access and connection to the grid is expected to be adopted in a near future. This new regulation shall take into account this NC RfG provision.</i>
FI	<p><i>Relevant TSO and DSOs have been in a working group that handles the coordination of RfG. Relevant TSO has also organized conferences and public events about the requirements of RfG. Regulator has participated in these public events. The relevant TSO has conducted the public consultation before the relevant TSO has send the proposal to regulator. Regulator has made its own public consultation about the proposal. Regulator has forwarded the statements to the relevant TSO and asked the relevant TSO to comment and make needed changes to the proposal based on the statements. After that relevant TSO has responded and provided a reasoned reply and made the changes that were necessary. In the end regulator has evaluated the proposal and its reasons and approved it by decision.</i></p> <p><i>The requirements set by the TSO bind every DSO and DSOs have implemented the necessary requirements to their own terms of connection. Regulator has confirmed and approved these terms by decisions.</i></p> <p><i>Connecting customers can always make a request for investigation if they suspect that the conditions have not been met.</i></p>
FR	<i>No modality has not yet been adopted. After the publication of the ministerial order, the TSO will submit to CRE for approval the new models of connection agreement including the requirements of the network codes.</i>
GB	<i>The requirements of our industry codes (Grid Code and Distribution Code) required National Grid ESO and the Distribution Network Operators to ensure all connection contracts and general terms/conditions complied RfG.</i>

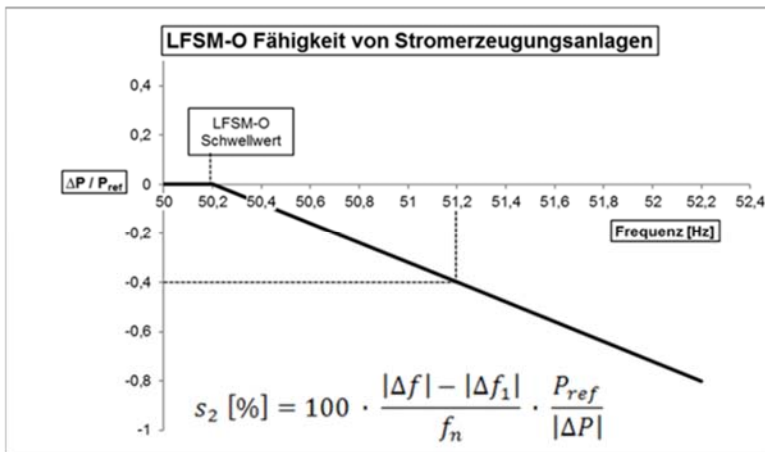
UK-NIR	<p>Compliance requirements are met by changes to the Grid Code. SONI is responsible for the development and maintenance of the Transmission Grid Code in Northern Ireland, through the Grid Code Review Panel (GCRP). The GCRP is a standing body mandated to review and discuss the Grid Code, its workings and offer suggestions for amendments. Each member of the GCRP represents the interests of the constituents of their appointing body and has the responsibility of engaging with their constituents and discussing their views.</p> <p>All relevant clauses in contracts and general terms and conditions relating to the grid connection of new system users refer to continued compliance with applicable Grid Code requirements. NC RfG is being implemented through grid code modifications, details of which can be found at http://www.soni.ltd.uk/how-the-grid-works/grid-codes/ And at distribution level via the Northern Ireland Distribution Code Review Panel https://www.nienetworks.co.uk/about-us/distribution-code/dc-review-panel</p>
GR	<i>No reply</i>
HR	<i>There is explicit connection between connecting contracts and national grid codes.</i>
HU	<i>No specific modality was adopted yet as the requirements are directly binding and well published on the TSO website. When HEA (NRA) approved the proposal on 14 November 2018 on the general requirements HEA ordered the TSO to consult in every half year with DSOs and report to the Authority, also to inform the industrial stakeholders during the next (Operational/Market/DSO) committee meeting on these developments. http://www.mekh.hu/download/c/fa/60000/11184_2018.pdf</i>
IE	<i>NC RfG is being implemented through grid code modifications, details of which can be found here: http://www.eirgridgroup.com/customer-and-industry/general-customer-information/grid-code-info/modifications/</i>
IT	<i>The Italian Regulatory Authority, approving with resolution 592/2018/R/eel the changes to the Italian Grid Code envisaged by the Italian TSO (Terna S.p.A.) and implementing with resolution 149/2019/R/eel the technical requirements (Norma CEI 0-16 and Norma CEI 0-21) for connections to distribution networks, guarantees that all new connections are compliant with NC RfG.</i>
LT	<i>All requirements are implemented into the connection agreement and transmission service agreement. NERC approves standard terms and conditions of transmission services agreement which are prepared by TSO. The compliance of the requirements is tested before the final operation notice is issued.</i>
LU	<i>Technical requirements (TAB - Technischen Anschlussbedingungen) and General Terms & Conditions are submitted for approval to NRA by TSOs and DSOs.</i>
LV	<i>The new framework is taken into account when developing the relevant general requirements. The requirements for their deployment have been included within the framework of the Grid Code as well in the Regulation on Connection to the System to Electricity Producers.</i>
NL	<ol style="list-style-type: none"> 1. The non-exhaustive requirements from the NC RfG are implemented in the Dutch technical codes. 2. The Dutch technical codes are also the terms and conditions from the grid operators. 3. On 21 December 2018 ACM established a partial decision in which ACM amended the technical codes for the implementation of the NC RfG. 4. The ACM has not yet decided on the following subjects: <ol style="list-style-type: none"> a. Rate of Change of Frequency (RoCoF),

