Network Code
“Demand Connection Code”
(NC-DCC)

A Public Consultation Document for the integration of the Regulation (EU) 1388/2016 in the Hellenic Grid Code

INDEPENDENT POWER TRANSMISSION OPERATOR

June 2019

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List of Abbreviations

Abbreviations on Demand Connection Type:

Abbreviation	Demand Connection Type
CDS	Closed distribution systems
CDSO	Closed distribution systems owner
DCDF	Distribution-connected demand facility
DF	Demand facility
DFO	Demand facility owner
DU	Demand unit
TC distribution facility	Transmission-connected distribution facility
TCDF	Transmission-connected demand facilities
TCDS	Transmission-connected distribution systems
TCDSO	Transmission-connected distribution systems owner

Other abbreviations:

Abbreviations	Declaration
CBA	Cost Benefit Analysis
DCC	Demand Connection Code
DNO	Distribution Network Operator
DRFO	Demand Respond Facility Owner
DRS	Demand Respond Services
DRSC	Demand Respond Services Code (That portion of the DCC Code which is identified as the Demand Response Services Code being applicable to Demand Response Providers)
DRUD	Demand Respond Unit Document
EON	Energization Notification Procedure
GG	Government Gazette
ENTSO-E	European Network for Transmission System Operators for Electricity
FON	Final Notification Procedure
HEDNO	Hellenic Distribution Network Operator (DEDDIE) (Διαχειριστής Ελληνικού Δικτύου Διανομής Ηλεκτρικής Ενέργειας)

Abbreviations	Declaration
IGD	Implementation Guidance Document
IPTO	Independent Transmission System Operator (ADMIE) (Ανεξάρτητος Διαχειριστής Μεταφοράς Ηλεκτρικής Ενέργειας)
NC RfG	Network Code on Requirements for Generators (Regulation (EU) 631/2016)
NTC	Net Transfer Capacity (Καθαρή Ικανότητα Μεταφοράς)
ONP	Operational Notification Procedure
RAE	Regulatory Authority for Energy
RES	Renewable Energy Sources
SOGL	Regulation (EU) 2017/1485 "establishing a guideline on electricity transmission system operation" (System Operation Guiding Lines – SOGL)

COMMISSION REGULATION (EU) 2016/1388
of 17 August 2016
establishing a network code on Demand Connection

THE EUROPEAN COMMISSION,

Having regard to the Treaty on the Functioning of the European Union,

Having regard to Regulation (EC) No 714/2009 of the European Parliament and of the Council of 13 July 2009 on conditions for access to the network for cross-border exchanges in electricity and repealing Regulation (EC) No 1228/2003[1], and in particular Article 6(11) thereof,

Whereas:

(1) The swift completion of a fully functioning and interconnected internal energy market is crucial to maintaining security of energy supply, increasing competitiveness and ensuring that all consumers can purchase energy at affordable prices.

(2) Regulation (EC) No 714/2009 sets out non-discriminatory rules governing access to the network for cross-border exchanges in electricity with a view to ensuring the proper functioning of the internal market in electricity. In addition, Article 5 of Directive 2009/72/EC of the European Parliament and of the Council[2] requires that Member States or, where Member States have so provided, regulatory authorities ensure, inter alia, that objective and non-discriminatory technical rules are developed which establish minimum technical design and operational requirements for the connection to the system. Where requirements constitute terms and conditions for connection to national networks, Article 37(6) of the same Directive requires regulatory authorities to be responsible for fixing or approving at least the methodologies used to calculate or establish them. In order to provide system security within the interconnected transmission system, it is essential to establish a common understanding of the requirements for grid connection applicable to demand facilities and distribution systems, including closed distribution systems. Those requirements that contribute to maintaining, preserving and restoring system security in order to facilitate proper functioning of the internal electricity market within and between synchronous areas, and to achieve cost efficiencies, should be regarded as cross-border network issues and market integration issues.

(3) Harmonised rules for grid connection for demand facilities and distribution systems should be set out in order to provide a clear legal framework for grid connections, facilitate Union-wide trade in electricity, ensure system security, facilitate the integration of renewable electricity sources, increase competition, and allow more efficient use of the network and resources, for the benefit of consumers.

(4) System security cannot be ensured independently from the technical capabilities of all users. Historically, generation facilities have formed the backbone of providing technical capabilities. However, in this regard, demand facilities are expected to play a more pivotal role in the future. Regular coordination at the level of the transmission and distribution networks and adequate performance of the equipment connected to the transmission and distribution networks with sufficient robustness to cope with disturbances and to help to prevent any major disruption or to facilitate restoration of the system after a collapse are fundamental pre- requisites.

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[1] OJ L 211, 14.8.2009, p. 15.

[2] Directive 2009/72/EC of the European Parliament and of the Council of 13 July 2009 concerning common rules for the internal market in electricity and repealing Directive 2003/54/EC (OJ L 211, 14.8.2009, p. 55).

(5) Regulatory authorities should consider the reasonable costs effectively incurred by system operators in the implementation of this Regulation when fixing or approving transmission or distribution tariffs or their methodologies or when approving the terms and conditions for connection and access to national networks in accordance with Article 37(1) and (6) of Directive 2009/72/EC and with Article 14 of Regulation (EC) No 714/2009.

(6) Different synchronous electricity systems in the Union have different characteristics which need to be taken into account when setting the requirements for demand connection. It is therefore appropriate to consider regional specificities when establishing network connection rules as required by Article 8(6) of Regulation (EC) No 714/2009.

(7) In view of the need to provide regulatory certainty, the requirements of this Regulation should apply to new transmission-connected demand facilities, new transmission-connected distribution facilities, new distribution systems and new demand units used by a demand facility or a closed distribution system to provide demand response services to relevant system operators and relevant transmission system operators ('TSOs'). The requirements of this Regulation should not apply to existing transmission-connected demand facilities, existing transmission-connected distribution facilities, existing distribution systems and existing demand units that are or can be used by a demand facility or a closed distribution system to provide demand response services to relevant system operators and relevant TSOs. The requirements of this Regulation also should not apply to new or existing demand facilities connected at the distribution level unless they provide demand response services to relevant system operators and relevant TSOs. However, the requirements of this Regulation should apply in case the relevant regulatory authority or Member State decides otherwise based on evolution of system requirements and a full cost-benefit analysis, or in case a substantial modernisation or replacement of equipment impacting the technical capabilities of an existing transmission-connected demand facility, an existing transmission-connected distribution facility, an existing distribution system, or an existing demand unit within a demand facility or a closed distribution system connected at a voltage level above 1 000 V has been performed.

(8) Demand response is an important instrument for increasing the flexibility of the internal energy market and for enabling optimal use of networks. It should be based on customers' actions or on their agreement for a third party to take action on their behalf. A demand facility owner or a closed distribution system operator ('CDSO') may offer demand response services to the market as well as to system operators for grid security. In the latter case, the demand facility owner or the closed distribution system operator should ensure that new demand units used to provide such services fulfil the requirements set out in this Regulation, either individually or commonly as part of demand aggregation through a third party. In this regard, third parties have a key role in bringing together demand response capacities and can have the responsibility and obligation to ensure the reliability of those services, where those responsibilities are delegated by the demand facility owner and the closed distribution system operator.

(9) The requirements should be based on the principles of non-discrimination and transparency as well as on the principle of optimisation between the highest overall efficiency and lowest total cost for all involved parties. TSOs and distribution system operators ('DSOs') including CDSOs can take those elements into account when defining the requirements in accordance with the provisions of this Regulation, whilst recognising that the thresholds which determine whether a system is a transmission system, or a distribution system are established at the national level.

(10) The requirements applicable to a demand facility connected to a transmission system should set out the capabilities at their interfaces and the necessary automated responses and data exchange. These requirements aim at ensuring the operability of the transmission

system, and the capacity to utilise the generation and demand response embedded in these networks over system operational ranges and critical events.

(11) The requirements applicable to a distribution system connected to a transmission system or another distribution system should set out the operational range of these systems and the necessary automated responses and data exchange. These requirements should ensure the effective development and operability of the transmission system, and the capacity to utilise the generation and demand response embedded in these networks over system operational ranges and critical events.

(12) The requirements applicable to a demand unit used by a demand facility or a closed distribution system to provide demand response services to relevant system operators and relevant TSOs should ensure the capacity to use the demand response over system operational ranges thereby minimising critical events.

(13) The administrative burdens and costs associated with providing demand response should be kept within reasonable limits, in particular as regards domestic consumers, who will play an increasingly important role in the transition to low carbon society and their uptake should not be unnecessarily burdened with administrative tasks.

(14) Due to its cross-border impact, this Regulation should aim at the same frequency- related requirements for all voltage levels, at least within a synchronous area. That is necessary because, within a synchronous area, a change in frequency in one Member State would immediately impact frequency and could damage equipment in all other Member States.

(15) Voltage ranges should be coordinated between interconnected systems because they are crucial to secure planning and operation of a power system within a synchronous area. Disconnections because of voltage disturbances have an impact on neighbouring systems. Failure to specify voltage ranges could lead to widespread uncertainty in planning and operation of the system with respect to operation beyond normal operating conditions.

(16) Appropriate and proportionate compliance testing should be introduced so that system operators can ensure operational security. In accordance with Article 37(1)(b) of Directive 2009/72/EC, regulatory authorities are responsible for ensuring that system operators are compliant with this Regulation.

(17) The regulatory authorities, Member States and system operators should ensure that, in the process of developing and approving the requirements for network connection, they are harmonized to the extent possible, in order to ensure full market integration. Established technical standards should be taken into particular consideration in the development of connection requirements.

(18) System operators should not specify technical requirements for equipment that hinder the free movement of goods in the internal market. Where system operators make technical specifications resulting in requirements for the placing on the market of equipment, the respective Member State should follow the procedure referred to in Articles 8 and 9 of Directive 98/34/EC of the European Parliament and of the Council[3].

[3] Directive 98/34/EC of the European Parliament and of the Council of 22 June 1998 laying down a procedure for the provision of information in the field of technical standards and regulations (OJ L 204, 21.7.1998, p. 37).

(19) A process for derogating from the rules should be set out in this Regulation to take into account local circumstances where exceptionally, for example, compliance with those rules could jeopardise the stability of the local network or where the safe operation of a transmission-connected demand facility, a transmission-connected distribution facility, a distribution system, or a demand unit used by a demand facility or a closed distribution system to provide demand response services to relevant system operators and relevant TSOs, might require operating conditions that are not in line with this Regulation.

(20) Subject to approval by the relevant regulatory authority, or other authority where applicable in a Member State, demand facility owners and relevant system operators should be allowed to propose derogations for certain classes of transmission-connected demand facilities, transmission-connected distribution facilities, distribution systems and demand units used by a demand facility or a closed distribution system to provide demand response services to relevant system operators and relevant TSOs.

(21) According to Article 28 of Directive 2009/72/EC, Member States may provide for the classification of a system which distributes electricity as a closed distribution system in certain circumstances. The provisions of this Regulation should apply to closed distribution systems only where Member States have so provided according to Article 28 of Directive 2009/72/EC.

(22) This Regulation has been adopted on the basis of Regulation (EC) No 714/2009 which it supplements and of which it forms an integral part. References to Regulation (EC) No 714/2009 in other legal acts should be understood as also referring to this Regulation.

(23) The measures provided for in this Regulation are in accordance with the opinion of the Committee referred to in Article 23(1) of Regulation (EC) No 714/2009,

TITLE I GENERAL PROVISIONS

Article 1.
Subject matter

1. This Regulation establishes a network code which lays down the requirements for grid connection of:

(a) transmission-connected demand facilities;

(b) transmission-connected distribution facilities;

(c) distribution systems, including closed distribution systems;

(d) demand units used by a demand facility or a closed distribution system to provide demand response services to relevant system operators and relevant TSOs.

2. This Regulation, therefore, helps to ensure fair conditions of competition in the internal electricity market, to ensure system security and the integration of renewable electricity sources, and to facilitate Union-wide trade in electricity.

3. This Regulation also lays down the obligations for ensuring that system operators make appropriate use of the demand facilities' and distribution systems' capabilities in a transparent and non-discriminatory manner to provide a level playing field throughout the Union.

Article 2.
Definitions

For the purposes of this Regulation, the definitions in Article 2 of Directive 2012/27/EU of the European Parliament and of the Council[4], Article 2 of Regulation (EC) No 714/2009, Article 2 of Commission Regulation (EU) 2015/1222[5], Article 2 of Commission Regulation (EU) 2016/631[6], Article 2 of Commission Regulation (EU) No 543/2013[7] and Article 2 of Directive 2009/72/EC shall apply.

In addition, the following definitions shall apply:

(1) **'demand facility'** means a facility which consumes electrical energy and is connected at one or more connection points to the transmission system. A distribution system and/or auxiliary supplies of a power generating module do no constitute a demand facility;

(2) **'transmission-connected demand facility'** means a demand facility which has a connection point to a transmission system;

(3) **'transmission-connected distribution facility'** means a distribution system connection or the electrical plant and equipment used at the connection to the transmission system;

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[4] Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC (OJ L 315, 14.11.2012, p. 1).

[5] Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management (OJ L 197, 25.7.2015, p. 24).

[6] Commission Regulation (EU) 2016/631 of 14 April 2016 establishing a network code on requirements for grid connection of generators (OJ L 112, 27.4.2016, p. 1).

[7] Commission Regulation (EU) No 543/2013 of 14 June 2013 on submission and publication of data in electricity markets and amending Annex I to Regulation (EC) No 714/2009 of the European Parliament and of the Council (OJ L 163, 15.6.2013, p. 1).

(4) **'demand unit'** means an indivisible set of installations containing equipment, which can be actively controlled by a demand facility owner or by a CDSO, either individually or commonly as part of demand aggregation through a third party;

(5) **'closed distribution system'** means a distribution system classified pursuant to Article 28 of Directive 2009/72/EC as a closed distribution system, by national regulatory authorities or by other competent authorities, where so provided by the Member State, which distributes electricity within a geographically confined industrial, commercial or shared services site and does not supply household customers, without prejudice to incidental use by a small number of households located within the area served by the system and with employment or similar associations with the owner of the system;

(6) **'main demand equipment'** means at least one of the following equipment: motors, transformers, high voltage equipment at the connection point and at the process production plant;

(7) **'transmission-connected distribution system'** means a distribution system connected to a transmission system, including transmission-connected distribution facilities;

(8) **'maximum import capability'** means the maximum continuous active power that a transmission-connected demand facility or a transmission-connected distribution facility can consume from the network at the connection point, as specified in the connection agreement or as agreed between the relevant system operator and the transmission-connected demand facility owner or transmission-connected distribution system operator respectively;

(9) **'maximum export capability'** means the maximum continuous active power that a transmission-connected demand facility or a transmission-connected distribution facility, can feed into the network at the connection point, as specified in the connection agreement or as agreed between the relevant system operator and the transmission- connected demand facility owner or transmission-connected distribution system operator respectively;

(10) **'low frequency demand disconnection'** means an action where demand is disconnected during a low frequency event in order to recover the balance between demand and generation and restore system frequency to acceptable limits;

(11) **'low voltage demand disconnection'** means a restoration action where demand is disconnected during a low voltage event in order to recover voltage to acceptable limits;

(12) **'on load tap changer'** means a device for changing the tap of a winding, suitable for operation while the transformer is energised or on load;

(13) **'on load tap changer blocking'** means an action that blocks the on-load tap changer during a low voltage event in order to stop transformers from further tapping and suppressing voltages in an area;

(14) **'control room'** means a relevant system operator's operation centre;

(15) **'block loading'** means the maximum step active power loading of reconnected demand during system restoration after black-out;

(16) **'demand response active power control'** means demand within a demand facility or closed distribution system that is available for modulation by the relevant system operator or relevant TSO, which results in an active power modification;

(17) **'demand response reactive power control'** means reactive power or reactive power compensation devices in a demand facility or closed distribution system that are available for modulation by the relevant system operator or relevant TSO;

(18) **'demand response transmission constraint management'** means demand within a demand facility or closed distribution system that is available for modulation by the relevant system operator or relevant TSO to manage transmission constraints within the system;

(19) **'demand aggregation'** means a set of demand facilities or closed distribution systems which can operate as a single facility or closed distribution system for the purposes of offering one or more demand response services;

(20) **'demand response system frequency control'** means demand within a demand facility or closed distribution system that is available for reduction or increase in response to frequency fluctuations, made by an autonomous response from the demand facility or closed distribution system to diminish these fluctuations;

(21) **'demand response very fast active power control'** means demand within a demand facility or closed distribution system that can be modulated very fast in response to a frequency deviation, which results in a very fast active power modification;

(22) **'demand response unit document'** (DRUD) means a document, issued either by the demand facility owner or the CDSO to the relevant system operator for demand units with demand response and connected at a voltage level above 1 000 V, which confirms the compliance of the demand unit with the technical requirements set out in this Regulation and provides the necessary data and statements, including a statement of compliance.

