

# ENTSO-E Network Code on Demand Connection

21 December 2012

## **Notice**

This document reflects the work done by ENTSO-E in line with ACER's framework guidelines on electricity grid connections published on 20 July 2011 and the EC mandate letter received by ENTSO-E on 5 January 2012.

It incorporates the input of an extensive informal and formal dialogue with stakeholders, including meetings, public workshops, a "Call for Stakeholder Input" between 5 April and 9 May 2012, as well as bilateral/ trilateral meetings with ACER and with the EC, and a formal consultation on a draft code that took place during the period between 27 June and 12 September 2012 aiming at exchanging views on the challenges and key issues.

This document is now called "Network Code on Demand Connection" and is submitted to ACER for ACER's reasoned opinion pursuant to Article 6 of Regulation (EC) 714/2009.

Having regard to 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,

Having regard to Regulation (EC) No 713/2009 of the European Parliament and of the Council of 13 July 2009 establishing an Agency for the Cooperation of Energy Regulators (ACER),

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, and especially Article 6,

Having regard to the priority list issued by the European Commission on 19 July 2012,

Having regard to the Framework Guidelines on Electricity Grid Connection issued by ACER on 20 July 2011;

Whereas:

(1) 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, and 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 underline the need for an increased cooperation and coordination among transmission system operators within a European Network of Transmission System Operators for Electricity (ENTSO-E) to create network codes for providing and managing effective and transparent access to the transmission networks across borders, and to ensure coordinated and sufficiently forward-looking planning and sound technical evolution of the transmission system in the Community, including the creation of interconnection capacities, with due regard to the environment;

(2) Transmission system operators (TSOs) are according to Article 2 and 12 of Directive 2009/72/EC responsible for providing and operating high and extra-high voltage networks for long-distance transmission of electricity as well as for supply of lower-level regional distribution systems and directly connected customers. Besides this transmission and supply task it is also the TSOs' responsibility to ensure the system security with a high level of reliability and quality;

(3) Distribution system operators (DSOs) are according to Articles 2 and 25 of Directive 2009/72/EC responsible for providing and operating low, medium and high voltage networks for regional distribution of electricity as well as for supply of lower-level Distribution Networks and directly connected customers. Besides the regional distribution and supply task it is also the DSOs' responsibility to ensure the security of their networks with a high level of reliability and quality.

(4) The Network Code provides for various requirements to be defined by the Relevant Network Operators. In those countries where the Transmission System Operators are entitled to define – read here to propose to the relevant bodies for its approval – the technical and instrumental operational procedures for the proper technical management of the power system or to give the necessary instructions to other entities, which need to be taken into account to ensure the necessary coordination of the system and maintain the overall system security, the Network Code does not affect the Transmission System Operators' competences and responsibilities.

(5) The Network Code provides for agreements by Relevant Network Operators on various technical requirements. In those countries where the Transmission System Operators are granted public authority or competence to adopt decisions when defining requirements for connecting Demand Facilities or Distribution Networks which have to be taken into account for, and cannot be changed by, any subsequent Connection Agreement with the Relevant Network Operator, this Network Code does not affect the Transmission System Operators' decision making powers in those countries.

(46) Secure system operation is only possible by close cooperation between all users of both distribution and transmission networks and the Network Operators. In the context of system security the transmission and distribution networks and all their respective users need to be considered as one entity from a systems engineering approach, given that the security of each part of the system is interdependent of the other part.

(57) It is therefore of crucial importance that demand users are obliged going forward to meet the relevant technical requirements concerning system security as a prerequisite for network connection.

(68) In order to preserve or to re-establish system security appropriate dynamic behaviour of relevant users and their protection and control facilities are necessary both in normal operating conditions and in a range of disturbed operating conditions. The close cooperation between owners and the Network Operators shall take place in due compliance with the principle of confidentiality, such as specified in Article 16 (1) of Directive 2009/72/EC.

(79) ENTSO-E has drafted this Network Code on Demand Connection aiming at setting out clear and objective requirements for different categories of significant grid users for network connection in order to contribute to non-discrimination, effective competition and the efficient functioning of the internal electricity market and to ensure system security.

(810) Regulation (EC) No 714/2009 in its Articles 8(7) provides that: *“the network codes shall be developed for cross-border network issues and market integration issues and shall be without prejudice to the Member States' right to establish national network codes which do not affect cross-border trade”*.

(911) For the purpose of this Network Code the definition of cross border network issues and market integration issues is derived with due consideration to the objectives of the Third Energy Package, namely: supporting the completion and functioning of the internal market in electricity and cross-border trade, facilitating the targets for penetration of renewable generation, and maintaining security of supply.

(1012) The interconnected transmission system establishes the wholesale platform for the internal electricity market. TSOs are responsible for maintaining, preserving and restoring security of the interconnected system with a high level of reliability and quality, which in this context is the essence in facilitating cross-border trading.

(1113) 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 future the role of demand users is expected to play a more pivotal role in this regard. Regular coordination at the level of dynamic generation and demand together with an adequate performance of equipment connected to their networks with robustness to face disturbances and to help to prevent any large disturbance or to facilitate restoration of the system after a collapse are

fundamental prerequisites.

(1214) Secure system operation is only possible by close cooperation of all users connected at all voltage levels with the network operators in an appropriate way. Consequently, the Transmission and Distribution Network and the generating and Demand Facilities need to be considered as one entity from a systems engineering perspective. It is therefore of crucial importance that Power Generating Modules, Distribution Networks and Demand Facilities are obliged to meet the requirements and to provide the technical capabilities with relevance to system security.

(1315) To ensure system security within the interconnected transmission network and to provide an adequate security level a common understanding on these requirements to Distribution Networks, including Closed Distribution Networks, and demand facilities, which are becoming increasingly more active, is essential.

(1416) All requirements that contribute to maintaining, preserving and restoring system security in order to facilitate the proper functioning of the internal electricity market within and between synchronous areas, and to achieving cost efficiencies through harmonisation of requirements shall be regarded as “cross-border network issues and market integration issues”.

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## Chapter 1 GENERAL PROVISIONS

### ARTICLE 1 SUBJECT MATTER

This Network Code defines a common set of requirements for Demand Facilities, Distribution Networks and Distribution Network Connections, both existing and new, which are significant according to the provisions of this Network Code.

The Network Code sets up a common framework for Network Connection Agreements between Network Operators and the Demand Facility Owner or Distribution Network Operator.

For the avoidance of doubt the requirements and conditions, contained within the Articles for demand (excluding DSO networks) set out below are specified on the basis of a pure demand. In situations where generation and demand co-exist in a Demand Facility or Closed Distribution Network, all demand requirements within this code will be evaluated on the basis that the generation is not present. The Power Generating Modules will have to comply with the requirements of the Network Code on Requirements for Grid Connection applicable to all Generators.

In accordance with the Article 8(7) of Regulation (EC) N° 714/2009, this Network Code shall not apply to the small isolated systems and in the micro isolated systems.

### ARTICLE 2 DEFINITIONS

1. For the purpose of this Network Code, the definitions contained in Article 2 of Directive 2009/72/EC and in Article 2 of Regulation (EC) N°714/2009 apply. The definitions contained in the Article 2 of the Network Code on Requirements for Grid Connection applicable to all Generators and the Network Code on Capacity Calculation and Congestion Management shall also apply, with the exception of the following terms, for which the definition given in this paragraph shall apply :

**Compliance Monitoring** means the process of verification that the technical capabilities for example of Demand Facilities, Distribution Networks or Distribution Network Connections are maintained compliant with the specifications and requirements of this Network Code after starting operation;

**Compliance Simulation** means the process of verification that Demand Facilities, Distribution Networks or Distribution Network Connections are compliant with the specifications and requirements of this Network Code, for example before starting operation of new installations. The verification should include, inter alia, the revision of documentation, the verification of the requested capabilities of the facility, Distribution Network or Distribution Network Connections by simulation studies and the revision against actual measurements;

**Compliance Testing** means the process of verification that Demand Facilities, Distribution Networks

or Distribution Network Connections are compliant with the specifications and requirements of this Network Code, for example before starting operation of new installations. The verification includes the revision of documentation, the verification of the requested capabilities of the facility by practical tests and simulation studies and the revision of actual measurements during trial operation;

**Connection Agreement** means a contract between the Relevant Network Operator and either the Demand Facility Owner or Distribution Network Operator which includes technical specifications and site specific requirements for the facility or Distribution Network Connection;

**Connection Point** means the interface as identified in the Connection Agreement at which:

- a) the Demand Facility is connected to a Transmission Network, or Distribution Network, or;
- b) the Distribution Network is connected to a Transmission Network, or;
- c) the Closed Distribution Network providing DSR is connected to the Distribution Network;

**Control Area** means a part of the interconnected electricity transmission system controlled by a single Transmission System Operator;

**Derogation** means a time limited or indefinite acceptance in writing by the Relevant National Regulatory Authority of a non-compliance of a Demand Facility or Distribution Network with regard to identified requirements of this Network Code;

**Energisation Operational Notification (EON)** means a notification issued by the Relevant Network Operator to either a Demand Facility Owner or a Distribution Network Operator prior to energisation of its internal Network;

**Equipment Certificate** means a document issued by an Authorised Certifier for equipment used in a Demand Unit providing DSR connected to the Distribution Network, Transmission Connected Distribution Network or Transmission Connected Demand Facility, confirming compliance with relevant requirements of this Network Code as far as the influence on overall performance by this specific equipment. The Equipment Certificate shall define the extent of its validity in relation to parameters for which there is only a range of values defined in this document. This will identify its validity at a national or other level at which a specific value is selected from the range allowed at a European level. The Equipment Certificate will have a unique number allowing simple reference to it in an Installation Document;

**Final Operational Notification (FON)** means a notification issued by the Relevant Network Operator to a Demand Facility Owner or, Distribution Network Operator confirming that the Demand Facility Owner or, Distribution Network Operator, respectively is entitled to operate its Demand Facility or Distribution Network by using the Network connection because compliance with the technical design and operational criteria has been demonstrated as referred to in this Network Code;

**Installation Document** means a simple structured document, data of tick sheet, containing information about a Demand Unit with Demand Side Response below 1000V and confirming compliance with the relevant requirements of this Network Code;

**Instruction** means command given orally, manually or by automatic remote control facilities, e.g.

reconnection of a Demand Facility or Distribution Network Connection, from a Network Operator to a Demand Facility Owner or Distribution Network Operator, respectively, in order to perform an action;

**Interim Operational Notification (ION)** means a notification issued by the Relevant Network Operator to a Demand Facility Owner or Distribution Network Operator, confirming that they are entitled to operate their equipment by using the Network connection for a limited period of time and to undertake compliance tests to meet the technical design and operational criteria of this Network Code;

**Limited Operational Notification (LON)** means a notification issued by the Relevant Network Operator to a Demand Facility Owner or, Distribution Network Operator, which has previously reached FON status, but is temporarily subject to either a significant modification or loss of capability which has resulted in non-compliance to the Network Code;

**Network Operator** means an entity that operates a Network. This can be either a TSO, a DSO, or the operator of a Closed Distribution Network;

**Relevant Network Operator** means the operator of the Network to which a Demand Facility, Demand Unit or Distribution Network is or will be connected;

**Relevant TSO** means the TSO in whose Control Area a Demand Facility, Demand Unit or Distribution Network Connection is or will be connected to the Network at any Voltage level; and

**Statement of Compliance** means a document provided by either a Demand Facility Owner or Distribution Network Operator to the Relevant Network Operator stating the current status with respect to compliance itemised for each element of this Network Code.

2. The following definitions shall apply:

**Aggregator** means a legal entity which is responsible for the operation of a number of Demand Facilities by means of Demand Aggregation;

**Block Loading** means the maximum step Active Power loading of reconnected demand during system restoration after black-out (is the state where the operation of part or all Transmission System is terminated);

**Closed Distribution Network** means in the context of this Network Code a Network classified as closed distribution network pursuant to Article 28(1) of Directive 2009/72/EC at national level. Article 28 of Directive 2009/72/EC defines such a Network as a system which distributes electricity within a geographically confined industrial, commercial or shared services site and does not (without prejudice to 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) supply household customers. This Closed Distribution Network will either have its operations or the production process of the users of

the system integrated for specific or technical reasons or distribute electricity primarily to the owner or operator of the Closed Distribution Network or their related undertakings;

**Control Room** means a Relevant Network Operator's centralised operation centre;

**Demand Aggregation** means a set of Demand Facilities which can be operated as a single facility for the purposes of offering one or more Demand Side Response services;

**Demand Facility** means a facility which consumes electrical energy and is connected at one or more Connection Points to the Network. For the avoidance of doubt a Distribution Network and/or auxiliary supplies of a Power Generating Module are not to be considered a Demand Facility;

**Demand Facility Owner** means the owner of the Demand Facility;

**Demand Side Response (DSR)** means demand offered for the purposes of, but not restricted to, providing Active or Reactive Power management, Voltage and Frequency regulation and System Reserve;

**Demand Side Response Active Power Control (DSR APC)** means demand within a Demand Facility or Closed Distribution Network that is accessible for modulation by the Relevant Network Operator, which results in an Active Power modification;

**Demand Side Response Low Frequency Demand Disconnection (DSR LFDD)** means demand within a Demand Facility or Closed Distribution Network that can be disconnected in case of low Frequency;

**Demand Side Response Low Voltage Demand Disconnection (DSR LVDD)** means demand within a Demand Facility or Closed Distribution Network that can be disconnected in case of low Voltage;

**Demand Side Response Reactive Power Control (DSR RPC)** means Reactive Power or Reactive Power devices (Mvar's) in a Demand Facility or Closed Distribution Network that are accessible for modulation by the Relevant Network Operator;

**Demand Side Response System Frequency Control (DSR SFC)** means reduction or increase of the demand of electrical devices in response to Frequency fluctuations, made by an autonomous response to temperature targets of these electrical devices to diminish these fluctuations;

**Demand Side Response Transmission Constraint Management (DSR TCM)** means demand that is accessible for modulation by the Relevant Network Operator to manage transmission constraints within the Network;

**Demand Side Response Unit Document (DSRUD)** means a document issued either by the Demand Facility Owner or Distribution Network Operator to the Relevant Network Operator or Relevant TSO pursuant to Article 9(3) for demand connections with DSR above 1000V. The DSRUD is intended to contain information confirming that the Demand Unit with DSR has demonstrated compliance with the technical criteria as referred to in this Network Code and provided the necessary data and statements including a Statement of Compliance;

**Demand Side Response Very Fast Active Power Control (DSR VFAPC)** means demand within a Demand Facility or Closed Distribution Network that can be modulated very fast, i.e. within 2 seconds, in response to a Frequency deviation, which results in a very fast Active Power modification;

**Demand Unit** means an indivisible set of installations which can be actively controlled by a Demand Facility Owner or Distribution Network Operator to moderate its electrical energy demand. A storage device within a Demand Facility or Closed Distribution Network operating in electricity consumption mode is considered to be a Demand Unit. A hydro pump-storage unit with both generating and pumping operation mode is excluded. If there is more than one unit consuming power within a Demand Facility, that cannot be operated independently from each other or can reasonably be considered in a combined way, then each of the combinations of these units shall be considered as one Demand Unit;

