

# ENTSO-E Working Draft Network Code on Emergency and Restoration

**FOR PUBLIC CONSULTATION**

**13 October 2014**

## *Notice*

This document reflects the status of the work of Transmission System Operator experts as of 13 October 2014 in line with the ACER Framework Guidelines on Electricity System Operation published on 02 December 2011 and after the EC mandate letter was received by ENTSO-E on 1 April 2014.

The document does not in any case represent a firm, binding or definitive ENTSO-E position on the content, the structure or the prerogatives of the Network Code on Emergency and Restoration.

A first version of the draft Network Code has been released for the first public workshop organised by ENTSO-E.

This second version of the draft Network Code is released for the public consultation in accordance with the provisions of Article 10 of Regulation (EC) No 714/2009 on 13<sup>th</sup> October 2014, the consultation being open until 5<sup>th</sup> December 2014.

This second version of the draft Network Code integrates remarks from the first public workshop and completes sections not previously developed. It is aligned on the last publically available versions of preceding Network Codes/Guidelines, particularly in terms of definitions and general provisions. Equally, references in this draft Network Code to preceding network codes/Guidelines refer to the last publically available versions of these Network Codes and Guidelines.

THE EUROPEAN COMMISSION,

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

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

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 underline the need for an increased cooperation and coordination among Transmission System Operators (TSO) 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 European Union, including the creation of interconnection capacities, with due regard to the environment.
- (2) TSOs are according to Article 2 and 12 of Directive 2009/72/EC responsible for the Operational Security in their Responsibility Areas and together in the Synchronous Areas and in the whole European Union, with a high level of reliability and quality.
- (3) Secure Transmission System operation can be made possible only if there is an obligation for the TSOs, Distribution System Operators (DSOs) and Significant Grid Users to cooperate and to meet the relevant minimum technical requirements for the operation of the interconnected Transmission Systems as one entity.
- (4) This Network Code on Emergency and Restoration was drafted aiming at setting out clear and objective requirements for TSOs, DSOs and Significant Grid Users in order to contribute to non-discrimination, effective competition and the efficient functioning of the internal electricity market and to ensure system security.
- (5) This Network Code sets the requirements for technical and organisational measures to be undertaken to prevent the propagation or deterioration of an incident in the system, in order to avoid an extended Disturbance and Blackout State, and the procedures to be implemented to restore the Alert or Normal Start after an extended Disturbance or Blackout State.
- (6) This Network Code foresees the establishment by each TSO of a System Defence Plan and of a Restoration Plan, through a three steps approach:
  - a. design phase, consisting of defining the detailed content of the plan;
  - b. implementation phase, consisting in the development and installation of all necessary means and in the procurement of services necessary to allow the activation of the plan; and
  - c. activation phase, consisting of operational use of one (or more) measure(s) from the plan.

(7) This Network Code provide harmonised requirements for the establishment by TSOs of their respective System Defence Plan and Restoration Plan, thus ensuring the overall efficiency of these plans at the European level.

HAS ADOPTED THIS REGULATION:

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# CHAPTER 1

## GENERAL PROVISIONS

### Article 1

#### Subject-matter and scope

1. This Network Code lays down minimum requirements on:
  - (a) the management of Emergency, Blackout and Restoration System States;
  - (b) the coordination of European system operation in Emergency, Blackout and Restoration System States in a common and coherent way; and
  - (c) simulations and tests for the purpose of reliable, efficient and rapid restoration from Emergency or Blackout System States.
2. The provisions of this Network Code shall not apply to the Transmission System or parts of the Transmission System of a Member State which is not operating synchronously with or which is temporarily disconnected from the rest of the Synchronous Area provided it is not the consequence of a Disturbance.

In addition, the provisions of this Network Code shall not apply to the Aland Islands.

3. For the Power systems operating in a Synchronous Area whose frequency is influenced in a predominant way by systems that are not bound by the EU legislation, provisions of this Network Code related to frequency management shall apply only to the extent that they could be duly, physically and technically applied and implemented by the respective TSO.
4. In Member States where more than one TSO exists, this Network Code shall apply to all TSOs within that Member State. Where a TSO does not have a function relevant to one or some obligations under this Network Code, Member States may under the national regulatory regime provide that the responsibility to comply with one or some obligations under this Network Code is assigned to one or more different TSO(s). In case of such assignment, the Network Code shall apply accordingly to the TSO(s) to which responsibilities have been assigned.
5. A TSO may delegate some of its tasks under this Network Code to a Regional Security Coordination Initiative, while respecting [Article 16(10) NC OS] and [Article 8(4) NC OPS]. The TSO shall remain sole liable and responsible under this Network Code for the tasks it delegated.
6. For the purpose of this Network Code, the classification of Existing Power Generating Modules and Existing Demand Facilities pursuant to Article 1(5) of [NC OS] shall apply.

The Significant Grid Users within the scope of this Network Code shall be:

- (a) Existing and New Power Generating Modules of type B, C and D according to the criteria defined in Article 3(6) of [NC RfG];
- (b) Existing and New Transmission Connected Demand Facilities according to the criteria defined in Article 5 and Article 8 of [NC DC] and all Existing and New Transmission Connected Closed Distribution Networks;
- (c) Significant Demand Facilities, Closed Distribution Networks and Aggregators according to the [NC DC], in the case where they provide Demand Side Response directly to the TSO;
- (d) Redispatching Aggregators and Providers of Active Power Reserve according to the [NC LFCR]; and
- (e) HVDC Systems and DC-connected Power Park Modules.

## Article 2 Definitions

For the purpose of this Network Code, the definitions in Article 2 of Regulation (EC) No 714/2009, Article 2 of Commission Regulations establishing Guidelines adopted according to Article 18 of Regulation (EC) No 714/2009, Article 2 of Commission Regulations establishing Network Codes adopted according to Article 6(11) of Regulation (EC) No 714/2009, Article 2 of Commission Regulation (EU) No 543/2013 as well as Article 2 of Directive 2009/72/EC shall apply. In addition, the following definitions shall apply:

**Bottom-up Re-energisation Strategy** means a strategy that does not require the assistance from other TSOs to re-energise part of the system of a TSO;

**Demand** means the netted value of Active Power seen from a given point of the system, computed as (load – generation), generally expressed in kilowatts (kW) or megawatts (MW), at a given instant or averaged over any designated interval of time;

**Energy Storage** means a device being used for storage of electrical energy and that can be used to balance the system, e.g. water pumped-storage or batteries;

**Frequency Leader** means the TSO managing Frequency within a Synchronised Region in order to restore System Frequency back to Nominal Frequency;

**Re-energisation** means the process of energising parts of the system that have been disconnected by reconnecting generation and Demand;

**Reference Load** means the total load of a LFC Area including all consumption connected to both transmission and distribution systems and the losses on both transmission and distribution systems. It is usually calculated as the sum of all generation on the transmission and distribution systems (measured or estimated), excluding houseload of Power Generating Modules and importation balance of the LFC Area;

**Restoration Plan** means the summary of all technical and organisational measures to be undertaken to restore the system back to Normal State;

**Resynchronisation** means synchronising two Synchronised Regions by connecting the two Synchronised Regions at the Resynchronisation Point;

**Resynchronisation Leader** means the TSO in charge of Resynchronisation of two Synchronised Regions;

**Resynchronisation Point** means the substation used to connect two Synchronised Regions by closing circuit-breakers;

**Synchronised Region** means a subpart of a Synchronous Area covered by interconnected TSOs with a common System Frequency not synchronised with the rest of the Synchronous Area; and

**Top-down Re-energisation Strategy** means a strategy that requires the assistance of other TSOs to re-energise part of the system of a TSO.