(23) **'demand response service'** includes one of the following services:
- demand response active power control
- demand response reactive power control
- demand response transmission constrain management
- demand response system frequency control
- demand response very fast active power control

(24) **'demand control'** means any of the following methods in achieving demand reduction:
- customer voltage reduction initiated by IPTO/HEDNO
- customer demand reduction by disconnection initiated by The Company
- demand reduction instructed by IPTO/HEDNO
- automatic low frequency demand disconnection
- emergency manual demand disconnection

(25) **'demand response provider'** means a party who owns, operates controls or manages Main Plant and Apparatus which was first connected to the System on or after 18 August 2019 and who had placed Purchase Contracts for its Main Plant and Apparatus on or after 7 September 2018 or is the subject of a Substantial Modification on or after 18 August 2019 and has an agreement with IPTO/HEDNO to provide a Demand Response Service(s). The party may be one or more Customers, contracting bilaterally with IPTO/HEDNO for the provision of services, or may be a third-party providing Demand Aggregation from many individual Customers.

(26) **'demand facility owner (DFO)'** means a person who owns or operates one or more Demand Units within a Demand Facility.

Article 3.
Scope of application

1. The connection requirements set out in this Regulation shall apply to:

(a) new transmission-connected demand facilities;

(b) new transmission-connected distribution facilities;

(c) new distribution systems, including new closed distribution systems;

(d) new demand units used by a demand facility or a closed distribution system to provide demand response services to relevant system operators and relevant TSOs.

The relevant system operator shall refuse to allow the connection of a new transmission-connected demand facility, a new transmission-connected distribution facility, or a new distribution system, which does not comply with the requirements set out in this Regulation and which is not covered by a derogation granted by the regulatory authority, or other authority where applicable in a Member State pursuant to Article 50. The relevant system operator shall communicate such refusal, by means of a reasoned statement in writing, to the demand facility owner, DSO, or CDSO and, unless specified otherwise by the regulatory authority, to the regulatory authority.

Based on compliance monitoring in accordance with Title III, the relevant TSO shall refuse demand response services subject to Articles 27 to 30 from new demand units not fulfilling the requirements set out in this Regulation.

2. This Regulation shall not apply to:

(a) demand facilities and distribution systems connected to the transmission system and distribution systems, or to parts of the transmission system or distribution systems, of islands of Member States of which the systems are not operated synchronously with either the Continental Europe, Great Britain, Nordic, Ireland and Northern Ireland or Baltic synchronous area;

(b) storage devices except for pump-storage power generating modules in accordance with Article 5(2).

3. In case of demand facilities or closed distribution systems with more than one demand unit, these demand units shall together be considered as one demand unit if they cannot be operated independently from each other or can reasonably be considered in a combined manner.

Article 4.
Application to existing transmission-connected demand facilities, existing transmission-connected distribution facilities, existing distribution systems and existing demand units used to provide demand response services

1. Existing transmission-connected demand facilities, existing transmission-connected distribution facilities, existing distribution systems and existing demand units that are or can be used by a demand facility or a closed distribution system to provide demand response services to a relevant system operator or relevant TSO, are not subject to the requirements of this Regulation, except where:

(a) an existing transmission-connected demand facility, an existing transmission-connected distribution facility, an existing distribution system, or an existing demand unit within a demand facility at a voltage level above 1 000 V or a closed distribution system connected at a voltage level above 1 000 V, has been modified to such an extent that its connection agreement must be substantially revised in accordance with the following procedure:

(i) demand facility owners, DSOs, or CDSOs who intend to undertake the modernisation of a plant or replacement of equipment impacting the technical capabilities of the transmission-connected demand facility, the transmission-connected distribution facility, the distribution system, or the demand unit shall notify their plans to the relevant system operator in advance;

(ii) if the relevant system operator considers that the extent of the modernisation or replacement of equipment is such that a new connection agreement is required, the system operator shall notify the relevant regulatory authority or, where applicable, the Member State; and

(iii) the relevant regulatory authority or, where applicable, the Member State shall decide if the existing connection agreement needs to be revised or a new connection agreement is required, and which requirements of this Regulation shall apply; or

(b) a regulatory authority or, where applicable, a Member State decides to make an existing transmission-connected demand facility, an existing transmission-connected distribution facility, an existing distribution system, or an existing demand unit subject to all or some of the requirements of this Regulation, following a proposal from the relevant TSO in accordance with paragraphs 3, 4 and 5.

2. For the purposes of this Regulation, a transmission-connected demand facility, a transmission-connected distribution facility, a distribution system, or a demand unit that is, or can be, used by a demand facility or a closed distribution system to provide demand response services to a relevant system operator or relevant TSO, shall be considered as existing if:

(a) it is already connected to the network on the date of entry into force of this Regulation; or

(b) the demand facility owner, DSO, or CDSO has concluded a final and binding contract for the purchase of the main demand equipment or the demand unit by two years after the entry into force of the Regulation. The demand facility owner, DSO, or CDSO must notify the relevant system operator and relevant TSO of the conclusion of the contract within 30 months after the entry into force of the Regulation.

The notification submitted by the demand facility owner, DSO, or CDSO to the relevant system operator and the relevant TSO shall at least indicate the contract title, its date of signature and date of entry into force, and the specifications of the main demand equipment or the demand unit to be constructed, assembled or purchased.

A Member State may provide that in specified circumstances the regulatory authority may determine whether the transmission-connected demand facility, the transmission-connected distribution facility, the distribution system, or the demand unit is to be considered existing or new.

3. Following a public consultation in accordance with Article 9 and in order to address significant factual changes in circumstances, such as the evolution of system requirements including penetration of renewable energy sources, smart grids, distributed generation or demand response, the relevant TSO may propose to the regulatory authority concerned, or where applicable, to the Member State to extend the application of this Regulation to existing transmission-connected demand facilities, existing transmission-connected distribution facilities, existing distribution systems, or existing demand units used by a demand facility or a closed distribution system to provide demand response services to a relevant system operator or relevant TSO.

For that purpose, a sound and transparent quantitative cost-benefit analysis shall be carried out, in accordance with Articles 48 and 49. The analysis shall indicate:

(a) the costs, in regard to existing transmission-connected demand facilities, existing transmission-connected distribution facilities, existing distribution systems and existing demand units, of requiring compliance with this Regulation;

(b) the socioeconomic benefit resulting from applying the requirements set out in this Regulation; and

(c) the potential of alternative measures to achieve the required performance.

4. Before carrying out the quantitative cost-benefit analysis referred to in paragraph 3, the relevant TSO shall:

(a) carry out a preliminary qualitative comparison of costs and benefits;

(b) obtain approval from the relevant regulatory authority or, where applicable, the Member State.

5. The relevant regulatory authority or, where applicable, the Member State shall decide on the extension of the applicability of this Regulation to existing transmission-connected demand facilities, existing transmission-connected distribution facilities, existing distribution systems, or existing demand units, within six months of receipt of the report and the recommendation of the relevant TSO in accordance with paragraph 4 of Article 48. The decision of the regulatory authority or, where applicable, the Member State shall be published.

6. The relevant TSO shall take account of the legitimate expectations of demand facility owners, DSOs and CDSOs as part of the assessment of the application of this Regulation to existing transmission-connected demand facilities, existing transmission-connected distribution facilities, existing distribution systems, or existing demand units.

7. The relevant TSO may assess the application of some or all of the provisions of this Regulation to existing transmission-connected demand facilities, existing transmission-connected distribution facilities, existing distribution systems, or existing demand units, every three years in accordance with the requirements and process set out in paragraphs 3 to 5.

Article 5.
Application to pump-storage power generating modules and industrial sites

1. This Regulation shall not apply to pump-storage power generating modules that have both generating and pumping operation mode.

2. Any pumping module within a pump-storage station that only provides pumping mode shall be subject to the requirements of this Regulation and shall be treated as a demand facility.

3. In the case of industrial sites with an embedded power generating module, the system operator of an industrial site, the demand facility owner, the power generating facility owner and the relevant system operator to whose system the industrial site is connected, may agree, in coordination with the relevant IPTO, on conditions for disconnection of critical loads from the relevant system. The objective of the agreement shall be to secure production processes of the industrial site in case of disturbed conditions in the relevant system.

Article 6.
Regulatory aspects

1. Requirements of general application to be established by relevant system operators (IPTO or HEDNO) under this Regulation shall be subject to approval by the entity designated by the

Member State (Greece) and be published. The designated entity shall be the regulatory authority (RAE) unless otherwise provided by the Member State.

2. For site specific requirements to be established by relevant system operators under this Regulation, approval may be required by the designated entity.

3. When applying this Regulation, Member States, competent entities and system operators shall:

(a) apply the principles of proportionality and non-discrimination;

(b) ensure transparency;

(c) apply the principle of optimisation between the highest overall efficiency and lowest total costs for all parties involved;

(d) respect the responsibility assigned to the relevant TSO in order to ensure system security, including as required by national legislation;

(e) consult with relevant DSOs and take account of potential impacts on their system;

(f) take into consideration agreed European standards and technical specifications.

4. The relevant system operator or TSO shall submit a proposal for requirements of general application, or the methodology used to calculate or establish them, for approval by the competent entity within two years of entry into force of this Regulation.

5. Where this Regulation requires the relevant system operator, relevant TSO, demand facility owner, power generating facility owner, DSO and/or CDSO to seek agreement, they shall endeavour to do so within six months after a first proposal has been submitted by one party to the other parties. If no agreement has been found within this time frame, each party may request the relevant regulatory authority to issue a decision within six months.

6. Competent entities shall take decisions on proposals for requirements or methodologies within six months following the receipt of such proposals.

7. If the relevant system operator or TSO deems an amendment to requirements or methodologies as provided for and approved under paragraph 1 and 2 to be necessary, the requirements provided for in paragraphs 3 to 8 shall apply to the proposed amendment. System operators and TSOs proposing an amendment shall take into account the legitimate expectations, if any, of demand facility owners, DSOs, CDSOs, equipment manufacturers and other stakeholders based on the initially specified or agreed requirements or methodologies.

8. Any party having a complaint against a relevant system operator or a TSO in relation to that relevant system operator's or TSO's obligations under this Regulation may refer the complaint to the regulatory authority which, acting as dispute settlement authority, shall issue a decision within two months after receipt of the complaint. That period may be extended by two months where additional information is sought by the regulatory authority. That extended period may be further extended with the agreement of the complainant. The regulatory authority's decision shall have binding effect unless and until overruled on appeal.

9. Where the requirements under this Regulation are to be established by a relevant system operator that is not a TSO, Member States may provide that instead the TSO be responsible for establishing the relevant requirements.

Article 7.
Multiple TSOs

1. Where more than one TSO exists in a Member State, this Regulation shall apply to all those TSOs.

2. Member States may, under the national regulatory regime, provide that the responsibility of a TSO to comply with one or some or all obligations under this Regulation is assigned to one or more specific TSOs.

Article 8.
Recovery of costs

1. The costs borne by system operators subject to network tariff regulation and stemming from the obligations laid down in this Regulation shall be assessed by the relevant regulatory authorities. Costs assessed as reasonable, efficient and proportionate shall be recovered through network tariffs or other appropriate mechanisms.

2. If requested by the relevant regulatory authorities, system operators referred to in paragraph 1 shall, within three months of the request, provide the information necessary to facilitate assessment of the costs incurred.

Article 9.
Public consultation

1. Relevant system operators and relevant TSOs shall carry out a consultation with stakeholders, including the competent authorities of each Member State on:

(a) proposals to extend the applicability of this Regulation to existing transmission-connected demand facilities, existing transmission-connected distribution facilities, existing distribution systems and existing demand units in accordance with Article 4(3);

(b) the report prepared in accordance with Article 48(3);

(c) the cost-benefit analysis undertaken in accordance with Article 53(2);

(d) the requirements for demand units specified in accordance with Article 28(2)(c), (e), (f), (k) and (l) and Article 29(2)(c) to (e).

The consultation shall last at least for a period of one month.

2. The relevant system operators or relevant TSOs shall duly take into account the views of the stakeholders resulting from the consultations, prior to the submission of the draft proposal, the report, the cost-benefit analysis, or the requirements for demand units, for approval by the regulatory authority, competent entity or, if applicable, the Member State. In all cases, a sound justification for including or not the view of the stakeholders shall be provided and published in a timely manner before, or simultaneously with, the publication of the proposal, the report, the cost-benefit analysis, or the requirements for demand units specified in accordance with Article 28 and Article 29.

Article 10.
Stakeholder involvement

The Agency for the Cooperation of Energy Regulators (the Agency), in close cooperation with the European Network of Transmission System Operators for Electricity (ENTSO for Electricity),, shall organise stakeholder involvement, regarding the requirements for the grid connection of transmission-

connected demand facilities, transmission-connected distribution facilities, distribution systems and demand units used by a demand facility or a closed distribution system to provide demand response services to relevant system operators, and other aspects of the implementation of this Regulation. This shall include regular meetings with stakeholders to identify problems and propose improvements notably related to the requirements for grid connection of transmission-connected demand facilities, transmission-connected distribution facilities, distribution systems and demand units used by a demand facility or a closed distribution system to provide demand response services to relevant system operators.

Article 11.
Confidentiality obligations

1. Any confidential information received, exchanged or transmitted pursuant to this Regulation shall be subject to the conditions of professional secrecy laid down in paragraphs 2, 3 and 4.

2. The obligation of professional secrecy shall apply to any persons, regulatory authorities, or entities subject to the provisions of this Regulation.

3. Confidential information received by the persons, regulatory authorities, or entities referred to in paragraph 2 in the course of their duties may not be divulged to any other person or authority, without prejudice to cases covered by national law, the other provisions of this Regulation or other relevant Union law.

4. Without prejudice to cases covered by national or Union law, regulatory authorities, entities, or persons who receive confidential information pursuant to this Regulation may use it only for the purpose of carrying out their duties under this Regulation.

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

CHAPTER 1 - General requirements

Article 12.
General frequency requirements

1. Transmission-connected demand facilities, transmission-connected distribution facilities and distribution systems shall be capable of remaining connected to the network for the frequency ranges and their relevant minimum operating time periods summarized in Table 1.

