

ENTSO-E Draft Network Code on Operational Planning and Scheduling

26 October 2012

Notice

This document contains a draft Network Code for Operational Planning and Scheduling, prepared by the Drafting Team of the Operational Planning and Scheduling Network Code as of 26 October 2012, in line with the ACER Framework Guidelines on System Operation published on 2 December 2011.

The document does not in any case represent a firm, binding or definitive ENTSO-E position on the contents, the structure, or the prerogatives of the Network Code for Operational Planning and Scheduling. Such position will be released for public consultation following the procedure according to the provisions of the 3rd Legislative Package.

PURPOSE AND OBJECTIVES

THE EUROPEAN COMMISSION,

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

Having regard to Directive 2009/72/EC of the European Parliament and of the Council of 13 July 2009 concerning common rules for the internal market in electricity and repealing Directive 2003/54/EC;

Having regard to Regulation (EC) 714/2009 of the European parliament and of the Council of 13 July 2009 and in particular Article 6;

Having regard to the priority list issued by the European Commission on 22 December 2010;

Having regard to the Framework Guidelines on Electricity System Operation issued by ACER on 2. December 2011;

Whereas:

- (1) Directive 2009/72/EC of the European Parliament and of the Council of 13 July 2009 concerning common rules for the internal market in electricity and repealing Directive 2003/54/EC and Regulation (EC) N° 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 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 Systems 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) Directive 2009/72/EC stresses that a secure supply of electricity is of vital importance for the development of European society, the implementation of a sustainable climate change policy, and the fostering of competitiveness within the internal market;
- (3) Transmission System Operators (TSOs) are according to Article 2 of Directive 2009/72/EC responsible for operating, ensuring the maintenance of and, if necessary developing the extra-high and high voltage interconnected system in a given area and, where applicable, its interconnections with other systems, and for ensuring the long-term ability of the system to meet reasonable demands for the transmission of electricity. TSOs are also responsible for the Operational Security of their Control Areas and together in the whole Synchronous Areas and the European Union, with a high level of reliability and quality;
- (4) Secure Transmission System operation can be made possible only if there is an obligation for the TSOs, Distribution System Operators 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;

- (5) ENTSO-E has drafted this Network Code for Operational Planning and Scheduling aiming at setting out clear and objective requirements for TSOs, Distribution System Operators and Significant Grid Users, in order to contribute to non-discrimination, effective competition and the efficient functioning of the internal electricity market, to ensure RES integration and system security;
- (6) This Network Code has been drafted in accordance with the Article 8(7) of Regulation (EC) No 714/2009 according to which the Network Codes shall be developed for cross-border network issues and market integration issues and shall be without prejudice to the Member States' right to establish national Network Codes which do not affect cross-border trade;
- (7) To ensure the Operational Security and to provide a relevant level of security of the interconnected Transmission Systems, common minimum requirements on processes necessary to prepare real time operation should be defined for both the cross-border cooperation between the TSOs and for taking into account, where relevant, characteristics of the connected generation, consumption and distribution systems;
- (8) Transmission System Operators should respect these common requirements on processes necessary to prepare real time operation at every time horizon which proves necessary to anticipate real time operation in order to maintain the Operational Security, quality and stability of the interconnected Transmission System and to support the efficient functioning of the European Internal Electricity Market as ensuring integration of RES. These time horizons and related processes are the basis for the key elements, structure and provisions of this Network Code;
- (9) Each Transmission System Operator should establish for each relevant time horizon scenarios which the system operation must be prepared to face in a secured way. These scenarios should reflect the uncertainties related to the different Generation, Demand, Cross border Exchanges patterns. These scenarios should be prepared on the best estimation of TSOs taking into account their knowledge about generation and demand;
- (10) Each Transmission System Operator should establish for each relevant time horizon Common Grid Models in line with these scenarios and covering zones allowing coordinated security analysis as congestion and power flow management, including where relevant characteristics of the connected generation, consumption and distribution as transmission equipment and taking into account planned outages;
- (11) Each Transmission System Operator should perform a contingency analysis on these Common Grid Models for each relevant time horizon, using simulation tools, in order to assess System State and to adopt the necessary remedial actions;

