ENTSO-E Working Draft Network Code on Emergency and Restoration

DRAFT FOR THE FOURTH PUBLIC WORKSHOP

22 January 2015

Notice

This document reflects the status of the work of Transmission System Operator experts as of 22 January 2015 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.

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

An addendum of the draft Network Code has been released for Article 13 and Chapter 4, for additional public consultation in accordance with the provisions of Article 10 of Regulation (EC) No 714/2009 on 15th December 2014, the consultation being open until 14th January 2014.

This third version of the draft Network Code integrates remarks from the public workshops and public consultations. 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

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this draft Network Code to preceding network codes/Guidelines refer to the last publically available versions of these Network Codes and Guidelines. It is released for the fourth public worshop organised by ENTSO-E.

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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) Directive 2009/72/EC and Regulation (EC) No 714/2009 provide for powers and duties of national regulatory authorities with regard to measures taken by Transmission System Operators (TSO), allowing Member States to involve in certain cases also other national authorities. Those competences should also apply to measures taken by TSOs under this Network Code. To ensure consistent cross-border application of the most relevant of those competences, it is necessary to clarify the competence of national regulatory authorities to approve or fix specific terms and conditions or actions necessary to ensure operational security or their methodologies The

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Network Code does not preclude Member States from providing for the approval or fixing by national regulatory authorities of other relevant terms and conditions or actions necessary to ensure operational security or their methodologies, within a timeframe allowing the timely delivery of those terms and conditions or actions.

(7) This Network Code is not detrimental to the right of any party having a complaint against a Transmission System Operator or Distribution System Operator in relation to that operator's obligations under this Network Code to direct its complaint to the regulatory authority.

(8) 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.

(9) 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.

(10) This Network Code endeavors to ensure the continuity of energy transactions during Emergency, Blackout or Restoration State and provides the conditions under which such transactions could be suspended.

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 States;
   (b) the coordination of European system operation in Emergency, Blackout and Restoration 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. This NC shall apply to all transmission systems and interconnections in the Union except the transmission systems on islands which are not connected with other transmission systems via interconnections.

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 more obligations under this Network Code, Member States may provide that the responsibility for complying with those obligations is assigned to one or more different, specific TSO.

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;

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(d) Redispatching Aggregators and Providers of Active Power Reserve according to the [NC LFCR]; and
(e) HVDC Systems and DC-connected Power Park Modules.

7. This Network Code shall apply to new and existing type A Power Generating Modules providing they qualify as Defence Provider pursuant to Article 8 (8) and/or Restoration Provider pursuant to Article 20 (9) of this Network Code.

8. Type A and type B Power Generating Modules may fulfil the requirements they are subject to directly or indirectly (including but not restricted to through an Aggregator).

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;

Defence Service Provider means a legal entity with a legal or contractual obligation to provide a service contributing to one or several measures of the System Defence Plan;

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 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;

Market Activities Suspension Triggers means the conditions which when met, individually or cumulatively, could lead to a suspension of market activities;

Market Activities Restoration Triggers means the conditions that should be met to start restoration of market activities;

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

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

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Restoration Service Provider means a legal entity with a legal or contractual obligation to provide a service contributing to one or several measures of the Restoration Plan;

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;

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) overall 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 borne by Network Operators stemming from the obligations laid down in this Network Code shall be assessed by the competent regulatory authorities. Costs assessed as

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reasonable, efficient and proportionate shall be recovered in a timely manner through network tariffs or other appropriate mechanisms as determined by the competent regulatory authorities.

2. If requested by the competent regulatory authorities, Network Operators shall, within three months of such a request, provide information necessary to facilitate assessment of the costs incurred.

Article 5

Consultation and coordination

1. When expressly provided in this Network Code, a TSO shall consult other parties for the terms and conditions or actions it defines before real-time or for real-time.

   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 motivation and objective of the consultation / decision that it has to take;
   c) collect from the concerned parties any relevant information and suggestions;
   d) duly consider the views, situations and constraints of the parties consulted;
   e) before adopting a decision, provide to the parties consulted a clear and robust justification for including or not the views, situations and constraints resulting from the consultation.

2. A TSO shall coordinate with other parties when expressly provided in this Network Code for a set of actions to be performed in real-time by several parties.

   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, duly considering the views, 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 can be reached, the TSO shall launch an action that has, if possible, no impact on the parties that have rejected the coordination or, when time allows, ask the relevant authority 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.

4. Each TSO and DSO shall respect technical, legal, personal safety and security constraints.

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Article 6

Confidentiality obligations

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

2. The obligation of professional secrecy shall apply to any person subject to the provisions of this Network Code.

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

4. Without prejudice to cases covered by national law, regulatory authorities, bodies or persons which receive confidential information pursuant to this Network Code may use it only for the purpose of the performance of their functions under this Network Code.

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 TSOs 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.