Table 1: Frequency ranges and minimum operating times

System Frequency Range	Minimum operating time
47.5Hz – 48.5Hz	30min
48.5Hz – 49.0Hz	30min
49.0Hz – 51.0Hz	Unlimited
51.0Hz – 51.5Hz	30min

Comment/Justification:

There is no specific provision regarding frequency ranges and respective minimum time periods for demand types connection in the existing version of the Greek transmission grid code. Instead, system operational frequency ranges are defined with additional reference to required operational frequency ranges of generation units (Art. 213 & 241), as follows.

- 47.5 - 49.5 Hz -> 60min
- 49.5 - 50.5 Hz -> Unlimited
- 50.5 - 52.5 Hz -> 60min

The proposed values in Table 1 are in line with the respective frequency ranges and their relative minimum operating time periods as stated in IPTO's proposal for the implementation of the Regulation (EU) 631/2016 (NC-RfG). The selection of identical values is justified by the fact that a TCDF or a CDSO, such as an industrial site, may also include onsite generation. Similarly, in the case of a TCDS, distributed generation (e.g. RES) is probably included and as a result identical values shall be adopted.

2. The transmission-connected demand facility owner or the DSO may agree with IPTO on wider frequency ranges or longer minimum times for operation. If wider frequency ranges or longer minimum times for operation are technically feasible, the consent of the transmission-connected demand facility owner or DSO shall not be unreasonably withheld.

Article 13.
General voltage requirements

1. Transmission-connected demand facilities, transmission-connected distribution facilities and transmission- connected distribution systems shall be capable of remaining connected to the network and operating within the ranges of the network voltage at the connection point, expressed by the voltage at the connection point related to the reference 1 p.u. voltage, and for the time periods specified in Table 2 (nominal voltage at connection point 150 kV) and Table 3 (nominal voltage at connection point 400 kV).

2. Equipment of distribution systems shall be capable of remaining connected to the network and operating within the ranges of the network voltage at the connection point, expressed by the voltage at the connection point related to the reference 1 p.u. voltage, and for the time periods

specified in Table 2 (nominal voltage at connection point 150 kV) and Table 3 (nominal voltage at connection point 400 kV).

Table 2: Minimum time periods during which a TCDF, a TCDS, a TC distribution facility and equipment of distribution systems must be capable of remaining connected to the network for deviation from the reference 1 p.u. value at the connection point, where the voltage base for p.u. values is 150 kV

Voltage range	Time period for operation
0,90 p.u. – 1,118 p.u.	Unlimited
1,118 p.u. – 1,15 p.u.	60 minutes

Table 3: Minimum time periods during which a TCDF, a TCDS, a TC distribution facility and equipment of distribution systems must be capable of remaining connected to the network for deviation from the reference 1 p.u. value at the connection point, where the voltage base for p.u. values is 400 kV

Voltage range	Time period for operation
0,90 p.u. – 1,05 p.u.	Unlimited
1,05 p.u. – 1,10 p.u.	60 minutes

Comment/Justification:

There is no specific provision regarding voltage ranges and respective minimum time periods for demand types connection in the existing version of the Greek transmission grid code. Operational voltage ranges are stated (Art. 213) for voltage levels of 150 kV and 400 kV but without defined minimum time limits. Current operational limits are as follows:

- 400kV -> 0.875 - 1.05 pu
- 150kV -> 0.9 - 1.133 pu

The proposed values in Table 2 and Table 3 are in line with the respective voltage ranges and their relative minimum operating time periods as stated in IPTO's proposal for the implementation of the Regulation (EU) 631/2016 (NC-RfG).

3. The voltage range at the connection point shall be expressed by the voltage at the connection point related to reference 1 per unit (pu) voltage. For the 400 kV grid voltage level (or alternatively commonly referred to as 380 kV level), the reference 1 pu value is 400 kV, for other grid voltage levels the reference 1 pu voltage may differ for each system operator in the same synchronous area.

4. Article 13 (4) of NC-DCC is not applicable to Greece

5. Article 13 (5) of NC-DCC is not applicable to Greece

6. If required by IPTO, a transmission-connected demand facility, a transmission-connected distribution facility, or a transmission-connected distribution system shall be capable of automatic disconnection at specified voltages. The terms and settings for automatic disconnection shall be agreed between IPTO and the transmission-connected demand facility owner or the DSO.

Comment/Justification:

This is a non-mandatory requirement. It is noted that in the existing version of the Greek transmission grid code (Art. 84 & 90) IPTO has the right to apply automatic voltage disconnection schemes as a remedial action in case of system emergency. The terms and settings for automatic disconnection shall be agreed upon between the TSO and the transmission-connected demand facility owner or the transmission-connected (C)DSO. Low Voltage Demand Disconnection (LVDD) are not applied yet in the Greek Transmission System.

It is also noted that the provision of Article 13.6 is also related to the requirements of Article 19.2 of Regulation (EU) 1388/2016 (NC-DCC).

7. Article 13 (4) of Regulation (EU) 1388/2016 (NC-DCC) is not applicable to Greece

Article 14.
Short-circuit requirements

1. Based on the rated short-circuit withstand capability of its transmission network elements, IPTO shall specify the maximum short-circuit current at the connection point that the transmission-connected demand facility or the transmission-connected distribution system shall be capable of withstanding. The maximum short-circuit currents for nominal voltage at the connection point 150 kV and 400 kV respectively are specified in Table 4.

Table 4: Maximum short circuits currents at the connection point that the TCDF or the TCDS shall be capable of withstanding for voltage levels of 150 kV and 400 kV

Nominal Voltage	Maximum Short Circuit Current
150 kV	31 kA
400 kV	40 kA

Comment/Justification:

The proposed values are in line with the maximum allowed short-circuit currents that the Greek transmission system elements are designed to withstand according to the existing version of the Greek transmission grid code (Art. 213.9). Moreover, in the existing Transmission Grid Code (Art. 213.10) it is stated that system planning should meet the requirement for sub-transient short circuit level less than 90% of the values presented in Table 4 for 3-phase and 1-phase faults, namely 28 kA and 36 kA for 150 kV and 400 kV respectively.

2. IPTO shall deliver to the transmission-connected demand facility owner or the transmission-connected distribution system operator an estimate of the minimum and maximum short-circuit currents to be expected at the connection point as an equivalent of the network.

Comment/Justification:

The maximum short circuit current is calculated by IPTO during the design phase of a new user connection at the transmission system according to the document "Διαδικασία Σύνδεσης Χρηστών στο Ελληνικό Σύστημα Μεταφοράς Ηλεκτρικής Ενέργειας", which is a supplementary guideline to the Greek transmission grid code. An estimate of expected minimum short circuit current can be also calculated and delivered to the TCDF owner or the TCDS operator.

In any case, an update of the calculated values shall be delivered to the TCDF owner or the TCDS operator when major changes in the transmission system are implemented, taking into account the thresholds described in paragraphs 14.4 and 14.6 of Regulation (EU) 1388/2016 (NC-DCC).

3. After an unplanned event, IPTO shall inform the affected transmission-connected demand facility owner or the affected transmission-connected distribution system operator as soon as possible and no later than one week after the unplanned event, of the changes above a threshold for the maximum short-circuit current that the affected transmission-connected demand facility or the

affected transmission-connected distribution system shall be able to withstand from the IPTO's network in accordance with paragraph 1.

4. The threshold set in paragraph 3 shall either be specified by the transmission-connected demand facility owner for its facility, or by the transmission-connected distribution system operator for its network.

Comment/Justification:

The threshold set shall either be specified by the TCDF owner for its facility or by the TCDS operator for its network on a site-specific basis, taking into account the rated short-circuit withstand capability of the affected equipment and other relative parameters (e.g. protection schemes and settings).

5. Before a planned event, the IPTO shall inform the affected transmission-connected demand facility owner or the affected transmission-connected distribution system operator, as soon as possible and no later than one week before the planned event, of the changes above a threshold for the maximum short-circuit current that the affected transmission-connected demand facility or the affected transmission-connected distribution system shall be able to withstand from the IPTO's network, in accordance with paragraph 1.

6. The threshold set in paragraph 5 shall either be specified by the transmission-connected demand facility owner for its facility, or by the transmission-connected distribution system operator for its network.

Comment/Justification:

The threshold set shall either be specified by the TCDF owner for its facility or by the TCDS operator for its network on a site-specific basis, taking into account the rated short-circuit withstand capability of the affected equipment and other relative parameters (e.g. protection schemes and settings).

7. IPTO shall request information from a transmission-connected demand facility owner or a transmission-connected distribution system operator concerning the contribution in terms of short-circuit current from that facility or network. As a minimum, the equivalent modules of the network shall be delivered and demonstrated for zero, positive and negative sequences.

Comment/Justification:

Contribution of TCDF or TCDS to SC is requested (for 3-phase faults at the connection point), as well as equivalent parameters of electrical equipment, but only for positive and zero sequence, in the existing version of the Greek transmission grid code (Art. 263.2).

8. After an unplanned event, the transmission-connected demand facility owner or the transmission-connected distribution system operator shall inform IPTO, as soon as possible and no later than one week after the unplanned event, of the changes in short-circuit contribution above the threshold set by IPTO, as stated in Table 5.

9. Before a planned event, the transmission-connected demand facility owner or the transmission-connected distribution system operator shall inform the IPTO, as soon as possible and no later than one week before the planned event, of the changes in short-circuit contribution above the threshold set by IPTO, as stated in Table 5. IPTO may define different thresholds on a case-by-case basis depending on specific requirements for connection points or regions of the transmission network.

Table 5: Threshold of the maximum short circuit current inducing an information from the TCDF or TCDS in case of a change above this threshold. for voltage levels of 150 kV and 400 kV

Nominal Voltage	Threshold of the maximum short circuit current inducing an information from the TCDF or TCDS in case of a change above this threshold.
150 kV	1.4 kA
400 kV	1.8 kA

Comment/Justification:

The transmission system is planned with a security margin of 10% of equipment ratings, namely 28 kA and 36 kA for 150 kV and 400 kV respectively. A change of 1.4 kA and 1.8 kA for each voltage level regarding short circuit current contribution results in a relative increase of short circuit current of maximum 5% of the equipment rating, in which case a security margin of at least 5% could be maintained.

As part of the considerations in selection of the safety margin a reasonable time to instigate the necessary mitigations is included. Therefore, a permissible change of short circuit current up to a maximum of 5%, is still considered sufficient for mitigations measures to be applied, taking into account the 10% total margin.

Alternatively, IPTO could set thresholds on a case-by-case basis depending on specific requirements for connection points or regions of the transmission network.

Article 15.
Reactive power requirements

1. Transmission-connected demand facilities and transmission-connected distribution systems shall be capable of maintaining their steady-state operation at their connection point within a reactive power range specified by IPTO, according to the following conditions:

(a) for transmission-connected demand facilities, the actual reactive power range specified by IPTO for importing and exporting reactive power shall not be wider than 48 percent of the larger of the maximum import capacity or maximum export capacity (0,9 power factor import or export of active power), except in situations where either technical or financial system benefits are demonstrated, for transmission-connected demand facilities, by the transmission-connected demand facility owner and accepted by IPTO;

(b) for transmission-connected distribution systems, the actual reactive power range specified by IPTO for importing and exporting reactive power shall not be wider than:

(i) 48 percent (i.e. 0,9 power factor) of the larger of the maximum import capability or maximum export capability during reactive power import (consumption); and

(ii) 48 percent (i.e. 0,9 power factor) of the larger of the maximum import capability or maximum export capability during reactive power export (production);

except in situations where either technical or financial system benefits are proved by the relevant TSO and the transmission-connected distribution system operator through joint analysis;

Comment/Justification:

The specification of a maximum allowable reactive power range at the connection point of a demand facility (DF) or a distribution system (DS) connected to the transmission system is a mandatory requirement. According Article 15.1 of the Regulation (EU) 1388/2016 (NC-DCC), this range should not be wider than ±48% of the largest of the maximum import/export capability of a transmission connected distribution system or a demand facility. This (maximum) range is an exhaustive requirement. On the other hand, IPTO has the right to specify narrower ranges that the ones proposed in Article 15.1 where either technical or financial system benefits are proved.

It is underlined that according Article 2 – Definitions of the Regulation (EU) 1388/2016 (NC-DCC), the maximum import / export capability of a transmission connected distribution system or a demand facility is defined as:

(8) 'maximum import capability' means the maximum continuous active power that a transmission-connected demand facility or a transmission-connected distribution facility can consume from the network at the connection point, as specified in the connection agreement or as agreed between the relevant system operator and the transmission- connected demand facility owner or transmission-connected distribution system operator respectively;

(9) 'maximum export capability' means the maximum continuous active power that a transmission-connected demand facility or a transmission-connected distribution facility, can feed into the network at the connection point, as specified in the connection agreement or as agreed between the relevant system operator and the transmission- connected demand facility owner or transmission-connected distribution system operator respectively;

This definition does not consider possible RES penetration in a DS as well as possible installation of RES generation in a DF. Moreover, the relation of the ±48% reactive power range with a maximum / minimum active power interchange allows the circulation of huge amounts pf reactive power when the DF or the DS interchange with the transmission system active power lower than the maximum.

In the existing version of the Greek transmission grid code (Article 243.19), narrower power factor ranges are specified as average hourly values according to the total loading of the interconnected Greek power system and as percentage of the annual Peak load. Specifically:

- Average cosφ if System Load ≥ 0.7*Peak -> 0.96 reactive to 0.98 capacitive
- Average cosφ if System Load ≤ 0.7*Peak -> 0.91 reactive to 0.97 capacitive

Also, according to Article 96.4, a narrower range for desired cosφ may be requested for TCDFs as an ancillary service. It should be noted that a major difference between an ancillary service and a general technical requirement is that the latter one is compulsory, while the in the first case compliance is based on financial incentives.

IPTO will consider the implementation of Article 15.1 requirement along with existing transmission Grid code requirements (Article 243.19) on a case by case base.

(c) IPTO and the transmission-connected distribution system operator (HEDNO) shall agree on the scope of the analysis, which shall address the possible solutions, and determine the optimal solution for reactive power exchange between their systems, taking adequately into consideration the specific system characteristics, variable structure of power exchange, bidirectional flows and the reactive power capabilities in the distribution system;

(d) IPTO may establish the use of metrics other than power factor in order to set out equivalent reactive power capability ranges;

Comment/Justification:

Power factor (cosφ) is currently used as metric to set out equivalent reactive power capability ranges for TCDFs and TCDS, while reactive power requirements clearly refer to the transmission system connection point. IPTO will consider the adoption of different metrics complementary to power factor, such as Q/P ratios, could be useful, since they are widely used in European grid codes and CNCs.

(e) the reactive power range requirement values shall be met at the connection point;

(f) by way of derogation from point (e), where a connection point is shared between a power generating module and a demand facility, equivalent requirements shall be met at the point defined in relevant agreements or national law.

2. IPTO may require that transmission-connected distribution systems have the capability at the connection point to not export reactive power (at reference 1 pu voltage) at an active power flow of less than 25 % of the maximum import capability. Where applicable, Member States may require the relevant TSO to justify its request through a joint analysis with the transmission-connected distribution system operator. If this requirement is not justified based on the joint analysis, the relevant TSO and the transmission-connected distribution system operator shall agree on necessary requirements according to the outcomes of a joint analysis.

Comment/Justification:

In case of low demand, TCDS with a high share of cables act capacitive (leading power factor) and could spill/export reactive power on to the transmission system. Currently, this is encountered in many European grids in cases where low demand coincides with high RES power generation at the distribution level, which means there is relatively low capacity of large thermal or hydro power plants in order to regulate voltage at the transmission network and avoid undesired steady-state overvoltages.

This is a non-mandatory requirement regarding the reference value of 25 % of the maximum import capability. Nevertheless, a joint analysis with HEDNO shall be conducted aiming at a final agreement with IPTO on necessary equivalent requirements.