**Distribution Network** means an electrical Network, including Closed Distribution Networks, for the distribution of electrical power from and to third party[s] connected to it, a Transmission or another Distribution Network;

**Distribution Network Connection** means the electrical plant and equipment present at the Connection Point, typically a substation, of either a new or existing Distribution Network to the Transmission Network;

**Distribution Network Operator (DNO)** means either a Distribution System Operator or an operator of a Closed Distribution Network;

**ENTSO-E Network Area** means the geographic area covered by the Network of the members of ENTSO-E;

**Existing Demand Facility** means a Demand Facility which is not a New Demand Facility.

**Existing Distribution Network Connection** means a Distribution Network Connection which is not a New Distribution Network Connection;

**Interim Compliance Statement** means an itemized statement of compliance provided by the Demand Facility Owner or, Distribution Network Operator, to the Relevant Network Operator as established in this Network Code and as additionally required by national legislation including the national codes;

**Low Frequency Demand Disconnection (LFDD)** means an action where demand is disconnected during a low Frequency event in order to recover the balance between demand and generation to restore system Frequency to acceptable limits;

**Low Voltage Demand Disconnection (LVDD)** means a restoration action where demand is disconnected during a low voltage event in order to recover Voltage to a sustainable level within acceptable limits;

**Main Plant** means at least one of the following equipment: motors, transformers, high voltage

equipment at the Connection Point and process production plant;

**Maximum Export Capability (MEC)** means the maximum continuous Active Power which a Demand Facility, or Distribution Network, can feed into the Network at the Connection Point as defined in the Connection Agreement or as agreed between the Relevant Network Operator and the Demand Facility Owner or Distribution Network Operator respectively;

**Maximum Import Capability (MIC)** means the maximum continuous Active Power which a Demand Facility or a Distribution Network, can consume from the Network at the Connection Point as defined in the Connection Agreement or as agreed between the Relevant Network Operator and the Demand Facility Owner or Distribution Network Operator respectively;

**New Demand Facility** means a Demand Facility for which:

- a) with regard to the provisions of the initial version of this Network Code, a final and binding contract of purchase of the Main Plant has been signed after the date, which is two years after the date of the entry into force of this Network Code, or,
- b) with regard to the provisions of the initial version of this Network Code, no confirmation is provided by the Demand Facility Owner, with a delay not exceeding thirty months as from the date of entry into force of this Network Code, that a final and binding contract of purchase of the Main Plant exists prior to the date, which is two years after the date of the entry into force of this Network Code, or,
- c) with regard to the provisions of any subsequent amendment to this Network Code and/or after any change of thresholds pursuant to the re-assessment procedure of Article 6, a final and binding contract of purchase of the main plant has been signed after the date, which is two years after the entry into force of any subsequent amendment to this Network Code and/or after the entry into force of any change of thresholds pursuant to the re-assessment procedure of Article 6;

**New Distribution Network Connection** means a Distribution Network Connection of either a new or existing Distribution Network, which is or will be connected to the Transmission Network for which

- a) with regard to the provisions of the initial version of this Network Code, a final and binding contract of purchase of the Main Plant has been signed after the date, which is two years after the date of the entry into force of this Network Code, or,
- b) with regard to the provisions of the initial version of this Network Code, no confirmation is provided by the Distribution Network Operator, with a delay not exceeding thirty months as from the date of entry into force of this Network Code, that a final and binding contract of purchase of the Main Plant exists prior to the date, which is two years after the date of the entry into force of this Network Code, or,
- c) with regard to the provisions of any subsequent amendment to this Network Code and/or after any change of thresholds pursuant to the re-assessment procedure of Article 6, a final and binding contract of purchase of the main plant has been signed after the date, which is two years after the entry into force of any subsequent amendment to this Network Code and/or after the entry into force of any change of thresholds pursuant to the re-assessment procedure of Article 6;

**On Load Tap Changer** means a device for changing the tap of a winding, suitable for operation while the transformer is energized or on load;

**On Load Tap Changer Blocking** means an action that blocks the On Load Tap Changer[s] during a low Voltage event in order to stop transformers from further tapping and suppressing Voltages in an area. This should be employed in association with LVDD;

**Significant Demand Facility** means a Demand Facility which is deemed significant, either singularly or when considered aggregated, on the basis of its impact on the cross-border system performance via influence on the control area's security of supply, RES integration or market integration, which is identified according to the criteria set forth in this Network Code in Article 3 to 8;

**Significant Distribution Network** means a Distribution Network which is deemed significant on the basis of its impact on the cross-border system performance via influence on the control area's security of supply, RES integration or market integration, which is identified according to the criteria set forth in this Network Code in Article 3 to 8;

**Significant Distribution Network Connection** means a Distribution Network Connection which is deemed significant on the basis of its impact on the cross-border system performance via influence on the control area's security of supply, RES integration or market integration, which is identified according to the criteria set forth in this Network Code in Article 3 to 8;

**Significant Temperature Controlled Device** means a Temperature Controlled Device which is deemed significant on the basis of its impact on the cross-border system performance via influence on the control area's security of supply, RES integration or market integration, which is identified according to the criteria set forth in this Network Code in Article 21;

**System Reserve** means Active or Reactive Power reserves to actively manage the Network predominantly to respond to Frequency and Voltage fluctuations;

**Temperature Controlled Device** means a device which heats and cools, and therefore whose electrical usage is proportional to the temperature regulated. Examples include but are not restricted to fridges, freezers, heat pumps, water heating;

**Transmission Connected Closed Distribution Network** means a Closed Distribution Network which has a Connection Point to a Transmission Network;

**Transmission Connected Demand Facility** means a Demand Facility which has a Connection Point to a Transmission Network;

**Transmission Connected Demand Facility Owner** means the owner of a Transmission Connected Demand Facility;

**Transmission Connected Distribution Network Operator** means the operator of a Transmission

Connected Distribution Network;

**Transmission Connected Distribution Network** means a Distribution Network which has a Connection Point to a Transmission Network;

**Transmission Network** means an electrical Network for the transmission of electrical power from and to third party[s] connected to it, including Demand Facilities, Distribution Networks or other Transmission Networks. The extent of this Network is defined at a national level.

### **ARTICLE 3 SCOPE**

1. The requirements set forth by this Network Code shall apply to Demand Facilities, Distribution Networks and Distribution Network Connections as identified in Article 1.
2. Any pump-storage Power Generating Module which has both generating and pumping operation mode does not have to meet the requirements of this Network Code.
3. Any pumping module within a pump-storage station which only provides pumping mode is subject to the requirements of this Network Code, and shall be treated as a Demand Facility.
4. Without prejudice to the general applicability of the requirements set forth in this Network Code, the Network Operator of an industrial site and the Relevant Network Operator to whose Network the industrial site is connected to, shall have the right in coordination with the Relevant TSO, with respect to Power Generation Modules which are embedded in industrial sites, to agree while respecting the provisions of Article 9(3) on conditions for disconnection of critical loads from the Relevant Network Operator's Network. The only objective of such an agreement shall be to secure production processes of such a site in case of disturbed conditions in the Relevant Network Operator's Network, using power generated from these Power Generating Modules. The requirements of this Network Code, notwithstanding such an agreement, shall apply to all Demand Units embedded in such an industrial site.

### **ARTICLE 4 SIGNIFICANT DEMAND FACILITIES AND DISTRIBUTION NETWORK CONNECTIONS**

1. For the purposes of the respective requirements in this Network Code a Significant Distribution Network is categorised as either a:

- a) **Distribution Network:** either connected to another Distribution Network or Transmission Network. The single frequency requirement applicable to all Distribution Networks is a basic level requirement, ensuring there is no wide scale loss of generation or Demand side Response over system operational ranges, thereby minimizing critical events., It includes requirements necessary for wide spread intervention during system critical events;
  - b) **Distribution Network Connection** to the Transmission Network. Requirements applicable to a Distribution Network Connection set the capabilities of these interfaces and the necessary automated responses and data exchange. These requirements ensure operability of the Transmission Network and the functionality to utilise the generation and Demand Side Response embedded within these Networks over system operational ranges, and critical events;
  - c) **Transmission Connected Distribution Network.** Requirements applicable to a Transmission Connected Distribution Network set the operational range of these networks, the necessary automated responses and data exchange. These requirements ensure the effective development and operability of the Transmission Network and the functionality to utilise the generation and Demand Side Response embedded within these networks over system operational ranges, and critical events;
  - d) **Closed Distribution Network providing DSR** either connected to a Distribution Network or Transmission Network. Requirements applicable to a Closed Distribution Network providing DSR provide a wider level of automated response, ensuring the functionality to utilise the Demand Side Response over system operational ranges, thereby minimizing critical events, and include requirements necessary for wide spread intervention during system critical events.
2. For the purposes of the respective requirements in this Network Code a Significant Demand Facility is categorised as either a:
- a) **Transmission Connected Demand Facility.** Requirements set the capabilities of these interfaces and the necessary automated responses and data exchange. These requirements ensure operability of the Transmission Network over system operational ranges, and critical events;
  - b) **Demand Facility providing DSR** either connected to a Distribution Network or Transmission Network. Requirements applicable to a Demand Facility providing DSR provide a wider level of automated response, ensuring the functionality to utilise the Demand Side Response over system operational ranges, thereby minimizing critical events, and include requirements necessary for wide spread intervention during system critical events.

**ARTICLE 5**  
**APPLICATION TO EXISTING DEMAND FACILITIES AND EXISTING DISTRIBUTION NETWORK CONNECTIONS**

The requirements of this Network Code shall apply to Existing Demand Facilities, Existing Distribution Networks and Existing Distribution Network Connections deemed significant regarding the provisions of this Network Code, according to the provisions of Article 19 or by a decision of the Relevant National Regulatory Authority according to the provisions of Article 36.

**ARTICLE 6**  
**REASSESSMENT OF SIGNIFICANCE OF EXISTING DEMAND FACILITIES AND EXISTING DISTRIBUTION NETWORK CONNECTIONS**

1. Regularly but not more than every three years, the Relevant TSO may reassess the applicability of the requirements set forth by this Network Code to Existing Demand Facilities and Existing Distribution Network Connections.
2. This reassessment and submission for National Regulatory Authority approval shall be made in the conditions set forth in Article 36.
3. The Relevant TSO shall notify the launch of the procedure for reassessment on its website. The date of notification on the website shall constitute the first date of the launch of the procedure for reassessment.

**ARTICLE 7**  
**APPLICATION TO NEW DEMAND FACILITIES AND NEW DISTRIBUTION NETWORK CONNECTIONS**

1. Demand Facilities or Distribution Network Connections, not yet connected to the Network shall be considered as Existing Demand Facilities or Existing Distribution Network Connections, provided that sufficient evidence is provided to the Relevant Network Operator and the following procedure is observed:
  - a) No later than thirty months as from the date of the entry into force of this Network Code, the Demand Facility Owner or Distribution Network Operator shall provide the Relevant Network Operator with confirmation of a final and binding contract it has concluded for the construction, assembly or purchase of the Main Plant of a Demand Facility or Distribution Network Connection. Those contracts shall exist prior to the date which is two years after the date of the entry into force of this Network Code.
  - b) The confirmation shall at least indicate the contract title, its date of signature and entry into force, as well as the specifications of the Main Plant to be constructed, assembled or purchased.
  - c) The Relevant Network Operator may demand that the National Regulatory Authority confirms the existence, relevance and finality of such a contract, i.e. that its material terms can no longer be changed by one of the parties to the contract unilaterally and that no party to the contract has the right to terminate it at will. The Demand Facility Owner or

Distribution Network Operator shall supply the National Regulatory Authority with all documents the National Regulatory Authority requests in order to ascertain that a binding and final contract exists.

- d) The Demand Facility or Distribution Network Connection confirmed, in accordance with the procedure set forth in points a) to c) above, shall be considered as an Existing Demand Facility or Existing Distribution Network Connection, provided that:
- i. In accordance with paragraphs 1 (a) and (b) above, the Relevant Network Operator is provided with sufficient evidence of the existence of binding and final contracts for the construction, assembly or purchase of the Main Plant of a Demand Facility or Distribution Network Connection prior to the date, which is two years after the date of entry into force of this Network Code; or
  - ii. Following the verification performed by the Relevant National Regulatory Authority in accordance with point (c) above, it is ascertained that binding and final contracts for the construction, assembly or purchase of the Main Plant of a Demand Facility or Distribution Network Connection exist prior to the date, which is two years after the date of entry into force of this Network Code.
- e) In case the Demand Facility Owner or Distribution Network Operator does not provide the Relevant Network Operator with the confirmation within the delay set forth in point (a) above, the Demand Facility or Distribution Network Connection shall be considered as a New Demand Facility or a New Distribution Network Connection.

## **ARTICLE 8**

### **SIGNIFICANCE OF NEW DEMAND FACILITIES AND NEW DISTRIBUTION NETWORK CONNECTIONS**

A New Transmission Connected Demand Facility, New Demand Facility with Demand Side Response, New Distribution Network or New Distribution Network Connection shall be deemed as significant.

## **ARTICLE 9**

### **REGULATORY ASPECTS**

1. The requirements established in this Network Code and their implementation are based on the principle of non-discrimination and transparency as well as the principle of optimisation between the highest overall efficiency and lowest cost for all involved parties.
2. Notwithstanding the above, the application of the principles of non-discrimination and the principle of optimisation between the highest overall efficiency and lowest costs for all involved parties shall be balanced with the aim of achieving the maximum transparency and the assignment to the real originator of the costs.

This shall be reflected in objective differences in treatment of demand technologies with different inherent characteristics. In addition, unnecessary investments in some geographic areas

should be avoided in order to ensure that their respective regional specificities are appropriately taken into account. The Relevant Network Operator shall have the right to take into account these differences when defining requirements, in compliance with the provisions of this Network Code and their national law.

3. Where reference is made to this paragraph, the ~~determination of the~~ terms and conditions for connection and access to networks or their methodologies ~~to establish them~~ shall be ~~set~~ established by the National Regulatory Authorities, or by the Member States, in accordance with the rules of national law implementing Directive 2009/72/EC, and with the principles of transparency, proportionality and non-discrimination.

~~When this Network Code establishes that terms and conditions can or shall be agreed, the TSO can determine those terms and conditions if national law assigns it to the TSO and such an assignment was in place at the date of entry into force of this Network Code~~

4. Any decision by a Network Operator other than the Relevant TSO and any agreement between a Network Operator other than the Relevant TSO and a Demand Facility Owner or Distribution Network Operator shall be exercised in compliance with and respecting the Relevant TSO's responsibility to ensure system security according to national legislation. Further details to ensure this principle may be specified either by national legislation or by agreements between the Relevant TSO and the Network Operators in its control area, as the case may be.

- 4.5. The allocation of tasks between the Relevant Network Operators, as well as the legal framework under which they determine the grid connections requirements under this Network Code, are established pursuant to this Network Code. TSOs granted public authority or competence according to national law can adopt decisions when defining requirements under this Network Code while respecting Directive 2009/72/EC.