- (12) Each Transmission System Operator should contribute to develop grid models, integrating the latest schedules, standardised at least per synchronous area, in order to perform the necessary Operational Security analysis for each relevant time horizon;
- (13) Each Transmission System Operator should elaborate and update for each time horizon, a coordinated outages plan allowing Transmission System Operators, Distributions System Operators and Significant Grid Users allowing to coordinate their maintenance works when they have impacts on cross border power flows affecting the Operational Security of the transmission system;
- (14) Each Transmission System Operator should elaborate for each time horizon a coordinated assessment of the available generation capacities in order to allow to balance the demand and to have the required amount of Ancillary Services, taking into account planned outages, uncertainties on demand, classic generation and renewables, as the possibilities of cross-border exchanges within available transmission capacities;
- (15) On a Day-Ahead and daily time horizon, Transmission Systems Operators should implement process allowing the acquisition and coherency verification of schedules of energies exchanged;
- (16) The operational and scheduling processes required to anticipate real time Operational Security difficulties and develop relevant preventive and curative measures involve timely and adequate data exchange which should therefore not encounter any barrier between the different actors involved;

HAS ADOPTED THIS NETWORK CODE:

Chapter 1

GENERAL PROVISIONS

Article 1

SUBJECT MATTER AND SCOPE

1. This Network Code defines the minimum Operational Planning and Scheduling requirements for ensuring coherent and coordinated preparation of real-time operation of the transmission system applicable to all Transmission System Operators and Distribution System Operators as well as Significant Grid Users.
2. This Network code aims at:
 - a) determining common time horizons, methodologies and principles allowing to carry out coordinated analysis on the Operational Security and of the Adequacy in preparation of real time operation to maintain Operational Security and support the efficient functioning of the European Internal Electricity Market;
 - b) determining conditions to plan outages allowing works required by Power Generating Facility Operators, Distribution System Operators, Demand Facilities of significance for the interconnected transmission system and Transmission System Operators.
3. In the micro isolated systems and small isolated systems and in the isolated systems which do not present any cross-border network issues or market integration issues, the provisions of this Network Code shall not apply.

Article 2

DEFINITIONS

1. For the purpose of this Network Code, the definitions contained in Article 2 of Directive 2009/72/EC and in Article 2 of Regulation (EC) N°714/2009 apply. The definitions contained in the Article 2 of the [NC RfG], [NC CACM], [NC DCC], [NC OS] shall also apply.
2. The following definitions shall apply:

Adequacy means ability of generation connected to an area to meet the load of this area;

Aggregated Netted External Schedule means a Schedule representing the netted aggregation of all External TSO Schedules and External Commercial Trade Schedules between two Market Balance Areas or between a Market Balance Area and a group of other Market Balance Areas;

Availability means state of a Power Generating Module, Transmission Line, Ancillary Service, Demand Facility, non TSO owned Interconnector or another facility is capable of providing service, whether or not it actually is in service;

Close to Real-Time means time interval before real-time in an order of magnitude of 15 minutes;

Commissioning means the process of assuring that all systems and components of a Power Generating Module, Demand Facility or non TSO owned Interconnector are designed, installed, tested, according to the operational requirements of the owner or final client;

Constraint means a situation, either described in a Common Grid Model, or occurring in real time, where Operational Security Limits are not respected;

Consumption Schedule means a Schedule representing the consumption of a Demand Facility or the aggregation of Consumption Schedules of a group of Demand Facilities;

Cross Area Border means across a border between two or more Control Areas;

Day-Ahead means the day before the calendar day of operation;

External Commercial Trade Schedule means a Schedule representing the commercial exchange of electricity between Market Participants in different Market Balance Areas;

External TSO Schedule means a Schedule representing the exchange of electricity between TSO in different Market Balance Areas;

Forced Outage means the unplanned removal from service Availability of a Power Generating Module, Transmission Line, or other facility for emergency reasons;

Generation Schedule means a Schedule representing the generation of electricity of a Power Generating Module or the aggregation of Generation Schedules of a group of Power Generating Modules;

Grid Element means element of the Transmission System;

Individual Grid Model means Control Area-wide dataset created by a TSO for Operational Security analysis purpose, to be merged with other Individual Grid Model components in order to create the Common Grid Model;

Intraday means the period of time within the day of operation before the momentary operational situation;

Internal Commercial Trade Schedule means a Schedule representing the commercial exchange of electricity within a Market Balance Area between different Market Participants or between Nominated Electricity Market Operators and Market Coupling Operators;

Market Balance Area means the Responsibility Area except if there are several Bidding Zones within this Responsibility Area. In the latter case the Market Balanced Area equals Bidding Zone;

Netted Area AC Position means the netted aggregation of all AC-External Schedules of an area;