ENTSO-E procced to revised wording of the above paragraph, following feedback from stakeholders on their interpretation of the requirements in the code, since it is clear that the existing text can be misconceived. The confusion is centred on, is it required to install capability that is sufficient to be compliant with the requirement at a **single operational point** at or below 25% of the maximum import capability, or for **every operational point** at or below 25%.

To resolve this issue, ENTSO-E responded with a revised wording of Article 15.2 that could deliver certainty with regard to the originally intended purpose of the requirement as discussed and agreed with stakeholders in the consultation and development of the NC-DCC.

Revised wording for Article 15.2[8]

"The relevant TSO may require that transmission-connected distribution systems have the capability at the connection point to not export reactive power (at reference 1 pu voltage) over the normal range of output of generating resources within the distribution system in combination with either,

- an active power flow into the distribution system of 25 % of the maximum import capability or,
- a defined active power flow from transmission to the distribution system from zero up to 25% of the maximum import capability, if the latter leads to are more cost-efficient solution.

[8] "Joint DSO response to ENTSO-E answer on article 15paragraph 2of NC DCC", August 2017
"ENTSO-E response to CEDEC on Interpretation of article 15 in NC DCC", May 2017.
Both are available on the internet.

Where applicable, Member States may require the relevant TSO to justify its request through a joint analysis with the transmission-connected distribution system operator. If this requirement is not justified based on the joint analysis, the relevant TSO and the transmission-connected distribution system operator shall agree on necessary requirements according to the outcomes of a joint analysis"

IPTO may consider the implementation of Article 15.2 requirement along with existing transmission Grid code requirements (Article 243.19) on a case by case base.

3. Without prejudice to point (b) of paragraph 1, IPTO may require the transmission-connected distribution system to actively control the exchange of reactive power at the connection point for the benefit of the entire system. IPTO and the transmission-connected distribution system operator (HEDNO) shall agree on a method to carry out this control, to ensure the justified level of security of supply for both parties. The justification shall include a roadmap in which the steps and the timeline for fulfilling the requirement are specified.

4. In accordance with paragraph 3, the transmission-connected distribution system operator (HEDNO) may require IPTO to consider its transmission-connected distribution system for reactive power management.

Comment/Justification:

Paragraphs 15.3 and 15.4 are non-mandatory and consist of general statements that could be further clarified by IPTO in coordination with HEDNO with a view to set a concrete regulatory framework for reactive power management. This framework shall describe a commonly accepted methodology, even if site specific cases have to be considered, for joint control of reactive power exchange at the connection point for the benefit of the entire system.

Article 16.
Protection requirements

1. IPTO shall specify the devices and settings required to protect the transmission network in accordance with the characteristics of the transmission-connected demand facility or the transmission-connected distribution system. IPTO and the transmission-connected demand facility owner or the transmission-connected distribution system operator shall agree on protection schemes and settings relevant for the transmission-connected demand facility or the transmission-connected distribution system.

2. Electrical protection of the transmission-connected demand facility or the transmission-connected distribution system shall take precedence over operational controls while respecting system security, health and safety of staff and the public.

3. Protection scheme devices may cover the following elements:

(a) external and internal short circuit;

(b) over- and under-voltage at the connection point to the transmission system;

(c) over- and under-frequency;

(d) demand circuit protection;

(e) unit transformer protection;

(f) back-up against protection and switchgear malfunction.

Comment/Justification:

In the existing version of the Greek transmission grid code (Article 243), protection schemes are generally described and are in line with the basic elements mentioned in paragraph 16.3. The proposal is to specify the electrical protection schemes, and especially settings, for TCDFs and TCDS on a case-by-case basis, as per existing practices.

4. The relevant TSO and the transmission-connected demand facility owner or the transmission-connected distribution system operator shall agree on any changes to the protection schemes relevant for the transmission- connected demand facility or the transmission-connected distribution system, and on the arrangements for the protection schemes of the transmission-connected demand facility or the transmission-connected distribution system.

Article 17.
Control requirements

1. IPTO and the transmission-connected demand facility owner or the transmission-connected distribution system operator shall agree on the schemes and settings of the different control devices of the transmission- connected demand facility or the transmission-connected distribution system relevant for system security.

2. The agreement shall cover at least the following elements:

(a) isolated (network) operation;

(b) damping of oscillations;

(c) disturbances to the transmission network;

(d) automatic switching to emergency supply and restoration to normal topology;

(e) automatic circuit-breaker re-closure (on 1-phase faults).

3. IPTO and the transmission-connected demand facility owner or the transmission-connected distribution system operator shall agree on any changes to the schemes and settings of the different control devices of the transmission-connected demand facility or the transmission-connected distribution system relevant for system security.

Comment/Justification:

Requirements set out in Article 17.2 shall be considered on a case by case base. It is noted that in the existing version of the Greek transmission grid code, minimal requirements regarding schemes and settings of control devices are not specified for demand type connections, apart from protection related requirements (Article 243). In Article 215 it is generally stated that isolated network operation is not allowed, while in Article 234 there is only a brief outline concerning small signal stability and damping of oscillations.

4. With regard to priority ranking of protection and control, the transmission-connected demand facility owner or the transmission-connected distribution system operator shall set the protection and control devices of its transmission- connected demand facility or its transmission-connected distribution system respectively, in compliance with the following priority ranking, organised in decreasing order of importance:

(a) transmission network protection;

(b) transmission-connected demand facility or transmission-connected distribution system protection;

(c) frequency control (active power adjustment);

(d) power restriction.

Comment/Justification:

There is no relative provision in the existing version of the Greek transmission grid code stating the priority ranking of protection and control explicitly.

Article 18.
Information exchange

1. Transmission-connected demand facilities shall be equipped according to the standards specified by IPTO in order to exchange information between IPTO and the transmission-connected demand facility with the specified time stamping. IPTO shall make the specified standards publicly available.

2. Transmission-connected distribution system shall be equipped according to the standards specified by IPTO in order to exchange information between IPTO and the transmission-connected distribution system with the specified time stamping. IPTO shall make the specified standards publicly available.

3. IPTO shall specify the information exchange standards. IPTO shall make publicly available the precise list of data required.

Comment/Justification:

There are Articles (245, 246 & 248) concerning structural data provision and information exchange in the existing version of the Greek transmission grid code as well as in Article 75 of the existing Greek distribution grid code.

Time synchronization protocols, time of information exchange (real time or periodically), and precise list of data required are explicitly described in the connection agreements with TCDFs and TCDS.

Requirements for data exchange between IPTO/HEDNO and transmission-connected demand facilities are specified in the Regulation (EU) 2017/1485 "establishing a guideline on electricity transmission system operation" (System Operation Guiding Lines – SOGL), Art. 52. Requirements for data exchange between IPTO/HEDNO and distribution-connected demand facilities or third parties participating in demand response, are specified in SOGL Art. 53. Requirements for data exchange between IPTO/HEDNO and transmission-connected distribution systems are specified in SOGL Art. 43 and Art. 44.

A list of structural data provision and information exchange, taking into account existing practice, is given in Annex 6.

Article 19.
Demand disconnection and demand reconnection

1. All transmission-connected demand facilities and transmission-connected distribution systems shall fulfil the following requirements related to low frequency demand disconnection functional capabilities:

(a) each transmission-connected distribution system operator and, where specified by IPTO, transmission-connected demand facility owner, shall provide capabilities that enable automatic 'low frequency' disconnection of a specified proportion of their demand. IPTO may specify a disconnection trigger based on a combination of low frequency and rate-of-change-of-frequency;

(b) the low frequency demand disconnection functional capabilities shall allow for disconnecting demand in stages for a range of operational frequencies;

(c) the low frequency demand disconnection functional capabilities shall allow for operation from a nominal Alternating Current ('AC') input to be specified by the relevant system operator, and shall meet the following requirements:

(i) frequency range: at least between 47- 50 Hz, adjustable in steps of 0,05 Hz;

(ii) operating time: no more than 150 ms after triggering the frequency setpoint;

(iii) voltage lock-out: blocking of the functional capability shall be possible when the voltage is within a range of 30 to 90 % of reference 1 pu voltage;

(iv) provide the direction of active power flow at the point of disconnection;

(d) the AC voltage supply used in providing low frequency demand disconnection functional capabilities, shall be provided from the network at the frequency signal measuring point, as used in providing functional capabilities in accordance with paragraph 1(c), so that the frequency of the low frequency demand disconnection functional capabilities supply voltage is the same as the one of the network.

Comment/Justification:

The frequency at which a given TCDF, transmission-connected CDS or TCDS will be disconnected due to under frequency load shedding scheme (UFLS) shall be agreed with IPTO, taking into account the design of emergency remedial actions (defense plan). The proportion of demand to be disconnected is highly dependent on a number of factors, including but not limited to the site configuration and critical loads such as high priority customers or demand units on TCDS, e.g. major infrastructure.

Such factors shall be taken into consideration when determining the proportion of demand to be disconnected. A noteworthy fact is that the proposed parameter 47 – 50 Hz is a wider capability range than UFLS scheme settings currently in use (49.0 - 48.2 Hz).

IPTO requires TCDSO (HEDNO) to provide automatic low frequency demand disconnection capabilities according to existing version of the Greek transmission grid code (Articles 84 & 90.1,2). The same applies for TCDFs and transmission-connected CDSOs (Articles 84 & 90.3,4), although IPTO does not currently include TCDFs owners and transmission-connected CDSOs in the existing UFLS schemes. IPTO does however not exclude that they will be part of a future defence plan, if such an option is justified for system security reasons.

In practice, existing UFLS schemes of the interconnected Greek grid are based on UF relays connected at HV/MV substations and load shedding is implemented in predefined UF stages (49.0, 48.8, 48.4 and 48.2 Hz). Specific blocks of load, based on a priority ranking approved by RAE and concerning critical loads (e.g. public service buildings, hospitals, army facilities, industrial sites etc.), are disconnected at each stage by tripping appropriate number of MV feeders.

In the existing version of the Greek transmission grid code, there are no detailed technical specifications, as those stated in paragraph 19.2(c). The proposed values of the Regulation (EU) 1388/2016 (NC-DCC) are in line with ENTSO-E guidelines for emergency operations[9], as follows:

[9] ENTSO-E, Continental Europe Operation Handbook, Policy 5: Emergency operations v3.1, Chapter B.

- UFLS scheme shall be implemented in the range of 49.0 to 48.0 Hz.
- Maximum total tripping action time of UFLS considering measurement, calculation time of relays, tripping action of auxiliary circuits and circuit breaker opening time shall not exceed 300 ms. A previous version of this requirement was that maximum disconnection delay shall be 150 ms including breakers operation time.
- Blocking of the UFLS relays should be possible when the voltage is within a range of 30 to 90% of nominal voltage.

A list of additional ENTSO-E basic requirements that should be adopted by IPTO in order to procced with the harmonization of general UFLS scheme in Continental Europe is given:

- At least an amount of demand corresponding to 5% of the total load shall be disconnected at 49.0 Hz.
- In total, an amount of demand corresponding to 45% +/- 7% of the total load shall be disconnected between 49.0 and 48.0 Hz.
- The number of disconnection steps shall be minimum 6, including the step triggered at 49.0 Hz).
- For each step, an amount of demand corresponding to 10% of total load shall be disconnected at maximum.
- No intentional time delay shall be set in UFLS relays.
- Additional *df/dt* function in UFLS relays is allowed in the range 49.8 – 49.0 Hz.

It should be noted that the frequency control capabilities for demand units, as specified under Article 29.2 for demand response system frequency control, must be exhausted prior to the activation of the UFLS scheme.

2. With regard to low voltage demand disconnection functional capabilities, the following requirements shall apply:

(a) IPTO may specify, in coordination with the transmission-connected distribution system operators, low voltage demand disconnection functional capabilities for the transmission-connected distribution facilities;

(b) IPTO may specify, in coordination with the transmission-connected demand facility owners, low voltage demand disconnection functional capabilities for the transmission-connected demand facilities;

(c) based on IPTO's assessment concerning system security, the implementation of on load tap changer blocking and low voltage demand disconnection shall be binding for the transmission-connected distribution system operators;

(d) if IPTO decides to implement a low voltage demand disconnection functional capability, the equipment for both on load tap changer blocking and low voltage demand disconnection shall be installed in coordination with IPTO;

(e) the method for low voltage demand disconnection shall be implemented by relay or control room initiation;

(f) the low voltage demand disconnection functional capabilities shall have the following features:

(i) the low voltage demand disconnection functional capability shall monitor the voltage by measuring all three phases;

(ii) blocking of the relays' operation shall be based on direction of either active power or reactive power flow.

3. With regard to blocking of on load tap changers, the following requirements shall apply:

(a) if required by IPTO, the transformer at the transmission-connected distribution facility shall be capable of automatic or manual on load tap changer blocking;

(b) IPTO shall specify the automatic on load tap changer blocking functional capability.

Comment/Justification
Articles 19.2 and 19.3 are non-mandatory, thus they will be used by IPTO on site specific cases. It is noted that there is provision in existing version of the Greek transmission grid code (Articles 84 & 90) for the optional implementation of low voltage demand disconnection (LVDD) regarding TCDFs and TCDS, although LVDD schemes are not a common practice in the Greek transmission grid. There is no provision in the existing Greek transmission grid code related to the implementation of on load tap changer blocking. On-load tapping blocking is not currently in use on the Greek interconnected transmission system but may be required in the future if identified by the relevant system security studies considering voltage stability criteria. The proposal is to invoke the right to specify the requirement for on-load tap changing blocking and low voltage demand disconnection, but to advise on a case-by-case basis, as necessary, following consultation with the relevant stakeholders, and taking into consideration that the specific requirements will be dependent on plant design and compatibility requirements. If required, all necessary details will be made available by TSO in due time for plant design, which is intended to mean during the connection offer phase.

4. All transmission-connected demand facilities and transmission-connected distribution systems shall fulfil the following requirements related to disconnection or reconnection of a transmission-connected demand facility or a transmission-connected distribution system:

(a) with regard to the capability of reconnection after a disconnection, the IPTO shall specify the conditions under which a transmission-connected demand facility or a transmission-connected distribution system is entitled to reconnect to the transmission system. Installation of automatic reconnection systems shall be subject to prior authorisation by IPTO;

(b) with regard to reconnection of a transmission-connected demand facility or a transmission-connected distribution system, the transmission-connected demand facility or the transmission-connected distribution system shall be capable of synchronisation for frequencies within the ranges set out in Article 12. IPTO and the transmission-connected demand facility owner or the transmission-connected distribution system operator shall agree on the settings of synchronisation devices prior to connection of the transmission-connected demand facility or the transmission-connected distribution system, including voltage, frequency, phase angle range and deviation of voltage and frequency;

(c) a transmission-connected demand facility or a transmission-connected distribution facility shall be capable of being remotely disconnected from the transmission system when required by IPTO. If required, the automated disconnection equipment for reconfiguration of the system in preparation for block loading shall be specified by IPTO. IPTO shall specify the time required for remote disconnection.

Article 20.
Power quality

Transmission-connected demand facility owners and transmission-connected distribution system operators shall ensure that their connection to the network does not result in a determined level of distortion or fluctuation of the supply voltage on the network, at the connection point. The level of distortion shall not exceed that allocated to them by IPTO. IPTO shall coordinate their power quality requirements with the requirements of adjacent TSOs.

Comment/Justification:
In the existing version of the Greek transmission grid code (Article 243), power quality requirements refer to standards IEC/61000-3-6 (Harmonic Distortion Limits), IEC/61000-3-7 (Voltage Fluctuation Limits) and CENELEC EN 50160.