	<p><i>b. Reactive power requirements.</i></p> <p><i>5. We assume that the TSO will adopt the relevant clauses. If not, we expect disputes.</i></p>
PL	<p><i>No specific modalities are adopted. The TSO and DSOs shall ensure that the clauses in the contracts and general conditions for connecting to the network are adjusted. In the event of a dispute regarding the content of the contract for the provision of transmission services, the regulatory authority shall, at the request of any party to the contract, determine the final content of the legal relationship (Article 8 of the Energy Law).</i></p>
PT	<p><i>In addition of above mentioned decree, in point 1.a, this will be addressed in ongoing review project. This review will ensure that all relevant clauses in contracts, general terms and conditions relating to grid connection of new generator modules are adapted to the requirements of the RfG. Due to its relevance, this includes the connection agreement with transport and distribution network grid, the definition of a network connection agreement instead of the current conditions letter.</i></p>
RO	<p><i>In Romania, Connection contracts are referring to respect legislation into force, which represent implementation of R631/2016 – point 7 from Norms – ANRE order no 11/2015, order for aproval of connection contract frame to the electrical networks.</i></p>
SE	<p><i>The work has not yet started at Ei, we plan to start later this year with the planning of the NRAs supervision. The system operators have reported that they have started to work with the compliance of contracts and conditions, including the general terms of agreements.</i></p>
SI	<p><i>Connection approvals and connection contracts must in accordance with the national legislation comply with the national grid codes for the transmission or distribution system.</i></p> <p><i>In the process of approving the requirements of general application the Energy Agency (NRA) has order the TSO and DSO to implement the approved proposal and publish it in the national grid codes.</i></p>
SK	<p><i>The Office ensured compliance with the Regulation by issuing the above mentioned decisions, which are binding for all PMG's</i></p>

Annex II: Figures

Austria

Figure 1 (related to question 2.c)



$$\Delta f = f_{Messung, t+1} - f_n$$

$$\Delta f_1 = f_{Messung, t} - f_n$$

Germany

Figure 2 (related to question 2.a)

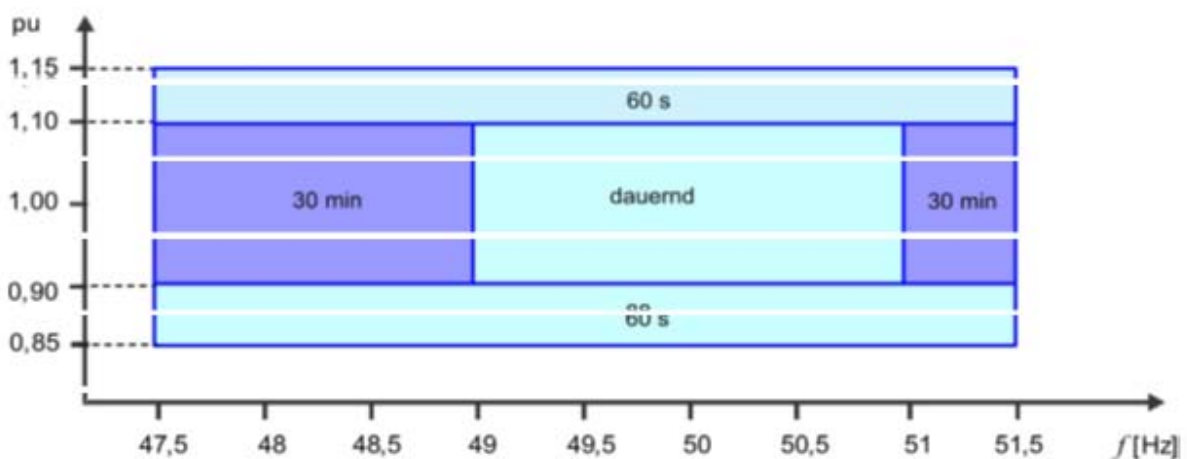


Fig. 4 - Requirements for the quasi-stationary operation of generation plants

Figure 3 (related to question 2.a)