Outage Incompatibility means the state in which a combination of one or more

Relevant Grid Element, Relevant Power Generating Modules, Relevant Demand Facility and/or non TSO owned Interconnector outages and the best estimate of the forecasted electricity grid situation leads to the impossibility to maintain Operational Security without Load Shedding;

Outage Planning Agent means a legal entity which has the task of planning Availabilities of Relevant Power Generating Modules, Demand Facilities or interconnectors;

Outage Planning Region means a combination of Responsibility Areas in which processes are defined to coordinate outage planning on all planning timescales;

Regional Security Coordination Initiative (RSCI) means regional unified scheme set up by TSOs in order to coordinate Operational Security analysis on a determined geographic area;

Relevant Demand Facility means a Demand Facility which participates to the coordinated outage planning process as its availability status influences cross-border Operational Security;

Relevant Grid Element means a Grid Element which participates to the coordinated outage planning process as its availability status influences cross-border Operational Security;

Relevant Power Generating Module means a Power Generating Module which participates to the coordinated outage planning process as its availability status influences cross-border Operational Security;

Relevant Non TSO Owned Interconnector means a non TSO owned interconnector which participates to the coordinated outage planning process as its availability status influences cross-border Operational Security;

Restitution Time means the time required to restore service in a Grid Element which is currently under planned outage;

Schedule means a reference set of values representing the generation, consumption or exchange of electricity between actors for a given time period expressed as a time series with a time interval and resolution;

Scheduling Agent means an entity in charge to provide Schedules in accordance with the applicable national legal framework;

Week-Ahead means the week before the calendar week of operation;

Year-Ahead means the year before the calendar year of operation.

Article 3

REGULATORY ASPECTS

1. The requirements established in this Network Code and their applications are based on the principle of non-discrimination and transparency as well as the principle of optimisation 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. Where reference is made to this paragraph, the TSO shall, after consultation with its national regulatory authority, establish the terms and conditions or actions necessary to ensure Operational Security in accordance with the principles of transparency, proportionality and non-discrimination. The establishment of these terms and conditions or actions necessary to ensure Operational Security shall be performed in compliance with and respecting the TSO's responsibility to ensure system security according to national legislation.
4. When a Regional Security Coordination Initiative is being referred to in this Network Code, it shall abide to the following requirements:
 - a) The RSCI shall only provide services mandated by TSOs; and
 - b) The RSCI shall be controlled only by TSOs.

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 Transmission System Operators shall be assessed by National Regulatory Authorities.
2. Costs assessed as reasonable and proportionate shall be recovered in a timely manner via network tariffs or appropriate mechanisms as determined by National Regulatory Authorities.
3. If requested to do so by National Regulatory Authorities, Transmission System 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

CONFIDENTIALITY OBLIGATIONS

1. Each TSO, DSO, Power Generating Facility Operator or Demand Facility Operator 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 the 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 operator of any other transmission system with which its system is interconnected, sufficient information 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 in connection with this Network Code and shall use them exclusively for the purpose they have been submitted, in compliance with this Network Code.

Article 6

ROLES IN OPERATIONAL PLANNING AND SCHEDULING AND DELEGATION

1. Transmission System Operators and entities designated in accordance with Article 18(7), Article 21(7) and Article 33(1) shall be entitled to delegate all or part of any role assigned to them under this Network Code to one or more competent third parties. The delegating entity shall remain responsible for ensuring compliance with the obligations under this Network Code.
2. In all cases a third party shall have clearly demonstrated its ability to fulfil each of the obligations of the Network Code, to the satisfaction of the delegating party, prior to delegation.
3. In the event that all or part of any role specified in this Network Code is delegated to a third party, the delegating party shall ensure that suitable confidentiality agreements have been put in place prior to delegation.

Chapter 2

DATA FOR OPERATIONAL SECURITY ANALYSIS IN OPERATIONAL PLANNING

Article 7

YEAR-AHEAD SCENARIOS

1. TSOs shall contribute to establish by the 15th of July of every year a common list of scenarios against which the operation of the interconnected system shall be assessed. These scenarios shall be sufficiently representative to allow the identification and the assessment of the influence on the Operational Security of the interconnected transmission system of at least the following parameters:
 - a) load;
 - b) conditions in relation with renewable energies contribution;
 - c) defined import/export positions, including agreed reference values allowing the merging task; and
 - d) standard generation pattern given a fully available production park.
2. These scenarios shall be defined taking into account their probability of occurrence and historical experience by the TSOs in order to detect possible deviations from Operational Security Limits.
3. ENTSO-E shall publish the latest version of the common list of scenarios together with their general description on the ENTSO-E website.