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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 relevant DSOs, Significant Grid Users, neighbouring TSOs and Synchronous Area TSOs, covering at least the technical and organisational measures specified in Chapter 2. The deadlines for the implementation of these measures shall be part of the design phase. In any case, these deadlines shall be consistent with implementation periods defined in Chapter 2.

2. When designing a System Defence Plan, each TSO shall take into account, at least:
    a) Operational Security Limits;
    b) behaviour and capabilities of load and generation;
    c) specific needs of high priority Significant Grid Users listed pursuant to Article 32(10) [NC OS]; and
    d) characteristics of its Network and underlying DSOs Networks.

3. In the design of its System Defence Plan, each TSO shall respect the following principles:
    a) the impact for System Users is minimal;
    b) the measures are economically efficient;
    c) only the necessary measures are activated; and
    d) the measures do not endanger the Operational Security.

4. The System Defence Plan shall include at least:
    a) System Protection Schemes including at least:
        i. automatic under-Frequency control scheme;
        ii. automatic over-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.

5. 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.

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6. Without prejudice to the possible competence under national law of a National Regulatory Authority or other relevant national authorities to approve the concept of, parts or the whole System Defence Plan, 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 TSO may notify the whole System Defence Plan to its National Regulatory Authority or other relevant national authorities, when explicitly foreseen in national law.

   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 managed or the situation to be solved;
   b) conditions triggering the measures of the System Defence Plan;
   c) general principle of each measure, explaining how each measure contributes to the objectives of the System Defence and how these measures will be implemented; and
   d) deadlines for implementation of the measures.

7. In the design of its System Defence Plan, each TSO shall:
   a) list measures to be implemented on its installations;
   b) identify DSOs that have to implement measures on their installations;
   c) list measures to be implemented by these DSOs;
   d) identify Significant Grid Users that have to implement measures on their installations, in the case these measures are using mandatory requirements from [NC DC], [NC RFG], [NC HVDC] or national legislation;
   e) list measures to be implemented by these Significant Grid Users; and
   f) list measures to be delivered by Defence Service Providers.

8. Each TSO shall define the conditions for Defence Service Providers including at least:
   a) characteristics of the service to be provided, like minimum or maximum amount of Power, activation time, communication capabilities;
   b) conditions for aggregation; and
   c) for Defence Service Providers with contract, additional requirements and conditions.

   The TSO shall submit these conditions to its NRA, or where applicable any other competent authority of a Member State, for approval.

Article 9

Implementation of the System Defence Plan

1. Each TSO shall implement and maintain the measures of its System Defence Plan which are to be implemented on the Transmission System.

2. Each TSO shall:
   a) notify Transmission Connected DSOs the measures of the System Defence Plan which are to be implemented, including the deadlines for implementation:

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i. on their installations pursuant to Article 8(7); and/or
ii. on the installations of Significant Grid Users identified pursuant to Article 8(7) connected to their Distribution Systems; and/or
iii. on the installations of Defence Service Providers connected to their Distribution Systems; and/or
iv. on the installations of DSOs connected to their Distribution Systems.

b) notify Significant Grid Users identified pursuant to Article 8(7) and/or Defence Service Providers 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 directly Significant Grid Users identified pursuant to Article 8(7) and/or Defence Service Providers and/or DSOs connected to Distribution Systems and shall inform the concerned DSO of such notification.

3. Each notified DSO shall notify Significant Grid Users and/or Defence Service Providers and/or DSOs 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 them.

4. Each notified DSO, Significant Grid Users and Defence Service Providers shall:
   a) implement the measures notified to them and confirm this implementation to the notifying Network Operator, who shall then notify the TSO; and
   b) maintain the measures implemented on its installations.

Article 10

Activation of the System Defence Plan

1. Each TSO shall activate its System Defence Plan in coordination with DSOs, Significant Grid Users identified pursuant to Article 8(7), Defence Service Providers selected pursuant to Article 8(8) and TSOs.

2. 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 times according to Article 8(1) of [NC OS] and no Remedial Action is available to restore the system to Normal State; or
   b) according to Operational Security Analysis, the Operational Security of the transmission system requires the activation of a measure of the System Defence Plan in addition to available Remedial Actions.

3. Each TSO shall coordinate activation of System Defence Plan measures having a significant cross-border impact, with the impacted TSOs.

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Article 11

TSO coordination in Emergency State

1. Each TSO upon request from a neighbouring TSO in Emergency State shall provide through Interconnectors any possible assistance to the requesting TSO, provided it does not endanger its own or other neighbouring systems. This assistance includes, but is not limited to, a curtailment of Cross Zonal Allocated Capacities according to Article 69 [GL CACM] and assistance for Active Power, according to Article 18.

2. When provided through HVDC Interconnectors, this assistance includes, but is not limited to, taking into account the technical characteristics and capability of HVDC System:
    a) manual regulation actions of the transmitted Active Power to help the TSO in Emergency State to bring power flows within Operational Security Limits or frequency of neighbouring Synchronous Area within System Frequency limits for Alert State defined in Article 42(4) [NC LFCR];
    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.