### Article 3

#### Regulatory aspects

1. The requirements established in this Network Code and their applications are based on the principle of proportionality, non-discrimination and transparency as well as the principle of optimization between the highest overall efficiency and lowest total cost for all involved parties.
2. Notwithstanding the above, the application of non-discrimination principle and the principle of optimization between the highest overall efficiency and lowest total costs while maintaining Operational Security as the highest priority for all involved parties, shall be balanced with the aim of achieving the maximum transparency in issues of interest for the market and the assignment to the real originator of the costs.
3. When defining terms and conditions or actions necessary to ensure Operational Security pursuant to this Network Code, a TSO shall act in accordance with the principles of transparency, proportionality and non-discrimination and shall take into account at least the following:
  - a) characteristics of the system;
  - b) operational conditions; and
  - c) efficiency.
4. This Network Code relies on the capabilities required in the [NC RfG], [NC DC] and [NC HVDC]. The Power Generating Facilities, Demand Facilities and HVDC Systems that are not a subject of the provisions in [NC RfG], [NC DC] and [NC HVDC] shall continue to be bound by those technical requirements that apply to them pursuant to legislation in force in the respective Member State or contractual arrangements in force.

### Article 4

#### 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 as determined by National Regulatory Authorities.



3. If requested by National Regulatory Authorities, regulated Network Operators shall, within three 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 5

##### **Consultation and coordination**

1. When a TSO has to consult other parties under this Network Code, the following process shall apply:
  - a) liaise with the concerned parties;
  - b) explain the objective of the consultation / decision that it has to take;
  - c) collect from the concerned parties any relevant information and suggestions;
  - d) take into account the situations and constraints of the parties consulted;
  - e) before adopting a decision, indicate to the parties consulted how their observations were taken into consideration, including reasons where observations have not been taken into account.
2. When a TSO has to coordinate with other parties under this Network Code, the following process shall apply:
  - a) liaise with the concerned parties;
  - b) explain the motivation and objective of the coordination / actions to be taken;
  - c) propose actions to be launched by each parties while respecting the principles of non-discrimination and proportionality;
  - d) collect from the concerned parties any relevant information and suggestions;
  - e) make a proposal on actions to be launched by each parties, taking into account the situations and constraints of the concerned parties;
  - f) when the concerned parties agree with the TSO's proposal, each party, including the TSO, shall launch the actions in line with the proposal agreed;
  - g) when no agreement could be reached, the TSO shall set up an action that has no impact on the parties that have rejected the coordination or, when possible, ask the relevant NRA to decide.
3. Each TSO shall support any TSO in Emergency, Blackout or Restoration States, upon request, provided it does not endanger its own system.

#### Article 6

##### **Confidentiality obligations**

1. Each TSO, DSO and Significant Grid User shall preserve the confidentiality of the information and data submitted to them in connection with this Network Code and shall use them exclusively for the purpose they have been submitted in compliance with this Network Code.

2. Without prejudice to the obligation to preserve the confidentiality of commercially sensitive information obtained in the course of carrying out its activities, each TSO shall provide to the other TSOs or where required DSOs, of a system with which its system is interconnected, the required information in compliance with this Network Code to ensure the secure and efficient operation, coordinated development and interoperability of the interconnected system.
3. The Regional Security Coordination Initiatives which are taking the form of a legal entity shall preserve the confidentiality of the information and data submitted to them pursuant to this Network Code and shall use them exclusively for the purpose they have been submitted.

#### Article 7

##### **Agreement with TSOs not bound by this Network Code**

1. No later than 12 months after entering into force of this Network Code all TSOs shall endeavour to implement a Synchronous Area agreement within a Synchronous Area to ensure that TSOs with no legal obligation to respect this Network Code, belonging to the Synchronous Area, also cooperate to fulfil the requirements.
2. If an agreement according to Article 7(1) cannot be implemented, the respective TSOs shall implement, no later than by [date – 14 months after entry into force], processes to ensure compliance with the requirements of this Network Code.
3. If an agreement according to Article 7(1) cannot be implemented within 12 months after entering into force of this Network Code, the TSO's operating in a Synchronous Area whose frequency is influenced in a predominant way by Power systems that are not bound by the EU legislation shall nevertheless endeavour to implement a Synchronous Area agreement within their Synchronous Area to ensure that TSOs with no legal obligation to respect this Network Code, belonging to the Synchronous Area, also cooperate to fulfil the requirements.

## CHAPTER 2 SYSTEM DEFENCE PLAN

### SECTION 1 GENERAL PRINCIPLES

#### Article 8

#### Design of the System Defence Plan

1. Each TSO shall design a System Defence Plan in consultation with DSOs, Significant Grid Users and neighbouring TSOs, covering at least the technical and organisational measures specified in Section 2.
2. When designing a System Defence Plan, each TSO shall take into account, at least:
  - a) Stability Limits defined according to Article 15(3) [NC OS];
  - b) short-circuit current limits as defined according to Article 11(1) [NC OS];
  - c) the expected behaviour of Significant Grid Users and existing and new type A Power Generating Modules;
  - d) specific needs of the Significant Grid Users listed as high priority Significant Grid Users pursuant to Article 32(10) [NC OS]; and
  - e) characteristics of its Network.
3. In the design of its System Defence Plan, each TSO shall respect the following principles:
  - a) the impact for Grid Users is minimal;
  - b) the measures are economically efficient;
  - c) the minimum necessary measures are activated; and
  - d) the measures do not endanger the Operational Security of the neighbouring Transmission Systems.
4. In the design of its System Defence Plan, each TSO shall consider the capabilities required:
  - a) for Significant Grid Users and new type A Power Generating Modules, in [NC RfG], [NC DC] and [NC HVDC]; and
  - b) in national legislation for Significant Grid Users who are not subject to or are derogated from [NC RfG], [NC DC] and [NC HVDC].
5. Each TSO shall identify the DSOs, Significant Grid Users and new type A Power Generating Modules that have an active role for providing the necessary services in case of activation of the System Defence Plan.
6. The System Defence Plan shall include at least:
  - a) System Protection Schemes including at least:
    - i. automatic low Frequency control scheme;
    - ii. automatic high Frequency control scheme; and
    - iii. automatic scheme against Voltage collapse.
  - b) System Defence Plan procedures, including at least:
    - i. Frequency Deviation management procedure;

- ii. Voltage deviation management procedure;
  - iii. power flow management procedure;
  - iv. assistance for Active Power procedure; and
  - v. manual Demand disconnection procedure.
7. Each TSO shall define at least in its System Defence Plan procedures:
  - a) the conditions under which the procedure is activated, according to Article 10;
  - b) the relevant set of measures; and
  - c) System Defence Plan instructions to be issued by the TSO.
8. Each TSO shall notify the concept of the System Defence Plan to its National Regulatory Authority or, when explicitly foreseen in national law, other relevant national authorities, following its design pursuant to this article and subsequently pursuant to any changes of the concept of the System Defence Plan.

The concept of the System Defence Plan shall include the following:

  - a) objectives the System Defence Plan intend to achieve, including the phenomena to be mastered or the situation to be solved;
  - b) context triggering the measures of the System Defence Plan; and
  - c) general principle of each measure, explaining how each measure contributes to the objectives of the System Defence Plan.