Article 8

CONSTRUCTION OF YEAR-AHEAD INDIVIDUAL GRID MODELS

1. In accordance with Article 10(1), each TSO shall develop and provide on the ENTSO-E operational planning data environment its Individual Grid Models obeying the scenarios defined in Article 7.
2. When developing its Individual Grid Models, each TSO shall:
 - a) agree with the directly connected TSOs the net exchanges on AC;
 - b) agree with the directly connected TSOs the estimated power flow on DC interconnections; and
 - c) balance the sum of the following elements for each scenario:
 - i. net exchanges;
 - ii. estimated power flows on DC Interconnections;
 - iii. load, including losses estimation; and

- iv. generation.

Article 9

DISTRIBUTED GENERATION AND CONSUMPTION IN YEAR-AHEAD SCENARIOS

1. Each TSO shall integrate in the scenarios the power generated and consumed by the Power Generating Facilities and Demand Facilities connected to Distribution Networks within their Responsibility Areas.
2. For Power Generating Facilities connected to Distribution Network, each TSO shall ensure that the aggregated active power output is:
 - a) consistent with the scenarios defined in Article 7; and
 - b) differentiated according to the type of primary energy source.

Article 10

YEAR-AHEAD COMMON GRID MODELS AND OUTAGES INFORMATION

1. All TSOs shall decide, no later than 6 months after the entry into force of this Network Code, on the provisions dealing with the gathering, merging and saving of the year-ahead Individual Grid Models. These provisions shall cover the following elements:
 - a) data format;
 - b) time granularity;
 - c) deadlines for the gathering, merging and saving of the year-ahead Individual Grid Models;
 - d) quality control of datasets;
 - e) tasks to be performed at Pan-European level; and
 - f) requirements for the ENTSO-E operational planning data environment as described in Chapter 8.
2. Each TSO shall deliver to the affected TSOs on their request further detailed information on the topology modifications or operational arrangements issued as a consequence of an outage, in such a way that an accurate representation of the system is provided for performing complete Operational Security analysis.

Article 11

UPDATES OF YEAR-AHEAD COMMON GRID MODELS

1. Taking into account changes in the TSO's best estimations of data and scenarios, each TSO shall update its Individual Grid Models in accordance with the newly identified conditions.

Article 12

WEEK-AHEAD GRID MODELS

1. Together with the other concerned TSOs, all TSOs of an Outage Planning Region shall define the most representative scenarios for analysing the Operational Security of the transmission system for the week-ahead time horizons.
2. Each TSO shall provide information to the TSOs in its Outage Planning Region in order to allow these TSOs to update their Individual Grid Model in accordance with the scenarios defined in this article.

Article 13

DAY-AHEAD AND INTRADAY GRID MODELS

1. All TSOs shall decide no later than 6 months after the entry into force of this Network Code on the provisions dealing with the gathering and merging of the Day-Ahead and Intraday Individual Grid Models, at least at Synchronous Area level. These provisions shall cover the following elements:
 - a) data format;
 - b) time granularity;
 - c) deadlines compatible with setting up Remedial Actions and Capacity Calculation,
 - d) quality control of datasets;
 - e) tasks to be performed at the regional, Synchronous Area and Pan-European level including time schedules for the different tasks in all time horizons; and
 - f) specifications of the ENTSO-E operational planning data environment as described in Chapter 8.
2. Each TSO shall create and deliver on the ENTSO-E operational planning data environment referred to in Chapter 8 its Individual Grid Models in accordance with Article 13(1) in order to facilitate the Day-Ahead and Intraday Operational Security analysis. Each TSO shall ensure that at least the Day-Ahead Individual Grid Model is available and contains at least the following information:
 - a) Schedules received from Scheduling Agents in accordance with Chapter 7;
 - b) updated information on demand and renewable generation in accordance with national legal framework;
 - c) topology of the transmission system; and
 - d) Internal Remedial Actions taken for congestion management.
3. Each TSO shall assess the accuracy of the estimated Relevant Grid Element flows of its at least Day-Ahead Individual Grid Models, taking into account the events occurred between Individual Grid Model elaboration and the time of the State Estimation, by comparing its results with State Estimation results and real-time measurements.
4. If significant (i.e. repeated and higher than the typical measured deviation) discrepancies are detected, the TSO shall perform an analysis to determine the causes

of the discrepancies. If the causes depend on the TSOs processes for creating the Individual Grid Models, the concerned TSOs shall adapt the processes for creating more accurate Individual Grid Models.