3. 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.

4. A TSO may manually open an Interconnector without coordination, in specific conditions including the violation of threshold endangering personnel safety or damaging equipment.

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 set of measures shall be in line with procedures agreed according to Article 9(3) [NC OS] and respect at least the following requirements:
    a) a decrease of generation shall be smaller than the decrease of load during under Frequency events;

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b) a decrease of generation shall be greater than the decrease of load during over Frequency events; and
c) flows on interconnectors shall not exceed Operational Security Limits due to asymmetrical response of each LFC Area to under or over Frequency events.

2. Each TSO shall adapt the settings of its Load Frequency Control in order to prevent:
   a) endangering the Operational Security of the Synchronous Area; and
   b) interfering with manual activation or deactivation of Active Power as described in paragraphs 3and 4.

3. Each TSO shall be entitled to define an Active Power set-point which the Significant Grid User shall maintain provided it is identified for this measure pursuant to Article 8(7) and the set-point respects its technical constraints. Significant Grid User shall execute the instructions given directly by the TSO or indirectly through DSOs without undue delay.

   Each TSO shall be entitled to disconnect Significant Grid Users, directly or indirectly through DSOs.

   Significant Grid Users shall remain in this state until further instructions by the relevant System Operator.

4. In case of under-frequency event, each TSO shall activate Demand Side Response from the Defence Service Providers providing DSR selected pursuant to Article 8(8) before activation of the automatic Low Frequency Demand Disconnection scheme described in Article 13, provided the rate of change of Frequency allows it.

Article 13

Automatic under-Frequency control scheme

1. The automatic under-Frequency control scheme shall include an automatic Low Frequency Demand Disconnection scheme and the settings of Limited Frequency Sensitive Mode – Underfrequency in the TSO LFC Area.

2. In the design of its System Defence Plan, each TSO shall foresee activation of Limited Frequency Sensitive Mode – Underfrequency before activation of the automatic Low Frequency Demand Disconnection scheme, provided the rate of change of frequency allows it.

3. Each TSO and DSO identified pursuant to Article 8(7) shall foresee automatic activation and/or activate manually disconnection of Energy Storage acting as load connected to its network before activation of the automatic Low Frequency Demand Disconnection scheme, provided the rate of change of Frequency allows it.

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4. The automatic Low Frequency Demand Disconnection scheme of the System Defence Plan to be defined by each TSO shall include the disconnection of Demand at different frequencies, from a starting to an ending mandatory level within an implementation range and respecting a minimum number and maximum size of steps. The implementation range defines the maximum admissible deviation of Demand to be disconnected from target Demand to be disconnected at a given frequency, calculated through linear interpolation between starting and ending mandatory levels. The starting mandatory level, the ending mandatory level, the implementation range, the minimum number of steps and the maximum Demand disconnection for each step shall respect the following characteristics:

Parameter	Values SA Continental Europe	Values SA Nordic	Values SA Great Britain	Values SA Ireland	Measuring Unit
Demand disconnection starting mandatory level : Frequency	49	48.7 – 48.8	48.8	48.85	Hz
Demand disconnection starting mandatory level: Demand to be disconnected	5	5	5	6	% of the Total Load
Demand disconnection ending mandatory level: Frequency	48	48	48	48.5	Hz
Demand disconnection ending mandatory level: Cumulative Demand to be disconnected	45	30	50	60	% of the Total Load
Implementation range (the Implementation range does not allow to disconnect less Demand than the Demand to be disconnected at starting mandatory level)	±7	±10	±10	±7	% of the Total Load for a given frequency
Minimum number of steps to reach the ending mandatory level	6	2	4	6	Number of steps
Maximum Demand disconnection for each step	10	15	10	12	% of the Total Load for a given step

Table 1: Automatic Low Frequency Demand Disconnection scheme characteristics

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5. Each TSO may include in the automatic Low Frequency Demand Disconnection scheme of its System Defence Plan a Demand disconnection based on frequency gradient assuming that:
    a) it is activated only when the Frequency Deviation is higher than the Maximum Steady State Frequency Deviation, the frequency gradient is higher than the one produced by the Reference Incident and until the frequency reaches the frequency of the Demand disconnection starting mandatory level; and
    b) the characteristics described in table 1 are respected.

6. Each TSO may include in the automatic Low Frequency Demand Disconnection scheme of its System Defence Plan additional Demand disconnection steps below the Demand disconnection ending mandatory level defined in table 1.

7. Each TSO shall be entitled to implement other Special Protection Schemes triggered by a frequency smaller or equal to the frequency of the Demand disconnection ending mandatory level and aiming at faster restoration process, ensuring that such schemes do not further deteriorate frequency.