Article 21.
Simulation models

1. Transmission-connected demand facilities and transmission-connected distribution systems shall fulfil the requirements set out in paragraphs 3 and 4 related to the simulation models or equivalent information.

2. IPTO may require simulation models or equivalent information showing the behaviour of the transmission- connected demand facility, or the transmission-connected distribution system, or both, in steady and dynamic states.

3. IPTO shall specify the content and format of those simulation models or equivalent information. The content and format shall include:

(a) steady and dynamic states, including 50 Hz component, suitable for load flow, fault level analysis (balanced and unbalanced faults) and RMS dynamic simulations;

(b) electromagnetic transient simulations at the connection point;

(c) structure and block diagrams.

4. For the purpose of dynamic simulations, the simulation model or equivalent information referred to in paragraph 3(a) shall contain the following sub-models or equivalent information:

(a) power control;

(b) voltage control;

(c) transmission-connected demand facility and transmission-connected distribution system protection models;

(d) the different types of demand, that is to say electro technical characteristics of the demand; and

(e) converter models.

5. IPTO shall specify the requirements of the performance of the recordings of transmission-connected demand facilities or transmission-connected distribution facilities, or both, in order to compare the response of the model with these recordings.

6. Additional requirements for simulation models and studies are detailed in Annex 4.

Comment/Justification:

In the existing version of the Greek transmission grid code (Article 263), electrical characteristics of TCDFs equipment are requested but relative information is not fully in line with Regulation (EU) 1388/2016 (NC-DCC). On the other hand, there is no relative provision as far as TCDS is concerned.

In any case, IPTO shall decide the detail of the requested information within the scope of the performed power system analysis.

CHAPTER 2 – *Operational Notification Procedure*

Article 22.
General provisions

1. The operational notification procedure for the connection of each new transmission-connected demand facility, each new transmission-connected distribution facility and each new transmission-connected distribution system, shall comprise:

(a) an energisation operational notification (EON);

(b) an interim operational notification (ION);

(c) a final operational notification (FON).

2. Each transmission-connected demand facility owner or transmission-connected distribution system operator to which one or more of the requirements in Title II apply shall demonstrate to the relevant TSO that it has complied with the requirements set out in Title II of this Regulation by completing successfully the operational notification procedure for connection of each transmission-connected demand facility, each transmission-connected distribution facility and each transmission-connected distribution system described in Articles 23 to 26.

3. The relevant TSO shall specify and make publicly available further details concerning the operational notification procedure.

In addition to Article 23, Article 24, Article 25 and Article 26, further explanations and requirements are detailed in Annex 2.

Article 23.
Energisation operational notification

1. An EON shall entitle the transmission-connected demand facility owner or transmission-connected distribution system operator to energise its internal network and auxiliaries by using the grid connection that is specified for the connection point.

2. An EON shall be issued by the relevant TSO, subject to completion of preparations including agreement on the protection and control settings relevant to the connection point between the relevant TSO and the transmission- connected demand facility owner or transmission-connected distribution system operator.

Article 24.
Interim operational notification

1. An ION shall entitle the transmission-connected demand facility owner or transmission-connected distribution system operator to operate the transmission-connected demand facility, the transmission-connected distribution facility, or the transmission-connected distribution system by using the grid connection for a limited period of time.

2. An ION shall be issued by the relevant TSO, subject to completion of the data and study review process as required by this Article.

3. With regard to the data and study review, the relevant TSO shall have the right to request that the transmission- connected demand facility owner or transmission-connected distribution system operator provide the following:

(a) an itemised statement of compliance;

(b) detailed technical data of the transmission-connected demand facility, the transmission-connected distribution facility or the transmission-connected distribution system relevant to the grid connection as specified by the relevant TSO;

(c) equipment certificates issued by an authorised certifier in respect of transmission-connected demand facilities, transmission-connected distribution facilities and transmission-connected distribution systems, where these are relied upon as part of the evidence of compliance;

(d) simulation models, as specified in Article 21 and required by the TSO;

(e) studies demonstrating expected steady-state and dynamic performance as required in Articles 43, 46 and 47;

(f) details of intended practical method of completing compliance tests according to Chapter 2 of Title IV.

4. The maximum period during which the transmission-connected demand facility owner or transmission-connected distribution system operator may maintain ION status shall be 24 months. The relevant TSO is entitled to specify a shorter ION validity period. An extension of the ION shall be granted only if the transmission-connected demand facility owner or transmission-connected distribution system operator has made substantial progress towards full compliance. Outstanding issues shall be clearly identified at the time of requesting extension.

5. An extension of the period during which the transmission-connected demand facility owner or transmission- connected distribution system operator may maintain ION status, beyond the period established in paragraph 4, may be granted if a request for a derogation is made to the relevant TSO before the expiry of that period in accordance with the derogation procedure laid down in Article 50.

Article 25.
Final operational notification

1. A FON shall entitle the transmission-connected demand facility owner or transmission-connected distribution system operator to operate the transmission-connected demand facility, the transmission-connected distribution facility or the transmission-connected distribution system by using the grid connection.

2. A FON shall be issued by the relevant TSO, upon prior removal of all incompatibilities identified for the purposes of the ION status and subject to the completion of the data and study review process as required by this Article.

3. For the purposes of the data and study review, the transmission-connected demand facility owner or transmission- connected distribution system operator must submit the following to the relevant TSO:

(a) an itemised statement of compliance; and

(b) an update of the applicable technical data, simulation models and studies as referred to in points (b), (d) and (e) of Article 24(3), including the use of actual measured values during testing.

4. If incompatibility is identified in connection with the issuing of the FON, a derogation may be granted upon a request made to the relevant TSO, in accordance with the derogation procedure described in Chapter 2 of Title V. A FON shall be issued by the relevant TSO if the transmission-

connected demand facility, the transmission-connected distribution facility, or the transmission-connected distribution system complies with the provisions of the derogation.

Where a request for a derogation is rejected, the relevant TSO shall have the right to refuse to allow the operation of the transmission-connected demand facility, the transmission-connected distribution facility, or the transmission-connected distribution system until the transmission-connected demand facility owner or transmission-connected distribution system operator and the relevant TSO resolve the incompatibility and the relevant TSO considers that the transmission- connected demand facility, the transmission-connected distribution facility, or the transmission-connected distribution system complies with the provisions of this Regulation.

If the relevant TSO and the transmission-connected demand facility owner or transmission-connected distribution system operator do not resolve the incompatibility within a reasonable time frame, but in any case not later than six months after the notification of the rejection of the request for a derogation, each party may refer the issue for decision to the regulatory authority.

Article 26.
Limited operational notification

1. Transmission-connected demand facility owners or transmission-connected distribution system operators to whom a FON has been granted, shall inform the relevant TSO, no later than 24 hours after the incident has occurred, of the following circumstances:

(a) the facility is temporarily subject to either significant modification or loss of capability affecting its performance; or

(b) equipment failure leading to non-compliance with some relevant requirements.

A longer time period to inform the relevant TSO can be agreed with the transmission-connected demand facility owner or transmission-connected distribution system operator depending on the nature of the changes.

2. The transmission-connected demand facility owner or transmission-connected distribution system operator shall apply to the relevant TSO for a limited operational notification (LON), if the transmission-connected demand facility owner or transmission-connected distribution system operator expects the circumstances described in paragraph 1 to persist for more than three months.

3. A LON shall be issued by the relevant TSO and shall contain the following information which shall be clearly identifiable:

(a) the unresolved issues justifying the granting of the LON;

(b) the responsibilities and timescales for expected solution; and

(c) a maximum period of validity which shall not exceed 12 months. The initial period granted may be shorter with the possibility of an extension if evidence is submitted to the satisfaction of the relevant TSO demonstrating that substantial progress has been made towards achieving full compliance.

4. The FON shall be suspended during the period of validity of the LON with regard to the items for which the LON has been issued.

5. A further extension of the period of validity of the LON may be granted upon a request for a derogation made to the relevant TSO before the expiry of that period, in accordance with the derogation procedure described in Chapter 2 of Title V.

6. The relevant TSO shall have the right to refuse to allow the operation of the transmission-connected demand facility, the transmission-connected distribution facility, or the transmission-connected distribution system once the LON is no longer valid. In such cases, the FON shall automatically become invalid.

7. If the relevant TSO does not grant an extension of the period of validity of the LON in accordance with paragraph 5 or if it refuses to allow the operation of the transmission-connected demand facility, the transmission- connected distribution facility, or the transmission-connected distribution system once the LON is no longer valid in accordance with paragraph 6, the transmission-connected demand facility owner or transmission-connected distribution system operator may refer the issue for decision to the regulatory authority within six months after the notification of the decision of the relevant TSO.

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

CHAPTER 1 - General requirements

Article 27.
General provisions

1. Demand response services provided to system operators shall be distinguished based on the following categories:

(a) remotely controlled by instruction from the relevant system operator (IPTO or HEDNO):

(i) demand response active power control;

(ii) demand response reactive power control;

(iii) demand response transmission constraint management.

(b) autonomously controlled, once the facility has been instructed into operation upon instruction from IPTO, pursuant to the terms of the provided demand response service agreement:

(i) demand response system frequency control;

(ii) demand response very fast active power control.

2. Demand facilities and closed distribution systems may provide demand response services to relevant system operators (IPTO and HEDNO). Demand response services can include, jointly or separately, upward or downward modification of demand.

3. The categories referred to in paragraph 1 are not exclusive and this Regulation does not prevent other categories from being developed. This Regulation does not apply to demand response services provided to other entities than relevant system operators or relevant TSOs.

Comment/Justification:

Article 27 may be rephrased in the future, taking into account all other possible demand response services that will be established in the Greek regulatory framework. Other categories of demand response services shall be explicitly defined, as well as the relevant system operator to whom the service will be provided (e.g. IPTO only or participation of HEDNO too).

The existing market regulatory framework for demand response services is described in Regulation (EU) 2017/2195 "Establishing a Guideline on Electricity Balancing" (Incorporated in the Greek Regulatory Framework as "Κανονισμός Αγοράς Εξισορρόπησης," ΦΕΚ 5910, 31 Δεκεμβρίου 2018)

Article 28.
Specific provisions for demand units with demand response active power control, reactive power control and transmission constraint management

1. Demand facilities and closed distribution systems may offer demand response active power control, demand response reactive power control, or demand response transmission constraint management to relevant system operators (IPTO and HEDNO).

2. Demand units with demand response active power control, demand response reactive power control, or demand response transmission constraint management shall comply with the following requirements, either individually or, where it is not part of a transmission-connected demand facility, collectively as part of demand aggregation through a third party:

(a) be capable of operating across the frequency ranges specified in Table 1 ;

Comment/Justification:

The frequency requirements defined in Article 12.1 are also applicable to DUs with demand response active power control, demand response reactive power control, or demand response transmission constraint management, or demand response system frequency control, either individually or, where it is not part of TCDF, collectively as part of demand aggregation through a third party.

(b) be capable of operating across the voltage ranges specified in Table 2 (nominal voltage at connection point 150 kV) or Table 3 (nominal voltage at connection point 400 kV);

Comment/Justification:

The voltage requirements defined in Article 13.1 are also applicable to DUs with demand response active power control, demand response reactive power control, or demand response transmission constraint management, or demand response system frequency control, either individually or, where it is not part of a TCDF, collectively as part of demand aggregation through a third party.

(c) be capable of operating across the normal operational voltage range of the system at the connection point, specified by the relevant system operator (HEDNO), if connected at a voltage level below 110 kV. This range shall take into account existing standards and shall, prior to approval in accordance with Article 6, be subject to consultation with the relevant stakeholders in accordance with Article 9(1);

Comment/Justification:

The normal operational voltage range at the connection point for voltage levels below 110 kV, across which a DU delivering demand response shall be capable to operate, will be fixed by HEDNO. Proposed values could be in the range 0.9 – 1.1 pu as per existing practice of HEDNO for operational range of MV and LV distribution grids.

(d) be capable of controlling power consumption from the network in a range equal to the range contracted, directly or indirectly through a third party, by the relevant system operator (IPTO or HEDNO);

(e) be equipped to receive instructions, directly or indirectly through a third party, from the relevant system operator (IPTO or HEDNO) to modify their demand and to transfer the necessary information. The relevant system operator shall make publicly available the technical specifications approved to enable this transfer of information. For demand units connected at a voltage level below 110 kV, these specifications shall, prior to approval in accordance with Article 6, be subject to consultation with the relevant stakeholders in accordance with Article 9(1);

Comment/Justification:

The detailed requirements of information exchange for a DU offering active power control, reactive power control and transmission constraint management depends on the type of offered demand response service. These requirements will be defined in the terms and conditions of these services, considering available

technical capabilities. Some basic principles of information exchange requirements for a DU offering demand response services are given in Article 53 of SOGL.

(f) be capable of adjusting its power consumption within a time period specified by the relevant system operator (IPTO or HEDNO). For demand units connected at a voltage level below 110 kV, these specifications shall, prior to approval in accordance with Article 6, be subject to consultation with the relevant stakeholders in accordance with Article 9(1);

Comment/Justification:

The time period within which a DU delivering demand response needs to adjust its power consumption depends on the type of offered demand response service. These time periods will be defined in the terms and conditions of these services, considering available technical capabilities.

(g) be capable of full execution of an instruction issued by the relevant system operator or the relevant TSO to modify its power consumption to the limits of the electrical protection safeguards, unless a contractually agreed method is in place with the relevant system operator or relevant TSO for the replacement of their contribution (including aggregated demand facilities' contribution through a third party);

(h) once a modification to power consumption has taken place and for the duration of the requested modification, only modify the demand used to provide the service if required by the relevant system operator or relevant TSO to the limits of the electrical protection safeguards, unless a contractually agreed method is in place with the relevant system operator or relevant TSO for the replacement of their contribution (including aggregated demand facilities' contribution through a third party). Instructions to modify power consumption may have immediate or delayed effects;

(i) notify the relevant system operator (IPTO or HEDNO) of the modification of demand response capacity. The relevant system operator shall specify the modalities of the notification;

Comment/Justification:

The notification of a change in demand response capacity shall be carried-out as per the contractual provisions of the terms and conditions of the provided services, taking into account the specification of DUs information exchange requirements.

(j) where the relevant system operator (IPTO or HEDNO), directly or indirectly through a third party, command the modification of the power consumption, enable the modification of a part of its demand in response to an instruction by the relevant system operator, within the limits agreed with the demand facility owner or the CDSO and according to the demand unit settings;

(k) with regard to the rate of change of frequency withstand capability:

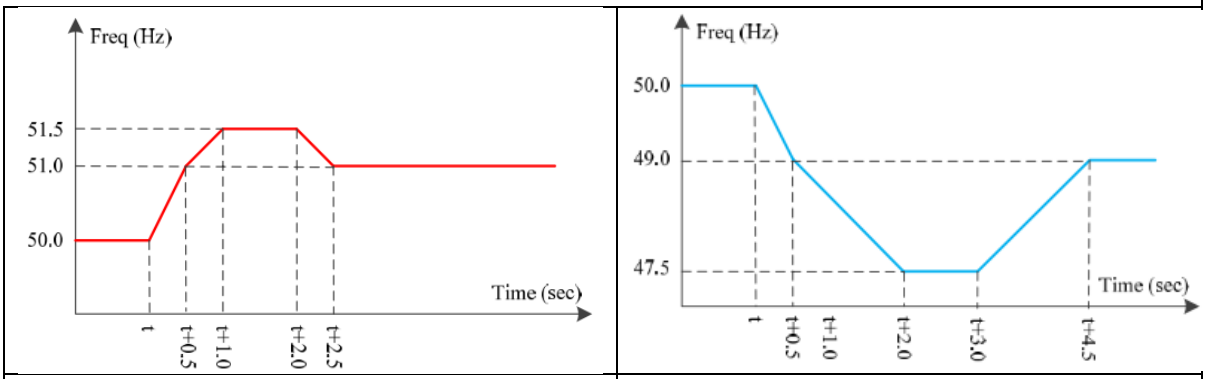
(i) All demand units should be capable of staying connected to the network and operate at rates of change of frequency (RoCoF) up to 2Hz/sec, observed in a sliding window of 500msec

(ii) The proposed RoCoF withstand capability may be defined according the frequency against time profile depicted in Figure 1, with explicit measurement techniques of 500 ms duration.