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Chapter 3

OPERATIONAL SECURITY ANALYSIS IN OPERATIONAL PLANNING

Article 14

OPERATIONAL SECURITY ANALYSIS IN OPERATIONAL PLANNING

1. Each TSO shall perform coordinated Operational Security analysis at least at the following time horizons:
 - a) Year-Ahead and updates;
 - b) Week-Ahead;
 - c) Day-Ahead; and
 - d) Intraday.
2. Each TSO shall perform Operational Security analyses at the time horizons specified in Article 14.1 in N-situation by simulating each Contingency from the TSO's Contingency List in accordance with Article 11 of [NC OS] and thus checking that the Operational Security Limits defined in accordance with Article 6(5) and 6(6) of [NC OS] in the (N-1) Situation are fulfilled.
3. Each TSO shall coordinate its Operational Security analyses in accordance with the Article 10(2) and Article 11(3) of the [NC OS] and in accordance with Article 18 , in order to verify the respect of the Operational Security Limits affecting the own and the Responsibility Areas of other TSOs.
4. Each TSO shall use Common Grid Models described in Article 10, Article 11 , Article 12 and Article 13 to perform Operational Security analyses referred to in Article 14(1) and Article 14(2).
5. Each TSO shall assess as necessary bilateral or regional coordination of actions in line with the requirements on short-circuits current and dynamic stability in the [NC OS].

Article 15

CROSS CONTROL AREA REMEDIAL ACTIONS

1. In accordance with Article 6(9) of [NC OS], each TSO shall prepare in coordination with the affected TSOs Cross Control Area Remedial Actions to be implemented in due time to cope with Contingencies detected in the different time horizons in which Operational Security analysis are performed. Each TSO shall assess the effectiveness of these Remedial Actions.

2. Within 6 months after the entry into force of this Network Code, each TSO shall consult its NRA on the principles for categorisation of Remedial Actions.
3. When setting up these Cross Control Area Remedial Actions, TSOs shall check:
 - a) that the Remedial Action does not jeopardise the Operational Security of the Transmission System in which the Remedial Action is executed;
 - b) the agreement of the TSO that executes the Remedial Action;
 - c) the Remedial Action is in line with the categorisation as defined in Article 15 (2);
 - d) the technical-economical efficiency of the Remedial Action.
4. Each TSO shall report on these Cross Control Area Remedial Actions in accordance with the [Regulation on Transparency and provision of information in electricity market].

Article 16

YEAR-AHEAD AND UPDATED OPERATIONAL SECURITY ANALYSIS

1. Each TSO shall perform an Operational Security analysis on its Observability Area taking as an input the updates of the Common Grid Model and relevant information described in Article 10 and Article 12 in order to detect possible Constraints and agree upon Remedial Actions with the affected TSOs.
2. Each TSO shall perform Operational Security analysis referred to in Article 16(1) in accordance with the coordination methodology described in Article 18(2) in order to detect at least the following network Constraints:
 - a) power flows over Operational Security Limits;
 - b) breach of Voltage Stability of the Transmission System; and
 - c) short circuit event impacting the correct functioning of the elements of the transmission system and protection equipment.

Article 17

DAY-AHEAD, INTRADAY AND CLOSE TO REAL-TIME OPERATIONAL SECURITY ANALYSIS

1. On a Day-Ahead basis and within the Intraday periods, each TSO shall perform an Operational Security analysis on its Responsibility Area, taking into account all the elements contained in its Contingency List in order to detect possible Constraints and agree upon Remedial Actions with the affected TSOs.
2. For this analysis and in order to assess Operational Security, each TSO shall take into account the updates of generation or load patterns, the results of the Day-Ahead and Intraday market processes as well as the results of the Scheduling tasks described in Chapter 7 of this Network Code.
3. In order to perform Operational Security analysis, each TSO shall use the Day-Ahead forecast of renewable and distributed generation, and update Intraday forecast. The

Day-Ahead forecast of renewable and distributed generation shall be published in accordance with [Regulation on Transparency and provision of information in electricity market].

4. On a Day-Ahead and Intraday basis, each TSO shall evaluate in a coordinated way, in accordance with Article 18, the effectiveness of the Remedial Actions in accordance with Article 11 of [NC OS].
5. Close to real-time, each TSO shall perform Operational Security analysis by using State Estimation. This analysis shall be performed on a time cycle basis not exceeding 15 minutes and shall be executed upon request from another TSO in case of changes significantly affecting voltages or power flows.