## Article 9

### **Implementation of the System Defence Plan**

1. Each TSO shall make available the measures of its System Defence Plan which are to be implemented on the Transmission System.
2. Each TSO shall:
  - a) notify DSOs the measures of the System Defence Plan which are to be implemented on their installations and/or the installations of Significant Grid Users and new type A Power Generating Modules connected to their Distribution System, including the deadlines for implementation;
  - b) notify Significant Grid Users directly connected to its Transmission System the measures of the System Defence Plan which are to be implemented on their installations, including the deadlines for implementation. When provided in national legislation, the TSO shall notify Significant Grid Users and new type A Power Generating Modules connected to Distribution Systems and shall inform the concerned DSO of such notification.
3. Each notified DSO shall notify Significant Grid Users and new type A Power Generating Modules directly connected to its Distribution System the measures of the System Defence Plan which they have to implement on their installations, including the deadlines for implementation, unless the TSO already notified the Significant Grid Users and new type A Power Generating Modules.

4. Each notified DSO, Significant Grid User and new type A Power Generating Module shall:
  - a) implement the measures notified to them and confirm this implementation to the notifying Network Operator; and
  - b) make available the measures implemented on its installations.

#### Article 10

##### **Activation of the System Defence Plan**

1. In addition to the measures of the System Defence Plan to be automatically activated, each TSO shall activate a procedure of the System Defence Plan when:
  - a) the system is in Emergency State due to at least one deviation from the Operational Security Limits and no Remedial Action is available to restore the system to Normal State;
  - b) according to forecast studies, the safety of the transmission system requires the activation of a measure to avoid the violation of any Operational Security Limit. Such activation concerns, but is not limited to, manual Demand Disconnection in case of absence of Adequacy in the TSO's Responsibility Area in D-1 and intraday as defined in Article 49 [NC OPS]; or
  - c) in application of a specific procedure as defined in the System Defence Plan and notified to its National Regulatory Authority or, when explicitly foreseen in national law, other relevant national authorities.
2. Each DSO and Significant Grid User shall execute System Defence Plan instructions issued by the TSO, according to System Defence Plan procedures.
3. Each TSO shall coordinate activation of System Defence Plan measures having a significant cross-border impact, with the impacted TSOs.
4. A TSO may prepare the manual measures of its System Defence Plan prior to their activation. The TSO may launch such preparation phase in Normal or Alert State. Such preparation concerns, but is not limited to, assistance for Active Power and manual Demand Disconnection.

When a TSO launches a preparation phase before activating a System Defence Plan measure with potential impact on interconnected transmission systems, it shall provide to the impacted TSOs all relevant information, including the expected time of activation and potential cross-border impact.

#### Article 11

##### **TSO coordination in Emergency State**

1. Each TSO shall provide through AC Interconnectors any possible assistance to a neighbouring TSO in Emergency State, provided it does not endanger its own system. This assistance includes, but is not limited to, a curtailment of Cross Zonal Allocated Capacities in event of

force majeure or Emergency Situation, according to Article 69 [NC CACM] and assistance for Active Power, according to Article 18.

2. Each TSO shall announce and duly prepare any manual opening of an Interconnector in coordination with neighbouring TSOs, ensuring that this action will not endanger the remaining interconnected system.
3. A TSO may manually open an Interconnector without prior coordination, in specific conditions including, but not limited to, the violation of threshold endangering personnel safety or damaging equipment.
4. Each TSO shall provide through HVDC Interconnectors any possible assistance, provided it does not endanger its own system, upon request from a neighbouring TSO in Emergency State. The TSO shall provide such assistance through the following mechanisms and conditions, taking into account the technical characteristics and capability of HVDC Interconnectors:
  - a) manual regulation actions of the transmitted Active Power to help the TSO in Emergency State to bring power flows or power balance to an acceptable operating level;
  - b) automatic control functions of the transmitted Active Power as defined in Article 9 [NC HVDC] based on the signals and criteria agreed upon between the TSOs, to support the TSO in Emergency State to go back to Normal State;
  - c) automatic Frequency control according to Articles 11 to 14 [NC HVDC] in case of islanded operation; and
  - d) Voltage and Reactive Power control according to Article 20 [NC HVDC] for the need of the TSO in Emergency State.

## **SECTION 2 MEASURES OF THE SYSTEM DEFENCE PLAN**

### Article 12

#### **Frequency Deviation management procedure**

1. The Frequency Deviation management procedure of the System Defence Plan shall contain a set of measures to manage System Frequency Deviation outside System Frequency limits for Alert State defined in Article 42(4) [NC LFCR]. This measure shall respect at least the following requirements:
  - a) a decrease of generation shall be smaller than the decrease of Demand during low Frequency events;
  - b) a decrease of generation shall be greater than the decrease of Demand during high Frequency events; and
  - c) Interconnectors shall not be overloaded due to asymmetrical response of each LFC Area to low or high Frequency events.

2. The settings for Load Frequency Control shall not endanger the Operational Security of the Synchronous Area.
3. Each TSO shall be entitled to define an Active Power set-point which the Significant Grid Users shall maintain. Significant Grid Users shall execute the instructions given directly by the TSO or indirectly through DSOs, concerning the power set point of their Power Generating Modules or Demand Facilities or Closed Distribution Networks providing Demand Side Response, while respecting their technical constraints.
4. Each TSO shall be entitled to disconnect Significant Grid Users and to instruct new type A Power Generating Modules to cease Active Power, in accordance with Article 8(1)(f) [NC RFG], directly or indirectly through DSOs.
5. In case of under-frequency deviation, each TSO shall activate Demand Side Response before activation of the automatic Low Frequency Demand Disconnection scheme described in Article 13, provided the rate of change of Frequency allows the TSO to do so.

#### Article 13

##### **Automatic low Frequency control scheme**

1. The automatic low Frequency control scheme shall include an automatic Low Frequency Demand Disconnection scheme and the settings of Limited Frequency Sensitive Mode in the TSO LFC Area.
2. Each TSO shall activate Limited Frequency Sensitive Mode before activation of the automatic Low Frequency Demand Disconnection scheme, provided the rate of change of Frequency allows the TSO to do so.
3. The automatic Low Frequency Demand Disconnection scheme of the System Defence Plan shall have the following parameters:
  - a) Frequency range in which Low Frequency Demand Disconnection is possible (low Frequency allowed range);
  - b) Frequency range in which Low Frequency Demand Disconnection is mandatory (low Frequency mandatory range);
  - c) total amount of Demand to be disconnected, expressed as a percentage of the Reference Load (total Demand disconnection);
  - d) maximum amount of Demand to be disconnected at each step of the Low Frequency Demand Disconnection scheme, expressed as a percentage of the Reference Load (maximum Demand disconnection per step);
  - e) maximum value of Frequency between each step (maximum Frequency step);
  - f) maximum disconnection delay, which shall include time for accurate Frequency measurements and breakers operation time (maximum delay);
  - g) maximum inaccuracy of Frequency measurements on Low Frequency Demand Disconnection relays (maximum inaccuracy);

- h) Frequency range in which Energy Storage shall be automatically disconnected with a time delay (Energy Storage delay Frequency range);
- i) Frequency range in which Energy Storage shall be automatically disconnected without a time delay (Energy Storage Frequency range); and
- j) Frequency range in which demand disconnection based on Frequency gradient is possible (gradient Frequency allowed range).