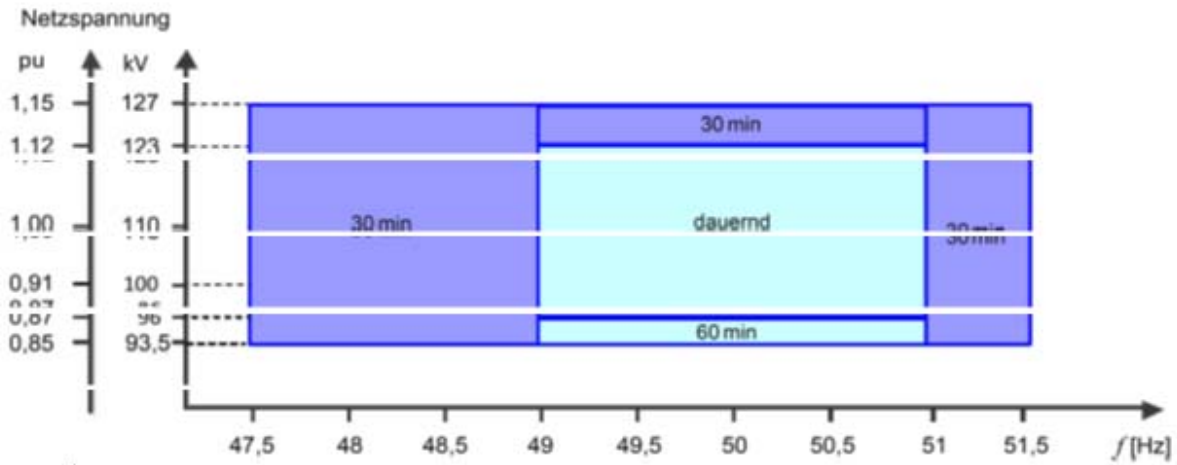


Fig. 5

Figure 4 (related to question 2.a)

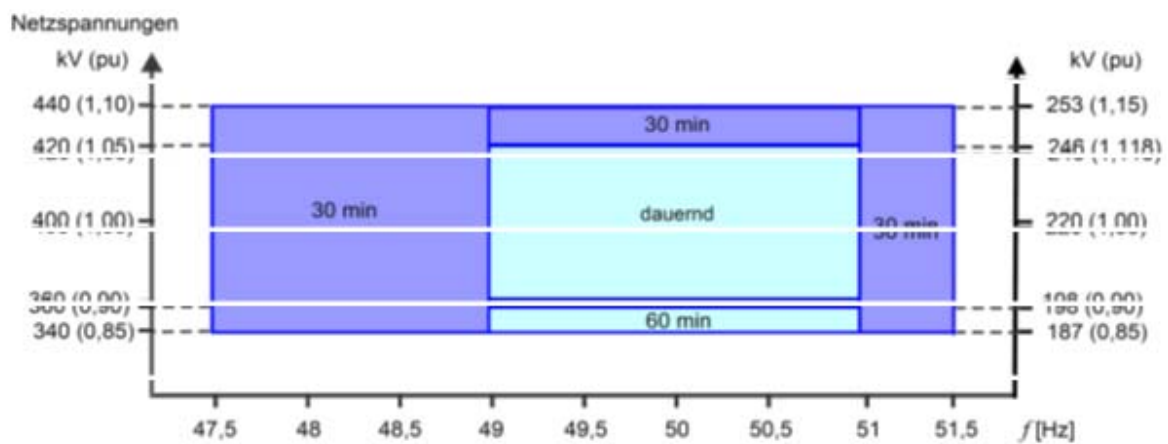


Fig. 6.

(VDE-AR-N 4130, Chapter 10.2.1.2)

Figure 5 (related to question 2.b)

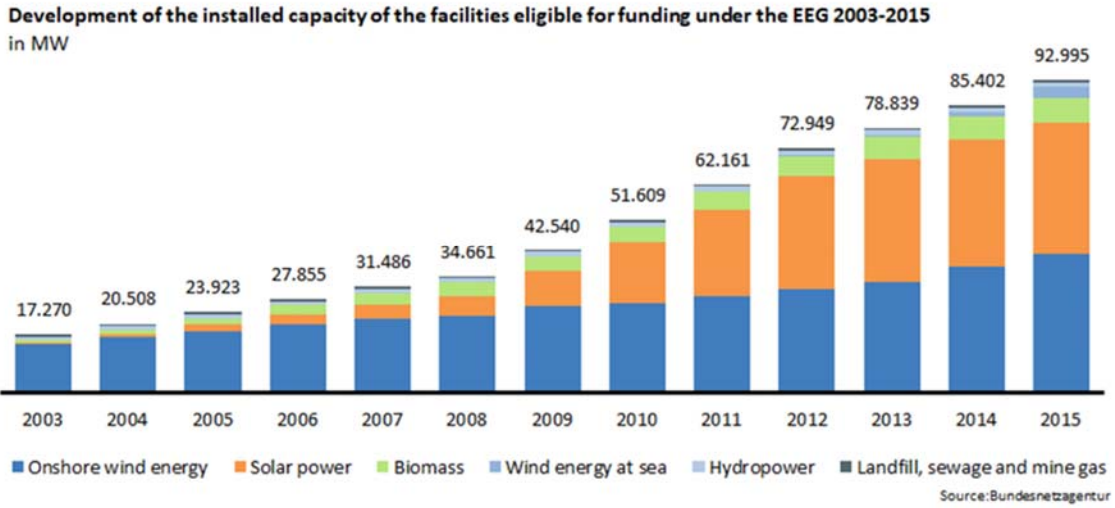
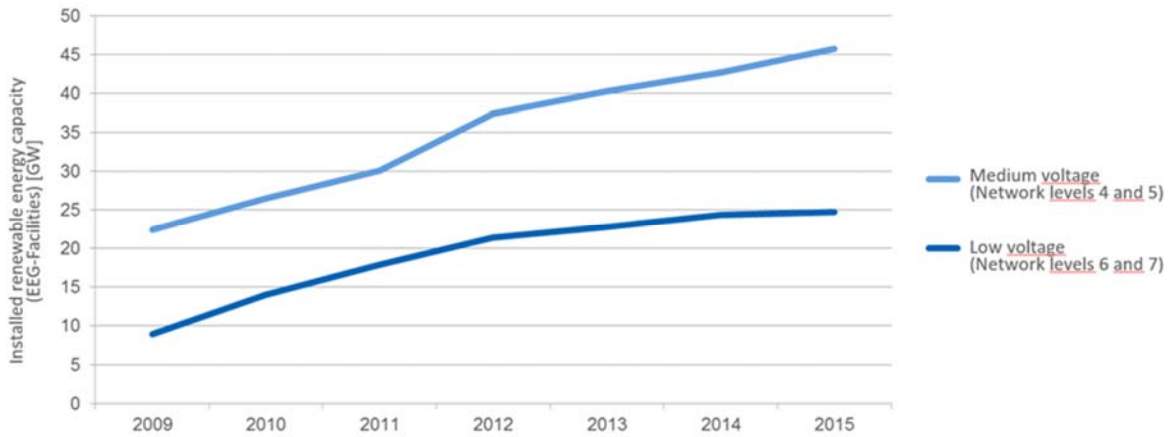