8. Each TSO and/or DSO shall, when implementing the automatic Low Frequency Demand Disconnection scheme, pursuant to the notification under Article 9(2):
    a) avoid intentional time delay for Low Frequency Demand Disconnection is set additionally to the operating time of the relays and circuit breakers;
    b) minimise disconnection of Power Generating Modules connected directly to its distribution system and especially those providing inertia; and
    c) avoid that this scheme leads to power flow deviation and Voltage deviation outside Operational Security Limits.

    When a DSO cannot fulfil the two requirements under paragraphs 8(b) and 8(c), it shall notify the TSO and propose which one of these requirements shall prevail. The TSO shall define the applicable requirements.

Article 14

Automatic over-Frequency control scheme

1. The automatic over-Frequency control scheme of the System Defence Plan shall lead to an automatic decrease of the total Active Power injected in each LFC Area using Limited Frequency Sensitive Mode – Overfrequency. No later than one year after the entry into force of the Network Code, in consultation with the other TSOs of its Synchronous Area, each TSO shall establish:
    a) the frequency thresholds for the activation of this scheme;
    b) the reduction ratio of Active Power injection; and
    c) maximum step of disconnection of Power Generating Modules and/or of HVDC System in case a step-wise linear disconnection is needed, in its LFC Area, in addition to the Limited Frequency Sensitive Mode – Overfrequency in order to fulfil requirements (a) and (b).

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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 be entitled to define a Reactive Power or Voltage range and instruct the DSOs and Significant Grid Users identified for this measure pursuant to Article 8(7) to maintain it, according to Article 10 [NC OS].

3. Each TSO shall, upon request of neighbouring TSO being in Emergency State, 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 may include one or more of the following schemes depending on the results of a TSO assessment of system security as described in Article 20(3) [NC DC]:

    a) Low Voltage Demand Disconnection scheme according to Article 20(3) [NC DC];
    b) On Load Tap Changer blocking scheme according to Article 20(4) [NC DC]; and
    c) Special Protection Schemes for Voltage management.

2. Unless the assessment demonstrates the implementation of the On Load Tap Changer blocking scheme is not necessary to prevent a Voltage collapse in the TSO Responsibility Area, 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 (local or remote from control room);
    b) Voltage level threshold at the Connection Point;
    c) Reactive Power flow direction; and
    d) maximum time delay between threshold detection and blocking.

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 outside Operational Security Limits defined according to Article 8(5) [NC OS]. These measures shall be used in addition to the measures developed according to Article 12(4) [NC OS].

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2. Each TSO shall be entitled to define an Active Power set-point which the Significant Grid User shall maintain provided it is identified for this measure pursuant to Article 8(7) and the set-point respects its technical constraints. Significant Grid User shall execute the instructions given directly by the TSO or indirectly through DSOs without undue delay.

   Each TSO shall be entitled to disconnect Significant Grid Users directly or indirectly through DSOs.

   Significant Grid Users shall remain in this state until further instructions by the relevant Network Operator.

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 has activated all available Balancing Energy and 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]; or
   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 adapt its Availability Status in order to make available all its Active Power, provided it was not already activated through any Balancing mechanism, while respecting its technical constraints.

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 Areas.

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 from 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.

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5. In case of request of assistance for Active Power pursuant to paragraph 3, the requesting and the requested TSOs shall be entitled to modify reliability margins based on the real-time status of the system and to fully use the non-allocated cross-zonal capacity.

6. Assistance for Active Power shall be firm, unless the TSO providing the said assistance enters into Emergency or Blackout State.

Article 19

Manual Demand disconnection procedure

1. In addition to the measures described in Article 12, Article 15, Article 17 and Article 18 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. The TSO shall then activate this measure 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 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 relevant DSOs, Significant Grid Users, neighbouring TSOs and Synchronous Area TSOs, to return its system to Normal State as fast as possible, covering at least the technical and organisational measures specified in Chapter 3. The deadlines for the implementation of these measures shall be part of the design phase. In any case, these deadlines shall be consistent with implementation periods defined in Chapter 3.

2. When designing a Restoration Plan, each TSO shall take into account, at least:
    a) behaviour and capabilities of load and generation;
    b) specific needs of high priority Significant Grid Users listed pursuant to Article 32(10) [NC OS]; and
    c) characteristics of its Network and underlying DSOs Networks.

3. In the design of its Restoration Plan, each TSO shall respect the following principles:
    a) the impact for System Users is minimal;
    b) the measures are economically efficient; and
    c) only the necessary measures are activated.

4. 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.

5. 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.

6. 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.

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7. Without prejudice to the possible competence under national law of a National Regulatory Authority or other relevant national authorities to approve the concept of, parts or the whole Restoration Plan, 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 TSO may notify the whole Restoration Plan to its National Regulatory Authority or other relevant national authorities, when explicitly foreseen in national law.