- 5.6. For the purpose of this Network Code, if the Distribution Network Operator would not be the owner of the asset which it operates, the Distribution Network Operator shall ensure that the relevant entity that is recognised as the client for the construction or adaption of the Distribution Network, typically the ultimate owner of the Distribution Network assets, is informed and involved whenever necessary.

## ARTICLE 10 RECOVERY OF COSTS

1. The costs related to the obligations referred to in this Network Code which have to be borne by regulated Network Operators shall be assessed by National Regulatory Authorities.
2. Costs assessed as efficient, reasonable and proportionate shall be recovered ~~in a timely manner via network tariffs or appropriate mechanisms~~ as determined by National Regulatory Authorities.
3. If requested to do so by National Regulatory Authorities, regulated Network Operators shall, within 3 months of such a request, use best endeavours to provide such additional information as reasonably requested by National Regulatory Authorities to facilitate the assessment of the costs incurred.

## **ARTICLE 11**

### **CONFIDENTIALITY OBLIGATIONS**

1. Each Relevant Network Operator and Relevant TSO shall preserve the confidentiality of the information and data submitted to them in fulfilment of the obligations under this Network Code and shall use them exclusively for the purpose they have been submitted in compliance with this Network Code, notably to verify the compliance of requirements set forth in this Network Code.
2. Notwithstanding the above, disclosure of such information and data may occur in case a Relevant Network Operator or a Relevant TSO is compelled under EU or national law to disclose it, under the conditions set forth in the relevant legislation. Such disclosure shall be reported to the owner of such information and data.
3. In case of disclosure for other purposes than those described in paragraph 1 and 2, a Relevant Network Operator or a Relevant TSO shall seek the consent of the owner of such information and data. The Relevant Network Operator or Relevant TSO shall provide the motivation for this disclosure. This consent cannot be unreasonably withheld.

## **ARTICLE 12**

### **RELATIONSHIP WITH NATIONAL LAW PROVISIONS**

This Network Code shall be without prejudice to the rights of Member States to maintain or introduce measures that contain more detailed or more stringent provisions than those set out herein, provided that these measures are compatible with the principles set forth in this Network Code.

## **Chapter 2 REQUIREMENTS**

### **SECTION 1 GENERAL REQUIREMENTS**

#### **ARTICLE 13 GENERAL FREQUENCY REQUIREMENTS**

1. All Transmission Connected Demand Facilities, and all Distribution Networks, shall fulfil the following Frequency stability requirements:
  - a) With regard to Frequency ranges:
    - i. A Transmission Connected Demand Facility Owner and Distribution Network Operator shall use their best endeavours in the design of its Transmission Connected Demand Facility and Distribution Network respectively for it to cope with the Frequency ranges and time periods specified in Table 1.

Synchronous Area	Frequency Range	Time period for operation
Continental Europe	47.5 Hz – 48.5 Hz	To be defined by each TSO, while respecting the provisions of Article 9(3), but not less than 30 minutes
	48.5 Hz – 49.0 Hz	To be defined by each TSO, while respecting the provisions of Article 9(3), but not less than the period for 47.5 Hz – 48.5 Hz
	49.0 Hz – 51.0 Hz	Unlimited
	51.0 Hz – 51.5 Hz	30 minutes
Nordic	47.5 Hz – 48.5 Hz	30 minutes
	48.5 Hz – 49.0 Hz	To be defined by each TSO, while respecting the provisions of Article 9(3), but not less than 30 minutes
	49.0 Hz – 51.0 Hz	Unlimited
	51.0 Hz – 51.5 Hz	30 minutes
Great Britain	47.0 Hz – 47.5 Hz	20 seconds
	47.5 Hz – 48.5 Hz	90 minutes
	48.5 Hz – 49.0 Hz	To be defined by each TSO, while respecting the provisions of Article 9(3), but not less than 90 minutes
	49.0 Hz – 51.0 Hz	Unlimited
	51.0 Hz – 51.5 Hz	90 minutes
	51.5 Hz – 52.0 Hz	15 minutes
Ireland	47.5 Hz – 48.5 Hz	90 minutes
	48.5 Hz – 49.0 Hz	To be defined by each TSO, while respecting the provisions of Article 9(3), but not less than 90 minutes
	49.0 Hz – 51.0 Hz	Unlimited
	51.0 Hz – 51.5 Hz	90 minutes
Baltic	47.5 Hz – 48.5 Hz	To be defined by each TSO while respecting the provisions of Article 9(3), but not less than 30 minutes
	48.5 Hz – 49.0 Hz	To be defined by each TSO, while respecting the provisions of Article 9(3), but not less than the period for 47.5 Hz – 48.5 Hz
	49.0 Hz – 51.0 Hz	Unlimited
	51.0 Hz – 51.5 Hz	To be defined by each TSO while respecting the provisions of Article 9(3), but not less than 30 minutes

Table 1: This table shows the minimum time periods for which a Transmission Connected Demand Facility Owner and Distribution Network Operator shall do best endeavours to cope with in the design of its Demand Facility or Distribution Network respectively.

- ii. Wider Frequency ranges or longer minimum times for operation can be agreed between the Relevant Network Operator and the Distribution Network Operator or Transmission

Connected Demand Facility Owner, in coordination with the Relevant TSO, while respecting the provisions of Article 9(3). If wider Frequency ranges or longer minimum times for operation are technically feasible, the consent of the Distribution Network Operator or Transmission Connected Demand Facility Owner shall not be unreasonably withheld.

## **ARTICLE 14**

### **GENERAL VOLTAGE REQUIREMENTS**

1. All Transmission Connected Demand Facilities and all Transmission Connected Distribution Networks, deemed significant pursuant to the provisions of this Network Code, shall fulfil the following Voltage stability requirements:
  - a) With regard to Voltage ranges:
    - i. In case of a deviation of the Network Voltage at the Connection Point from its nominal value, any Transmission Connected Demand Facility Owner or Transmission Connected Distribution Network Operator with a Connection Point at 110 kV or above, shall ensure its equipment at the Connection Point site is capable of withstanding without damage the Voltage range at the Connection Point, expressed by the Voltage at the Connection Point related to nominal per unit Voltage, within the time periods specified by Table 2.1 and Table 2.2. The establishment of the reference nominal Voltage shall be subject to coordination between the adjacent TSOs.

Synchronous Area	Voltage Range	Time period for operation
Continental Europe	0.90 pu – 1.05 pu	Unlimited
	1.05 pu – 1.0875 pu	To be defined by each TSO while respecting the provisions of Article 9(3) with required co-ordination at interconnection points with adjacent TSOs under the conditions, but not less than 60 minutes
	1.0875 pu – 1.10 pu	60 minutes
Nordic	0.90 pu – 1.05 pu	Unlimited
	1.05 pu – 1.10 pu	60 minutes
Great Britain	0.90 pu – 1.05 pu	Unlimited
	1.05 pu – 1.10 pu	15 minutes
Ireland	0.90 pu – 1.05 pu	Unlimited
Baltic	0.88 pu – 0.90 pu	20 minutes
	0.90 pu – 1.10 pu	Unlimited
	1.10 pu – 1.15 pu	20 minutes

Table 2.1: This table shows the Voltage and minimum periods of time each Transmission Connected Demand Facility and Transmission Connected Distribution Network shall be capable of operating for Voltages deviating from the nominal value at the Connection Point without disconnecting from the Transmission Network. The Voltage base for pu values is between and including 300 kV and 400 kV.

Synchronous Area	Voltage Range	Time period for operation
Continental Europe	0.90 pu – 1.118 pu	Unlimited
	1.118 pu – 1.15 pu	To be defined by each TSO while respecting the provisions of Article 9(3) with required co-ordination at interconnection points with adjacent TSOs under the conditions, but not less than 20 minutes
Nordic	0.90 pu – 1.05 pu	Unlimited
	1.05 pu – 1.10 pu	60 minutes
Great Britain	0.90pu–1.10pu	Unlimited
Ireland	0.90 pu – 1.118 pu	Unlimited
Baltic	0.85 pu – 0.90 pu	30 minutes
	0.90 pu – 1.12 pu	Unlimited
	1.12 pu – 1.15 pu	20 minutes

Table 2.2: This table shows the Voltage and minimum periods of time each Transmission Connected Demand Facilities or Transmission Connected Distribution Network shall be capable of operating for Voltages deviating from the nominal value at the Connection Point without disconnecting from the Transmission Network. The Voltage base for pu values is between and including 110 kV and under 300 kV.

- ii. Notwithstanding the provisions of paragraph (1)a)i, a Transmission Connected Demand Facility and Transmission Connected Distribution Network shall be capable of automatic disconnection at specified Voltages, if required by the Relevant TSO. The terms and settings for automatic disconnection shall be agreed between the Relevant TSO and the Transmission Connected Demand Facility Owner or the Transmission Connected Distribution Network Operator, while respecting the provisions of Article 9(3).

## ARTICLE 15 SHORT-CIRCUIT REQUIREMENTS

1. All Transmission Connected Demand Facilities and Transmission Connected Distribution Networks, deemed significant pursuant to the provisions of this Network Code, shall fulfil the following requirements referring to short-circuit Current:
  - a) Based on the rated short-circuit withstand capability of its equipment, the Relevant TSO shall define, subject to notification to the National Regulatory Authority, the maximum short-

circuit Current at the Connection Point that the Transmission Connected Demand Facility and Transmission Connected Distribution Network shall be capable of withstanding. The modalities of that notification shall be determined in accordance with the applicable national regulatory framework.

- b) The Relevant TSO shall deliver to the Transmission Connected Demand Facility Owner and Transmission Connected Distribution Network Operator an estimate of the minimum and maximum short-circuit Currents at the Connection Point as an equivalent of the Network.
- c) The Relevant TSO shall inform the Transmission Connected Demand Facility Owner or Transmission Connected Distribution Network Operator as soon as practicable, but no later than one week after an unplanned event, of the changes above a threshold in the maximum short-circuit current that it shall be able to withstand from its Network in paragraph (1)(a). The threshold will be set by either the Transmission Connected Demand Facility Owner for their facility or Transmission Connected Distribution Network Operator for their Distribution Network.
- d) The Relevant TSO shall inform the Transmission Connected Demand Facility Owner or Transmission Connected Distribution Network Operator as soon as practicable before a planned event of changes above a threshold in the maximum short-circuit current that it shall be able to withstand from its Network in paragraph (1)(a). The threshold will be set by either the Transmission Connected Demand Facility Owner for their facility or Transmission Connected Distribution Network Operator for their Distribution Network.
- e) The Relevant TSO shall request information from a Transmission Connected Demand Facility Owner or a Transmission Connected Distribution Network Operator, concerning the contribution in terms of short-circuit current from that facility or Network respectively. As a minimum this should be as an equivalent of the Network for zero, positive and negative sequence.
- f) The Transmission Connected Demand Facility Owner and Transmission Connected Distribution Network Operator shall inform the Relevant TSO as soon as practicable, but no later than one week after an unplanned event, of the changes in short-circuit contribution above a threshold set by the Relevant TSO, while respecting the provisions of Article 9(3), from its Demand Facility or Distribution Network in paragraph 1(e).
- g) The Transmission Connected Demand Facility Owner and Transmission Connected Distribution Network Operator shall inform the Relevant TSO as soon as practicable before a planned event of changes in short-circuit contribution above a threshold set by the Relevant TSO, while respecting the provisions of Article 9(3), from its Demand Facility or Distribution Network in paragraph 1(e).

## **ARTICLE 16**

### **REACTIVE POWER REQUIREMENTS**

1. All Transmission Connected Demand Facilities and all Transmission Connected Distribution Networks, deemed significant pursuant to the provisions of this Network Code, shall fulfil the following requirements referring to Reactive Power exchange and control:
  - a) With regard to Reactive Power ranges:

- i. Transmission Connected Distribution Networks and Transmission Connected Demand Facilities shall be capable to maintain their steady-state operation at their Connection Point in a Reactive Power range specified by the Relevant TSO, while respecting the provisions of Article 9(3) and the following conditions:
  - For Transmission Connected Demand Facilities without onsite generation, the actual Reactive Power range specified by the Relevant TSO for importing reactive power shall not be wider than 0.9 to 1 Power Factor of their Maximum Import Capability, except in situations where either technical or financial system benefits are demonstrated and accepted by the Relevant TSO, while respecting the provisions of Article 9(3);
  - For Transmission Connected Demand Facilities with onsite generation, the actual Reactive Power range specified by the Relevant TSO shall not be wider than 0.9 Power Factor of the larger of their Maximum Import Capability or Maximum Export Capability in import to 0.9 Power Factor of their Maximum Export Capability in export, except in situations where either technical or financial system benefits are demonstrated and accepted by the Relevant TSO, while respecting the provisions of Article 9(3);
  - For Transmission Connected Distribution Networks, the actual Reactive Power range specified by the Relevant Network Operator shall not be wider than 0.9 Power Factor of the larger of their Maximum Import Capability or Maximum Export Capability in import to 0.9 Power Factor of their Maximum Export Capability in export, except in situations where either technical or financial system benefits are demonstrated by the Relevant TSO and the Distribution Network Operator through joint analysis.

The scope of the analysis shall be agreed between the Relevant TSO and Distribution Network Operator and will consider the possible solutions and determine the optimal solution for reactive power exchange between their Networks taking adequately in consideration the specific Network characteristics, variable structure of power exchange, bidirectional flows and the Reactive Power capabilities in the Distribution Network, while respecting the provisions of Article 9(3);

- The use of other metrics than Power Factor to define equivalent Reactive Power capability ranges can be specified by the Relevant TSO.
  - The Reactive Power range requirement shall apply at the Connection Point.
- ii. Transmission Connected Distribution Networks shall have the capability at the Connection Point to not export Reactive Power (at nominal Voltage) at an Active Power flow of less than 25% of the Maximum Import Capability, except in situations where either technical or financial system benefits are demonstrated by the Relevant TSO and the Distribution Network Operator through joint analyse, while respecting the provisions of Article 9(3).
  - iii. The scope of the analysis will be agreed between the Relevant TSO and Distribution Network Operator and will consider the possible solutions and determine the optimal solution for reactive power exchange between their Networks taking adequately in consideration the specific Network characteristics, variable structure of power exchange, bidirectional flows and the reactive capabilities in the Distribution Network, while respecting the provisions of Article 9(3);

- b) Without prejudice to the provisions of paragraph 1(a) of this article, the Relevant TSO shall have the right to require, while respecting the provisions of Article 9(3), the ability of the

Transmission Connected Distribution Network to actively control the exchange of Reactive Power at the Connection Point as part of a wider common concept for management of Reactive Power capabilities for the benefit of the entire Network. The method of this control shall be agreed between the Relevant TSO and the Transmission Connected Distribution Network Operator 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.

- c) The Distribution Network Operator shall have the right to apply to the Relevant TSO to be considered for Reactive Power management set out in paragraph b), while respecting the provisions of Article 9(3).