Article 18

SECURITY ANALYSIS COORDINATION

1. Not later than 24 months after the entry into force of this Network Code, ENTSO-E shall submit, a methodology for Operational Security analysis in operational planning, harmonised at least per Synchronous Area, to ACER for its opinion. ENTSO-E shall publish those methodologies on its website. Each TSO shall apply this methodology.
2. TSOs shall consult ACER on the adaptations of the methodologies described in the previous paragraph.
3. TSOs shall establish if necessary bilateral or regional agreements, covering, but not limited to, the following elements:
 - a) possible required additional scenarios and datasets to the ones described in Chapter 2;
 - b) processes for the evaluation of deviations from Operational Security Limits, in accordance with the methodology referred to in Article 18(1) and Article 18(2); and
 - c) appropriate preventative and curative measures including but not limited to:
 - i. defining coordinated Remedial Actions, such as adapting topology or phase-shifter transformers, in accordance with Article 15;
 - ii. processes for the applicability of the Remedial Actions;
 - iii. adopting dedicated solutions concerning planned outages; and
 - iv. using Redispatch or Countertrade in order to prevent violations of the Operational Limits between the Responsibility Areas in accordance with Article 15.
4. TSOs shall, at least at regional level, commonly evaluate the consequences and probability of occurrence of the forecast situation, sharing the Operational Security Limits applied in their area.
5. All TSOs shall adopt appropriate Remedial Actions covering at least the following measures:

- a) preparing coordinated Remedial Actions, in line with Article 15, including but not limited to adapting topology and phase shifting transformers or using Redispatch or Countertrading in order to prevent Constraints between their Responsibility Area;
 - b) adopting dedicated solutions concerning planned outages; and
6. When, as a result of Operational Security analysis, a Contingency is detected whose consequences affect other TSO(s) the detecting TSO shall share the information with the concerned TSO(s).
7. When a group of TSOs decide to coordinate Operational Security analysis in a Regional Security Coordination Initiatives, these TSOs shall adopt a multi-party agreement without prejudice to the sole liability of each TSO for the realization of joint regional security including the possibility to establish a single entity to perform all or part of the necessary functions requested for the regional Operational Security analysis. The TSOs shall officially inform other TSOs and RSCIs about conclusion of such agreement.

These multi-party agreements shall cover at least the following topic:

- a) the compatible or common tools and processes to deliver these functions;
- b) the processes to set up common Remedial Actions; and
- c) where applicable, the functions covered by single entities.

Chapter 4

OUTAGE PLANNING

Article 19

OUTAGE PLANNING REGIONS

1. All TSOs shall adopt a multi-party agreement defining the Outage Planning Regions within which coordinated outage planning shall be performed.
2. When defining the scope of the Outage Planning Regions, all TSOs shall ensure that:
 - a) each Control Area is included within at least one Outage Planning Region;
 - b) the definition is based on an assessment against the cross-border impact on Operational Security of a planned outage in a Control Area;
 - c) when a planned outage within one Control Area has a major cross-border impact on Operational Security in another Control Area, these Control Areas are included within the same Outage Planning Region;
 - d) a coordination procedure is defined for each Outage Planning Region; and
 - e) a procedure to amend the scope of the Outage Planning Regions is established.
3. The definition of the Outage Planning Regions, together with all other information required by Article 19(2) shall be published by the TSOs on the ENTSO-E website.

Article 20

REGIONAL COORDINATION PROCEDURE

1. All TSOs, when elaborating their regional coordination procedure in accordance with Article 19(2)(d), shall define at least:
 - a) the modalities of the coordination meetings which shall take place at least on year-ahead and week-ahead time horizons;
 - b) the modalities of the coordinated participation of the Regional Security Coordination Initiatives operating in their Outage Planning Region and of the TSOs whose Control Area belongs to another Outage Planning Region, especially as regards the coordination of outages, information sharing about past, current and future System States of the transmission system and validation of outage plans relevant to the concerned time horizon; and
 - c) the modalities of the validation by of the year-ahead grid outages plans by all TSOs of the Outage Planning Region.
2. Each TSO shall participate to the outage planning coordination processes of its Outage Planning Regions as elaborated in accordance with Article 20(1).

3. If Outage Incompatibilities arise between outages planned in different Outage Planning Regions, the affected TSOs shall coordinate to relieve these incompatibilities.
4. Each TSO shall endeavour to provide the affected TSO with all relevant information at its disposal on the Transmission System, Power Generating or Demand Facility related projects that impact the operation of affected TSO's grids.