Figure 6 (related to question 2.b)

Figure 1: EEG in Zahlen 2015 – Bundesnetzagentur



Installed RES power. Source: Statistical reports 2009 - 2011 and EEG in Zahlen 2012

Figure 7 (related to question 2.c)

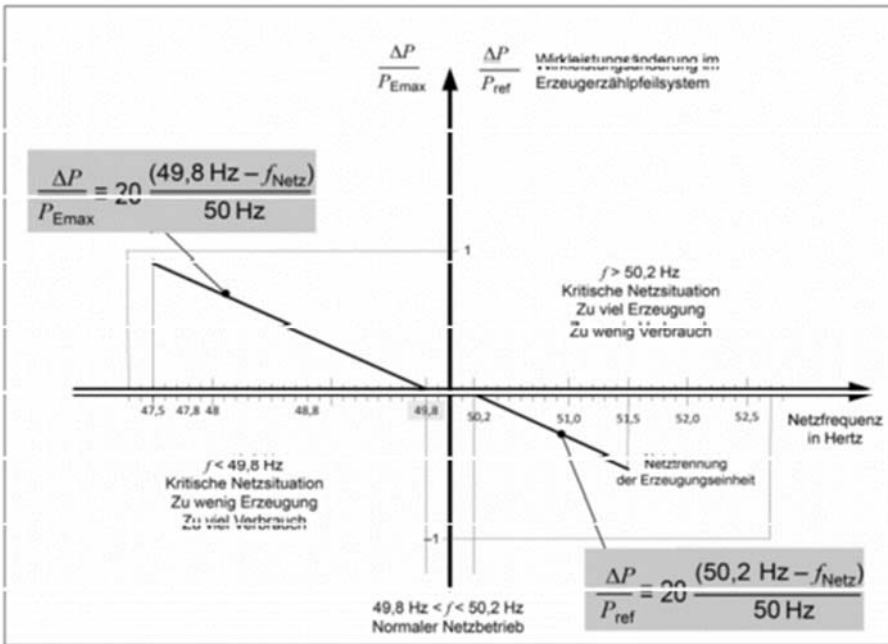
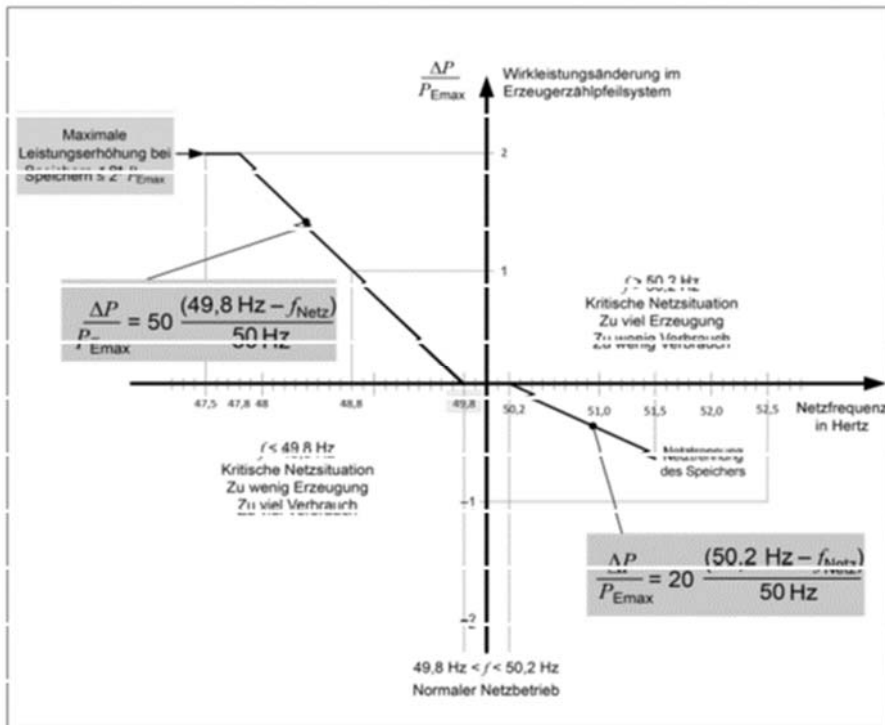
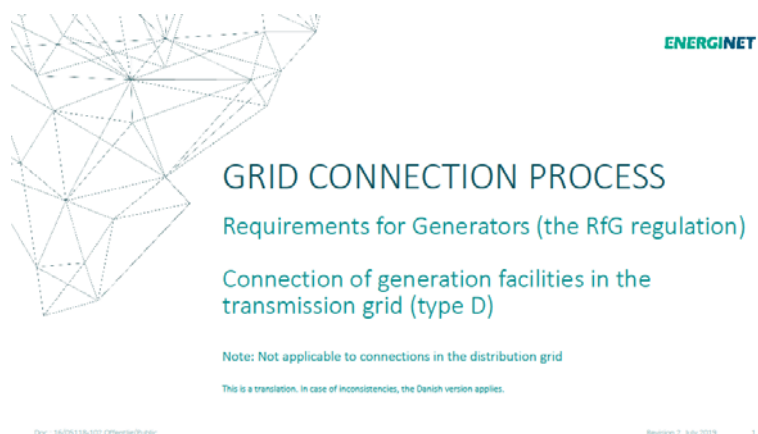