   The concept of the Restoration Plan shall include the following:
   a) objectives the Restoration Plan intend to achieve, including the phenomena to be managed or the situation to be solved;
   b) conditions triggering the measures of the Restoration Plan;
   c) general principle of each measure explaining how each measure contributes to the objectives of the Restoration Plan and how these measures will be implemented; and
   d) deadlines for implementation of the measures.

8. In the design of its Restoration Plan, each TSO shall:
   a) list all measures to be implemented on its installations;
   b) identify DSOs that have to implement measure on their installations;
   c) list measures to be implemented by these DSOs;
   d) identify Significant Grid Users that have to implement measures on their installations, in the case these measures are using mandatory requirements from [NC DC], [NC RFG], [NC HVDC] or national legislation;
   e) list measures to be implemented by these Significant Grid Users; and
   f) list measures to be delivered by Restoration Service Providers.

   Each TSO shall define the number of power sources in its Responsibility Area necessary to re-energize its System with Bottom-up Strategy, having the following capabilities:

   a) Black Start Capability;
   b) quick re-synchronisation capability (through Houseload Operation); and
   c) Island Operation.

9. Each TSO shall define, in consultation with the DSOs, the conditions for Restoration Service Providers, including at least:
   a) characteristics of the service to be provided, like minimum or maximum amount of Power, activation time, communication capabilities;
   b) target geographical distribution of power sources with Black Start and Island Operation capabilities;
   c) conditions for aggregation; and
   d) for Restoration Service Providers with contract, additional requirements and conditions.

   The TSO shall submit these conditions to its NRA, or where applicable any other competent authority of a Member State, for approval.

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Article 21

Implementation of the Restoration Plan

1. Each TSO shall implement and maintain the measures of its Restoration Plan which are to be implemented on the Transmission System.

2. Each TSO shall:
   a) notify Transmission Connected DSOs the measures of the Restoration Plan which are to be implemented, including the deadlines for implementation:
      i. on their installations pursuant to Article 20(8); and/or
      ii. on the installations of Significant Grid Users identified pursuant to Article 20(8) connected to their Distribution Systems; and/or
      iii. on the installations of Restoration Service Providers connected to their Distribution Systems; and/or
      iv. on the installations of DSOs connected to their Distribution Systems.
   b) notify Significant Grid Users identified pursuant to Article 20(8) and/or Restoration Service Providers 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 directly Significant Grid Users identified pursuant to Article 20(8) and/or Restoration Service Providers and/or DSOs connected to Distribution Systems and shall inform the concerned DSO of such notification.

3. Each notified DSO shall notify Significant Grid Users and/or Restoration Service Providers and/or DSOs 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 them.

4. Each notified DSO, Significant Grid Users and Restoration Service Provider shall:
   a) implement the measures notified to them and confirm this implementation to the notifying Network Operator, who shall then notify the TSO; and
   b) maintain 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 identified pursuant to Article 20(8), Restoration Service Providers selected pursuant to Article 20(9) and 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.

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2. Each DSO, Significant Grid User identified pursuant to Article 20(8), and Restoration Service Provider selected pursuant to Article 20(9) 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 a 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;
    c) the conditions of the power systems;
    d) the conditions of the directly connected systems, including at least the status of Interconnectors; and
    e) the high priority Significant Grid Users listed pursuant to Article 32(10) [NC OS].

2. When applying a Top-down Re-energisation Strategy, each TSO shall manage the connection of load and generation with the aim to regulate the Frequency towards the Nominal Frequency with a maximum tolerance of the Maximum Steady-State Frequency Deviation. Each TSO shall respect conditions for connection of load and generation defined by the Frequency Leader, when appointed.

3. When applying a Bottom-up Re-energisation Strategy, each TSO shall manage the connection of load and generation with the aim to regulate the Frequency towards the target Frequency defined according to Article 25(3b).

4. During Re-energisation, DSOs shall, after being consulted by the TSO, connect the amount of generation and load requested by the TSO, taking into account the automatic re-connection of load and generation in their Grids.

5. When considering the activation of Top-down Re-energisation Strategy, the TSO shall request neighbouring TSOs to support the Re-energisation. The requested TSOs shall provide

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assistance for the Re-energisation, unless it would lead their systems 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. Each TSO shall activate its Frequency management procedure in preparation of Resynchronisation procedure, when a Synchronous Area is split in several Synchronised Regions or in case of Frequency Deviation in the Synchronous Area.

3. The Frequency management procedure shall include at least:
   a) appointment of Frequency Leaders;
   b) definition of target Frequency in case of Bottom-up Re-energisation Strategy;
   c) Frequency management after Frequency Deviation; and
   d) Frequency management after Synchronous Area split.

4. The Frequency management procedure shall include the determination of the amount of load 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 at first 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 target Frequency defined according to Article 25(3b) 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 at first 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

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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) maximum limits for phase angle, frequency and voltage differences for connecting 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.

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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, while respecting maximum limits defined in Article 29(1):
        i. maximum frequency difference between 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; and
        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).