## **ARTICLE 17**

### **PROTECTION AND CONTROL**

1. All Transmission Connected Demand Facilities and all Transmission Connected Distribution Networks, deemed significant pursuant to the provisions of this Network Code, shall fulfil the following requirements referring to the protection and control:

- a) With regard to electrical protection schemes and settings:

- i. The Relevant TSO shall define the settings necessary to protect the Network while respecting the characteristics of the Transmission Connected Demand Facility or Transmission Connected Distribution Network. Protection schemes as well as settings relevant for the Transmission Connected Demand Facility or Transmission Connected Distribution Network shall be agreed between the Relevant TSO and the Transmission Connected Demand Facility Owner or Transmission Connected Distribution Network Operator while respecting the provisions of Article 9(3).
- ii. Electrical protection of the Transmission Connected Demand Facility or Transmission Connected Distribution Network shall take precedence over operational controls while respecting system security, health and safety of staff and the public as well as mitigation of the damage to the Transmission Connected Demand Facility or Transmission Connected Distribution Network.

- b) Protection scheme devices may cover the following aspects:

- i. external and internal short circuit;
- ii. over- and under-voltage at the Connection Point;
- iii. over- and under-frequency;
- iv. demand circuit protection;
- v. unit transformer protection; and
- vi. backup schemes against protection and switchgear malfunction.

- c) The Relevant TSO shall define the mandatory devices while respecting the provisions of Article 9(3).

- d) Any changes to the protection schemes, relevant for the Transmission Connected Demand Facility or Transmission Connected Distribution Network and the Network, as well as to the setting relevant for the Transmission Connected Demand Facility or Transmission Connected Distribution Network, shall be agreed between the Relevant TSO and the Transmission Connected Demand Facility Owner or Transmission Connected Distribution Network Operator, while respecting the provisions of Article 9(3).
2. With regard to control schemes and settings:
- a) Schemes and settings of the different control devices of the Transmission Connected Demand Facility or Transmission Connected Distribution Network, relevant for system security, shall be agreed between the Relevant TSO, and the Transmission Connected Demand Facility Owner or Transmission Connected Distribution Network Operator, while respecting the provisions of Article 9(3). This agreement shall cover the following aspects:
- i. isolated (Network) operation;
  - ii. damping of oscillations;
  - iii. disturbances to the Network;
  - iv. automatic switching to emergency supply and come-back to normal topology; and
  - v. automatic circuit-breaker re-closure (on 1-phase faults).
- b) Any changes to the schemes and settings of the different control devices of the Transmission Connected Demand Facility or Transmission Connected Distribution Network, relevant for system security, shall be agreed between the Relevant TSO, and the Transmission Connected Demand Facility Owner or Transmission Connected Distribution Network Operator, while respecting the provisions of Article 9(3).
3. With regard to priority ranking of protection and control, the Transmission Connected Demand Facility Owner or Transmission Connected Distribution Network Operator shall organize the protection and control devices of its Transmission Connected Demand Facility or Distribution Network Connection respectively, in compliance with the following priority ranking, organized in decreasing order of importance:
- a) Network and Demand Facility or Distribution Network protection;
  - b) Frequency control (Active Power adjustment); and
  - c) Power Restriction.

## **ARTICLE 18**

### **INFORMATION EXCHANGE**

1. All Transmission Connected Demand Facilities and Transmission Connected Distribution Networks, deemed significant pursuant to the provisions of this Network Code, shall fulfil the following requirements related to the information exchange:
- a) Transmission Connected Demand Facilities shall be equipped according to the standard defined by the Relevant TSO, while respecting the provisions of Article 9(3), to transfer

information between the Relevant TSO and the Transmission Connected Demand Facility with the defined time stamping. The defined standard shall be made publically available by the Relevant TSO.

- b) Transmission Connected Distribution Networks shall be equipped according to the standard defined by the Relevant TSO, while respecting the provisions of Article 9(3) to transfer information between the Relevant TSO and the Transmission Connected Distribution Network with the defined time stamping. The defined standard shall be made publically available by the Relevant TSO.
- c) The Relevant TSO shall define the information exchange standards while respecting the provisions of Article 9(3). The precise list of data required shall be made publically available by the Relevant TSO.

## **ARTICLE 19**

### **DEVELOPMENT, MODERNIZATION AND EQUIPMENT REPLACEMENT**

1. All Existing Distribution Network Connections, Existing Transmission Connected Demand Facilities, Existing Demand Facilities providing DSR and Existing Closed Distribution Networks providing DSR, deemed significant pursuant to the provisions of this Network Code, shall fulfil the following requirements related to equipment development:
  - a) A Demand Facility Owner or Distribution Network Operator intending to develop, increasing plant and equipment, of the Existing Demand Facility or Existing Distribution Network Connection in a way that may have an impact on its performance and ability to meet the requirements of this Network Code shall notify the Relevant Network Operator directly or indirectly (including but not restricted to via an Aggregator). The notification shall take place in advance to the national timescales defined, while respecting the provisions of Article 9 (3). This equipment development may include high-voltage equipment, protection and control systems, including hardware and software.
  - b) The developed equipment shall comply with the respective Network Code requirements which are relevant to the planned work.
2. All Existing Distribution Network Connections, Existing Transmission Connected Demand Facilities, Existing Demand Facilities providing DSR and Existing Closed Distribution Networks providing DSR, deemed significant pursuant to the provisions of this Network Code, shall fulfil the following requirements related to modernization and equipment replacement:
  - a) A Demand Facility Owner or Distribution Network Operator intending to modernize and replace the equipment of the Existing Demand Facility or Existing Distribution Network in a way that may have an impact on its performance and ability to meet the requirements of this Network Code shall notify to the Relevant Network Operator directly or indirectly (including but not restricted to via an Aggregator). The notification shall take place in advance to the national timescales defined, while respecting the provisions of Article 9(3). This modernization and equipment replacement may include high-voltage equipment, protection and control systems, including hardware and software.
  - b) The modernized and replaced equipment shall comply with the respective Network Code requirements which are relevant to the planned work.

## **ARTICLE 20**

### **DEMAND DISCONNECTION FOR SYSTEM DEFENCE AND DEMAND RECONNECTION**

1. All Transmission Connected Demand Facilities and Transmission Connected Distribution Networks, deemed significant pursuant to the provisions of this Network Code, shall fulfil the following requirements related to Low Frequency Demand Disconnection schemes:
  - a) Each Transmission Connected Distribution Network Operator and as specified by the TSO, Transmission Connected Demand Facility Owner, shall provide capabilities that shall enable automatic low Frequency (or alternatively if specified by the TSO combined with rate-of-change-of-Frequency) disconnection of a percentage of their demand. The percentage of the demand shall be specified by the TSO, in coordination with all TSOs in the Synchronous Area. This specification shall be based on a rule set defined by the TSO while respecting the provisions of Article 9(3).
  - b) The Low Frequency Demand Disconnection schemes shall be capable of disconnecting demand in stages for a range of operational frequencies. The number of stages and their respective operational frequencies shall be defined by the TSO, while respecting the provisions of Article 9(3).
  - c) The percentage of the demand disconnection at each Frequency shall be defined by the TSO while respecting the provisions of Article 9(3).
  - d) The geographical distribution of this demand disconnection shall be provided by the Transmission Connected Distribution Network Operator or Transmission Connected Demand Facility Owner and approved by the TSO. In cases of nested Distribution Networks the geographical distribution shall be equitable to all the associated Distribution Network Operators.
  - e) Each Distribution Network Operator and Transmission Connected Demand Facility Owner shall notify the TSO in writing of the details of the automatic Low Frequency Demand Disconnection on its Network. This notification shall be made every year and shall identify, for each Connection Point to the Transmission Network, the Frequency settings at which demand disconnection shall be initiated and the percentage of demand disconnected at every such setting.
  - f) The Low Frequency Demand Disconnection scheme shall be suitable for operation from a nominal AC input to be defined by the Relevant Network Operator, while respecting the provisions of Article 9(3), and shall have the following functional capability:
    - i. Frequency Range: at least between 47-50Hz, adjustable in steps of 0.05Hz;
    - ii. Operating time: no more than 150 ms after triggering the Frequency setpoint;
    - iii. Voltage lock-out: blocking of the scheme should be possible when the voltage is within a range of 30 to 90% of nominal Voltage; and
    - iv. Direction of Active Power flow at the point of disconnection.
2. With regard to Low Frequency Demand Disconnection schemes AC Voltage supply:
  - a) The voltage supply to the Low Frequency Demand Disconnection schemes shall be derived from the Network at the Frequency signal measuring point, as defined in the Low Frequency Demand Disconnection scheme in paragraph 1(f), so that the Frequency of the Low Frequency Demand Disconnection schemes supply Voltage is the same as that of the Network.

3. With regard to Low Voltage Demand Disconnection schemes:
  - a) Low Voltage Demand Disconnection schemes for Transmission Connected Distribution Networks shall be defined by the Relevant TSO, while respecting the provisions of Article 9(3), in coordination with Transmission Connected Distribution Network Operators. In cases of nested Distribution Networks the geographical distribution shall be equitable to all the associated Distribution Network Operators.
  - b) Low Voltage Demand Disconnection schemes for a Transmission Connected Demand Facility shall be defined by the Relevant TSO, while respecting the provisions of Article 9(3), in coordination with the Transmission Connected Demand Facility Owner.
  - c) Based on the TSO assessment of system security the implementation of On Load Tap Changer Blocking and Low Voltage Demand Disconnection shall be binding for Transmission Connected Distribution Network Operators.
  - d) If the Relevant TSO decides to implement a Low Voltage Demand Disconnection scheme, both On Load Tap Changer Blocking and Low Voltage Demand Disconnection shall be fitted in a coordinated way led by the TSO.
  - e) The method of Low Voltage Demand Disconnection shall be implemented by relay or Control Room initiation.
  - f) The Low Voltage Demand Disconnection schemes shall have the following functional capability:
    - i. The Low Voltage Demand Disconnection scheme 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.
4. With regard to blocking of On Load Tap Changers:
  - a) The transformer at the Transmission Connected Distribution Network Connection Point to the Transmission Network shall be capable of automatic or manual On Load Tap Changer Blocking, if required by the Relevant TSO.
  - b) The automatic On Load Tap Changer Blocking scheme shall be specified by the Relevant TSO, while respecting the provisions of Article 9(3).
5. Transmission Connected Demand Facilities and Transmission Connected Distribution Networks shall fulfil the following requirement referring to disconnection or reconnection of a Transmission Connected Demand Facility or Transmission Connected Distribution Network:
  - a) With regard to capability of reconnection after a disconnection, the Relevant TSO shall define, while respecting the provisions of Article 9(3), the conditions under which a Transmission Connected Demand Facility and Transmission Connected Distribution Network is entitled to reconnect to the Transmission Network. Installation of automatic reconnection systems shall be subject to prior authorization by the Relevant TSO.
  - b) With regards to reconnection of a Transmission Connected Demand Facility or Transmission Connected Distribution Network, the Transmission Connected Demand Facility and Transmission Connected Distribution Network shall be capable of synchronisation for Frequencies within the ranges set out in Article 13(1)(a)(i). The Relevant TSO and the Transmission Connected Demand Facility Owner or Transmission Connected Distribution

Network Operator shall agree on the settings of synchronization devices prior to connection of the Transmission Connected Demand Facility or Transmission Connected Distribution Network, including: Voltage, Frequency, phase angle range, deviation of Voltage and Frequency.

- c) A Transmission Connected Demand Facility and Transmission Connected Distribution Network shall be capable of being remotely disconnected from the Transmission Network when required by the Relevant TSO. Where automated disconnection equipment is required (for reconfiguration of the Network in preparation for Block Loading) these shall be defined by the Relevant TSO while respecting the provisions of Article 9(3). The time taken for remote disconnection shall be defined by the Relevant TSO while respecting the provisions of Article 9(3).

## **ARTICLE 21**

### **GENERAL PROVISIONS FOR DEMAND SIDE RESPONSE**

1. Demand Side Response shall be distinguished by different System Reserve categories, either remotely or autonomously controlled, to provide response to Frequency and Voltage fluctuations, namely:
  - a) Remotely controlled:
    - i. Demand Side Response Active Power Control;
    - ii. Demand Side Response Reactive Power Control; and
    - iii. Demand Side Response Transmission Constraint Management;
  - b) Autonomously controlled:
    - i. Demand Side Response System Frequency Control; and
    - ii. Demand Side Response Very Fast Active Power Control.
2. For Demand Side Response Active Power Control, Reactive Power Control, and Demand Side Response Transmission Constraint Management, Demand Facilities and Closed Distribution Networks may voluntarily provide this service.
3. Once one of the DSR services set forth in paragraph 1 (a) is offered by a Demand Facility or Closed Distribution Network, the demand offered for the DSR service shall be available for either or both Demand Side Response Low Frequency Demand Disconnection and Demand Side Response Low Voltage Demand Disconnection.
4. Demand Side Response Active Power Control (DSR APC) capabilities shall apply for new devices identified as significant (Active Power Control devices) if this is decided in accordance with the procedure set forth below:
  - i. The TSOs shall jointly elaborate and propose a list of demand devices identified as significant to be fitted with necessary component[s], for future application of Demand Side Response Active Power Control (DSR APC). This proposal shall aim at applying Demand Side Response Active Power Control (DSR APC) in a socio-economic efficient manner.

- ii. This list of demand devices shall be submitted to the European Commission with a view to making these devices subject to DSR APC in accordance with the process set Article 15 of Directive 2009/125/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for the setting of ecodesign requirements for energy related products. The date of the submission by the TSOs shall be jointly agreed between all the TSOs.
  - iii. The European Commission shall review the proposal and inform relevant stakeholders, including the TSOs, of the outcome of such a review within three months as from its submission in light of the criteria set in Article 15 paragraph 2 of Directive 2009/125/EC.
  - iv. If the European Commission decides to initiate the process for preparing and submitting a draft implementing measure for the demand devices concerned in accordance with Article 15 of Directive 2009/125/EC, all the TSOs shall jointly provide their input during such a process, and more particularly in the context of the Consultation Forum provided for in Article 18 of Directive 2009/125/EC.
  - v. The relevant ecodesign requirement adopted pursuant to Article 15 of Directive 2009/125/EC shall include the requirements set in Article 22 for the relevant categories of Demand Side Response Active Power Control (DSR APC) devices in coordination with the TSOs and the relevant DSOs.
  - vi. The TSOs shall, contribute to any subsequent review and amendment of the relevant ecodesign requirement under Directive 2009/125/EC. Article 21(4)(i-iv) shall apply to this review and updating process.
5. Demand Side Response System Frequency Control (DSR SFC) shall mandatorily apply to new Temperature Controlled Devices identified as significant if this is decided in accordance with the procedure set forth below:
- i. The TSOs shall jointly elaborate and propose a list of significant Temperature Controlled Devices for the application of Demand Side Response System Frequency Control (DSR SFC). This proposal shall aim at applying Demand Side Response System Frequency Control (DSR SFC) in a socio-economic efficient manner.
  - ii. This list of Significant Temperature Controlled Devices shall be submitted to the European Commission with a view to making these devices subject to DSR SFC in accordance with the process set under Directive 2009/125/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for the setting of ecodesign requirements for energy related products. The date of the submission by the TSOs shall be jointly agreed between all the TSOs.
  - iii. The European Commission shall review the proposal and inform relevant stakeholders, including the TSOs, of the outcome of such a review within three months as from its submission.