The parameters shall be in line with the following values for each Synchronous Area: **[figures under review]**.

Parameter	Values SA Continental Europe	Values SA Nordic	Values SA Baltic	Values SA Great Britain	Values SA Ireland	Measuring Unit
Low Frequency allowed range						Hz
Low Frequency mandatory range						Hz
Total Demand disconnection						% of Reference Load
Maximum Demand disconnection per step						% of Reference Load
Maximum Frequency step						mHz
Maximum delay						Ms
Maximum inaccuracy						mHz
Energy Storage delay Frequency range						Hz
Energy Storage Frequency range						Hz
Gradient Frequency allowed range						Hz

Table 1: Automatic Low Frequency Demand Disconnection scheme parameters



4. The DSO shall, when implementing the automatic Low Frequency Demand Disconnection scheme, pursuant to the notification under Article 9(2):
  - a) ensure to minimise the total disconnected installed capacity of Power Generating Modules connected directly to its distribution system; and
  - b) ensure that this scheme does not lead to power flow deviation and Voltage deviation outside Operational Security Limits.

When a DSO cannot fulfil the two requirements under paragraphs 4(a) and 4(b), it shall notify the TSO and propose which one of these requirements shall prevail. The TSO shall define the applicable requirements.

5. When the automatic Low Frequency Demand Disconnection scheme has to be implemented on Transmission System, the TSO shall respect principles set in paragraphs 4(a) and 4(b).

#### Article 14

##### **Automatic high Frequency control scheme**

1. The automatic high Frequency control scheme of the System Defence Plan shall lead to a decreases of the total Active Power of each LFC Area with a Droop between 2% and 12%, in case of Frequency Deviation outside System Frequency limits for Alert State defined in Article 42(4) [NC LFCR].
2. In case the combined action of Limited Frequency Sensitive Mode of Power Generating Modules in a LFC Area are not sufficient to fulfil the above requirement, each TSO shall complement the automatic high Frequency control scheme of its System Defence Plan with a step-wise linear disconnection of Power Generating Modules.

#### Article 15

##### **Voltage deviation management procedure**

1. The Voltage deviation management procedure of the System Defence Plan shall contain a set of measures to manage Voltage deviation outside Operational Security Limits defined in Article 10(1) and (2) [NC OS].
2. Each TSO shall organise these measures in such a way that Voltage control capabilities of Significant Grid Users are used before activating manual Demand disconnection as defined in Article 19.
3. Each TSO shall be entitled to define a Reactive Power or Voltage set-point and instruct the DSOs, Closed Distribution Networks and Significant Grid Users to maintain it, according to Article 10 [NC OS].

4. Each TSO shall, upon request of neighbouring TSO, make available all Reactive Power capabilities that do not endanger Operational Security in its Responsibility Area. During activation of this measure, the Operational Security Limits defined according to Article 8(8) [NC OS] may be exceeded.

#### Article 16

##### **Automatic scheme against Voltage collapse**

1. The automatic scheme against Voltage collapse of the System Defence Plan shall include at least an On Load Tap Changer Blocking scheme.
2. The TSO shall define the conditions under which the On Load Tap Changer shall block according to Article 20(4) [NC DC], including at least:
  - a) method of blocking (automatic or manual);
  - b) Voltage level threshold at the Connection Point;
  - c) Reactive Power flow direction; and
  - d) maximum time delay between threshold detection and blocking.
3. Each TSO shall define automatic Low Voltage Demand Disconnection schemes, as defined in Article 20(3) [NC DC], or other System Protection Schemes for Voltage management, when deemed necessary considering local network conditions.

#### Article 17

##### **Power flow management procedure**

1. The power flow management procedure of the System Defence Plan shall include a set of measures to manage power flow deviation outside Operational Security Limits defined in accordance with Article 8(5) [NC OS]. These measures shall be used in addition to the measures developed according to Article 12(4) [NC OS].
2. Each TSO shall be entitled to define an Active Power set-point which the Significant Grid Users shall maintain. Significant Grid Users shall execute the instructions given directly by the TSO or indirectly through DSOs, concerning the power set-point of their Power Generating Modules or Demand Facilities or Closed Distribution Networks providing Demand Side Response, while respecting their technical constraints.
3. Each TSO shall be entitled to disconnect Significant Grid Users and to instruct new type A Power Generating Modules to cease Active Power, in accordance with Article 8(1)(f) [NC RFG], directly or indirectly through DSOs.

## Article 18

### **Assistance for Active Power procedure**

1. Each TSO shall be entitled to request assistance for Active Power in the following situations:
  - a) in case of absence of Responsibility Area Adequacy in day-ahead and intraday, as defined in Article 49 [NC OPS], provided the TSO activated all available Balancing Energy or taken into account all available Balancing Energy at the moment of absence of Adequacy, within its Coordinated Balancing Area, according to Article 39 [NC EB].
  - b) in case the TSO is in Restoration State whereas some of its neighbouring TSOs are in Normal or Alert State.
2. The TSO in the situation referred in paragraph 1(a) shall be entitled to request assistance for Active Power from Balancing Service Providers and from any Significant Grid User connected in its LFC Area that does not have an agreement with a Balancing Service Provider.

The Balancing Service Provider and the Significant Grid User shall make available to the TSO all its Active Power, provided it was not already activated through any Balancing mechanism.

3. The TSO in the situations referred in paragraph 1(a) and (b) shall be entitled to request assistance for Active Power from all neighbouring TSOs, irrespective of their participation into its Coordinated Balancing Area.
4. Unless facing the same situation as the requesting TSO, each requested TSO shall:
  - a) make available its Unshared Bids as defined in [NC EB];
  - b) be entitled to activate the available Balancing Energy from the Coordinated Balancing Area(s) it belongs to and that do not include the requesting TSO, in order to provide the corresponding power to the requesting TSO; and
  - c) be entitled to request assistance for Active Power from its Balancing Service Providers and to any Significant Grid User connected in its Responsibility Area that does not have an agreement with a Balancing Service Provider, in order to provide the corresponding power to the requesting TSO.
5. Assistance for Active Power shall be firm, unless the TSO providing the said assistance enters into Emergency or Blackout States.

## Article 19

### **Manual Demand disconnection procedure**

1. Each TSO shall be entitled to determine an amount of Demand to be manually disconnected, directly or indirectly through DSOs, when necessary to prevent any propagation or worsening of an Emergency State, in order to:
  - a) solve overloads or under Voltage situations; or
  - b) solve situations in which assistance for Active Power according to Article 18 has been requested but is not sufficient to ensure Adequacy on its Responsibility Area in D-1 and intraday as defined in Article 49 [NC OPS], leading to a risk of Frequency deterioration in the Synchronous Area.

2. The TSO shall notify to DSOs the amount of Demand to be disconnected on their distribution systems. Each DSO shall disconnect the notified amount of Demand, without undue delay.