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CHAPTER 4
MARKET INTERACTIONS

Article 32

Market Activities Suspension Triggers and Market Activities Restoration Triggers

1. Each TSO shall define, in consultation with NEMOs, BRPs, BSPs and any third party that has been granted a role in the framework of the wholesale market Electricity according to [NC EB], a set of Market Activities Suspension Triggers and a set of Market Activities Restoration Triggers.

2. The Market Activities Suspension Triggers shall cover at least the situations where prolongation of market activities would worsen the conditions of the transmission system being in Emergency State.

3. The Market Activities Restoration Triggers shall cover at least all the situations where the restoration of market activities would not worsen the conditions of transmission system being restored.

4. When defining the Market Activities Suspension Triggers, each TSO shall consider at least the following parameters:
    a) a percentage of Demand Disconnection in the LFC area of the TSO;
    b) a percentage of generation disconnection in the LFC area of the TSO;
    c) a significant part of the LFC area in desynchronised operation with the rest of the LFC area of the TSO;
    d) the Cross Zonal Capacity on a Bidding Zone Border is reduced to zero; and
    e) a percentage of Balancing Service Providers and/or Balance Responsible Parties not able to perform their market activities for reason(s) out of their control.

5. When defining the Market Activities Restoration Triggers, each TSO shall consider at least the following parameters:
    a) a percentage of remaining Demand Disconnection in the LFC area of the TSO;
    b) a percentage of remaining generation disconnection in the LFC area of the TSO;
    c) a part of the LFC area remaining in desynchronised operation with the rest of the LFC area of the TSO;
    d) availability of Cross Zonal Capacity on Bidding Zone Border; and
    e) a significant percentage of Balancing Service Providers and/or Balance Responsible Parties being able to perform their market activities.

6. When defining the Market Activities Suspension Triggers and the Market Activities Restoration Triggers, each TSO shall define a waiting period of time to be respected, when the Triggers are met, before starting the procedure for market activities suspension pursuant to Article 33 and the procedure for market activities restoration pursuant to Article 34.

7. Each TSO shall define triggers that it can assess in real time, based on information at its disposal.

8. The TSO shall submit the Market Activities Suspension Triggers and the Market Activities Restoration Triggers it defined to its NRA for approval. The TSO shall publish them.

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Article 33

Procedure for market activities suspension

1. When, during an Emergency State one or several Market Activities Suspension Triggers are met, or during a Blackout State, each TSO, in coordination with neighbouring TSOs, shall be entitled to suspend:
    a) Cross Zonal Capacity made available on the corresponding Bidding Zone Borders for market time periods where it is expected the transmission system shall not be restored to Normal or Alert State; and/or
    b) submission by Balancing Service Provider of Balancing Capacity and Balancing Energy bids, as described in Article 23 [NC EB]; and/or
    c) provision by Balance Responsible Party of a balanced Position in day ahead and the provision of change of its Position, as described in Article 25(4) [NC EB]; and/or
    d) provision of schedules, as described in Article 53(1) and 53(2) [NC OPS].

2. In case of suspension of market activities, each TSO shall be entitled to request Significant Grid Users to keep their last Active Power set point, until further instruction by the TSO, if technically possible.

3. When, during an Emergency State one or several Market Activities Suspension Triggers are met, or during Blackout State, each TSO shall be entitled to suspend full or partial operation of its processes impacted by this suspension.

Article 34

Procedure for market activities restoration

1. Each TSO, in coordination with neighbouring TSOs, shall launch the restoration of suspended market activities when:
    a) the Market Activities Restoration Triggers are met;
    b) DSOs, NEMOs, BRPs, BSPs and any third party that has been granted a role in the framework of the wholesale market Electricity according to [NC EB] have been duly informed in advance in accordance with Article 35; and
    c) tools and communication means necessary for TSOs, NEMOs and the percentage of Balancing Service Providers and/or Balance Responsible Parties as defined in Article 32(5)(e) to operate the activities are properly functioning.

2. Each TSO, in coordination with neighbouring TSOs, shall launch the restoration of TSO processes when the conditions of the paragraph 1 of this Article are fulfilled or before if necessary to restore market activities.

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3. For calculation of Cross Zonal Capacities, each TSO shall select after consultation of the Coordinated Capacity Calculator one of the following strategies to provide Cross Zonal Capacities to the NEMO(s):
    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 Articles 29 and 30 [GL CACM]; or
    c) use values TSO defines based on the actual physical network conditions, taking into account Article 24.

4. When part of the total coupled area where market activities have been suspended is back to Normal State or Alert State, the TSO(s) of this area shall be entitled to launch a market coupling in a part of the total coupled area, after consultation with NEMOs, Market Participants and any third party that has been granted a role in the wholesale market Electricity according to [NC EB], DSOs and the Coordinated Capacity Calculator.