Article 21

RELEVANT NON-TSO OWNED INTERCONNECTORS, RELEVANT POWER GENERATING MODULES AND RELEVANT DEMAND FACILITIES

1. No later than 3 months after the entry into force of this Network Code each TSO shall establish a list of:
 - a) the Relevant Power Generating Modules, Relevant Demand Facilities and Relevant Non-TSO Owned Interconnectors which shall participate to the coordinated outage planning process as described in this Network Code; and
 - b) the types of information to be submitted by the concerned Outage Planning Agent according to Article 21(7) to the TSO. This information shall include, but not be limited to:
 - i. information related to technical characteristics; and
 - ii. information related to Availability.
2. Each TSO shall consult the other TSOs in its Outage Planning Region on the necessity to include specific Power Generating Modules or Demand Facilities in the proposed list.
3. The proposed list shall contain at least:
 - a) all Power Generating Modules and Demand Facilities whose unavailability leads to a variation of the cross-border flows beyond the thresholds defined by each TSO according to the methodology in Article 18(1) or to a deviation from the Operational Security Limits;
 - b) all combinations of Power Generating Modules and Demand Facilities feeding into the Transmission System and Distribution Network through a single grid element of which their aggregated availability status influences cross-border flows beyond the thresholds defined by each TSO according to the methodology in Article 18(1); and
 - c) all Non-TSO Owned Interconnectors.
4. While respecting the provisions of Article 3(3), each TSO shall define and publish the following lists:
 - a) list of parties required to provide information; and
 - b) list of information to be provided.
5. In case changes occur in the installed units in its Control Area having an impact on other TSOs, each TSO shall reassess the list established in accordance with Article 21(1) and consult all other TSOs of its Outage Planning Regions on the need to adapt the list of relevant units.

6. When a TSO identifies a need to update the list established in accordance with Article 21(1), the concerned TSO shall update the list while respecting the provisions of Article 3(3). The TSO shall publish the updated list in accordance with Article 21(4).
7. For every Relevant Power Generating Module, Relevant Demand Facility and Relevant Non-TSO Owned Interconnector, the concerned owner shall appoint an Outage Planning Agent.

Article 22

RELEVANT GRID ELEMENTS WITH IMPACT ACROSS BORDERS

1. No later than 6 months after the entry into force of this Network Code, for all Outage Planning Regions, all TSOs shall establish a list of Relevant Grid Elements for coordinated Outage Planning. This shall be achieved through a coordinated process involving all TSOs of the concerned Outage Planning Region.
2. The list of Relevant Grid Elements shall contain at least:
 - a) all Grid Elements interconnecting Control Areas;
 - b) all Grid Elements of a Control Area whose planned outage impact another Control Area beyond the thresholds defined by each TSO according to the methodology in Article 18(1);
 - c) all Grid Elements contained as an External Contingency in the Contingency List of at least one TSO; and
 - d) all Grid Elements which induce a limit upon the Cross-Border Capacities.
3. The list of Relevant Grid Elements shall also contain the types of information which shall be provided by each TSO and shall contain at least the following information:
 - a) outage dates;
 - b) outage reasons such as maintenance, grid development, reparation or combined works;
 - c) specific conditions for execution of the outage; and
 - d) Restitution Time information.
4. All TSOs shall publish the list of Relevant Grid Elements in accordance with [Regulation on Transparency and provision of information in electricity market].
5. Prior to the start of the year-ahead planning process, each TSO shall assess the necessity to update the list of Relevant Grid Elements and address when necessary change requests to the Outage Planning Regions of which it is a member. All TSOs within an Outage Planning Region shall update the list of Relevant Grid Elements.
6. No later than 6 months after the entry into force of this Network Code, each TSO shall identify, in coordination with the concerned Distribution System Operators, the elements of the Distribution Network whose planned outages impact another Control Area beyond the thresholds defined by each TSO according to the methodology in Article 18(1).

7. For the identified elements according to Article 22(6) the connecting TSO shall coordinate the outage planning with the concerned Distribution System Operator complying with the processes described in Articles 23, 24, 25 and 26 of this NC.