- iv. If the European Commission decides to initiate the process for preparing and submitting a draft implementing measures for the Temperature Controlled Devices Concerned, all the TSOs shall jointly contribute to the identification of the relevant devices, more particularly in the context of the Consultation Forum provided for in Article 18 of Directive 2009/125/EC.
- v. The relevant ecodesign requirement adopted pursuant to Article 15 of Directive 2009/125/EC shall include the requirements set in Article 23 for the relevant Demand Side Response System Frequency Control (DSR SFC) devices in coordination with the TSOs and the relevant DSOs will be implemented by the European Commission.
- vi. The TSOs shall, contribute to any subsequent review and amendment of the relevant ecodesign requirement under Directive 2009/125/EC. Article 21(5)(i-iv.) shall apply to this review and updating process.

## **ARTICLE 22**

### **DEMAND SIDE RESPONSE - ACTIVE POWER CONTROL, REACTIVE POWER CONTROL AND TRANSMISSION CONSTRAINT MANAGEMENT**

1. With regard to either Demand Side Response Active Power Control, Reactive Power Control, or Transmission Constraint Management, Demand Facilities and Closed Distribution Networks may voluntarily offer this service. The requirements below shall be mandatory only for Demand Facilities or Closed Distribution Networks whom offer these services, either individually or as part of Demand Aggregation:
  - a) The Demand Facility or Closed Distribution Network shall not be involved in the activities specified in Article 21(1)(a), in case providing any type of DSR may put at risk the safety of persons or assets.
  - b) All Demand Units providing DSR shall be capable of operating across the Frequency ranges specified in Article 13(1)(a)(i.), and extended range specified in Article 13(1)(a)(ii.). A reduced Frequency range can be agreed directly or indirectly (including but not restricted to via an Aggregator) between the Demand Facility Owner or operator of the Closed Distribution Network and the Relevant Network Operator in coordination with the Relevant TSO, while respecting the provisions of Article 9(3).
  - c) Demand Facilities and Closed Distribution Networks providing DSR with a Connection Point at or above 110kV shall be capable of operating across the Voltage ranges specified in Article 14(1)(a)(i.).
  - d) Demand Facilities and Closed Distribution Networks providing DSR with a Connection Point below 110kV shall be capable of operating across the normal operational Voltage range of the Network at the Connection Point, defined by the Relevant Network Operator, while respecting the provisions of Article 9(3).
  - e) The method of DSR LFDD or DSR LVDD shall be agreed between the Demand Facility Owner directly or indirectly (including but not restricted to via an Aggregator) or Operator of the Closed Distribution Network and the Relevant Network Operator, in coordination with the Relevant TSO, while respecting the provisions of Article 9(3). This agreement may result in:

- i. decreasing power consumption by an Instruction sent by the Relevant Network Operator or the Relevant TSO;
  - ii. decreasing power consumption with a pre-alert signal sent by the Relevant Network Operator or the Relevant TSO; or
  - iii. for Voltage control, disconnection or reconnection of static compensation facilities controlled by the Relevant Network Operator or the Relevant TSO.
- f) Where modification to the power consumption is ordered by command sent by the Relevant Network Operator or the Relevant TSO, directly or indirectly (including but not restricted to via an Aggregator) each Demand Facility Owner or Operator of a Closed Distribution Network to which the command applies to shall make arrangements that shall enable the modification of a part of its demand responding to an Instruction by the Relevant Network Operator or the Relevant TSO. The demand modification shall be net of embedded generation in the Demand Facility or Closed Distribution Network, which is operated connected to the Transmission Network or Distribution Network.
- g) Where modification to the power consumption is specified via Frequency and/or Voltage control and pre-alert signal sent by the Relevant Network Operator or the Relevant TSO, each Demand Facility or Closed Distribution Network concerned shall be equipped to receive directly or indirectly (including but not restricted to via an Aggregator) the orders from the Relevant Network Operator or the Relevant TSO, to measure the Frequency and/or Voltage value, for DSR LFDD and LVDD respectively, to command the demand trip and to transfer the information. The equipment shall be defined, according to the standards and settings specified by the Relevant Network Operator, while respecting the provisions of Article 9(3).
- h) For Voltage control with disconnection or reconnection of static compensation facilities, each Transmission Connected Demand Facility or Transmission Connected Closed Distribution Network shall be able to connect or disconnect its static compensation facilities, directly or indirectly (including but not restricted to via an Aggregator), responding to an order transmitted by the Relevant TSO, or in the conditions set forth in the agreement between the Relevant TSO and the Demand Facility Owner or the operator of a Closed Distribution Network
- i) The Demand Facility or Closed Distribution Network shall be capable of controlling power consumption from the Network in a range equal or greater than as contracted by the Relevant TSO, directly or indirectly (including but not restricted to via an Aggregator), while respecting the provisions of Article 9(3).
- j) The Demand Facility or Closed Distribution Network shall be equipped to receive the orders, directly or indirectly, from the Relevant Network Operator or the Relevant TSO to modify its demand and to transfer the necessary information, according to the standards and settings defined by the Relevant Network Operator, while respecting the provisions of Article 9(3).
- k) The Demand Facility or Closed Distribution Network shall be capable of adjusting its power consumption as expected within a time period defined by the Relevant TSO, while respecting the provisions of Article 9(3).

- l) A Demand Facility or Closed Distribution Network providing one or more type of DSR shall not ignore or interrupt the full execution of an order issued by the Relevant Network Operator, Aggregator or the Relevant TSO to modify its power consumption with respect to that type of DSR , unless a contractually agreed method with the Relevant Network Operator or Relevant TSO for the replacement of their contribution is in place (including but not restricted to grouped Demand Facilities contribution via an Aggregator).
- m) A Demand Facility or Closed Distribution Network, once a modification to power consumption has taken place, shall modify its demand only if required by the Relevant Network Operator or Relevant TSO directly or indirectly (including but not restricted to via an Aggregator), while respecting the provisions of Article 9(3).
- n) Instructions to modify power consumption may have immediate (less than 1 second) or delayed effects.
- o) The Demand Facility Owner or operator of the Closed Distribution Network shall directly or indirectly, (including but not restricted to via an Aggregator), notify the Relevant Network Operator or Relevant TSO pursuant to Article 9(3) in writing each year the details of the changes of its DSR capacity at its installation. Any modification of this DSR capacity during the year shall be notified to the Relevant Network Operator or Relevant TSO pursuant to Article 9(3) without any delay. The situations when, and the level of detail required of these changes or modifications, will be specified by the Relevant Network Operator or Relevant TSO while respecting the provisions of Article 9(3) and may be aggregated (including but not restricted to via an Aggregator).
- p) With regard to the rate-of-change-of-Frequency withstand capability, the Demand Facility or Closed Distribution Network shall have the capability to not disconnect from the Network due to the rate-of-change-of-Frequency up to a value defined by the Relevant TSO, while respecting the provisions of Article 9(3). The value of rate of change of Frequency shall be based on a 500 ms average.

## **ARTICLE 23**

### **DEMAND SIDE RESPONSE SYSTEM FREQUENCY CONTROL**

1. With Regard to Demand Side Response System Frequency Control on Temperature Controlled Devices:
  - a) The control system of the Demand Side Response System Frequency Control shall have no influence on the target temperature, within a deadband around the nominal system Frequency of 50.00Hz, of a width to be defined by the Relevant TSO while respecting the provisions of Article 9(3) in co-ordination with the TSOs in the synchronous area.
  - b) The control system shall be designed with a logic interface (input port) in order that a communication signal may be fitted into the system to inhibit operation as part of a Demand Side Response system within the facility. The Relevant Network Operator shall have the right to define while respecting the provisions of Article 9(3) the requirements for further equipment to make use of this logical interface.

- c) The built in hysteresis of the Temperature Controlled Device between its controllers on and off temperature range settings shall be designed to be utilised by the Demand Side Response System Frequency Control.
  - d) The Temperature Controlled Devices on and off temperature range settings shall not be exceeded by the Demand Side Response System Frequency Control when responding to Frequency deviations from the nominal Frequency.
  - e) The Demand Side Response System Frequency Control shall provide a response to deviations in Network Frequency across a Frequency range by corresponding changes to the target temperature in proportion of its maximum temperature range. The maximum change in target temperature shall be at the widest when the system Frequency is at the boundary of the system operating range, defined by the Relevant TSO, while respecting the provisions of Article 9(3).
  - f) The maximum Frequency deviation from nominal value of 50.00 Hz shall be defined by the Relevant TSO in co-ordination with the TSOs in the synchronous area, while respecting the provisions of Article 9(3).
  - g) The temperature controller of the device shall measure and update the actual system Frequency measurement at least every 0.2 seconds.
  - h) For system Frequency below the deadband around the nominal value of 50.00Hz, the target temperature shall be lowered for a heating system and raised for a cooling system.
  - i) For system Frequency above the deadband around the nominal value of 50.00Hz, the target temperature shall be raised for a heating system and lowered for a cooling system.
  - j) On return of Frequency within the deadband of nominal value of 50.00 Hz, a random time delay of up to 5 minutes shall be initiated before normal operation resumes.
  - k) With regard to the Demand Side Response System Frequency Control's sensitivity and accuracy of the Frequency measurement and the consequent movement of the temperature target, the system shall be able to detect a change in system Frequency of 0.01Hz, in order to give overall linear proportional system response. The system shall be capable of a rapid detection and response to changes in system Frequency. An offset in the steady state measurement of Frequency shall be acceptable up to 0.05Hz.
2. Temperature Controlled Devices, unable to deliver the turn on and off temperature range equal to or less than half the devices available temperature deviation range, may be given a defined time limited dispensation for production and sale, until it reaches compliance. The time period for this defined time limited dispensation shall be specified in the process set forth in Article 21(5).

**ARTICLE 24**  
**DEMAND SIDE RESPONSE VERY FAST ACTIVE POWER CONTROL**

1. The facilitation of a Demand Facility or Closed Distribution Network to voluntarily deliver Demand Side Response Very Fast Active Power Control by a change of Active Power related to the rate-of-change-of-Frequency for that portion of its demand, shall be agreed between the Relevant TSO and Demand Facility Owner or operator of a Closed Distribution Network, in coordination with the Relevant Network Operator, while respecting the provisions of Article 9(3).
2. The operating principle of this control system and the associated performance parameters shall be defined by the Relevant TSO, in agreement with the Relevant Network Operator, while respecting the provisions of Article 9(3).
3. The response time for Very Fast Active Power Control will be defined by Relevant TSO but will not be more than 2 seconds.

**ARTICLE 25**  
**POWER QUALITY**

All Transmission Connected Demand Facility Owners and Transmission Connected Distribution Network Operators shall ensure that their connection to the Network does not result in a 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 the Relevant TSO while respecting the provisions of Article 9(3).

**ARTICLE 26**  
**SIMULATION MODELS**

1. All Transmission Connected Demand Facilities, Demand Facilities or Closed Distribution Network providing DSR (excluding DSR SFC), and Transmission Connected Distribution Networks, shall fulfil the following requirements related with regard to the simulation models or equivalent information:
  - a) Each TSO shall have the right to require the simulation models or equivalent information showing the behaviour of the Demand Facility, Closed Distribution Network providing DSR (excluding DSR SFC) and/or Transmission Connected Distribution Network in both steady and dynamic states.

Each TSO shall define, while respecting the provisions of Article 9(3), the content and format of those simulation models or equivalent information. The content and format defined may include but is not restricted to:

- i. steady and dynamic states, including 50 Hz component;
- ii. electromagnetic transient simulations at the Connection Point ;
- iii. structure and block diagrams.

- b) For the purpose of dynamic simulations, the simulation model or equivalent information provided shall as defined in paragraph 1(a) contain the following sub-models or equivalent information:
- i. Power control;
  - ii. Voltage control;
  - iii. Demand Facility and Transmission Connected Distribution Network protection models;
  - iv. The constituent demand types, i.e. electro technical characteristics of the demand; and
  - v. Converter models.
- c) Each Relevant Network Operator or Relevant TSO shall define, while respecting the provisions of Article 9(3), requirements for Transmission Connected Demand Facilities and/or Transmission Connected Distribution Network recordings in order to compare the response of the model with these recordings.

## **Chapter 3**

### **OPERATIONAL NOTIFICATION PROCEDURE**

#### **SECTION 1**

#### **OPERATIONAL NOTIFICATION PROCEDURE FOR NEW DEMAND FACILITIES AND NEW DISTRIBUTION NETWORK CONNECTIONS**

#### **ARTICLE 27**

#### **GENERAL PROVISIONS**

1. The provisions of Chapter 3 Section 1 shall apply only to New Demand Facilities and New Distribution Network Connections as described in Articles 3, 7 and 8, with the exception of DSR SFC devices.
2. Each Demand Facility Owner or Distribution Network Operator to which one or more of the requirements in Chapter 2 apply, shall confirm to the Relevant Network Operator its ability to satisfy the technical design and operational criteria as referred to in Chapter 2 of this Network Code.
3. Further details of the operational notification procedure shall be defined and made publically available by the Relevant Network Operator while respecting the provisions of Article 9(3).

#### **ARTICLE 28**

#### **PROVISIONS FOR DEMAND UNITS WITH DSR WITHIN A DEMAND FACILITY CONNECTED AT OR BELOW 1000V**

1. The operational notification procedure for a new Demand Unit with DSR, within a Demand Facility connected at or below 1000V, shall comprise an Installation Document.

The Installation Document template will be provided by the Relevant Network Operator, and the contents agreed with the Relevant TSO while respecting the provisions of Article 9(3).

Based on an Installation Document, the Demand Facility Owner shall fill in the required information and submit it, either directly or indirectly (via an Aggregator), to the Relevant Network Operator. The date of this submission shall be before the capacity of the Demand Side Response of the Demand Unit is offered in the market and specified by the Relevant Network Operator, while respecting Article 9(3).

For subsequent Demand Units with DSR separate independent Installation Documents shall be provided before the capacity of the Demand Side Response of the Demand Unit is offered in the market.

The content of the Installation Document of individual Demand Units may be aggregated (including but not restricted to via an Aggregator) as specified, and where accepted, by the Relevant Network Operator or Relevant TSO while respecting the provisions of Article 9(3).

2. The content of the Installation Document shall be defined by the Relevant Network Operator while respecting the provisions of Article 9(3). The Installation Document shall contain the following items:
  - a) the location at which the Demand Unit with DSR is connected to the Network;
  - b) the maximum capacity of the DSR installation in kW;
  - c) the type of DSR services provided as defined in Article 21;
  - d) for equipment used information shall be provided as directed by the Relevant Network Operator (an Equipment Certificate may be used); and
  - e) the contact details of the Demand Facility Owner.

The Relevant Network Operator may define, while respecting the provisions of Article 9 (3), additional items to be included in the Installation Document.

3. On permanent removal of the DSR services in the Demand Unit, the Demand Facility Owner shall notify the Relevant Network Operator either directly or indirectly in writing. This information may be aggregated (including but not restricted to via an Aggregator) as specified, and where accepted, by the Relevant Network Operator or Relevant TSO while respecting the provisions of Article 9(3).