Figure 8 (related to question 2.c)



Denmark

Figure 9 (related to question 3.a)



Tab the picture to open

Estonia

Figure 10 (related to question 2.a)

Sünkroonala	Sagedusvahemik	Talitluse kestus
Balti energiasüsteem	47,5 Hz – 48,5 Hz	30 minutit
	48,5 Hz – 49,0 Hz	30 minutit
	49,0 Hz – 51,0 Hz	Piiramata
	51,0 Hz – 51,5 Hz	30 minutit

Spain

Figure 11 (related to question 2.c)

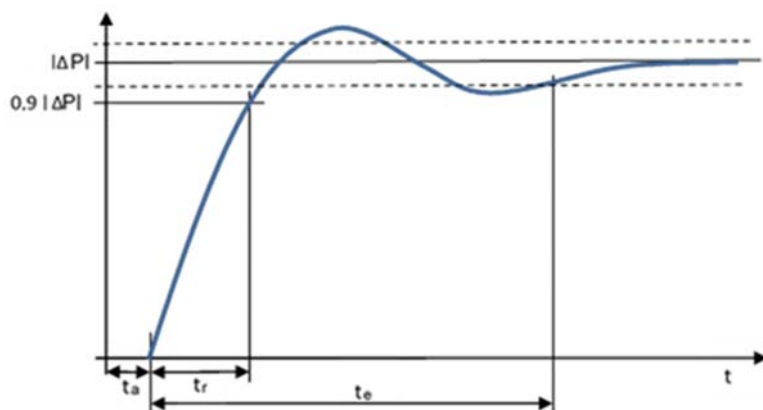


Figure 12 (related to question 2.c)

	Synchronous PGM	PPM
t_r	≤ 8 s for an active power change upto 45% of maximum power ⁽¹⁾	≤ 2 s for an active power change upto 50% of maximum power
t_e	≤ 30 s	≤ 20 s

(1) Upon limitations of hydroelectric projects and justified technical limitations (gas motors; gas turbines, etc.) shorter times might be agreed with TSO.

Figure 13 (related to question 2.c)

	Synchronous PGM	No wind PPM	Wind PPM
t_r	≤ 5 minutes for an active power change up to 20% of maximum power ⁽¹⁾	≤ 10 s for an active power change up to 50% of maximum power	≤ 5 s for an active power change upto 20% of maximum power, when power is over 50% of maximum power. When power is under 50% of maximum power, time response will be as short as technically possible, although time response over 5 s need to be justify.
t_e	≤ 6 min ⁽¹⁾	≤ 30 s	

(1) This slow behaviour is not acceptable when direction of frequency change had reversed few seconds before, in which case similar time response will be expected to that applying to the reduction active power case.