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## **CHAPTER 3**

### **RESTORATION PLAN**

#### **SECTION 1**

#### **GENERAL PRINCIPLES**

##### Article 20

#### **Design of the Restoration Plan**

1. Each TSO shall design a Restoration Plan, in consultation with DSOs, Significant Grid Users and neighbouring TSOs, to return its system to Normal State as fast as possible.
2. When designing a Restoration Plan, each TSO shall take into account, at least:
  - a) the expected behaviour of the Significant Grid Users and of existing and new type A Power Generating Modules in its Responsibility Area;
  - b) specific needs of the Significant Grid Users listed as high priority Significant Grid Users pursuant to Article 32(10) [NC OS]; and
  - c) characteristics of its Network.
3. In the design of its Restoration Plan, each TSO shall respect the following principles:
  - a) the impact for Grid Users is minimal;
  - b) the measures are economically efficient; and
  - c) the minimum necessary measures are activated.
4. In the design of its Restoration Plan, each TSO shall consider the capabilities required:
  - a) for Significant Grid Users and for new type A Power Generating Modules, in [NC RfG], [NC DC] and [NC HVDC]; and
  - b) in the national laws for those Significant Grid Users who are not subject to or are derogated from [NC RfG], [NC DC] and [NC HVDC].
5. Each TSO shall identify the DSOs, Significant Grid Users and new type A Power Generating Modules that have an active role for providing the necessary services in case of activation of the Restoration Plan.
6. In the design of its Restoration Plan, each TSO shall identify the possible power sources in its Responsibility Area that can be used in Bottom-up Re-energisation Strategy, having the following capabilities:
  - a) Black Start Capability;
  - b) Houseload Operation; and
  - c) Island Operation.
7. In the design of its Restoration Plan, each TSO shall define the power sources within its Responsibility Area necessary to re-energize its System with Bottom-up Strategy, taking into account at least:

- a) geographical distribution of power sources with Black Start and Island Operation capabilities;
  - b) technical capability, availability and reliability of these power sources; and
  - c) conditions for Island Operation.
8. The Restoration Plan shall contain the necessary means to allow the TSO to perform a Bottom-up Re-energisation Strategy, containing at least means for:
- a) managing Voltage and Frequency Deviations due to Re-energisation;
  - b) monitoring and performing Island Operation; and
  - c) resynchronising Island Operation areas.
9. The Restoration Plan shall consist at least of the following procedures:
- a) Re-energisation procedure;
  - b) Frequency management procedure;
  - c) Resynchronisation procedure; and
  - d) communication procedure.
10. Each TSO shall define at least in its Restoration Plan procedures:
- a) the conditions under which the procedure is activated;
  - b) the relevant set of measures; and
  - c) Restoration Plan instructions to be issued by the TSO.
11. Each TSO shall notify the concept of the Restoration Plan to the National Regulatory Authorities or, when explicitly foreseen in national law, other relevant national authorities, following its design pursuant to this article and subsequently pursuant to any changes of the concept of the Restoration Plan.

The concept of the Restoration Plan shall include the following:

- a) objectives the Restoration Plan intend to achieve, including the phenomena to be mastered or the situation to be solved;
- b) context triggering the measures of the Restoration Plan; and
- c) general principle of each measure explaining how each measure contributes to the objectives of the Restoration Plan.

## Article 21

### **Implementation of the Restoration Plan**

1. Each TSO shall make available the measures of its Restoration Plan which are to be implemented on the Transmission System.
2. Each TSO shall:
  - a) notify DSOs the measures of the Restoration Plan which are to be implemented on their installations and/or the installations of Significant Grid Users and new type A Power Generating Modules connected to their Distribution System, including the deadlines for implementation;

- b) notify Significant Grid Users directly connected to its Transmission System the measures of the Restoration Plan which are to be implemented on their installations, including the deadlines for implementation. When provided in national legislation, the TSO shall notify Significant Grid Users and new type A Power Generating Modules connected to Distribution Systems and shall inform the concerned DSO of such notification.
3. Each notified DSO shall notify Significant Grid Users and new type A Power Generating Modules directly connected to its Distribution System the measures of the Restoration Plan which they have to implement on their installations, including the deadlines for implementation, unless the TSO has already notified the Significant Grid Users and new type A Power Generating Modules.
4. Each notified DSO, Significant Grid User and new type A Power Generating Module shall:
  - a) implement the measures notified to them and confirm this implementation to the notifying Network Operator; and
  - b) make available the measures implemented on its installations.

#### Article 22

##### **Activation of the Restoration Plan**

1. Each TSO shall activate its Restoration Plan in coordination with DSOs, Significant Grid Users and neighbouring TSOs:
  - a) in Emergency state, once the system is stabilised following activation of the measures of the System Defence Plan; and
  - b) in Blackout State.
2. Each DSO and Significant Grid User shall execute the Restoration Plan instructions issued by the TSO, according to Restoration Plan procedures.

#### **SECTION 2 RE-ENERGISATION**

#### Article 23

##### **Re-energisation procedure**

1. The Re-energisation procedure of the Restoration Plan shall contain a set of measures based on the strategies to be used by the TSO. These strategies shall include:
  - a) a Top-down Re-energisation Strategy; and
  - b) a Bottom-up Re-energisation Strategy.
2. Each TSO shall in real time combine Top-down and Bottom-up Re-energisation Strategies as needed.
3. Each TSO shall provide information to its neighbouring TSOs on its capability to support Top-down Re-energisation Strategy.

## Article 24

### Re-energisation Strategy

1. When activating the Re-energisation procedure, each TSO shall define on strategy to apply, taking into account:
  - a) the availability of power sources capable of Re-energisation in its Responsibility Area;
  - b) the expected duration of possible Re-energisation strategies; and
  - c) the conditions of the directly connected systems, including at least the status of Interconnectors.
2. During Re-energisation, each TSO shall manage the connection of Demand and generation with the aim of maintaining the Frequency close to the Nominal Frequency with a maximum tolerance of the Maximum Steady-State Frequency Deviation.
3. The TSO shall take into account the automatic connection of Demand and generation within its LFC Area in Frequency management.
4. During Re-energisation, DSOs shall, after being consulted by the TSO, connect the amount of generation and Demand requested by the TSO.
5. When considering the activation of Top-down Re-energisation Strategy, the TSO shall request neighbouring TSOs to support the Re-energisation. The requested TSO shall provide assistance for the Re-energisation, unless it would lead its system to Emergency or Blackout States. In this case, the requesting TSO shall use the Bottom-Up Re-energisation Strategy.

## SECTION 3

### FREQUENCY MANAGEMENT

## Article 25

### Frequency management procedure

1. The Frequency management procedure of the Restoration Plan shall contain a set of measures aiming at restoring System Frequency back to Nominal Frequency.
2. The Frequency management procedure shall be activated in preparation of Resynchronisation procedure, when a Synchronous Area is split in several Synchronised Regions.
3. The Frequency management procedure shall include at least:
  - a) appointment of Frequency Leaders;
  - b) Frequency management after Frequency Deviation; and
  - c) Frequency management after Synchronous Area split.
4. The Frequency management procedure shall include the determination of the amount of Demand and generation to be reconnected, taking into account the available Active Power Reserves within the Synchronised Region in order to avoid major Frequency Deviations.