(iii) For demand units connected at a voltage level below 110 kV, these specifications shall, prior to approval in accordance with Article 6, be subject to consultation with the relevant stakeholders in accordance with Article 9(1);

Comment/Justification:

The requirement for Rate of Change of Frequency (RoCoF) withstanding capability of DUs is aligned with the proposed requirements for generators, as stated in Article 13.1.(b) of IPTO's proposal for the implementation of the Regulation (EU) 631/2016 (NC-RfG).



Proposed Over-frequency profile | Proposed Under-frequency profile

Figure 1: Frequency against time withstanding capabilities for demand units with demand response active power control, reactive power control and transmission constraint management

(l) where modification to the power consumption is specified via frequency or voltage control, or both, and via pre-alert signal sent by the relevant system operator (IPTO or HEDNO), be equipped to receive, directly or indirectly through a third party, the instructions from the relevant system operator, to measure the frequency or voltage value, or both, to command the demand trip and to transfer the information. The relevant system operator shall specify and publish the technical specifications approved to enable this transfer of information. For demand units connected at a voltage level below 110 kV, these specifications shall, prior to approval in accordance with Article 6, be subject to consultation with the relevant stakeholders in accordance with Article 9(1).

Comment/Justification:

The pre-alert signal and relative instructions sent by the relevant system operator shall be defined as per the contractual provisions of the terms and conditions of the provided services, taking into account the specification of DUs information exchange standard.

3. For voltage control with disconnection or reconnection of static compensation facilities, each transmission-connected demand facility or transmission-connected closed distribution system shall be able to connect or disconnect its static compensation facilities, directly or indirectly, either individually or commonly as part of demand aggregation through a third party, in response to an instruction transmitted by IPTO, or in the conditions set forth in the contract between the IPTO and the demand facility owner or the CDSO.

Article 29.

Specific provisions for demand units with demand response system frequency control

1. Demand facilities and closed distribution systems may offer demand response system frequency control to relevant system operators (IPTO and HEDNO).

2. Demand units with demand response system frequency control shall comply with the following requirements, either individually or, where it is not part of a transmission-connected demand facility, collectively as part of demand aggregation through a third party:

(a) be capable of operating across the frequency ranges specified in Table 1 or the extended ranges, as those specified according to Article 12(2);

(b) be capable of operating across the voltage ranges specified in Table 2 (nominal voltage at connection point 150 kV) or Table 3 (nominal voltage at connection point 400 kV);

(c) be capable of operating across the normal operational voltage range of the system at the connection point, specified by the relevant system operator, if connected at a voltage level below 110 kV. This range shall take into account existing standards, and shall, prior to approval in accordance with Article 6, be subject to consultation with the relevant stakeholders in accordance with Article 9(1);

(d) be equipped with a control system that is insensitive within a dead band around the nominal system frequency of 50,00 Hz, of a width equal to ±200 mHz. For demand units connected at a voltage level below 110 kV, these specifications shall, prior to approval in accordance with Article 6, be subject to consultation with the relevant stakeholders in accordance with Article 9(1);

Comment/Justification:

The demand response system frequency control should only be activated during a frequency event.

The proposed dead band is aligned with ENTSO-E IGDs prescribing the allowed maximum frequency dead band for LFSM-U and LFSM-O emergency system frequency control as ±200 mHz for the Continental Europe synchronous area. Therefore, resulting in under-frequency threshold of 49.8 Hz and over-frequency threshold of 50.2 Hz. The proposed thresholds are also in line with the proposed requirements for generators, as stated in Articles 13.2(a) and 15.2(c) of IPTO's proposal for the implementation of Regulation (EU) 631/2016 (NC-RfG).

(e) be capable of, upon return to frequency within the dead band specified in paragraph 2(d), initiating a random time delay of up to 5 minutes before resuming normal operation.

The maximum frequency deviation from nominal value of 50,00 Hz to respond to shall be specified by IPTO in coordination with the TSOs in the synchronous area. For demand units connected at a voltage level below 110 kV, these specifications shall, prior to approval in accordance with Article 6, be subject to consultation with the relevant stakeholders in accordance with Article 9(1).

The demand shall be increased or decreased for a system frequency above or below the dead band of nominal (50,00 Hz) respectively;

Comment/Justification:

The full provision of Demand Response (DR) System Frequency Control should be exhausted in advance of any involuntary load shedding in the case of an under-frequency event, or any generation shedding in the case of an over-frequency event. In the case of an under-frequency event, involuntary load shedding commences when the system frequency drops to 49 Hz. Hence, it is proposed to set the under-frequency maximum deviation to 49.0 Hz. Similarly, the threshold value for over-frequency shall be equal to the value that the shedding of generation commences, i.e. 51.5Hz.

(f) be equipped with a controller that measures the actual system frequency. Measurements shall be updated at least every 0,2 seconds;

(g) be able to detect a change in system frequency of 0,01 Hz, in order to give overall linear proportional system response, with regard to the demand response system frequency control's sensitivity and accuracy of the frequency measurement and the consequent modification of the demand. The demand unit shall be capable of a rapid detection and response to changes in system frequency, to be specified by IPTO in coordination with the TSOs in the synchronous area. An offset in the steady-state measurement of frequency shall be acceptable up to 0,05 Hz.

Article 30.

Specific provisions for demand units with demand response very fast active power control

1. The relevant TSO in coordination with the relevant system operator may agree with a demand facility owner or a CDSO (including, but not restricted to, through a third party) on a contract for the delivery of demand response very fast active power control.

2. If the agreement referred to in paragraph 1 takes place, the contract referred to in paragraph 1 shall specify:

(a) a change of active power related to a measure such as the rate-of-change-of-frequency for that portion of its demand;

(b) the operating principle of this control system and the associated performance parameters;

(c) the response time for very fast active power control, which shall not be longer than 2 seconds.

Comment/Justification:

This type of demand response is related to contribution of demand side to inertial response, apart from primary frequency control. IPTO considers that such a kind of demand response service is rather not necessary as of today within the Continental Europe synchronous area. Frequency stability studies should be performed in coordination with the TSOs in the synchronous area in order to assess the potential impact of very fast active power control as an ancillary service.

CHAPTER 2 - Operational notification procedure

Article 31.
General provisions

1. The operational notification procedure for demand units used by a demand facility or a closed distribution system to provide demand response to system operators shall be distinguished between:

(a) demand units within a demand facility or a closed distribution system connected at a voltage level of or below 1 000 V;

(b) demand units within a demand facility or a closed distribution system connected at a voltage level above 1 000 V.

2. Each demand facility owner or CDSO, providing demand response to a relevant system operator or a relevant TSO, shall confirm to the relevant system operator, or relevant TSO, directly or indirectly through a third party, its ability to satisfy the technical design and operational requirements as referred to in Chapter 1 of Title III of this Regulation.

3. The demand facility owner or the CDSO shall notify, directly or indirectly, through a third party, the relevant system operator or relevant TSO, in advance of any decision to cease offering demand response services and/or about the permanent removal of the demand unit with demand response. This information may be aggregated as specified by the relevant system operator or relevant TSO.

4. The relevant system operator shall specify and make publicly available further details concerning the operational notification procedure.

Article 32.
Procedures for demand units within a demand facility or a closed distribution system connected at a voltage level of or below 1 000 V

1. The operational notification procedure for a demand unit within a demand facility or a closed distribution system connected at a voltage level of or below 1 000 V shall comprise an installation document.

2. The installation document template shall be provided by the relevant system operator, and the contents agreed with the relevant TSO, either directly or indirectly through a third party.

3. Based on an installation document, the demand facility owner or the CDSO shall submit information, directly or indirectly through a third party, to the relevant system operator or relevant TSO. The date of this submission shall be prior to the offer in the market of the capacity of the demand response by the demand unit. The requirements set in the installation document shall differentiate between different types of connections and between the different categories of demand response services.

4. For subsequent demand units with demand response, separate installation documents shall be provided.

5. The content of the installation document of individual demand units may be aggregated by the relevant system operator or relevant TSO.

6. The installation document shall contain the following items:

(a) the location at which the demand unit with demand response is connected to the network;

(b) the maximum capacity of the demand response installation in kW;

(c) the type of demand response services;

(d) the demand unit certificate and the equipment certificate as relevant for the demand response service, or if not available, equivalent information;

(e) the contact details of the demand facility owner, the closed distribution system operator or the third party aggregating the demand units from the demand facility or the closed distribution system.

7. Further details regarding the ONP and installation document are detailed in Annex 2.

Article 33.

Procedures for demand units within a demand facility or a closed distribution system connected at a voltage level above 1 000 V

1. The operational notification procedure for a demand unit within a demand facility or a closed distribution system connected at a voltage level above 1 000 V shall comprise a DRUD. The relevant system operator, in coordination with the relevant TSO, shall specify the content required for the DRUD. The content of the DRUD shall require a statement of compliance which contains the information in Articles 36 to 47 for demand facilities and closed distribution systems, but the compliance requirements in Articles 36 to 47 for demand facilities and closed distribution systems can be simplified to a single operational notification stage as well as be reduced. The demand facility owner or CDSO shall provide the information required and submit it to the relevant system operator. Subsequent demand units with demand response shall provide separate DRUDs.

2. Based on the DRUD, the relevant system operator shall issue a FON to the demand facility owner or CDSO.

3. Further explanations about the ONP and DRUD are detailed in Annex 2.

TITLE IV COMPLIANCE

CHAPTER 1 - General provisions

Article 34.

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

1. Transmission-connected demand facility owners and DSOs shall ensure that their transmission-connected demand facilities, transmission-connected distribution facilities, or distribution systems comply with the requirements provided for in this Regulation. A demand facility owner or a CDSO providing demand response services to relevant system operators and relevant TSOs shall ensure that the demand unit complies with the requirements provided for in this Regulation.

2. Where the requirements of this Regulation are applicable to demand units used by a demand facility or a closed distribution system to provide demand response services to relevant system operators and relevant TSOs, the demand facility owner or the CDSO may totally or partially delegate to third parties tasks such as communicating with the relevant system operator or relevant TSO and gathering the documentation from the demand facility owner, the DSO or the CDSO evidencing compliance.

   Third parties shall be treated as single users with the right to compile relevant documentation and demonstrate compliance of their aggregated demand facilities or aggregated closed distribution systems with the provisions of this Regulation. Demand facilities and closed distribution systems providing demand response services to relevant system operators and relevant TSOs may act collectively through third parties.

3. Where obligations are fulfilled through third parties, third parties shall only be required to inform the relevant system operator of changes to the total services being offered, taking account of location specific services.

4. Where the requirements are specified by the relevant TSO, or are for the purpose of the operation of the relevant TSO's system, alternative tests or requirements for test result acceptance for these requirements may be agreed with the relevant TSO.

5. Any intention to modify the technical capabilities of the transmission-connected demand facility, the transmission- connected distribution facility, the distribution system, or the demand unit, which has impact on compliance with the requirements provided for in Chapters 2 to 4 of Title IV, shall be notified to the relevant system operator, directly or indirectly through a third party, prior to pursuing such modification, within the time frame provided by the relevant system operator.

6. Any operational incidents or failures of the transmission-connected demand facility, the transmission-connected distribution facility, the distribution system or the demand unit, which have an impact on compliance with the requirements provided for in Chapters 2 to 4 of Title IV, shall be notified to the relevant system operator, directly or indirectly through a third party, as soon as possible after the occurrence of such an incident.

7. Any planned test schedules and procedures to verify compliance of the transmission-connected demand facility, the transmission-connected distribution facility, the distribution system, or the demand unit, with the requirements of this Regulation, shall be notified to the relevant system operator within the time frame specified by the relevant system operator and approved by the relevant system operator prior to their commencement.

8. The relevant system operator may participate in such tests and may record the performance of the transmission- connected demand facility, the transmission-connected distribution facility, the distribution system, and the demand unit.

9. In addition to the requirements of this chapter, for Compliance monitoring, testing and simulations, the requirements of the Greek Transmission Grid Code (6/2018) will also apply, particularly Chapter 48 (Monitoring, Testing and Investigation of System and User Installation Operation) and Chapter 54 (Monitoring, testing and investigation).

Article 35.
Tasks of the relevant system operator

1. The relevant system operator shall assess the compliance of a transmission-connected demand facility, a transmission-connected distribution facility, a distribution system, or a demand unit, with the requirements of this Regulation throughout the lifetime of the transmission-connected demand facility, the transmission-connected distribution facility, the distribution system, or the demand unit. The demand facility owner, the DSO or the CDSO shall be informed of the outcome of this assessment.

   The compliance of a demand unit used by a demand facility or a closed distribution system to provide demand response services to relevant TSOs, shall be jointly assessed by the relevant TSO and the relevant system operator, and if applicable in coordination with the third party involved in demand aggregation.

2. The relevant system operator shall have the right to request that the demand facility owner, the DSO or the CDSO carries out compliance tests and simulations according to a repeat plan or general scheme or after any failure, modification or replacement of any equipment that may have an impact on the compliance of the transmission- connected demand facility, the transmission-connected distribution facility, the distribution system, or the demand unit with the requirements of this Regulation.

   The demand facility owner, the DSO or the CDSO shall be informed of the outcome of those compliance tests and simulations.

3. The relevant system operator shall make publicly available the list of information and documents to be provided as well as the requirements to be fulfilled by the demand facility owner, the DSO or the CDSO in the frame of the compliance process. The list shall cover at least the following information, documents and requirements:

(a) all documentation and certificates to be provided by the demand facility owner, the DSO or the CDSO;

(b) details of the technical data required from the transmission-connected demand facility, the transmission-connected distribution facility, the distribution system, or the demand unit, with relevance to the grid connection or operation;

(c) requirements for models for steady-state and dynamic system studies;

(d) timeline for the provision of system data required to perform the studies;

(e) studies by the demand facility owner, the DSO or the CDSO for demonstrating expected steady-state and dynamic performance referring to the requirements set forth in Articles 43, 44 and 45;

(f) conditions and procedures including scope for registering equipment certificates;

(g) conditions and procedures for the use of relevant equipment certificates issued by an authorised certifier by the demand facility owner, the DSO or the CDSO.

4. The relevant system operator shall make public the allocation of responsibilities to the demand facility owner, the DSO or the CDSO and to the system operator for compliance testing, simulation and monitoring.

5. The relevant system operator may totally or partially delegate the performance of its compliance monitoring to third parties. In such cases, the relevant system operator shall continue ensuring compliance with Article 11, including entering into confidentiality commitments with the assignee.

6. If compliance tests or simulations cannot be carried out as agreed between the relevant system operator and the demand facility owner, the DSO or the CDSO due to reasons attributable to the relevant system operator, then the relevant system operator shall not unreasonably withhold the operational notification referred to in Title II and Title III.

CHAPTER 2 - Compliance testing

Article 36.
Common provisions for compliance testing

1. Testing of the performance of a transmission-connected demand facility, a transmission-connected distribution facility, or a demand unit with demand response active power control, demand response reactive power control or demand response transmission constraint management, shall aim at demonstrating that the requirements of this Regulation have been complied with.