Northern Ireland

Figure 14 (related to question 2.c)

Parameter	Parameter in RfG	Proposal	Article Number	Type Applicability	Justification Code
Frequency threshold	Between 50.2-50.5 Hz	50.2 Hz	13.2(a)	A, B, C and D PGMs & offshore PPMs	1
Droop settings	Between 2-12 %	Machines should be capable of operating in the range 2-12%. The default setting is 4%	13.2(a)	A, B, C and D PGMs & offshore PPMs	1

Figure 15 (related to question 2.e)

Parameter	Parameter in RfG	Proposal	Article Number	Type Applicability	Justification Code
Active Power Range ($\Delta P/P_{max}$)	1.5-10%	Not proposing a value as this is an error in the RfG Network Code. See note below	15.2 (d) (i) and (ii)	C and D PGMs & offshore PPMs	1
Frequency Response Insensitivity (Δf)	10-30 mHz	15mHz*	15.2 (d) (i) and (ii)	C and D PGMs & offshore PPMs	3
Frequency Response Insensitivity ($\Delta f/f$)	0.02-0.06%	0.03%	15.2 (d) (i) and (ii)	C and D PGMs & offshore PPMs	3
Frequency Response deadband	0-500mHz	+/-15mHz*	15.2 (d) (i) and (ii)	C and D PGMs & offshore PPMs	3
Droop	2-12%	Depends on gen type – default is 4%	15.2 (d) (i) and (ii)	C and D PGMs & offshore PPMs	1

Figure 16 (related to question 2.e)

Parameter	Parameter in RfG	Consultation Proposal	Article Number	Type Applicability	Justification Code
Active power range	1.5-10%	10%	15.2 (d) (iii)	C and D PGMs & offshore PPMs	3
<i>Admissible initial time delay for activation of active power frequency response for PGMs</i>	2s	2s	15.2 (d) (iii)	C and D PGMs & offshore PPMs	N/A
Admissible initial time delay for activation of active power frequency response for PPMs	Less than 2 seconds	0s No time delays other than those inherent in the design of the frequency response system	15.2 (d) (iii)	C and D PGMs & offshore PPMs	3
Maximum admissible choice of full activation time	30 seconds	5 seconds	15.2 (d) (iii)	C and D PGMs & offshore PPMs	3
Capability relating to the duration of provision of full active power frequency response	15-30 minutes	20	15.2 (d) (v)	C and D PGMs & offshore PPMs	3

Hungary

Figure 17 (related to question 2.c)

Témakör Aspect	Követelmények Non-Exhaustive Requirement	Nem kötelező követelmények Non-Mandatory Requirement	Hivatkozási Article	Meghatározás szövegi definiál Definition	Type A	Type B	Type C	Type D	Követelmény Comment	Magyar paraméterek HU	Hungarian parameters EN	Megjegyzés/hivatkozások (s)
KORLÁTOZOTT FREKVENCIA ÉRZÉKENY ÜZEMMÓD LIMITED FREQUENCY SENSITIVE MODE (LFSM)			13.2(a)	TSO	13.2(a)	14.1	15.1	16.1	aktiválási határérték és merevség frequency threshold and droop settings	Alap beállítás: küszöbérték: 50.2 Hz merevség: 5% A frekvencia, küszöbérték és merevség tartományja állítható	Default value: Threshold: 50.2 Hz Droop: 5% Adjustable ranges for frequency threshold and droop	Javasolt érték az ENTSO-E IGO szerint. (Referencia: - Limited frequency sensitive mode_ENTSO-E IGO_31 January 2018; - Frequency Stability Evaluation: Criteria for the Synchronous Zone of Continental Europe - Requirements and impacting factors_ENTSO-E RG-CE SPD Sub Group_March 2018)
	X		TSO	13.2(b)	szopori elvárás és újra csatlakozás erőssége requirements in case of expected compliance on an aggregate level					Nem alkalmazott	N/A	A német határhelyi alkalmazás eljárás az eredetileg csak 49.8 Hz és 50.2 Hz közötti frekvencián működő inverter csatlakozású megújuló termelői; egyidejű elvárásokról és új csatlakozásokra vonatkozóan

Figure 18 (related to question 2.g)

MESTESÉGES INERCIÁ BEÁLLÍTÁSÁRA VONATKOZÓ KÖVETELMÉNYEK SYNTHETIC INERTIA CAPABILITY FOR PFM	X	21.2	TSO			21.2	22	mesterséges inerciát biztosító szabványos rendszer működési elvének meghatározása definition of the operating principle of power systems to provide synthetic inertia and the related performance parameters	nincs meghatározva	not defined	<p>Az aktuális erőművek műben a teljesítményelektronikán (inverteren keresztül) csatlakozó megújuló villamosenergia termelő berendezések szabványosított növekedése a hagyományos, forgó töltéssel rendelkező, szinkron gépek termelő berendezésének kivételével a rendszer erőteljes inerciát, például a frekvencia, a frekvencia kiesés esetén a VEM-ben jelentkező kezdeti frekvencia változás merevségét (RoCoF).</p> <p>Az üzemi üzemelés során elvégzett dinamikus rendszervizsgálatok során meghatározásra kerül a minimálisan szükséges inerciaterhelés mértéke. A TSO számára minden olyan termelői berendezés használható, amely képes kimenő határolás teljesítményét a kezdeti RoCoF érték csökkentése, ill. a kekvencia frekvencia mélypont/magaspont (lower/higher nadir) stabilitás növelés, kekvessé tényleg - akár kis mértékű - megváltoztatására. Ez történhet mesterséges inercia vagy gyors frekvencia változás (fast frequency response) funkció megvalósításával.</p> <p>A funkció szabványtechnikai paramétereinek meghatározása a termelői vállalkozásokkal együtt történik.</p> <p>(Referencia: - Need for synthetic inertia (SI) for frequency regulation_ENTSO-E IGO_31 January 2018) Az IGO GL 39 (Jalisco) alapján az inercia/terhelésviszonyok vizsgálatát kell végezni a mesterséges inercia alkalmazásának alkalomszerűségéről (határolás 2018. 08. 14.)</p>
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Ireland