## Article 26

### Appointment of Frequency Leaders

1. During system Restoration, each TSO shall identify and monitor:
  - a) the extent and borders of the Synchronised Region or Synchronised Regions to which its Responsibility Area belongs;
  - b) the TSOs with which it shares a Synchronised Region; and
  - c) the available Active Power Reserves in its Responsibility Area.
2. During system Restoration, when a Synchronous Area is split in several Synchronised Regions, the TSOs of each Synchronised Region shall appoint a Frequency Leader, in accordance with paragraph 4.
3. During system Restoration, when a Synchronous Area is not split but the System Frequency exceeds Frequency limits for Alert State as defined in Article 42(4) [NC LFCR], all TSOs of the Synchronous Area shall appoint a Frequency Leader, in accordance with paragraph 4.
4. The TSO with the highest K-factor under operation as defined in Article 45 [NC LFCR] shall be appointed as the Frequency Leader, unless all TSOs of the Synchronised Region, or of the Synchronous Area, agree to appoint another TSO as the Frequency Leader. In that case, all TSOs of the Synchronised Region, or of the Synchronous Area, shall consider the following criteria:
  - a) the amount of available Active Power Reserves and especially Frequency Restoration Reserves;
  - b) the available capacities on Interconnectors;
  - c) the availability of Frequency measurements of neighbouring TSOs; and
  - d) the availability of measurements on critical elements within the Synchronised Region.
5. When a TSO is appointed as Frequency Leader of a Synchronised Region, this TSO shall inform all other TSOs of the Synchronous Area of its appointment.
6. Once appointed, a TSO shall remain Frequency Leader until:
  - a) another Frequency Leader is appointed for its Synchronised Region;
  - b) a new Frequency Leader is appointed as the result of Resynchronisation of its Synchronised Region with another Synchronised Region; or
  - c) the Synchronous Area has been completely resynchronised and the System Frequency is within the limits for Normal State as defined in Article 42(3) [NC LFCR].

## Article 27

### Frequency management after Frequency Deviation

1. During system Restoration, when a Frequency Leader has been appointed according to Article 26(3), all TSOs of the Synchronous Area, with the exception of the Frequency Leader, shall suspend the manual activation of Frequency Restoration Reserves and Replacement Reserves.
2. The Frequency Leader shall define, after consultation of the other TSOs of the Synchronous Area, on settings to be applied on the Load Frequency Control operated by each TSO of the Synchronous Area.
3. The Frequency Leader shall manage the manual activation of Frequency Restoration Reserves and Replacement Reserves within the Synchronous Area, aiming at regulating the frequency

of the Synchronous Area towards the Nominal Frequency while taking into consideration Operational Security Limits pursuant to Article 8(5) [NC OS]. Each TSO of the Synchronous Area shall support the Frequency Leader when requested.

#### Article 28

##### **Frequency management after Synchronous Area split**

1. During system restoration, when a Frequency Leader has been appointed according to Article 26(2), all TSOs of each Synchronised Region, with the exception of the Frequency Leaders, shall suspend the manual activation of Frequency Restoration Reserves and Replacement Reserves.
2. Each Frequency Leader shall decide, after consultation of the other TSOs of the Synchronised Region, on settings to be applied on the Load Frequency Control operated by each TSO of the Synchronised Region.
3. Each Frequency Leader shall manage the manual activation of Frequency Restoration Reserves and Replacement Reserves within the Synchronised Region, aiming at regulating the frequency of the Synchronised Region towards the Nominal Frequency while taking into consideration Operational Security Limits pursuant to Article 8(5) [NC OS]. Each TSO of the Synchronised Region shall support the Frequency Leader when requested.

#### **SECTION 4 RESYNCHRONISATION**

#### Article 29

##### **Resynchronisation procedure**

1. The Resynchronisation procedure of the Restoration Plan shall include, at least:
  - a) appointment of Resynchronisation Leaders;
  - b) Resynchronisation strategy; and
  - c) limits for maximum phase angle, frequency difference and voltage difference for closing lines.

#### Article 30

##### **Appointment of a Resynchronisation Leader**

1. During system Restoration, when a Synchronous Area is split into several Synchronised Regions, the TSOs of the Synchronous Area shall appoint Resynchronisation Leader(s) in accordance with paragraph 2.
2. For each pair of Synchronised Regions to be resynchronised, the Resynchronisation Leader shall be the Frequency Leader that fulfils the criteria of paragraph 3 and that is in the Synchronised Region with the highest amount of available Active Power Reserves, unless all TSOs of the two Synchronised Regions agree to appoint another TSO as the Resynchronisation Leader.
3. Each Resynchronisation Leader shall:
  - a) have in operation at least one substation equipped with a parallel switching device on the border between the two Synchronised Regions to be resynchronised;

- b) have access to Frequency measurements from both Synchronised Regions;
  - c) have access to Voltage measurements on the substations between which potential Resynchronisation Points are located; and
  - d) be able to control the Voltage at potential Resynchronisation Points.
4. When a TSO is appointed as Resynchronisation Leader of a pair of Synchronised Regions, this TSO shall inform all other TSOs of the Synchronous Area of its appointment.
5. A TSO shall remain Resynchronisation Leader until:
- a) another Resynchronisation Leader is appointed for one of the two Synchronised Regions; or
  - b) the two Synchronised Regions have been resynchronised, and all the steps in Article 31 have been completed.

#### Article 31

#### **Resynchronisation strategy**

1. Prior to Resynchronisation, the Resynchronisation Leader shall:
- a) define, after consultation of the Frequency Leaders of the involved Synchronised Regions:
    - i. maximum difference between Frequencies of the two Synchronised Regions;
    - ii. maximum Active and Reactive Power exchange; and
    - iii. settings to be applied on the Load Frequency Control.
  - b) after consultation of the Frequency Leaders of the Synchronised Regions and the TSOs operating the substations used for Resynchronisation:
    - i. select the Resynchronisation Point, taking into account the Operational Security Limits in the Synchronised Regions;
    - ii. define and prepare all necessary actions for the Resynchronisation of the two Synchronised Regions at the Resynchronisation Point;
    - iii. define and prepare subsequent set of actions to create additional connections between the Synchronised Regions;
    - iv. assess the readiness of the Synchronised Regions for Resynchronisation, taking into account the conditions defined in accordance with paragraph 1(a).
2. Frequency Leaders shall inform all TSOs within their Synchronised Regions of the planned Resynchronisation.
3. When all conditions defined in paragraph 1(a) are fulfilled, the Resynchronisation Leader shall perform the Resynchronisation and activate the actions defined in paragraph 1(b).

## CHAPTER 4 MARKET INTERACTIONS

### Article 32 General Provisions

**[NOTE FOR THE PUBLIC CONSULTATION: this article aims at stating the requirements from other NC that apply in Emergency and/or Restoration States. It has to be further elaborated.] For example:**

1. The settlement rules and principles defined in Chapter 5 of [NC Electricity Balancing] shall be applicable during Emergency State.
2. For each TSO in Emergency State which does not suspend market activities in accordance with this Chapter, NC Electricity Balancing, CACM, NC FCA and chapter 7 of NC OPS shall be applicable.

### Article 33 Procedure for market activities suspension

1. During Emergency and Blackout States, if deemed necessary, each TSO shall be entitled to totally or partially suspend any of the following market activities or any combination thereof:
  - a) full or partial operation of the single day-ahead coupling and its results, as described in Articles 45 and 46 [CACM];
  - b) operation of the single intraday coupling and its results, as described in Articles 56 and 57 [CACM];
  - c) any complementary regional auctions, as described in Article 60 [CACM];
  - d) operation of the Forward Capacity Allocation, as described in Articles 43, 44 and 45 [NC FCA];
  - e) submission by Balancing Service Provider of Balancing Capacity and Balancing Energy bids , as described in Article 23 [NC EB];
  - f) provision by Balance Responsible Party of a balanced Position in day ahead and the provision of change of its Position, as described in Article 24(4) to 24(7) [NC EB]; and/or
  - g) provision of schedules, as described in Article 53(1) and 53(2) [NC OPS].
2. When suspending any of the above mentioned market activities or any combination thereof, each TSO shall consult the other TSOs and NEMOs of the concerned Capacity Calculation Region. Each NEMO shall inform its Market Participants.