## **ARTICLE 29**

### **COMMON PROVISIONS FOR DEMAND FACILITIES AND CLOSED DISTRIBUTION NETWORKS PROVIDING DSR SERVICES AND CONNECTED ABOVE 1000 V, TRANSMISSION CONNECTED DEMAND FACILITIES AND TRANSMISSION CONNECTED DISTRIBUTION NETWORK CONNECTIONS**

1. The operational notification procedure for connection of a Demand Facility or Closed Distribution Network offering DSR services, a Transmission Connected Distribution Network and a Transmission Connected Demand Facility, allows for the use of an Equipment Certificate.
2. The Equipment Certificate process may be used to collate verified data and performance for a specific type of Demand Unit. If accepted by the Relevant Network Operator, Equipment Certificates shall be used to verify specific parts of data and performance in place of part of the operational notification procedure. An Equipment Certificate can be used repeatedly to demonstrate compliance within the same Demand Facility and Closed Distribution Network providing DSR services, Transmission Connected Demand Facility and Transmission Connected Distribution Network.
3. If accepted by the Relevant Network Operator, the Demand Facility Owner or Distribution Network Operator may use Equipment Certificates as validated information about components of the Demand Facility or Distribution Network, but Equipment Certificates shall not be used to indicate total compliance. The Relevant Network Operator will make available upon request by the Demand Facility Owner or Distribution Network Operator what parts of a project, if any, are acceptable in lieu of the full compliance process and how to proceed to make use of Equipment Certificates in this process.

**ARTICLE 30**  
**PROVISIONS FOR DEMAND UNITS WITH DSR WITHIN A DEMAND FACILITY CONNECTED ABOVE 1000V**

1. The operational notification procedure for connection for a new Demand Unit with DSR, within a Demand Facility connected above 1000V, shall comprise a Demand Side Response Unit Document (DSRUD). The DSRUD provided by the Demand Facility Owner shall contain information as defined by the Relevant Network Operator, including a Statement of Compliance. The selection of the required content of the DSRUD shall be defined by the Relevant Network Operator while respecting the provisions of Article 9(3). Its content shall be the information defined in Articles 41 to 50 for Demand Facilities, but can be simplified through delivery in a single stage of operational notification as well as reduced requirements of details. The Demand Facility Owner shall provide the required information and submit it to the Relevant Network Operator. For subsequent Demand Units with DSR separate independent DSRUDs shall be provided.
2. The Relevant Network Operator on acceptance of a complete and adequate DSRUD shall issue a Final Operational Notification to the Demand Facility Owner.
3. On permanent removal of the Demand Unit with DSR within the Demand Facility, the Demand Facility Owner shall notify the Relevant Network Operator or Relevant TSO pursuant to Article 9(3) directly or indirectly (for example via an Aggregator), in writing.

**ARTICLE 31**  
**PROVISIONS FOR TRANSMISSION CONNECTED DISTRIBUTION NETWORK CONNECTIONS AND TRANSMISSION CONNECTED DEMAND FACILITIES**

The operational notification procedure for connection for each new Transmission Connected Distribution Network and Transmission Connected Demand Facility shall comprise:

- a) Energisation Operational Notification;
- b) Interim Operational Notification; and
- c) Final Operational Notification.

**ARTICLE 32**  
**ENERGISATION OPERATIONAL NOTIFICATION FOR TRANSMISSION CONNECTED DISTRIBUTION NETWORK CONNECTIONS AND TRANSMISSION CONNECTED DEMAND FACILITIES**

1. Energisation Operational Notification shall entitle the Transmission Connected Demand Facility Owner or Transmission Connected Distribution Network Operator to energise its internal Network by using the Network connection that is defined by the Connection Point.
2. An Energisation Operational Notification shall be issued by the Relevant TSO, subject to the completion of preparation and the fulfilment of the requirements of the Relevant TSO in the relevant operational procedures. This preparation will include agreement on the protection and

control relevant to the Connection Point between the Relevant TSO and the Demand Facility Owner or Distribution Network Operator.

### **ARTICLE 33**

#### **INTERIM OPERATIONAL NOTIFICATION FOR TRANSMISSION CONNECTED DISTRIBUTION NETWORK CONNECTIONS AND TRANSMISSION CONNECTED DEMAND FACILITIES**

1. Interim Operational Notification shall entitle the Transmission Connected Demand Facility Owner or Transmission Connected Distribution Network Operator to operate the Transmission Connected Demand Facility, Transmission Connected Distribution Network, and/or Demand Unit by using the Network connection that is defined by the Connection Point for a limited period of time.
2. An Interim Operational Notification shall be issued by the Relevant TSO subject to the completion of data and study review process.
3. For the purpose of the completion of data and study review, the Relevant TSO shall have the right to request the following from the Transmission Connected Distribution Network or Transmission Connected Demand Facility:
  - a) interim Statement of Compliance;
  - b) detailed technical data of the Transmission Connected Demand Facility or Transmission Connected Distribution Network with relevance to the Network connection, that is defined by the Connection Point, as specified by the Relevant TSO;
  - c) Equipment Certificates of Demand Facilities and/or Distribution Network Connections where these are relied upon as part of the evidence of compliance;
  - d) studies demonstrating expected steady-state and dynamic performance as required by Chapter 4 Section 4 and 6 of this Network Code; and
  - e) details of intended practical method of completing compliance tests according to Chapter 4.
4. The maximum period for the Transmission Connected Demand Facility Owner or Transmission Connected Distribution Network Operator to remain in the Interim Operational Notification status shall not exceed twenty four months. The Relevant TSO shall be entitled to specify a shorter Interim Operational Notification validity period in accordance with Article 9(3). In that case, an Interim Operational Notification extension shall be granted only if the Demand Facility Owner or Distribution Network Operator demonstrates substantial progress towards full compliance of the Demand Unit. At the time of Interim Operational Notification extension, the outstanding issues should be explicitly identified.
5. A prolongation of the twenty four month period for the Demand Facility Owner or Distribution Network Operator for the Demand unit to remain in the Interim Operational Notification status may be granted upon request for Derogation made to the Relevant TSO. The request shall be made before the expiry of the twenty four month period and in accordance with the Derogation procedure specified in Chapter 5.

## **ARTICLE 34**

### **FINAL OPERATIONAL NOTIFICATION FOR TRANSMISSION CONNECTED DISTRIBUTION NETWORK CONNECTIONS AND TRANSMISSION CONNECTED DEMAND FACILITIES**

1. Final Operational Notification shall entitle the Transmission Connected Demand Facility Owner or Transmission Connected Distribution Network Operator to operate the Transmission Connected Demand Facility or Transmission Connected Distribution Network by using the Network connection that is defined by the Connection Point.
2. A Final Operational Notification shall be issued by the Relevant TSO upon prior removal of all incompatibilities identified for the purpose of the Interim Operational Notification status and subject to the completion of data and study review process.
3. For the purpose of the completion of data and study review, the Relevant TSO shall have the right to request the following from the Transmission Connected Distribution Network Operator or Transmission Connected Demand Facility Owner:
  - a) Statement of Compliance; and
  - b) Update of applicable technical data, simulation models and studies as referred to in Article 33 (3)(b),(c),(d) and (e), including use of actual measured values during testing.
4. In case of incompatibility identified for the purpose of issuing the Final Operational Notification, a Derogation may be granted upon request made to the Relevant TSO, in accordance with the Derogation procedure defined in Chapter 5.
5. The Final Operational Notification shall be issued by the Relevant TSO, if the request for Derogation addressed by Transmission Connected Demand Facility Owner or Transmission Connected Distribution Network Operator was approved.
6. The Transmission Connected Demand Facility Owner or Transmission Connected Distribution Network Operator whose request for Derogation was rejected, shall not be connected until a resolution removing the incompliance is agreed between the Transmission Connected Demand Facility Owner or Transmission Connected Distribution Network Operator, and the Relevant TSO. In case when the incompliance cannot be removed an Interim Operational Notification, for a New Demand Facility or a New Distribution Network Connection, or a Limited Operational Notification, for a failure in service or a change or modification, shall be issued.

## **ARTICLE 35**

### **LIMITED OPERATIONAL NOTIFICATION FOR TRANSMISSION CONNECTED DISTRIBUTION NETWORK CONNECTIONS AND TRANSMISSION CONNECTED DEMAND FACILITIES**

1. The Transmission Connected Demand Facility Owner or Transmission Connected Distribution Network Operator, to whom a Final Operational Notification has been granted, shall as soon as practicable inform the Relevant TSO of the following circumstances:
  - a) a temporary modification or loss of capability of the Transmission Connected Demand Facility or Transmission Connected Distribution Network, which affects the performance of

- the Transmission Demand Facility or Transmission Connected Distribution Network to meet the requirements of Chapter 2; or
- b) equipment failures leading to non-compliance with any relevant requirements.
2. The Transmission Connected Demand Facility Owner or Transmission Connected Distribution Network Operator shall apply within 1 month to the Relevant TSO for a Limited Operational Notification, if they expect the circumstances described in paragraph 1 to persist for more than three months.
  3. Limited Operational Notification shall be issued by the Relevant TSO with a clear identification of:
    - a) the unresolved issues justifying the granting of the Limited Operational Notification;
    - b) the responsibilities and timescales for expected solution; and
    - c) an initial period of validity.
  4. This initial period of validity, specified in paragraph 3(c), might be extended provided that evidence is given to demonstrate substantial progress in terms of achieving full compliance. The total period of validity of a Limited Operational Notification shall not exceed twelve months.
  5. A prolongation of the twelve month period for the Transmission Connected Demand Facility Owner or Transmission Connected Distribution Network Operator to remain in the Limited Operational Notification status may be granted upon request for Derogation made to the Relevant TSO.
  6. The request shall be made before the expiry of the twelve month period and in accordance with the Derogation procedure specified in Chapter 5.
  7. The Relevant TSO shall have the right to refuse the operation of the Transmission Connected Demand Facility or Transmission Connected Distribution Network Connection, if the Limited Operational Notification terminates without removal of the circumstances which caused its issuing. In such a case, the Final Operational Notification shall automatically be invalid.

## **SECTION 2**

### **OPERATIONAL NOTIFICATION PROCEDURE FOR EXISTING DEMAND FACILITIES OR EXISTING DISTRIBUTION NETWORK CONNECTIONS**

#### **ARTICLE 36 GENERAL PROVISIONS**

1. In order to assess the advantages of the applicability of any requirement set forth in this Network Code to Existing Demand Facilities or Existing Distribution Network Connections, the Relevant TSO shall initiate a preparatory stage to identify cases which merit initiating the phases defined in paragraphs 4 to 9. This preparatory stage shall consist of an initial qualitative comparison of costs and benefits related to the requirement under consideration for application to Existing Demand Facilities or Existing Distribution Network Connections.

2. In case, the Relevant TSO considers that this preparatory stage demonstrates that a subsequent analytical Cost Benefit Analysis has a reasonable prospect of determining a positive result, the Relevant TSO shall initiate the phases defined in paragraphs 4 to 9.
3. In case, the Relevant TSO considers that this preparatory stage does not demonstrate that a subsequent Cost Benefit Analysis has a reasonable prospect of determining a positive cost-benefit, the Relevant TSO may not initiate the phases defined in paragraphs 4 to 9.
4. The Relevant TSO shall carry out a quantitative Cost Benefit Analysis of a requirement under consideration for application to Existing Demand Facilities or Existing Distribution Networks, which has demonstrated potential benefits as a result of the preparatory stage according to paragraph 1. This quantitative Cost Benefit Analysis shall be followed by a public consultation. The public consultation shall include, amongst others, a proposal for a transition period for implementing an application to Existing Demand Facilities or Existing Distribution Network Connections. Such proposed transition period should not exceed two years from the decision of the Relevant National Regulatory Authority on the applicability.
5. Demand Facility Owners or Distribution Network Operators shall assist and contribute to this Cost Benefit Analysis and provide the relevant data as requested by the Relevant TSO within three months after receipt of the request, unless a longer period is agreed. As far as Distribution Networks are concerned, Distribution Network Operators shall be fully integrated in the Cost Benefit Analysis.
6. The Cost Benefit Analysis shall be undertaken using one or more of the following calculating principles:
  - a) net present value;
  - b) return on investment;
  - c) rate of return; and
  - d) time to break even.

The quantified benefits shall include any marginal socio-economic benefits in terms of improvement of security of supply including, but not limited to:

- a) associated reduction in probability of loss of supply over the lifetime of the modification;
- b) the probable extent and duration of such loss of supply; and
- c) the societal cost per hour of such loss of supply;

as well as benefits to the internal market in electricity, cross-border trade and integration of renewables including, but not limited to:

- a) Frequency response;
- b) reserve holding;
- c) Reactive Power provision;
- d) congestion management; and
- e) defence measures.

The quantified costs shall include as appropriate, but are not limited to:

- a) costs for implementing the requirement;
- b) any attributable loss of opportunity; and/or
- c) change in maintenance and operating costs.

7. If the socio-economic benefits do not outweigh the costs of applying the requirement under consideration no further action is to be taken.

If the socio-economic benefits outweigh the costs of applying the requirement under consideration to the Existing Demand Facilities or Existing Distribution Network Connections, the Relevant TSO shall summarise the analysis in a report. The report shall include a recommendation and a proposal for a transition period for implementing any application to Existing Demand Facilities or Existing Distribution Network Connections. Such proposed transition period should not exceed two years from the decision of the National Regulatory Authority on the applicability. This report shall be subject to public consultation.

If taking account of the outcome of the public consultation the Relevant TSO decides to proceed with the issue, the report including such consultation outcome and the recommendation on the applicability of the requirement under consideration to Existing Demand Facilities or Existing Distribution Network Connections, shall be forwarded within six months of the closure of the consultation to the Relevant National Regulatory Authority for decision.

8. The proposal by the Relevant TSO to the Relevant National Regulatory Authority on applicability of any requirement of this Network Code to Existing Demand Facilities or Existing Distribution Network Connections shall include the following:
  - a) an operational notification procedure in order to prove the implementation of the requirements by the Demand Facility Owner or Distribution Network Operator; and
  - b) an appropriate transition period for implementing the requirements which should not exceed two years from the decision of the National Regulatory Authority on the applicability. The determination of the transition period shall take into account the obstacles for efficient undertaking of the equipment modification and replacement.

The Relevant National Regulatory Authority shall decide on the case within three months after the receipt of the report including the recommendation of the Relevant TSO. The decision of the Relevant TSO on the applicability of the requirement under consideration to Existing Demand Facilities or Existing Distribution Network Connections and the decision of the Relevant National Regulatory Authority shall be published.

9. In case of a positive decision by the Relevant National Regulatory Authority, all relevant clauses in contracts and/or relevant clauses in general terms and conditions relating to the Network connection of Existing Demand Facilities or Existing Distribution Networks shall be amended to achieve compliance with the requirements of this Network Code which shall apply to them according to decision of the Relevant National Regulatory Authority. The relevant clauses shall be amended within three years after the positive decision of the Relevant National Regulatory Authority on their applicability. This requirement for amendment shall apply regardless of whether the relevant contracts or general terms and conditions provide for such an amendment.