5. Each TSO shall use available Cross Zonal schedules, respecting Cross Zonal Capacities defined according to paragraph 3, as input for its Load Frequency Control, upon request of its Frequency Leader when appointed.

Article 35

Communication procedure

1. Each TSO shall develop, in consultation with NEMO(s), BRPs, BSPs and any third party that has been granted a role in the framework of the wholesale market Electricity according to [GL EB] and Market Participants, a communication procedure detailing the tasks and actions expected from each party in its different roles during the restoration of market activities and the associated organisation. The communication procedure shall also include information to the NRA.

2. The procedure shall include at least the following steps :
    a) notification of the suspension of market activities by the TSO according to Article 33, including the best estimate for the time and date of the transmission system restoration;
    b) update on the restoration process of the transmission system by TSOs;
    c) notification by the NEMO(s), Balancing Service Providers and Balance Responsible Parties that their market tools and communication systems are operational;
    d) notification of the restoration of the transmission system back to Normal State or Alert State by the TSO(s);
    e) notification by the NEMO and/or the TSO of the best estimate for time and date when market activities will be restored; and
    f) confirmation by the NEMO and/or the TSO that market activities have been restored.

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Article 36

Settlement principles

1. In case of an Emergency State without suspension of market activities according to Article 33, the settlement rules and principles defined in Chapter 5 of [NC EB] shall apply.

2. The settlement of Emergency State with suspension of market activities according to Article 33, Blackout State or Restoration State may be governed by rules and principles deviating from Chapter 5 of [NC EB] as defined under national law or as defined by a TSO, in consultation with Market Participants and subject to NRA approval.

   The rules and principles shall address all settlements of TSO's with Balance Responsible Parties, Balance Services Providers and other TSOs.

   Each NRA shall ensure the financial neutrality of all TSOs under its competence with regard to the financial outcome as a result of the settlement pursuant to this paragraph, over the regulatory grid access tariffs period as defined by the relevant NRA.

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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 when in Emergency, Blackout or Restoration States:
    a) from DSOs identified pursuant to Article 20(8), necessary 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 identified pursuant to Article 20(8) and Restoration Service Providers selected pursuant to Article 20(9), 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 information during Emergency, Blackout or Restoration States:
    a) to directly connected TSOs, information about at least:
        i. known circumstances that lead to the current System State of its Transmission System;
        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 Region, information about at least:
        i. restrictions to maintain Island Operation;
        ii. the available additional generation and load; and
        iii. the availability of Operational Reserves.
    c) to Transmission Connected DSOs, information about at least:
        i. the System State of its Transmission System;
        ii. limits of active and reactive power, tap and breaker position at the connection points;
        iii. information on the current and planned status of Power Generating Modules connected to the DSO, if not available to the DSO directly; and
        iv. all necessary information leading to further coordination with distribution connected parties.
    d) to Defence Service Providers, information about at least:
        i. the System State of its Transmission System;
        ii. scheduled measures which require participation of the Defence Service Providers

e) to Restoration Service Providers, information about at least:
    i. the System State of its Transmission System;
    ii. ability and plans to re-energize couplings; and
    iii. scheduled measures which require participation of the Restoration Service Providers.

3. All TSOs 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 provide information at least the following parties about the the System State of its Transmission System and, if available, additional information:
    a) Nominated Electricity Market Operators, who shall make this information available to their Market Participants, according to Article 33; and
    b) its National Regulatory Authority, or when explicitly foreseen in national law, other relevant national authorities.

Article 38
Communication systems

1. Each TSO, DSO and Significant Grid User identified pursuant to Article 20(8) and Restoration Service Provider selected pursuant to Article 20(9) shall have at least one redundant voice communication system and/or one redundant data communication system to exchange the necessary information for Restoration Plan. At least one of these communication systems shall have backup power supply for at least 24 hours and shall be prioritised.

Article 39
Tools and 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 identified pursuant to Article 20(8) and Restoration Service Provider selected pursuant to Article 20(9) 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.

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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 identified in the Restoration Plan shall be operational in case of loss of primary power supply for at least 24 hours.

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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 all equipment and capabilities contributing to the System Defence Plan and the Restoration Plan. In this objective, each TSO shall periodically verify the compliance of capabilities that are used in the System Defence Plan and in the Restoration Plan, in accordance with Article 40(2) of this Network Code, Article 35(2) [NC RfG], Article 38(2) [NC DC], and Article 65(1) and (2) [NC HVDC].

2. Each TSO shall define, in consultation with DSOs, Significant Grid Users identified pursuant to Article 8(7) and Article 20(8), Defence Service Providers and Restoration Service Providers, a test plan, identifying the capabilities and equipment used in System Defence Plan and in Restoration Plan that have to be tested. The test plan shall include periodicity and conditions of the tests, following minimum requirements set forth in Article 41, Article 42 and Article 43 and shall follow the methodology described in [NC RfG], [NC DC] and [NC HVDC] for the corresponding tested capability.