Figure 19 (related to question 2.c)

Parameter	Parameter in RfG	Proposal	Article Number	Type Applicability	Justification Code
Frequency threshold	Between 50.2-50.5 Hz	50.2 Hz	13.2(a)	A, B, C and D PGMs & offshore PPMs	1
Droop settings	Between 2-12 %	Machines should be capable of operating in the range 2-12%. The default setting is 4%	13.2(a)	A, B, C and D PGMs & offshore PPMs	1

Figure 20 (related to question 2.d)

Requirement	Requirement in RfG	Proposal	Article Number	Type Applicability
Shorter initial FSM response delay for PGMs without inertia	Not specified	Not Mandatory – can be agreed on a case by case basis with System Services Contracts	15.2.d(iv)	Type A, B, C and D PGMs and offshore PPMs

Figure 21 (related to question 2.e)

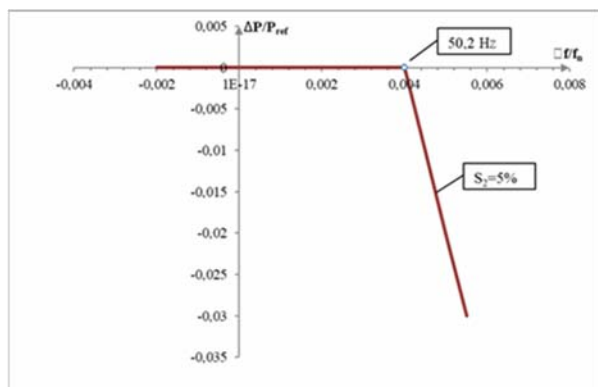
Parameter	Parameter in RfG	Proposal	Article Number	Type Applicability	Justification Code
Active Power Range ($\Delta P/P_{max}$)	1.5-10%	Not proposing a value as this is an error in the RfG Network Code. See note below	15.2 (d) (i) and (ii)	C and D PGMs & offshore PPMs	1
Frequency Response Insensitivity (Δf)	10-30 mHz	15mHz*	15.2 (d) (i) and (ii)	C and D PGMs & offshore PPMs	3
Frequency Response Insensitivity ($\Delta f/f$)	0.02-0.06%	0.03%	15.2 (d) (i) and (ii)	C and D PGMs & offshore PPMs	3
Frequency Response deadband	0-500mHz	+/-15mHz*	15.2 (d) (i) and (ii)	C and D PGMs & offshore PPMs	3
Droop	2-12%	Depends on gen type – default is 4%	15.2 (d) (i) and (ii)	C and D PGMs & offshore PPMs	1

Figure 22 (related to question 2.e)

Parameter	Parameter in RfG	Proposal	Article Number	Type Applicability	Justification Code
Active power range	1.5-10%	SPGMs: 5% PPMs: 60% in 5 seconds and 100% in 15 seconds	15.2 (d) (iii)	C and D PGMs & offshore PPMs	3
Admissible initial time delay for activation of active power frequency response for PGMs	2s	2s	15.2 (d) (iii)	C and D PGMs & offshore PPMs	N/A
Admissible initial time delay for activation of active power frequency response for PPMs	Less than 2 seconds	0s No time delays other than those inherent in the design of the frequency response system	15.2 (d) (iii)	C and D PGMs & offshore PPMs	3
Maximum admissible choice of full activation time	30 seconds	5s	15.2 (d) (iii)	C and D PGMs & offshore PPMs	3
Capability relating to the duration of provision of full active power frequency response	15-30 minutes	20min	15.2 (d) (v)	C and D PGMs & offshore PPMs	3

Latvia

Figure 23 (related to question 2.c)



Romania

Figure 24 (related to question 2.a)

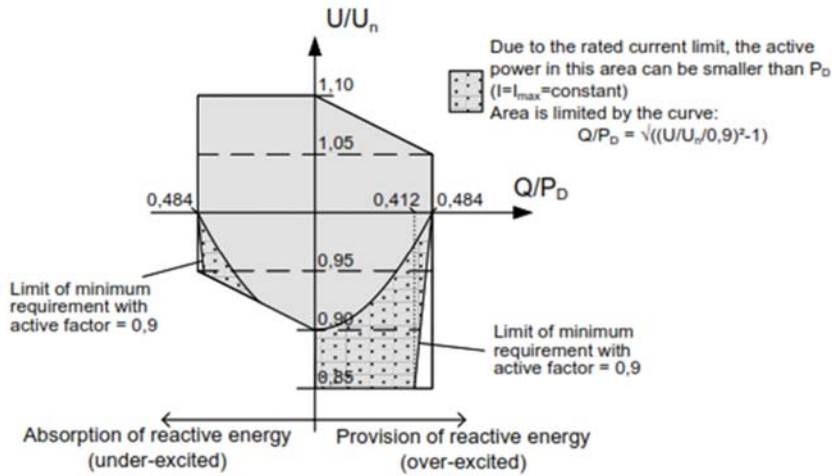


Figure 13 — Reactive power capability at active power P_D in the voltage range (positive sequence component of the fundamental)