## Article 34

### **Procedure for TSO processes suspension**

1. During Emergency and Blackout States, if deemed necessary, each TSO shall be entitled to totally or partially suspend at least one of the following TSO processes or any combination thereof:
  - a) determination of Cross Zonal Capacities;
  - b) real time execution of Availability Plans, as described in Article 44 [NC OPS];
  - c) agreed upon updates to the Year Ahead Availability Plans when these are related to the time period of the Emergency States, as described in Article 41 [NC OPS];
  - d) any of the processes and activities as described in Articles 31 and 32 [NC LFCR], upon request of the Frequency Leader when appointed.

## Article 35

### **Procedure for market activities and TSO processes restoration**

1. Each Market Party shall follow the instructions it receives from a TSO for the restoration of market activities, respecting if any the conditions and timeframe set by the TSOs in its instruction. Each NEMO shall inform its Market Participants.
2. As soon as the TSO is back to Normal State it shall restart the activities and processes it suspended according to Article 33 and Article 34 and inform the concerned Scheduling Agents and NEMOs.
3. For Cross Zonal Capacities calculations, each TSO shall select after consultation of the Coordinated Capacity Calculator one of the following strategies to provide Cross Zonal Capacities to NEMOs:
  - a) use of any already existing calculated Cross Zonal Capacities;
  - b) launch the regional capacity calculation processes applicable in Normal and Alert States according to Article 28 [CACM]; or
  - c) use of otherwise values it defines based on the actual physical network conditions.
4. When only part of a Capacity Calculation Region is back to Normal State, the TSOs of this Capacity Calculation Region shall be entitled to launch a partial market coupling, after consultation of the Coordinated Capacity Calculator and the NEMOs.
5. Each TSO shall use available Cross Zonal schedules, reflecting Cross Zonal Capacities defined according to paragraph 3, as input of its Load Frequency Control, upon request of its Frequency Leader when appointed according to Article 26.

## Article 36

### **Settlement principles**

1. When the system is in Emergency State, the settlement rules and principles defined in Chapter 5 of [NC Electricity Balancing] shall apply.

2. When the system is in Blackout and Restoration States, the settlement shall be ruled by national legislation.

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## CHAPTER 5

### INFORMATION EXCHANGE AND COMMUNICATION, TOOLS AND FACILITIES

#### Article 37

##### Information exchange

1. In addition to the provisions of Articles 16 to 29 [NC OS], each TSO shall request the following information:
  - a) from DSOs, information about at least:
    - i. existing part of their Network in Island Operation;
    - ii. ability to synchronize parts of their Network in Island Operation; and
    - iii. capability to start Island Operation.
  - b) from Significant Grid Users and Type A Power Generating Modules, directly or through an aggregator or a DSO, that are identified in Restoration Plan, information about at least the following conditions:
    - i. current status of the installation;
    - ii. operational limits;
    - iii. Full Activation Time and time to increase generation; and
    - iv. time critical processes.
2. Each TSO shall provide the following priority information during Emergency, Blackout or Restoration States:
  - a) to directly connected TSOs, information about at least:
    - i. known circumstances that lead to the concerned System State;
    - ii. the extent and borders of the Synchronised Region or Synchronised Regions to which its Responsibility Area belongs;
    - iii. restrictions to operate Synchronised Region; and
    - iv. other technical or organizational restrictions.
  - b) to the Frequency Leader of its Synchronised Regions, information about at least:
    - i. restrictions to maintain Island Operation;
    - ii. the available additional generation and Demand; and
    - iii. the availability of Operational Reserves.
3. All TSO shall exchange between each other information in Emergency, Blackout or Restoration State and define additional information if necessary including at least:
  - a) Active and Reactive Power time limits at Interconnectors; and
  - b) potential problems making assistance for Active Power necessary.
4. Each TSO who is in Emergency, Blackout or Restoration State shall inform at least the following parties:
  - a) Nominated Electricity Market Operators, who shall make this information available to Market Participants, according to Article 33;
  - b) DSOs and Significant Grid Users; and

- c) its National Regulatory Authorities, or when explicitly foreseen in national law, other relevant national authorities.

#### Article 38

##### **Voice communication channels**

1. Each TSO, DSO and Significant Grid User, identified in the System Defence Plan or Restoration Plan, shall have at least one redundant voice communication channel to exchange the necessary information for System Defence and Restoration Plans. At least one of these communication channels shall have backup power supply for at least 24 hours, be prioritised and not use public communication channel.

#### Article 39

##### **Facilities**

1. Each TSO shall make available critical tools and facilities defined in Article 8(15) [NC OS] for at least 24 hours in case of loss of primary power supply.
2. Each DSO and Significant Grid User, identified in the Restoration Plan, shall make available critical tools and facilities used in Restoration Plan for at least 24 hours in case of loss of primary power supply.
3. Each TSO shall have at least one geographically separate backup control room. The backup control room shall include at least the critical tools and facilities defined in Article 8(15) [NC OS]. Each TSO shall ensure backup power supply for its backup control room for at least 24 hours in case of loss of primary power supply.
4. Each TSO shall prepare an evacuation procedure for moving from the main control room to the backup control room, in a maximum time of three hours, including the operation of the system during the evacuation.
5. Substations which are necessary for restoration shall be operational in case of loss of primary power supply, allowing the use of critical tools and facilities of TSOs and DSOs.



## **CHAPTER 6**

### **COMPLIANCE AND REVIEW**

#### **SECTION 1**

#### **COMPLIANCE TESTING OF TSO, DSO AND SIGNIFICANT GRID USER CAPABILITIES**

##### Article 40

##### **General principles**

1. Each TSO shall periodically assess the proper functioning of equipment and capabilities contributing to the System Defence Plan and the Restoration Plan. Additionally, each TSO shall periodically verify the compliance of the DSO's and Significant Grid User's capabilities that are used in the System Defence Plan or in the Restoration Plan, in accordance with Article 35(2) [NC RfG], Article 38(2) [NC DC], and Article 65(1) and (2) [NC HVDC].
2. Each TSO shall define a test plan, identifying the TSOs, DSOs and Significant Grid Users capabilities and equipment used in System Defence Plan or in Restoration Plan that have to be tested, and the periodicity and conditions of the tests, in consultation with the DSO and the Significant Grid User, and following minimum requirements set forth in Article 41, Article 42 and Article 43. The test shall follow the methodology described in [NC RfG], [NC DC] and [NC HVDC] for the corresponding tested capability.
3. Each TSO, DSO and Significant Grid User shall ensure that Operational Security is not endangered during the test.
4. The test is deemed passed when it fulfils the criteria defined by the Relevant Network Operator. As long as a test fails to fulfil these criteria, the TSO, DSO and Significant Grid User shall repeat the test.

##### Article 41

##### **Compliance testing of Power Generating Module capabilities**

1. Each Power Generating Module with Black Start capability, which is identified in a Restoration Plan, shall perform Black Start Capability test, at least every three years, following the methodology described in Article 39(5) [NC RfG].
2. Each Significant Grid User which is a Type C and D Power Generating Module and which is identified in a Restoration Plan shall perform tripping to houseload test after any modernisation of the equipment having an impact on its Houseload Operation capability, or after two unsuccessful consecutive tripping in real operation, following the methodology described in Article 39(6) [NC RfG].