3. Each TSO, DSO, Significant Grid User, Defence Service Provider and Restoration Service Provider shall ensure that Operational Security is not endangered during the test. The test shall be conducted in a way that minimises the impact on System Users.

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, Significant Grid User, Defence Service Provider and Restoration Service Provider shall repeat the test.

Article 41
Compliance testing of Power Generating Module capabilities

1. Each Restoration Service Provider which is a Power Generating Module delivering Black Start service shall perform Black Start Capability test, at least every three years, following the methodology described in Article 39(5) [NC RfG].

2. Each Restoration Service Provider which is a Power Generating Module delivered quick re-synchronisation service 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].

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Article 42

Compliance testing of Demand Facilities providing Demand Side Response

1. Each Defence Service Provider delivering Demand Side Response shall perform demand modification test, after two unsuccessful responses in real operation or at least every year, following the methodology described in Article 44(1) [NC DC].

2. Each Defence Service Provider delivering DSR LFDD shall perform Low Frequency Demand Disconnection test within a periodicity to be defined at national level and following the methodology described in Article 43(1)(d) [NC DC] for Transmission Connected Demand Facilities or according a methodology similar to the requirements in Article 43(1)(d) [NC DC] defined by the Relevant Network Operator for other Demand Facilities.

Article 43

Compliance testing of HVDC capabilities

1. Each Restoration Service Provider which is an HVDC System delivering Black Start service 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 LFDD relays

1. Each DSO and TSO shall perform testing on the Low Frequency Demand Disconnection relays implemented on its installations, according to a periodicity to be defined at national level and following the methodology described in Article 41(1)(e) [NC DC].

Article 45

Testing of communication systems

1. Each TSO, DSO and Significant Grid User identified pursuant to Article 20(8) and Restoration Service Provider selected pursuant to Article 20(9) shall test the communication systems, defined in Article 38, at least every year.

2. Each TSO, DSO and Significant Grid User identified pursuant to Article 20(8) and Restoration Service Provider selected pursuant to Article 20(9) shall test the backup power supply of their communication systems at least every five years.

Article 46

Testing of tools and 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 functionality of critical tools and facilities defined in Article 8(15) [NC OS], at least every three year, covering both main and backup tools and facilities. Where

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these tools and facilities involve DSOs or Significant Grid Users, these parties shall participate in this test.

3. 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(5), at least every five years.

4. Each TSO shall test the evacuation procedure for moving from the main control room to the backup control room, according to Article 39(4) at least every year.

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] and on the basis on implementation details on TSOs installation when applicable.

2. Each TSO shall review, at least every five years, its complete 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 and Article 9.

Article 48
Compliance testing and periodic review of Restoration Plan

1. Each TSO shall test measures of its Restoration Plan based on computer simulation, using data from DSOs identified pursuant to Article 20(8) and Restoration Service Providers, at least every five years. The TSO shall define these simulation tests in a dedicated testing procedure covering at least:

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a) energizing restoration path from Restoration Service Providers with Black Start or Island Operation capabilities;
b) the supply of Power Generating Modules main auxiliaries;
c) Demand reconnection process; and
d) process for 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 identified pursuant to Article 20(8) and Restoration Service Providers. The TSO shall define, in consultation with the DSOs and Restoration Service Providers, these operational tests in a dedicated testing procedure.

3. Each TSO shall review its Restoration Plan to assess its effectiveness, at least every five 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 20 and 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 pursuant to Article 20(8) and (9), 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 for Electricity, 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 for Electricity to the Agency in accordance with Articles 8(9) and 9(1) of Regulation (EC) No 714/2009. The list of relevant information may be subject to updates. ENTSO for Electricity shall maintain a comprehensive, standardised format, digital data archive of the information required by the Agency.

2. All TSOs shall submit to ENTSO for Electricity the data required to perform the tasks in accordance with paragraph 1.

3. DSOs, Significant Grid Users, Defence Service Providers, Restoration Service Providers and other relevant organisations regarding emergency and restoration shall, at the joint request of the Agency and ENTSO-E, submit to ENTSO for Electricity the information required for monitoring in accordance with paragraph 1, except for information already obtained by the regulatory authorities, the Agency or ENTSO-E in the context of their respective implementation monitoring tasks.

Article 51
Stakeholder Involvement

1. The Agency, in close cooperation with ENTSO for electricity, shall organise stakeholder involvement regarding the implementation of this Regulation. This shall include regular meetings with stakeholders to identify problems and propose improvements.

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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 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.

Articles 8 and 20 shall apply as [from the day of entry into force].
Articles 9 and 21 shall apply as [from the day of expiration of a one year period following the publication of this Regulation].
Articles 13 and 38 shall apply as [from the day of expiration of a five years period following the publication of this Regulation].
All other shall apply as [from the day of expiration of a two years period following the publication of this Regulation].

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]

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