## **Chapter 4 COMPLIANCE**

### **SECTION 1 GENERAL PROVISIONS ON COMPLIANCE**

#### **ARTICLE 37 RESPONSIBILITY OF THE DEMAND FACILITY OWNER OR DISTRIBUTION NETWORK OPERATOR**

1. The Demand Facility Owner and the Distribution Network Operator shall ensure that respectively the Demand Facility, Distribution Network and/or the Distribution Network Connection is compliant with the requirements that apply to it under this Network Code, with the exception of DSR SFC. This compliance shall be maintained throughout the lifetime of the Demand Facility or Distribution Network.
2. Where the requirements of this code are defined by or are for the purpose of operation by the TSO, alternative tests or criteria for test result acceptance for these requirements will be agreed with the Relevant TSO.
3. The Demand Facility Owner or Distribution Network Operator may partially or totally delegate to third parties the task of gathering relevant documentation evidencing compliance.
4. Any intention to modify the technical capabilities of the Demand Facility, Distribution Network or Distribution Network Connection with possible impact on its compliance requirements of Sections 2-6 of this Chapter of the Network Code shall be notified to the Relevant Network Operator, directly or indirectly (including but not restricted to via an Aggregator), and prior to pursuing such modification in a time scale provided by the Relevant Network Operator respecting Article 9(3).
5. Any operational incidents or failures of the Demand Facility or Distribution Network Connection that have impact on its compliance requirements of Sections 2-6 of this Chapter of the Network Code shall be subject to notification to the Relevant Network Operator, directly or indirectly (including but not restricted to via an Aggregator), as soon as possible and without any intentional delay after the occurrence of such an incident.
6. Any foreseen test schedules and procedures to verify compliance of the Demand Facility or Distribution Network Connection to the requirements of this Network Code shall be subject to notification and approval by the Relevant Network Operator within the deadlines defined by the Relevant Network Operator and prior to their commencement.
7. The Relevant Network Operator shall be facilitated to participate to such test and may record the performance of the Demand Facility, Distribution Network and/or Distribution Network Connection.

**ARTICLE 38**  
**TASKS OF THE NETWORK OPERATOR**

1. The Relevant Network Operator shall be allowed to monitor compliance of the Demand Facility, Distribution Network or Distribution Network Connection to the requirements under this Network Code throughout the lifetime of the Demand Facility, Distribution Network or Distribution Network Connection. The Demand Facility Owner or Distribution Network Operator shall be informed of the outcome of this assessment.
2. The Relevant Network Operator shall have the right to request that the Demand Facility Owner or Distribution Network Operator carries out compliance tests and simulations not only during the operational notification procedures according to Chapter 3 but repeatedly throughout the lifetime of the Demand Facility, Distribution Network or Distribution Network Connection. Such a request may be made in particular according to a plan or general scheme for repeated tests and simulations or after any failure, modification or replacement of any equipment with possible impact on the compliance of the Demand Facility or Distribution Network Connection to the requirements under this Network Code, while respecting the provisions of Article 9(3).
3. The Relevant Network 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 or Distribution Network Operator in the frame of the compliance process. Such list shall, notably, cover the following information, documents and requirements:
  - a) all documentation and certificates to be provided by the Demand Facility Owner or Distribution Network Operator;
  - b) details of the technical data required from the Demand Facility, Distribution Network or Distribution Network Connection with relevance to the Network connection or operation;
  - c) requirements for models for steady-state and dynamic system studies;
  - d) timely provision of system data required to perform studies;
  - e) studies by the Demand Facility Owner or Distribution Network Operator for demonstrating expected steady-state and dynamic performance referring to the requirements set forth in Chapter 4 Section 4 and 5 of this Network Code;
  - f) conditions and procedures including scope for registering Equipment Certificates; and
  - g) conditions and procedures for use by the Demand Facility Owner or Distribution Network Operator of relevant Equipment Certificates instead of part of the activity for compliance as described in this Network Code.
4. The Relevant Network Operator shall make publicly available the allocation of responsibilities to the Demand Facility Owner or Distribution Network Operator and to the Network Operator for Compliance Testing, certification and monitoring.
5. The Relevant Network Operator may partially or totally delegate the performance of its Compliance Monitoring to third parties.
6. The Relevant Network Operator shall not withhold unreasonably any operational notification as described in Articles 32 to 34, if compliance tests or simulations cannot be performed as agreed

between the Relevant Network Operator and the Demand Facility Owner or Distribution Network Operator due to reasons which are in the sole control of the Relevant Network Operator or outside the sole control of the Demand Facility Owner or Distribution Network Operator.

### **ARTICLE 39 COMMON PROVISIONS ON COMPLIANCE TESTING**

1. The testing of the Demand Facility or Distribution Network Connection as specified in Articles 41 to 45 shall aim at demonstrating the fulfilment of the requirements of this Network Code.
2. Tests shall be run in the following circumstances:
  - a) a new connection is required;
  - b) a further development, replacement or modernisation of equipment takes place; or
  - c) alleged non-compliance by the Relevant Network Operator with the requirements of this Network Code.
3. Notwithstanding the minimum requirements relating to the Compliance Testing, laid down in Chapter 4 Section 2 and 3, the Relevant Network Operator shall be, while respecting the provisions of Article 9(3), entitled to:
  - a) allow the Demand Facility Owner or Distribution Network Operator to carry out an alternative set of tests, provided that those tests are efficient and sufficient to demonstrate compliance of the Demand Facility, Distribution Network or Distribution Network Connection with the requirements of this Network Code; and
  - b) require the Demand Facility Owner or Distribution Network Operator to carry out an additional or alternative set of tests in case information supplied to the Relevant Network Operator by the Demand Facility Owner or Distribution Network Operator, in relation with the compliance testing under the provisions of Chapter 4 Section 2 and 3, is not sufficient to demonstrate compliance with the requirements of this Network Code. Any additional or alternative tests should be sufficient to demonstrate compliance and be undertaken efficiently.
4. The Demand Facility Owner or Distribution Network Operator shall be responsible for carrying out the tests in accordance with the conditions laid down in Chapter 4. The Relevant Network Operator shall use its best endeavours to cooperate and not unduly delay the performance of the tests.
5. The Demand Facility Owner or Distribution Network Operator shall be responsible for the safety of the personnel and the plant during the tests.
6. The costs of the relevant tests including necessary deviation from the commercially preferred operating point in order to facilitate the tests shall be covered by the Demand Facility Owner or Distribution Network Operator.

7. The Relevant Network Operator shall be facilitated to participate to the test either on site or, if possible, remotely from the Network Operator's Control Room.

For that purpose, the Demand Facility Owner or Distribution Network Operator shall provide suitable monitoring equipment to record all relevant test signals and measurements, as well as ensure that the relevant representatives from both the Demand Facility or Distribution Network and the manufacturer are available on site for the entire testing period.

Signals specified by the Relevant Network Operator shall be provided in case the Relevant Network Operator intends to use its own equipment for selected tests, in order to record the performance during tests. The decision as regards the participation of the Relevant Network Operator to the test and the form of this participation shall remain at the sole and exclusive discretion of the Relevant Network Operator.

8. Where provided, the Relevant TSO shall have the right to specify a method for testing, directly or indirectly (including but not restricted to via an Aggregator) of:
  - a. the active control of Reactive Power according to Article 16; and/or
  - b. the capabilities for DSR as set forth in Articles 21, 22 and 24.

#### **ARTICLE 40**

##### **COMMON PROVISIONS ON COMPLIANCE SIMULATIONS**

1. The simulation of the Demand Facility, Distribution Network or Distribution Network Connection performance as specified in Articles 46 to 48 shall aim at demonstrating the fulfilment of the requirements of this Network Code.
2. Simulations shall be run in the following circumstances:
  - a) a new connection is required;
  - b) a further development, replacement or modernisation of equipment takes place; or
  - c) alleged non-compliance by the Relevant Network Operator with the requirements of this Network Code.
3. Notwithstanding the minimum requirements relating to the Compliance Simulations laid down in Chapter 4 Section 4 and 5, the Relevant Network Operator shall be, while respecting the provisions of Article 9(3), entitled to:
  - a) allow the Demand Facility Owner or Distribution Network Operator to carry out an alternative set of simulations, provided that those simulations are efficient and sufficient to demonstrate compliance of the Demand Facility or Distribution Network with the requirements of this Network Code; and
  - b) require the Demand Facility Owner or Distribution Network Operator to carry out an additional or alternative set of simulations in case information supplied to the Relevant Network Operator by the Demand Facility Owner or Distribution Network Operator in relation to Compliance Simulation under the provisions of Chapter 4 Section 4 or 6, is not sufficient to demonstrate compliance with the requirements of this Network Code.
4. The Demand Facility Owner shall provide simulation results relevant to each and any individual Demand Unit within the Demand Facility, in order to demonstrate the compliance with the requirements of this Network Code.

5. The Demand Facility Owner or Distribution Network Operator shall produce and provide a validated simulation model or equivalent information. The scope and format of the simulation models or equivalent information are described in Article 26 (1)a-b).
6. The Relevant Network Operator shall have the right to verify the compliance of the Demand Facility, Distribution Network or Distribution Network Connection with the requirements of this Network Code by carrying out its own Compliance Simulations based on the information provided in Article 17, 18, 26 and Chapter 4 Section 2 and 3.
7. The Relevant Network Operator shall provide to the Demand Facility Owner or Distribution Network Operator with the technical data and the simulation model of the Network, to the extent it is necessary to carry out the requested simulations according to Chapter 4 Section 4 or 6.

## **SECTION 2**

### **COMPLIANCE TESTING FOR TRANSMISSION CONNECTED DISTRIBUTION NETWORKS**

#### **ARTICLE 41**

##### **COMPLIANCE TESTS FOR DISCONNECTION FOR SYSTEM DEFENCE AND RECONNECTION**

1. The Transmission Connected Distribution Networks shall be compliant with the Relevant TSO requirements for system defence and reconnection referred to in Article 20 and shall be subject to the following compliance tests:
  - a) 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, authorized by the Relevant TSO;
  - b) with regard to synchronization testing, if required by the Relevant TSO, the Transmission Connected Distribution Network shall demonstrate the synchronisation facilities. This test shall verify the settings of the synchronisation devices. It shall cover the following matters: Voltage, Frequency, phase angle range, deviation of Voltage and Frequency;
  - c) with regard to remote disconnection testing, the Transmission Connected Distribution Network shall be capable of remote disconnection at the Connection Point[s] from the Transmission Network when required by the Relevant TSO within the time specified by the Relevant TSO;
  - d) with regard to Low Frequency Demand Disconnection testing, the Distribution Network Operator shall be able to demonstrate the capability of automatic low Frequency disconnection of a percentage of demand to be specified by the Relevant TSO, in coordination with adjacent TSOs, where equipped as defined in Article 20;
  - e) with regard to Low Frequency Demand Disconnection relays testing, the Low Frequency relays shall be tested to demonstrate, in accordance with Article 20(1) and (2), their functional capability for operation from a nominal AC supply input. This AC supply input shall

be specified by the Relevant TSO; and

- f) with regard to Low Voltage Demand Disconnection scheme testing, the Low Voltage Demand Disconnection scheme shall be tested to demonstrate, in accordance with Article 20(3), that their operation can be performed in a single action
2. The Equipment Certificate may be used instead of part of the tests above, provided that it is registered with the Relevant TSO.

## **ARTICLE 42**

### **COMPLIANCE TESTS FOR INFORMATION EXCHANGE**

1. With regard to information exchange between the Relevant TSO and the Transmission Connected Distribution Network, the Transmission Connected Distribution Network Operator shall demonstrate the technical capability to comply with the standard defined in Article 18(1)(b) and (c), with time stamping as specified.
2. The Equipment Certificate may be used instead of part of the test above, provided that it is registered with the Relevant TSO.

## **SECTION 3**

### **COMPLIANCE TESTING FOR TRANSMISSION CONNECTED DEMAND FACILITIES AND CLOSED DISTRIBUTION NETWORKS**

#### **ARTICLE 43**

#### **COMPLIANCE TESTS FOR DISCONNECTION FOR SYSTEM DEFENCE AND RECONNECTION**

1. The Transmission Connected Demand Facility as specified by the Relevant TSO shall be compliant with the requirements for system restoration referred to in Article 20 and shall be subject to the following compliance tests:
  - a) 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, authorized by the Relevant TSO;
  - b) with regard to synchronization testing where required by the Relevant TSO, the Transmission Connected Demand Facility shall be equipped with the necessary synchronisation facilities. This test shall cover the following matters: Voltage, Frequency, phase angle range, deviation of Voltage and Frequency;
  - c) with regard to remote disconnection testing, the Transmission Connected Demand Facility shall be capable of remote disconnection at the Connection Point[s] from the Transmission Network when required by the Relevant TSO;
  - d) with regard to Low Frequency Demand Disconnection scheme tests, the Low Frequency Demand Disconnection shall be tested to demonstrate, in accordance with Article 20(1) and (2), their functional capability for operation from a nominal AC input. This AC input shall be specified by the Relevant TSO; and

- e) with regard to Low Voltage Demand Disconnection schemes, the Low Voltage Demand Disconnection scheme shall be tested to demonstrate, in accordance with Article 20(3)(c) that their operation can be performed in a single action.
2. The Equipment Certificate may be used to replace part of the tests below, provided that it is registered with the Relevant TSO.

#### **ARTICLE 44**

### **COMPLIANCE TESTING OF DEMAND SIDE RESPONSE FOR DEMAND FACILITIES OR CLOSED DISTRIBUTION NETWORKS**

1. With regard to the demand modification test:
- a) the Demand Facility, or aggregated Demand Facilities, or Closed Distribution Network shall demonstrate their technical capability to modify their demand consumption, after receiving an order from the Relevant Network Operator, within the range, duration and time frame previously agreed and expected in Article 22;
  - b) the test shall be carried out preferably by an order or alternatively by simulating the receipt of an order from the Relevant Network Operator and adjusting the power demand of the Demand Facility or Closed Distribution Network;
  - c) the test is deemed passed, provided that the conditions defined by the Relevant Network Operator pursuant Article 22(1) (f) (g), (i), (j), (k), and (m) are cumulatively fulfilled; and
  - d) the Equipment Certificate may be used instead of part of the tests above, provided that it is registered with the Relevant Network Operator.
2. With regard to the disconnection or reconnection of static compensation facilities test:
- a) the Demand Facility or Closed Distribution Network shall demonstrate its technical capability to disconnect and/or reconnect its static compensation facilities when receiving an order from the Relevant Network Operator, in the time frame expected in Article 22;
  - b) the test shall be carried out by simulating the receipt of an order from the Relevant Network Operator and disconnect the static compensation facilities and by simulating the receipt of an order from the Relevant Network Operator and reconnect these facilities; and
  - c) the test is deemed passed, provided that the conditions defined by the Relevant Network Operator pursuant Article 22(1)(h), (i), (j), (k) and (m) are cumulatively fulfilled.