#### Article 42

##### **Compliance testing of Demand Facilities providing Demand Side Response**

1. Each Demand Facility providing Demand Side Response, which is identified in System Defence Plan and/or Restoration Plan shall perform demand modification test, at least every year, following the methodology described in Article 44(1) [NC DC].
2. Each Demand Facility providing Demand Side Response, which is identified in System Defence Plan, shall perform Low Frequency Demand Disconnection test at least every five years, following the methodology described in Article 43(1)(d) [NC DC].

#### Article 43

##### **Compliance testing of HVDC capabilities**

1. Each HVDC System with Black Start capability, which is identified in a Restoration Plan, shall perform Black Start Capability test, at least every three years, following the methodology described in Article 67(11) [NC HVDC].

#### Article 44

##### **Compliance testing of DSO relays**

1. Each Distribution System Operator, which is identified in System Defence Plan, shall perform Low Frequency Demand Disconnection relays testing, at least every five years, following the methodology described in Article 41(1)(e) [NC DC].

#### Article 45

##### **Testing of communication channels and tools**

1. Each TSO, DSO and Significant Grid User identified in System Defence Plan or Restoration Plan shall test their backup communication channels, defined in Article 38, at least every year.
2. Each TSO shall test the critical tools and facilities that are defined in Article 8(15) [NC OS], at least every two years, covering both main and backup tools and facilities. Where these tools and facilities involve DSOs or Significant Grid Users, these parties shall participate in this test.

#### Article 46

##### **Testing of TSO facilities**

1. Each TSO shall test the capability of main and backup power sources to supply its main and backup control rooms, in accordance with Article 39, at least every year.
2. Each TSO shall test the capability of backup power sources to supply essential services of the substations identified in Restoration Plan, in accordance with Article 39, at least every four years.

## SECTION 2

### COMPLIANCE TESTING AND REVIEW OF SYSTEM DEFENCE PLANS AND RESTORATION PLANS

#### Article 47

##### Periodic review of System Defence Plan

1. Each TSO shall monitor the proper implementation of the Low Frequency Demand Disconnection on the basis of the yearly written notification on Low Frequency Demand Disconnection provided by the DSO pursuant to Article 20(1) [NC DC] and by the Demand Facility Owner pursuant to Article 22(1)(o) [NC DC].
2. Each TSO shall review, at least every 5 years, its System Defence Plan to assess its effectiveness. The TSO shall in this review take into account at least:
  - a) development and evolutions on its Network since the last review or first design;
  - b) capabilities of new equipment installed on the transmission and distribution systems since the last review or first design;
  - c) Significant Grid Users commissioned since the last review or first design, their capabilities and relevant offered services;
  - d) tests carried out and analysis of system incidents pursuant to Article 33(5) [NC OS]; and
  - e) operational data collected during normal operation and after Disturbance.
3. When the TSO identifies the need to adapt the System Defence Plan, it shall amend its System Defence Plan and implement these amendments in accordance with Article 8 Article 21.

#### Article 48

##### Compliance testing and periodic review of Restoration Plan

1. Each TSO shall test parts of its Restoration Plan based on computer simulation, in coordination with DSO and Significant Grid Users identified in the Restoration plan, at least every five years. The TSO shall define these simulation tests in a dedicated testing procedure covering at least:
  - a) energizing restoration path from Power Generating Modules capable of providing Black Start or Island Operation;
  - b) the supply of Power Generating Modules main auxiliaries;
  - c) Demand reconnection; and
  - d) Resynchronisation of Networks in Island Operation.
2. In addition, if deemed necessary by the TSO to ensure the effectiveness of the Restoration Plan, each TSO shall perform operational testing of parts of Restoration Plan, in coordination with DSOs and Significant Grid Users identified in the Restoration plan. The TSO shall define these operational tests in a dedicated testing procedure.
3. Each TSO shall review its Restoration Plan to assess its effectiveness, at least every 5 years.
4. When the TSO identifies the need to adapt the Restoration Plan, it shall amend its Restoration Plan and implement these amendments in accordance with Article 21.

## Article 49

### **Testing of communication procedure**

1. Each TSO shall test the communication procedure referred in Article 20. The TSO shall organise these testing with all parties identified in the Restoration Plan, during training organised according to Article 30 [NC OS].

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## **CHAPTER 7**

### **IMPLEMENTATION**

#### Article 50 **Monitoring**

1. The Agency, in cooperation with ENTSO-E, shall draw up by [six months after the entry into force of this Regulation] a list of the relevant information to be communicated by ENTSO-E to the Agency in accordance with Articles 8(9) and 9(1) of Regulation (EC) No 714/2009 shall be determined within three months after the entry into force of this Regulation by the Agency in close cooperation with ENTSO-E. The list of relevant information may be subject to updates. ENTSO-E shall maintain a comprehensive, standardised format, digital data archive of the information required by the Agency.
2. All TSOs shall submit to ENTSO-E the data required to perform the tasks in accordance with paragraph 1.

#### Article 51 **Stakeholder Advisory Group**

1. ENTSO-E shall establish and regularly convene a stakeholder advisory group which shall represent the views of stakeholders to ENTSO-E. The stakeholder advisory group shall include a broad representation of relevant stakeholders. The Agency and the Commission may attend meetings of the stakeholder advisory group as observers.
2. The stakeholder advisory group may assist ENTSO-E in:
  - (a) fulfilling its monitoring duties pursuant to Article 8(8) of Regulation (EC) No 714/2009 and in particular in relation with the implementation of this Regulation; and
  - (b) preparing proposals for amendment of this Regulation pursuant to Article 7(1) and (2) of Regulation (EC) No 714/2009.
3. The stakeholder advisory group shall include a broad representation of stakeholders, including DSOs, system users and power equipment manufacturers. Prior to its first meeting and at least yearly thereafter, ENTSO-E shall submit to the Agency the proposed composition of the stakeholder advisory group. The Agency may issue an opinion on the composition of the stakeholder advisory group within two (2) months upon submission. ENTSO-E shall take utmost account of such an opinion.
4. ENTSO-E shall submit to the Agency proposed rules and procedures of the stakeholder advisory group. The Agency may provide an opinion on the proposed rules and procedures within two (2) months upon submission. ENTSO-E shall take utmost account of such an opinion.

5. The stakeholder advisory group may serve as a specific stakeholder advisory group or may for efficiency reasons be merged with other stakeholder advisory groups established to assist ENTSO-E in accordance with other network codes or guidelines developed pursuant to Article 6 or 18 of Regulation (EC) No 714/2009.
6. The stakeholder advisory group shall ensure a high level of transparency and make publicly available relevant documents such as the rules of procedures, summaries of the stakeholder advisory group meeting minutes or documents related to the meetings.

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## CHAPTER 8

### FINAL PROVISIONS

#### Article 52

##### **Amendments of contracts and general terms and conditions**

By [date – the same as the date in Article 53], each relevant TSO, DSO and each relevant Significant Grid User shall amend all relevant clauses in contracts and relevant clauses in general terms and conditions, regardless of whether the relevant contracts or general terms and conditions contain an amendment process, in order to achieve compliance with the requirements of this Network Code.

#### Article 53

##### **Entry into force**

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

It shall apply as [from the day of expiration of a XX years period following its publication] [OR] [from DATE].

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

Done at Brussels, [DD] [Month] [20YY]

*For the Commission*  
*The President*  
[Name President of European Commission]