Figure 25 (related to question 2.a)

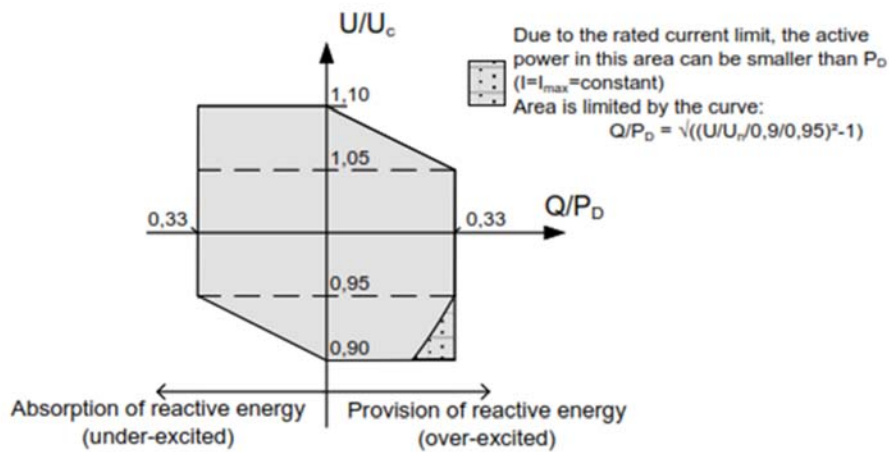


Figure 13 — Reactive power capability at active power P_D in the voltage range (positive sequence component of the fundamental)

Annex III: List of abbreviations & country codes

Acronym	Definition
ACER	Agency for the Cooperation of Energy Regulators
EC	European Commission
ENTSO-E	European Network of Transmission System Operators for Electricity
EU	European Union
NC	Network Code
NRA	National Regulatory Authority
RfG	Requirement for Generators
TSO	Transmission System Operator

ISO code	Country
AT	Austria
BE	Belgium
BG	Bulgaria
CZ	Czech Republic
DE	Germany
DK	Denmark
EE	Estonia
ES	Spain
FI	Finland
FR	France
GB	Great Britain
UK-NIR	Northern Ireland
GR	Greece
HR	Croatia

ISO code	Country
IE	Ireland
LT	Lithuania
LV	Latvia
HU	Hungary
IT	Italy
LU	Luxembourg
NL	Netherlands
PL	Poland
PT	Portugal
RO	Romania
SE	Sweden
SI	Slovenia
SK	Slovakia

Abbreviation	NRA
ACM	Autoriteit Consument & Markt/Authority for Consumers & Markets
ARERA	Autorità di Regolazione per Energia Reti e Ambiente
AGEN-RS	Agencija za Energijo/Energy Agency
ANRE	Autoritatea Națională de Reglementare în Domeniul Energie/Regulatory Authority for Energy
BNetzA	Bundesnetzagentur/Federal Network Agency for Electricity, Gas, Telecommunications, Posts and Railways

Abbreviation	NRA
CRU	The Commission for Regulation of Utilities
CRE	Commission de régulation de l'énergie
CREG	Commission de Régulation de l'Électricité et du Gaz/Commissie voor de Regulering van de Elektriciteit en het Gas
CNMC	La Comisión Nacional de los Mercados y la Competencia/The National Commission on Markets and Competition
DUR	Forsyningstilsynet/Danish Utility Regulator
E-Control	Energie-Control Austria
ECA	Konkurentsiamet/Estonian Competition Authority
Ei	Energimarknadsinspektionen/Swedish Energy Markets Inspectorate
ERO	Energetický regulační úřad/Energy Regulatory Office
ERSE	Entidade Reguladora dos Serviços Energéticos/Energy Services Regulatory Authority
EWRC	комисия за енергийно и водно регулиране (KEBP)/Energy and Water Regulatory Commission
EV	Energjavisto /Energy Authority
HEA	Magyar Energetikai és Közmű-szabályozási Hivatal/ The Hungarian Energy and Public Utility Regulatory Authority
HERA	Hrvatska energetska regulatorna agencija/Croatian Energy Regulatory Agency
ILR	Institut Luxembourgeois de Régulation
Ofgem	Office of Gas and Electricity Markets
PUC	Sabiedrisko pakalpojumu regulēšanas komisija/Public Utilities Commission
RAE	Ρυθμιστική Αρχή Ενέργειας/The Regulatory Authority for Energy
RONI	Úrad pre reguláciu sieťových odvetví/Regulatory Office For Network Industries
UR	Utility Regulator of Northern Ireland
URE	Urząd Regulacji Energetyki/Energy regulatory Office
VERT	National Energy Regulatory Council



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