2. Notwithstanding the minimum requirements for compliance testing set out in this Regulation, the relevant system operator is entitled to:

(a) allow the demand facility owner, the DSO or the CDSO to carry out an alternative set of tests, provided that those tests are efficient and suffice to demonstrate that a demand facility or a distribution system complies with the requirements of this Regulation; and

(b) require the demand facility owner, the DSO or the CDSO to carry out additional or alternative sets of tests in those cases where the information supplied to the relevant system operator in relation to compliance testing under the provisions of Articles 37 to 41, is not sufficient to demonstrate compliance with the requirements of this Regulation.

3. The demand facility owner, the DSO or the CDSO is responsible for carrying out the tests in accordance with the conditions laid down in Chapter 2 of Title IV. The relevant system operator shall cooperate and not unduly delay the performance of the tests.

4. The relevant system operator may participate in the compliance testing either on site or remotely from the system operator's control room. For that purpose, the demand facility owner, the DSO or the CDSO shall provide the monitoring equipment necessary to record all relevant test signals and measurements as well as ensure that the necessary representatives of the demand facility owner, the DSO or the CDSO are available on site for the entire testing period. Signals specified by the relevant system operator shall be provided if, for selected tests, the system operator wishes to use its own equipment to record performance. The relevant system operator has sole discretion to decide about its participation.

5. Additional details and requirements for compliance testing are detailed in Annex 3.

Article 37.
Compliance testing for disconnection and reconnection of transmission-connected distribution facilities

1. The transmission-connected distribution facilities shall comply with the requirements for disconnection and reconnection referred in Article 19 and shall be subject to the following compliance tests.

2. With regard to testing of the capability of reconnection after an incidental disconnection due to a network disturbance, reconnection shall be achieved through a reconnection procedure, preferably by automation, authorised by the relevant TSO.

3. With regard to the synchronisation test, the technical synchronisation capabilities of the transmission-connected distribution facility shall be demonstrated. This test shall verify the settings of the synchronisation devices. This test shall cover the following matters: voltage, frequency, phase angle range, deviation of voltage and frequency.

4. With regard to the remote disconnection test, the transmission-connected distribution facility's technical capability for remote disconnection at the connection point or points from the transmission system when required by the relevant TSO and within the time specified by the relevant TSO shall be demonstrated.

5. With regard to the low frequency demand disconnection test, the transmission-connected distribution facility's technical capability of low frequency demand disconnection of a percentage of demand to be specified by the relevant TSO, in coordination with adjacent TSOs, where equipped as provided for in Article 19, shall be demonstrated.

6. With regard to the low frequency demand disconnection relays test, the transmission-connected distribution facility's technical capability to operate from a nominal AC supply input shall be demonstrated in accordance with Article 19(1) and (2). This AC supply input shall be specified by the relevant TSO.

7. With regard to the low voltage demand disconnection test, the transmission-connected distribution facility's technical capability to operate in a single action with on load tap changer blocking in Article 19(3) shall be demonstrated in accordance with Article 19(2).

8. An equipment certificate may be used instead of part of the tests provided for in paragraph 1, on the condition that it is provided to the relevant TSO.

Article 38.

Compliance testing for information exchange of transmission-connected distribution facilities

1. With regard to information exchange between the relevant TSO and the transmission-connected distribution system operator in real time or periodically, the transmission-connected distribution facility's technical capability to comply with the information exchange standard established pursuant to Article 18(3) shall be demonstrated.

2. An equipment certificate may be used instead of part of the tests provided for in paragraph 1, on the condition that it is provided to the relevant TSO.

Article 39.

Compliance testing for disconnection and reconnection of transmission-connected demand facilities

1. The transmission-connected demand facilities shall comply with the requirements for disconnection and reconnection referred to in Article 19 and shall be subject to the following compliance tests.

2. With regard to testing of the capability of reconnection after an incidental disconnection due to a network disturbance, reconnection shall be achieved through a reconnection procedure, preferably by automation, authorised by the relevant TSO.

3. With regard to the synchronisation test, the technical synchronisation capabilities of the transmission-connected demand facility shall be demonstrated. This test shall verify the settings of the synchronisation devices. This test shall cover the following matters: voltage, frequency, phase angle range, deviation of voltage and frequency.

4. With regard to the remote disconnection test, the transmission-connected demand facility's technical capability for remote disconnection at the connection point or points from the transmission system when required by the relevant TSO and within the time specified by the relevant TSO shall be demonstrated.

5. With regard to the low frequency demand disconnection relays test, the transmission-connected demand facility's technical capability to operate from a nominal AC input shall be demonstrated in accordance with Article 19(1) and (2). This AC supply input shall be specified by the relevant TSO.

6. With regard to the low voltage demand disconnection test, the transmission-connected demand facility's technical capability to operate in a single action with on load tap changer blocking in Article 19(3) shall be demonstrated in accordance with Article 19(2).

7. An equipment certificate may be used instead of part of the tests provided for in paragraph 1, on the condition that it is provided to the relevant TSO.

Article 40.

Compliance testing for information exchange of transmission-connected demand facilities

1. With regard to information exchange between the relevant TSO and the transmission-connected demand facility owner in real time or periodically, the transmission-connected demand facility's technical capability to comply with the information exchange standard established pursuant to Article 18(3) shall be demonstrated.

2. An equipment certificate may be used instead of part of the tests provided for in paragraph 1, on the condition that it is provided to the relevant TSO.

Article 41.

Compliance testing for demand units with demand response active power control, reactive power control and transmission constraint management

1. With regard to the demand modification test:

(a) the technical capability of the demand unit used by a demand facility or a closed distribution system to provide demand response active power control, demand response reactive power control or demand response transmission constraint management to modify its power consumption, after receiving an instruction from the relevant system operator or relevant TSO, within the range, duration and time frame previously agreed and established in accordance with Article 28, shall be demonstrated, either individually or collectively as part of demand aggregation through a third party;

(b) the test shall be carried out either by an instruction or alternatively by simulating the receipt of an instruction from the relevant system operator or relevant TSO and adjusting the power demand of the demand facility or the closed distribution system;

(c) the test shall be deemed passed, provided that the conditions specified by the relevant system operator or relevant TSO pursuant to Article 28(2)(d)(f)(g)(h)(k) and (l) are fulfilled;

(d) an equipment certificate may be used instead of part of the tests provided for in paragraph 1(b), on the condition that it is provided to the relevant system operator or relevant TSO.

2. With regard to the disconnection or reconnection of static compensation facilities test:

(a) the technical capability of the demand unit used by a demand facility owner or closed distribution system operator to provide demand response active power control, demand response reactive power control or demand response transmission constraint management to disconnect or reconnect, or both, its static compensation facility when receiving an instruction from the relevant

system operator or relevant TSO, in the time frame expected in accordance with Article 28, shall be demonstrated, either individually or collectively as part of demand aggregation through a third party;

(b) the test shall be carried out by simulating the receipt of an instruction from the relevant system operator or relevant TSO and subsequently disconnecting the static compensation facility, and by simulating the receipt of an instruction from the relevant system operator or relevant TSO and subsequently reconnecting the facility;

(c) the test shall be deemed passed, provided that the conditions specified by the relevant system operator or relevant TSO pursuant to Article 28(2)(d)(f)(g)(h)(k) and (l) are fulfilled.

CHAPTER 3 - Compliance simulation

Article 42.
Common provisions on compliance simulations

1. Simulation of the performance of a transmission-connected demand facility, a transmission-connected distribution facility, or a demand unit with demand response very fast active power control within a demand facility or a closed distribution system shall result in demonstrating whether the requirements of this Regulation have been fulfilled or not.

2. Simulations shall be run in the following circumstances:

(a) a new connection to the transmission system is required;

(b) a new demand unit used by a demand facility or a closed distribution system to provide demand response very fast active power control to a relevant TSO has been contracted in accordance with Article 30;

(c) a further development, replacement or modernisation of equipment takes place;

(d) alleged incompliance by the relevant system operator with the requirements of this Regulation.

3. Notwithstanding the minimum requirements for compliance simulation set out in this Regulation, the relevant system operator is entitled to:

(a) allow the demand facility owner, the DSO or the CDSO to carry out an alternative set of simulations, provided that those simulations are efficient and suffice to demonstrate that a demand facility or a distribution system complies with the requirements of this Regulation or with national legislation; and

(b) require the demand facility owner, the DSO or the CDSO to carry out additional or alternative sets of simulations in those cases where the information supplied to the relevant system operator in relation to compliance simulation under the provisions of Articles 43, 44 and 45, is not sufficient to demonstrate compliance with the requirements of this Regulation.

4. The transmission-connected demand facility owner or the transmission-connected distribution system operator shall provide a report with the simulation results for each individual transmission-connected demand facility or transmission-connected distribution facility. The transmission-connected demand facility owner or the transmission- connected distribution system operator shall produce and provide a validated simulation model for a given transmission-connected demand facility or transmission-connected distribution facility. The scope of the simulation models is set out in Article 21(1) and (2).

5. The relevant system operator shall have the right to check that a demand facility or a distribution system complies with the requirements of this Regulation by carrying out its own compliance simulations based on the provided simulation reports, simulation models and compliance test measurements.

6. The relevant system operator shall provide the demand facility owner, the DSO or the CDSO with technical data and a simulation model of the network, to the extent necessary to carry out the requested simulations in accordance with Articles 43, 44 and 45.

7. Additional details and requirements for compliance simulations are detailed in Annex 4.

Article 43.
Compliance simulations for transmission-connected distribution facilities

1. With regard to the reactive power capability simulation of a transmission-connected distribution facility:

(a) a steady-state load flow simulation model of the network of the transmission-connected distribution system shall be used in order to calculate the reactive power exchange under different load and generation conditions;

(b) a combination of steady-state minimum and maximum load and generation conditions resulting in the lowest and highest reactive power exchange shall be part of the simulations;

(c) calculating the reactive power export at an active power flow of less than 25 % of the maximum import capability at the connection point shall be part of the simulations in accordance with Article 15.

2. The relevant TSO may specify the method for compliance simulation of the active control of reactive power set out in Article 15(3).

3. The simulation shall be deemed passed if the results demonstrate compliance with the requirements set out in Article 15.

Article 44.
Compliance simulations for transmission-connected demand facilities

1. With regard to the reactive power capability simulation of a transmission-connected demand facility without onsite generation:

(a) the transmission-connected demand facility without onsite generation's reactive power capability at the connection point shall be demonstrated;

(b) a load flow simulation model of the transmission-connected demand facility shall be used to calculate the reactive power exchange under different load conditions. Minimum and maximum load conditions resulting in the lowest and highest reactive power exchange at the connection point shall be part of the simulations;

(c) the simulation shall be deemed passed if the results demonstrate compliance with the requirements set out in Article 15(1) and (2).

2. With regard to the reactive power capability simulation of a transmission-connected demand facility with onsite generation:

(a) a load flow simulation model of the transmission-connected demand facility shall be used to calculate the reactive power exchange under different load conditions and under different generation conditions;

(b) a combination of minimum and maximum load and generation conditions resulting in the lowest and highest reactive power capability at the connection point shall be part of the simulations;

(c) the simulation shall be deemed passed if the results demonstrate compliance with the requirements set out in Article 15(1) and (2).

Article 45.

Compliance simulations for demand units with demand response very fast active power control

1. The model of the demand unit used by a demand facility owner or a closed distribution system operator to provide demand response very fast active power control shall demonstrate the technical capability of the demand unit to provide very fast active power control to a low frequency event in the conditions set out in Article 30.

2. The simulation shall be deemed passed provided that the model demonstrates compliance with the conditions set out in Article 30.

CHAPTER 4 - Compliance monitoring

Article 46.
Compliance monitoring for transmission-connected distribution facilities

With regard to compliance monitoring of the reactive power requirements applicable to transmission-connected distribution facilities:

(a) the transmission-connected distribution facility shall be equipped with necessary equipment to measure the active and reactive power, in accordance with Article 15; and

(b) the relevant system operator shall specify the time frame for compliance monitoring.

Article 47.
Compliance monitoring for transmission-connected demand facilities

With regard to compliance monitoring of the reactive power requirements applicable to transmission-connected demand facilities:

(a) the transmission-connected demand facility shall be equipped with necessary equipment to measure the active and reactive power, in accordance with Article 15; and

(b) the relevant system operator shall specify the time frame for compliance monitoring.

TITLE V APPLICATIONS AND DEROGATIONS

CHAPTER 1 - Cost-benefit analysis

Article 48.

Identification of costs and benefits of application of requirements to existing transmission-connected demand facilities, existing transmission-connected distribution facilities, existing distribution systems and existing demand units

1. Prior to the application of any requirement set out in this Regulation to existing transmission-connected demand facilities, existing transmission-connected distribution facilities, existing distribution systems and existing demand units in accordance with Article 4(3), the relevant TSO shall undertake a qualitative comparison of costs and benefits related to the requirement under consideration. This comparison shall take into account available network-based or market- based alternatives. The relevant TSO may only proceed to undertake a quantitative cost-benefit analysis in accordance with paragraphs 2 to 5, if the qualitative comparison indicates that the likely benefits exceed the likely costs. If, however, the cost is deemed high or the benefit is deemed low, then the relevant TSO shall not proceed further.

2. Following a preparatory stage undertaken in accordance with paragraph 1, the relevant TSO shall carry out a quantitative cost-benefit analysis of any requirement under consideration for application to existing transmission- connected demand facilities, existing transmission-connected distribution facilities, existing distribution systems and existing demand units that have demonstrated potential benefits as a result of the preparatory stage according to paragraph 1.

3. Within three months of concluding the cost-benefit analysis, the relevant TSO shall summarise the findings in a report which shall:

(a) include the cost-benefit analysis and a recommendation on how to proceed;

(b) include a proposal for a transitional period for applying the requirement to existing transmission-connected demand facilities, existing transmission-connected distribution facilities, existing distribution systems and existing demand units. That transitional period shall not be more than two years from the date of the decision of the regulatory authority or where applicable the Member State on the requirement's applicability;

(c) be subject to public consultation in accordance with Article 9.

4. No later than six months after the end of the public consultation, the relevant TSO shall prepare a report explaining the outcome of the consultation and making a proposal on the applicability of the requirement under con- sideration to existing transmission-connected demand facilities, existing transmission-connected distribution facilities, existing distribution systems and existing demand units. The report and proposal shall be notified to the regulatory authority or, where applicable, the Member State, and the demand facility owner, DSO, CDSO or, where applicable, third party shall be informed on its content.

5. The proposal made by the relevant TSO to the regulatory authority or, where applicable, the Member State pursuant to paragraph 4 shall include the following:

(a) an operational notification procedure for demonstrating the implementation of the requirements by the existing transmission-connected demand facilities, existing transmission-connected distribution facilities, existing distribution systems and existing demand units used by a demand facility or a closed distribution system to provide demand response services to relevant system operators and relevant TSOs;

(b) a transitional period for implementing the requirements which shall take into account the classes of transmission- connected demand facilities, transmission-connected distribution facilities, distribution systems and demand units used by a demand facility or a closed distribution system to provide demand response services to relevant system operators and relevant TSOs and any underlying obstacles to the efficient implementation of the equipment modification/refitting.