#### **ARTICLE 45**

### **COMPLIANCE TESTS FOR INFORMATION EXCHANGE**

1. With regard to information exchange between the Relevant TSO and the Transmission Connected Demand Facilities in real time or periodically with time stamping, the Transmission Connected Demand Facility shall demonstrate the technical capability to comply with the standard defined by the Relevant TSO pursuant to Article 18.
2. The Equipment Certificate may be used instead of part of the tests above, provided that it is registered with the Relevant Network Operator.

**SECTION 4**  
**COMPLIANCE SIMULATIONS FOR TRANSMISSION CONNECTED DISTRIBUTION NETWORKS**

**ARTICLE 46**  
**COMPLIANCE SIMULATIONS FOR REACTIVE POWER RANGES OF TRANSMISSION  
CONNECTED DISTRIBUTION NETWORKS**

1. With regard to Transmission Connected Distribution Networks, Reactive Power demand Compliance Simulations shall be carried out in the following conditions:
  - a) a steady-state load flow simulation model of the Network of the Transmission Connected Distribution Network shall be used to calculate the Reactive Power demand under different load conditions and under different generation conditions. A combination of steady-state minimum and maximum load and generation conditions resulting in the lowest and highest Reactive Power demand shall be part of the simulations. Calculation of 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;
  - b) the TSO shall have the right to specify the method for compliance simulation of the active control of Reactive Power as defined in Article 16(1)(c) while respecting Article 9(3); and
  - c) the simulation is deemed passed if the simulations demonstrate compliance with the requirements as described in Article 16(1)(a),(b) and (c).

**SECTION 5**  
**COMPLIANCE SIMULATIONS FOR DEMAND FACILITIES**

**ARTICLE 47**  
**COMPLIANCE SIMULATIONS FOR REACTIVE POWER RANGES OF TRANSMISSION  
CONNECTED DEMAND FACILITIES**

1. With regard to Transmission Connected Demand Facilities without onsite generation, Reactive Power demand compliance simulations shall be carried out in the following conditions:
  - a) the Transmission Connected Demand Facility without onsite generation shall demonstrate its Reactive Power capability at the Connection Point;
  - b) a load flow simulation model of the Transmission Connected Demand Facility shall be used to calculate the Reactive Power demand under different load conditions. Minimum and maximum load conditions resulting in the lowest and highest Reactive Power demand at the Connection Point shall be part of the simulations;
  - c) the simulation is deemed passed if the simulations demonstrate compliance with the requirements as described in Article 16(1)(a).
2. With regard to these Transmission Connected Demand Facilities with onsite generation, Reactive Power compliance simulations shall be carried out in the following conditions:
  - a) a load flow simulation model of the Network of the Transmission Connected Demand Facility shall be used to calculate the Reactive Power demand under different load conditions and under different generation conditions. 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; and
- b) the simulation is deemed passed if the simulations demonstrate compliance with the requirements as described in Article 16(1)(a).

#### **ARTICLE 48**

### **COMPLIANCE SIMULATIONS FOR VERY FAST ACTIVE POWER CONTROL OF DEMAND FACILITIES OR CLOSED DISTRIBUTION NETWORKS**

1. With regard to the Very Fast Active Power Control simulation:
  - a) the model of the Demand Facility or Closed Distribution Network shall demonstrate its capability to simulate Very Fast Active Power Control capability to a low Frequency event in the conditions described in Article 24.
  - b) the simulation is deemed passed, provided that the model demonstrates compliance with the conditions described in Article 24.

#### **SECTION 6**

### **COMPLIANCE MONITORING**

#### **ARTICLE 49**

### **COMPLIANCE MONITORING FOR TRANSMISSION CONNECTED DISTRIBUTION CONNECTED NETWORKS**

1. With regard to Compliance Monitoring of the Reactive Power requirements of Transmission Connected Distribution Networks:
  - a) The Reactive Power shall be measured at each Connection Point;
  - b) The Connection Point of the Transmission Connected Distribution Network shall be equipped with necessary equipment to measure the Active and Reactive Power, in accordance with Article 16; and
  - c) The Relevant Network Operator shall specify the time schedule for Compliance Monitoring, while respecting the provisions of Article 9(3).

#### **ARTICLE 50**

### **COMPLIANCE MONITORING FOR TRANSMISSION CONNECTED DEMAND FACILITIES**

1. With regard to Compliance Monitoring of the Reactive Power requirements of Transmission Connected Demand Facilities:
  - a) The Reactive Power shall be measured at the Connection Point;
  - b) The Connection Point of the Transmission Connected Demand Facility shall be equipped with necessary equipment to measure the Active and Reactive Power, in accordance with Article 16; and.
  - c) The Relevant Network Operator shall specify the time schedule for Compliance Monitoring, while respecting the provisions of Article 9(3).

## **Chapter 5 DEROGATIONS**

### **ARTICLE 51 GENERAL PROVISIONS**

1. The procedure for Derogation defined in this Chapter applies to all Demand Facilities as well as to all Distribution Network or Distribution Network Connections, both existing and new, to which the provisions of this Network Code are applicable pursuant to Articles 3 to 8.
2. The request for Derogation in paragraph 1, can only be submitted by the Demand Facility Owner for its Demand Facility or the Distribution Network Operator for its Distribution Network or Distribution Network Connection.
3. It shall also apply to Network Operators when requesting Derogations for classes of both existing and new Demand Facilities connected to their Network.
4. The Derogation process shall be transparent, non-discriminatory, non-biased, well documented and based in particular on the Cost Benefit Analysis performed in the conditions set forth by Article 36(5) and (6) by the Relevant TSO or by the Relevant Network Operator in coordination with the Relevant TSO. A Cost Benefit Analysis may not be performed by the Relevant Network Operator if, on its reasoned request, an individual exception is granted to the Relevant Network Operator by the National Regulatory Authority.
5. Criteria for assessing the request for Derogation shall be set by the Relevant National Regulatory Authority taking into account the recommendation of the Relevant Network Operator in coordination with the Relevant TSO. The criteria set by the Relevant National Regulatory Authority shall be non-discriminatory, objective and be published by the Relevant National Regulatory Authority.

### **ARTICLE 52 REQUEST FOR DEROGATION**

1. Demand Facilities Owners to which the provisions of this Network Code apply and which are connected either to the Transmission or Distribution Network may apply for Derogation. The request for Derogation may relate to one or several requirements of this Network Code. The request for Derogation shall be submitted to the Relevant Network Operator.
2. Distribution Network Operators to which the provisions of this Network Code apply and which are connected to the Transmission Network may apply for Derogation. The request for Derogation may relate to one or several requirements of this Network Code. The request for Derogation shall be submitted to the Relevant Network Operator.
3. The request for Derogation, submitted by the Demand Facility Owner or Distribution Network Operator shall include all the information and documents which are required by the Relevant Network Operator in coordination with the Relevant TSO, including, but not limited to:

- a) identification data of the applicant party, with reference contact person for any communications;
  - b) the specific plant or site to which the request is referred to;
  - c) the provision of the Network Code for which a Derogation is requested, with the detailed description of the requested Derogation; and
  - d) detailed accompanying justification with all relevant documents supporting the derogation application.
4. A Distribution Network Operator in its capacity as a Network Operator may apply for Derogation, in respect of one or several requirements of this Network Code by submitting a request to the Relevant National Regulatory Authority.
5. The request for Derogation, submitted by the Distribution Network Operator shall include all the information and documents which are required by the Relevant TSO, including, but not limited to:
- a) identification data of the Distribution Network Operator, with reference contact person for any communications;
  - b) the number of plant or Demand Facilities affected and the total installed capacity to which the request is referred to;
  - c) the provision of the Network Code for which a Derogation is requested, with the detailed description of the requested Derogation; and
  - d) the detailed accompanying justification with all relevant documents supporting the request.
6. A TSO may apply for Derogation, in respect of one or several requirements of this Network Code by submitting a request to the Relevant National Regulatory Authority
7. The request for Derogation, submitted by the TSO shall include the following information:
- a) identification data of the TSO, with reference contact person for any communications;
  - b) the number of plant or sites affected and the total installed capacity to which the request is referred to;
  - c) the provision of the Network Code for which a Derogation is requested, with the detailed description of the requested Derogation; and
  - d) the detailed accompanying justification with all relevant documents supporting the request.

## **ARTICLE 53 DECISION ON DEROGATION**

1. The request for Derogation submitted by the Demand Facility Owner or Distribution Network Operator, shall be assessed by the Relevant Network Operator.

In case the request for Derogation is considered to be incomplete, the Demand Facility Owner or Distribution Network Operator shall submit the missing information as requested by the Relevant Network Operator.

As from the date of the receipt of the complete request for Derogation by the Relevant Network Operator until the issuance of the decision granting or refusing the Derogation by the Relevant

National Regulatory Authority pursuant to paragraph 9, the Demand Facility or Distribution Network Connection to which the request for Derogation refers to shall be deemed compliant.

2. No later than six months after the receipt of the complete request, the Relevant Network Operator shall provide a reasoned opinion on the request for Derogation, together with their Cost-Benefit Analysis and submit them to the Relevant National Regulatory Authority.

The above deadline shall be shortened to three months in case a request for exemption from a Cost- Benefit Analysis is submitted by the Relevant Network Operator to the National Regulatory Authority.

3. In case the Relevant Network Operator has requested an exemption from a Cost-Benefit Analysis, the Relevant National Regulatory Authority shall decide on granting or rejecting this request within one month after the receipt of this request. When the request is rejected, the Relevant Network Operator shall provide a Cost-Benefit Analysis within three months following a decision of the National Regulatory Authority.
4. The request for Derogation submitted by the Distribution Network Operator in its capacity as network operator shall be assessed by the Relevant TSO.

In case the request for Derogation is considered to be incomplete, the Distribution Network Operator shall submit the missing information as requested by the Relevant TSO.

As from the date of the receipt of the complete request for Derogation by the Distribution Network Operator until the issuance of the decision granting or refusing the Derogation by the Relevant National Regulatory Authority pursuant to paragraph 9, the Demand Facilities or Closed Distribution Networks providing DSR to which the request for Derogation refers to shall be deemed compliant.

5. No later than six months after the receipt of the complete request, the Relevant TSO shall provide a reasoned opinion on the request for Derogation, together with a Cost-Benefit Analysis performed by the Relevant Distribution Network Operator, and submit them to the Relevant National Regulatory Authority.

The above deadline shall be shortened to three months in case a request for exemption from a Cost Benefit Analysis is submitted by the Distribution Network Operator to the Relevant National Regulatory Authority.

6. In case the Distribution Network Operator has requested an exemption from a Cost Benefit Analysis, the Relevant National Regulatory Authority shall decide on granting or rejecting this request within one month after the receipt of this request. When the request is rejected, the Distribution Network Operator shall provide a Cost Benefit Analysis within three months following the decision of the Relevant National Regulatory Authority.
7. The request for Derogation submitted by the TSO shall be assessed by the Relevant National Regulatory Authority.

In case the request for Derogation is considered to be incomplete the TSO shall submit the missing information as requested by the Relevant National Regulatory Authority.

As from the date of the receipt of the complete request for Derogation by the TSO until the issuance of the decision granting or refusing the Derogation by the Relevant National Regulatory

Authority pursuant to paragraph 9, the Demand Facilities or Distribution Network to which the request for Derogation refers to shall be deemed compliant.

8. Together with the request for Derogation referred to in paragraph 6, the TSO shall submit either a Cost Benefit Analysis or a request for exemption from a Cost Benefit Analysis to the Relevant National Regulatory Authority. In case the TSO has requested an exemption from Cost Benefit Analysis the Relevant National Regulatory Authority shall decide on granting or rejecting this request within one month after the receipt of this request. When the request is rejected, the TSO shall provide a Cost Benefit Analysis within three months following the decision of the Relevant National Regulatory Authority.
9. Within three months after the receipt of the complete request for Derogation, the Relevant National Regulatory Authority shall issue a motivated decision granting or rejecting the Derogation and specifying its duration of the Derogation,

The Relevant National Regulatory Authority shall communicate to the Relevant Network Operator, the Demand Facility Owner or Distribution Network Operator and the Agency the decisions granting or rejecting the Derogation.

10. The Agency shall monitor the procedures for Derogation and the National Regulatory Authorities shall cooperate with the Agency in this task and shall provide the Agency with all information necessary for this purpose.
11. The Agency may issue a reasoned recommendation to the National Regulatory Authority to revoke any Derogation, which has been granted without due justification.
12. The Relevant National Regulatory Authority shall have the right to issue a motivated decision revoking the granted Derogation, in the conditions set forth in the national law, in cases where the prerequisites for granting the Derogation no longer exist.

#### **ARTICLE 54**

#### **COMPLIANCE OF EXISTING DEMAND FACILITIES OR EXISTING DISTRIBUTION NETWORK CONNECTIONS**

1. An Existing Demand Facility or Existing Distribution Network Connection, deemed significant in accordance with the procedure set forth in Article 36, which is not compliant with at least a requirement of the Network Code, shall apply for a Derogation from these requirements in accordance with Article 52, within twelve months from the date the requirement, with which it is not compliant, becomes applicable.
2. If one month before the expiry of the twelve-month period set in paragraph 1, no application for Derogation has been received, the Relevant Network Operator shall, by formal notice, require the non-compliant Existing Demand Facility or Existing Distribution Network Connection, to either conform with the requirement, or to apply for a Derogation.
3. If at the expiry of the twelve-month period, the non-compliant Existing Demand Facility or Existing Distribution Network Connection referred to in paragraph 1 has not applied for a Derogation, the Relevant Network Operator shall have the right to disconnect the Existing Demand Facility or Existing Distribution Network. The decision on disconnection shall be motivated.

**ARTICLE 55**  
**REGISTER OF DEROGATIONS TO THE NETWORK CODE**

1. Each National Regulatory Authority shall maintain and publish a register of all Derogations granted or rejected and shall provide to the Agency an updated and consolidated register at least every 6 months, with a copy to ENTSO-E.
2. These registers shall contain in particular:
  - a) the requirement(s) for which the derogation is granted or refused;
  - b) content of the derogation;
  - c) consequences of the granting of the derogation;
  - d) reasons for granting or refusing the derogation; and
  - e) whether the exemption from the performance of the cost-benefit analysis was granted.

## **Chapter 6 FINAL PROVISIONS**

### **ARTICLE 56 AMENDMENT OF CONTRACTS AND GENERAL TERMS AND CONDITIONS**

All relevant clauses in contracts and/or relevant clauses in general terms and conditions relating to the Network connection of New Demand Facilities or a New Distribution Network Connection shall be amended to achieve compliance with the requirements of this Network Code.

The relevant clauses shall be amended within three years after the entry into force of this Network Code.

This requirement for amendment shall apply regardless of whether the relevant contracts or general terms and conditions provide for such an amendment.

### **ARTICLE 57 ENTRY INTO FORCE**

This Network Code shall enter into force on the twentieth day following that of its publication in the Official Journal of the European Union.

With the exception of Article 7, which shall apply thirty months after the entry into force, all provisions of this Network Code shall apply as from the day of expiration of a 3 year period following its publication.

This Network Code shall be binding in its entirety and directly applicable in all Member States.