Article 49.
Principles of cost-benefit analysis

1. Demand facility owners, DSOs and CDSOs shall assist and contribute to the cost-benefit analysis undertaken according to Articles 48 and 53 and provide the necessary data as requested by the relevant system operator or relevant TSO within three months of receiving a request, unless agreed otherwise by the relevant TSO. For the preparation of a cost-benefit-analysis by a demand facility owner or prospective owner, or by a DSO/CDSO or prospective operator, assessing a potential derogation pursuant to Article 52, the relevant TSO and DSO shall assist and contribute to the cost-benefit analysis and provide the necessary data as requested by the demand facility owner or prospective owner, or by the DSO/CDSO or prospective operator, within three months of receiving a request, unless agreed otherwise by the demand facility owner or prospective owner, or by the DSO/CDSO or prospective operator.

2. A cost-benefit analysis shall be in line with the following principles:

(a) the relevant TSO, demand facility owner or prospective owner, DSO/CDSO or prospective operator, shall base its cost-benefit analysis on one or more of the following calculating principles:

(i) the net present value;

(ii) the return on investment;

(iii) the rate of return;

(iv) the time needed to break even;

(b) the relevant TSO, demand facility owner or prospective owner, DSO/CDSO or prospective operator, shall also quantify socioeconomic benefits in terms of improvement in security of supply and shall include at least:

(i) the associated reduction in probability of loss of supply over the lifetime of the modification;

(ii) the probable extent and duration of such loss of supply;

(iii) the societal cost per hour of such loss of supply;

(c) the relevant TSO, demand facility owner or prospective owner, DSO/CDSO or prospective operator, shall quantify the benefits to the internal market in electricity, cross-border trade and integration of renewable energies, including at least:

(i) the active power frequency response;

(ii) the balancing reserves;

(iii) the reactive power provision;

(iv) congestion management;

(v) defence measures;

(d) the relevant TSO shall quantify the costs of applying the necessary rules to existing transmission-connected demand facilities, existing transmission-connected distribution facilities, existing distribution systems, or existing demand units, including at least:

(i) the direct costs incurred in implementing a requirement;

(ii) the costs associated with attributable loss of opportunity;

(iii) the costs associated with resulting changes in maintenance and operation.

CHAPTER 2 - Derogations

Article 50.
Power to grant derogations

1. Regulatory authorities may, at the request of a demand facility owner or prospective owner, and a DSO/CDSO or prospective operator, relevant system operator or relevant TSO, grant demand facility owners or prospective owners, and DSOs/CDSOs or prospective operators, relevant system operators or relevant TSOs derogations from one or more provisions of this Regulation for new and existing transmission-connected demand facilities, transmission-connected distribution facilities, distribution systems and demand units in accordance with Articles 51 to 53.

2. Where applicable in a Member State, derogations may be granted and revoked in accordance with Articles 51 to 53 by other authorities than the regulatory authority.

Article 51.
General provisions

1. Each regulatory authority shall specify, after consulting relevant system operators, demand facility owners, DSOs, CDSOs, and other stakeholders whom it deems affected by this Regulation, the criteria for granting derogations pursuant to Articles 52 and 53. It shall publish those criteria on its website and notify them to the Commission within nine months of the entry into force of this Regulation. The Commission may require a regulatory authority to amend the criteria if it considers that they are not in line with this Regulation. This possibility to review and amend the criteria for granting derogations shall not affect the derogations already granted which shall continue to apply until the scheduled expiry date as detailed in the decision granting the exemption.

2. If the regulatory authority deems that it is necessary due to a change in circumstances relating to the evolution of system requirements, it may review and amend at most once every year the criteria for granting derogations in accordance with paragraph 1. Any changes to the criteria shall not apply to derogations for which a request has already been made.

3. The regulatory authority may decide that transmission-connected demand facilities, transmission-connected distribution facilities, distribution systems and demand units for which a request for a derogation has been filed pursuant to Articles 52 or 53 do not need to comply with the requirements of this Regulation from which a derogation has been sought from the day of filing the request until the regulatory authority's decision is issued.

4. RAE's decision no 778/2018 on the criteria to be used for the Derogations has been issued in the Government Gazette (ΦΕΚ 4643/18.10.2018).

Article 52.
Request for a derogation by a demand facility owner, a distribution system operator or a closed distribution system operator

1. Demand facility owners or prospective owners, and DSOs/CDSOs or prospective operators, may request a derogation to one or several requirements of this Regulation for transmission-connected demand facilities, transmission-connected distribution facilities, distribution systems, or demand units used by a demand facility or a closed distribution system to provide demand response services to a relevant system operator and a relevant TSO.

2. A request for a derogation shall be filed with the relevant system operator and include:

(a) an identification of the demand facility owner or prospective owner, the DSO/CDSO or prospective operator, and a contact person for any communications;

(b) a description of the transmission-connected demand facility, the transmission-connected distribution facility, the distribution system, or the demand unit for which a derogation is requested;

(c) a reference to the provisions of this Regulation from which a derogation is requested and a detailed description of the requested derogation;

(d) detailed reasoning, with relevant supporting documents and cost-benefit analysis pursuant to the requirements of Article 49;

(e) demonstration that the requested derogation would have no adverse effect on cross-border trade.

3. Within two weeks of receipt of a request for a derogation, the relevant system operator shall confirm to the demand facility owner or prospective owner, or to the DSO/CDSO or prospective operator, whether the request is complete. If the relevant system operator considers that the request is incomplete, the demand facility owner or prospective owner, or the DSO/CDSO or prospective operator, shall submit the additional required information within one month from the receipt of the request for additional information. If the demand facility owner or prospective owner, or if the DSO/CDSO or prospective operator, does not supply the requested information within that time limit, the request for a derogation shall be deemed withdrawn.

4. The relevant system operator shall, in coordination with the relevant TSO and any affected adjacent DSO, assess the request for a derogation and the provided cost-benefit analysis, taking into account the criteria determined by the regulatory authority pursuant to Article 51.

5. Within six months of receipt of a request for a derogation, the relevant system operator shall forward the request to the regulatory authority and submit the assessment(s) prepared in accordance with paragraphs 4. That period may be extended by one month where the relevant system operator seeks further information from the demand facility owner or prospective owner, or from the DSO/CDSO or prospective operator, and by two months where the relevant system operator requests the relevant TSO to submit an assessment of the request for a derogation.

6. The regulatory authority shall adopt a decision concerning any request for a derogation within six months from the day after it receives the request. That time limit may be extended by three months before its expiry where the regulatory authority requires further information from the demand facility owner or prospective owner, or from the DSO/CDSO or prospective operator, or from any other interested parties. The additional period shall begin when the complete information has been received.

7. The demand facility owner or prospective owner, or the DSO/CDSO or prospective operator, shall submit any additional information requested by the regulatory authority within two months of such request. If the demand facility owner or prospective owner, or if the DSO/CDSO or prospective operator, does not supply the requested information within that time limit, the request for a derogation shall be deemed withdrawn unless, before its expiry:

(a) the regulatory authority decides to provide an extension; or

(b) the demand facility owner or prospective owner, or the DSO/CDSO or prospective operator, informs the regulatory authority by means of a reasoned submission that the request for a derogation is complete.

8. The regulatory authority shall issue a reasoned decision concerning a request for a derogation. Where the regulatory authority grants a derogation, it shall specify its duration.

9. The regulatory authority shall notify its decision to the relevant demand facility owner or prospective owner, the DSO/CDSO or prospective operator, the relevant system operator and the relevant TSO.

10. A regulatory authority may revoke a decision granting a derogation if the circumstances and underlying reasons no longer apply or upon a reasoned recommendation of the Commission or reasoned recommendation by the Agency pursuant to Article 55(2).

11. For demand units within a demand facility or a closed distribution system connected at a voltage level of or below 1 000 V, a request for a derogation under this Article may be made by a third party on behalf of the demand facility owner or prospective owner, or on behalf of the CDSO or prospective operator. Such a request may be for a single demand unit or multiple demand units within the same demand facility or closed distribution system. In the case of the latter, and provided the cumulative maximum capacity is specified, the third party may substitute the details required by point (a) of paragraph 2 with their details.

Article 53.
Request for a derogation by a relevant system operator or relevant TSO

1. Relevant system operators or relevant TSOs may request derogations for transmission-connected demand facilities, transmission-connected distribution facilities, distribution systems, or demand units within a demand facility or a closed distribution system connected or to be connected to their network.

2. Relevant system operators or relevant TSOs shall submit their requests for a derogation to the regulatory authority. Each request for a derogation shall include:

(a) identification of the relevant system operator or relevant TSO, and a contact person for any communications;

(b) a description of the transmission-connected demand facility, the transmission-connected distribution facility, the distribution system, or the demand unit for which a derogation is requested and the total installed capacity and number of transmission-connected demand facilities, transmission-connected distribution facilities, distribution systems, or demand units;

(c) the requirement or requirements of this Regulation for which a derogation is requested, with a detailed description of the requested derogation;

(d) detailed reasoning, with all relevant supporting documents;

(e) demonstration that the requested derogation would have no adverse effect on cross-border trade;

(f) a cost-benefit analysis pursuant to the requirements of Article 49. If applicable, the cost-benefit analysis shall be carried out in coordination with the relevant TSO and any adjacent DSO.

3. Where the request for a derogation is submitted by a relevant DSO, the regulatory authority shall, within two weeks from the day after receipt of that request, ask the relevant TSO to assess the request for a derogation in the light of the criteria determined by the regulatory authority pursuant to Article 51.

4. Within two weeks from the day after the receipt of such request for assessment, the relevant TSO shall confirm to the relevant DSO whether the request for a derogation is complete. If the relevant

TSO considers that it is incomplete, the relevant DSO shall submit the required additional information within one month from the receipt of the request for additional information.

5. Within six months of receipt of a request for a derogation, the relevant TSO shall submit to the regulatory authority its assessment, including any relevant documentation. The six-month time limit may be extended by one month where the relevant TSO seeks further information from the relevant DSO.

6. The regulatory authority shall adopt a decision concerning a request for a derogation within six months from the day after it receives the request. Where the request for a derogation is submitted by the relevant DSO, the six-month time limit runs from the day following receipt of the relevant TSO's assessment pursuant to paragraph 5.

7. The six-month time limit referred to in paragraph 6 may, before its expiry, be extended by an additional three months where the regulatory authority requests further information from the relevant system operator requesting the derogation or from any other interested parties. That additional period shall run from the day following the date of receipt of the complete information.

The relevant system operator shall provide any additional information requested by the regulatory authority within two months from the date of the request. If the relevant system operator does not provide the requested additional information within that time limit, the request for a derogation shall be deemed withdrawn unless, before expiry of the time limit:

(a) the regulatory authority decides to provide an extension; or

(b) the relevant system operator informs the regulatory authority by means of a reasoned submission that the request for a derogation is complete.

8. The regulatory authority shall issue a reasoned decision concerning a request for a derogation. Where the regulatory authority grants derogation, it shall specify its duration.

9. The regulatory authority shall notify its decision to the relevant system operator requesting the derogation, the relevant TSO and the Agency.

10. Regulatory authorities may lay down further requirements concerning the preparation of requests for a derogation by relevant system operators. In doing so, regulatory authorities shall take into account the delineation between the transmission system and the distribution system at the national level and shall consult with system operators, demand facility owners and stakeholders, including manufacturers.

11. A regulatory authority may revoke a decision granting a derogation if the circumstances and underlying reasons no longer apply or upon a reasoned recommendation of the Commission or reasoned recommendation by the Agency pursuant to Article 55(2).

Article 54.
Register of derogations from the requirements of this Regulation

1. Regulatory authorities shall maintain a register of all derogations they have granted or refused and shall provide the Agency with an updated and consolidated register at least once every six months, a copy of which shall be given to ENTSO for Electricity.

2. The register shall contain, in particular:

(a) the requirement or requirements for which the derogation is granted or refused;

(b) the content of the derogation;

(c) the reasons for granting or refusing the derogation;

(d) the consequences resulting from granting the derogation.

Article 55.
Monitoring of derogations

1. The Agency shall monitor the procedure of granting derogations with the cooperation of the regulatory authorities or relevant authorities of the Member State. Those authorities or relevant authorities of the Member State shall provide the Agency with all the information necessary for that purpose.

2. The Agency may issue a reasoned recommendation to a regulatory authority to revoke a derogation due to a lack of justification. The Commission may issue a reasoned recommendation to a regulatory authority or relevant authority of the Member State to revoke a derogation due to a lack of justification.

3. The Commission may request the Agency to report on the application of paragraphs 1 and 2 and to provide reasons for requesting or not requesting derogations to be revoked.

TITLE VI NON-BINDING GUIDANCE AND MONITORING OF IMPLEMENTATION

Article 56.
Non-binding guidance on implementation

1. No later than six months after the entry into force of this Regulation, the ENTSO for Electricity shall prepare and thereafter every two years provide non-binding written guidance to its members and other system operators concerning the elements of this Regulation requiring national decisions. The ENTSO for Electricity shall publish this guidance on its website.

2. ENTSO for Electricity shall consult stakeholders when providing non-binding guidance.

3. The non-binding guidance shall explain the technical issues, conditions and interdependencies which need to be considered when complying with the requirements of this Regulation at national level.

Article 57.
Monitoring

1. ENTSO for Electricity shall monitor the implementation of this Regulation in accordance with Article 8(8) of Regulation (EC) No 714/2009. Monitoring shall cover in particular the following matters:

(a) identification of any divergences in the national implementation of this Regulation;

(b) assessment of whether the choice of values and ranges in the requirements applicable to transmission-connected demand facilities, transmission-connected distribution facilities, distribution systems and demand units under this Regulation continues to be valid.

2. The Agency, in cooperation with ENTSO for Electricity, shall produce by 12 months after the entry into force of this Regulation a list of the relevant information to be communicated by ENTSO for Electricity to the Agency in accordance with Article 8(9) and Article 9(1) of Regulation (EC) No 714/2009. The list of relevant information may be subject to updates. ENTSO for Electricity shall maintain a comprehensive, standardised format, digital data archive of the information required by the Agency.

3. Relevant TSOs shall submit to ENTSO for Electricity the information required to perform the tasks referred to in paragraphs 1 and 2.

Based on a request of the regulatory authority, DSOs shall provide TSOs with information under paragraph 2 unless the information is already obtained by regulatory authorities, the Agency or ENTSO-E in relation to their respective implementation monitoring tasks, with the objective of avoiding duplication of information.

4. Where ENTSO for Electricity or the Agency establish areas subject to this Regulation where, based on market developments or experience gathered in the application of this Regulation, further harmonisation of the requirements under this Regulation is advisable to promote market integration, they shall propose draft amendments to this Regulation pursuant to Article 7(1) of Regulation (EC) No 714/2009.

TITLE VII FINAL PROVISIONS

Article 58.
Amendment of contracts and general terms and conditions

1. Regulatory authorities shall ensure that all relevant clauses in contracts and general terms and conditions relating to the grid connection of new transmission-connected demand facilities, new transmission-connected distribution facilities, new distribution systems and new demand units are brought into compliance with the requirements of this Regulation.

2. All relevant clauses in contracts and relevant clauses of general terms and conditions relating to the grid connection of existing transmission-connected demand facilities, existing transmission-connected distribution facilities, existing distribution systems and existing demand units subject to all or some of the requirements of this Regulation in accordance with paragraph 1 of Article 4 shall be amended in order to comply with the requirements of this Regulation. The relevant clauses shall be amended within three years following the decision of the regulatory authority or Member State as referred to in Article 4(1).

3. Regulatory authorities shall ensure that agreements between system operators and owners of new or existing demand facilities or operators of new or existing distribution systems subject to this Regulation and relating to grid connection requirements for transmission-connected demand facilities, transmission-connected distribution facilities, distribution systems and demand units used by a demand facility or a closed distribution system to provide demand response services to relevant system operators and relevant TSOs, in particular in national network codes, reflect the requirements set out in this Regulation.