Article 23

YEAR-AHEAD OUTAGE PLANNING

1. A timeframe for the Year-Ahead outage planning process, deviating from the timeframe defined in this Network Code, can only be adopted while respecting the provisions of Article 3(3) and if all concerned TSOs in a Synchronous Area agree. Such regionally defined timeframes can only be installed when there is no influence on the coordinated outage planning process of other Synchronous Areas.
2. Before the 1st of August of each year, the Outage Planning Agents of a Relevant Power Generating Module, a Relevant Demand Facility or Relevant Non-TSO Owned Interconnector shall submit a proposal on the Availability of its asset for the following year to its TSO in accordance with Article 21 and Article 22.
3. In accordance with Article 23(2), the Operator or the Outage Planning Agent of a Relevant Power Generating Module, Relevant Demand Facility or Relevant Non-TSO Owned Interconnector shall inform its TSO when its asset is considered to be in Commissioning for the following year and shall provide its TSO with an estimation of the Commissioning period.
4. Before the beginning of the Commissioning period, the Outage Planning Agent shall declare the relevant asset as unavailable. For the time period following the Commissioning period, the Outage Planning Agent shall submit a proposal on the Availability of its asset to its TSO in accordance with Article 23(2).
5. In order to prevent the occurrence of an Outage Incompatibility, each TSO shall assess on a Year-Ahead horizon whether Operational Security can be fulfilled without Load-Shedding while taking into account the Relevant Power Generating Module, Relevant Demand Facility and Relevant Non-TSO Owned Interconnector outage proposals.
6. If an Outage Incompatibility arises, the TSO and all affected Outage Planning Agents shall coordinate and the affected Outage Planning Agents shall propose to the concerned TSO an alternative outage plan relieving the detected incompatibilities.
7. If no alternative outage plan relieving the detected Outage Incompatibilities is proposed to the TSO in accordance with Article 23(6), the TSO shall establish an alternative outage plan relieving the detected Outage Incompatibilities, taking into account the impact on all affected Market Participants. The TSO shall inform all affected Outage Planning Agents as well as the concerned NRA of this alternative outage plan and of the reasons which motivated its adoption.

8. Each TSO shall plan the outage of its grid elements interconnecting different Control Areas in a coordinated manner with the other TSOs of its Outage Planning Region in accordance with the following principles:
 - a) combination of planned outages to the greatest extent possible to minimize the impact on the market while preserving Operational Security; and
 - b) consideration of all outage proposals from Relevant Power Generating Modules, Relevant Demand Facilities and Relevant Non-TSO Owned Interconnectors established in accordance with Article 23(2).
9. Each TSO shall plan outages of all remaining Relevant Grid Elements in accordance with Article 22 taking into account Relevant Non-TSO Owned Interconnectors, Relevant Power Generating Modules and Relevant Demand Facilities outage proposals and outages of Control Area Interconnection grid elements.
10. In case of Outage Incompatibilities, the TSO can request a change of the outage proposal of the Relevant Power Generating Module or of the Relevant Demand Facility and can initiate coordination with the concerned Outage Planning Agents.
11. If no agreed solution with the concerned Outage Planning Agents can be found, and the outages are required to ensure the integrity, safety or development of its grid, the TSO shall establish an alternative outage plan relieving the detected Outage Incompatibilities, taking into account the impact on all affected Market Participants. The TSO shall inform all affected Outage Planning Agents as well as the concerned NRA of this alternative outage plan and of the reasons which motivated its adoption.
12. Each TSO shall include the information about grid-related conditions and planned Pre-Fault Remedial Actions for executing specific planned Relevant Grid Element outages in the grid outage plans published on the ENTSO-E operational planning data environment.
13. Each TSO shall provide the concerned Outage Planning Agents with the preliminary Year-Ahead outage plans for the following year of its Relevant Non-TSO Owned Interconnectors, Relevant Power Generating Modules and Relevant Demand Facilities before the 1st November of each year.
14. Each TSO shall provide its preliminary Year-Ahead outage plans for all Relevant Grid Elements and its Relevant Power Generating Modules, Relevant Demand Facilities and Relevant Non-TSO Owned Interconnector outage plans for the following year to other TSOs before the 1st November of each year via the ENTSO-E operational planning data environment. These plans shall contain at least the types of information listed in Article 22(3).
15. Each TSO shall analyse the compatibility of all preliminary outage plans impacting its Responsibility Area and shall, in case of conflict, agree on a solution with the affected TSOs. Once a solution is found for each conflict, all the TSOs of the concerned Outage Planning Region shall validate the Year-Ahead outage plans for all Relevant Grid Elements in accordance with the procedure established in Article 20(1).
16. Before the 1st December of each year, each TSO shall:

- a) finalise Year-Ahead outage plans for all Relevant Power Generating Modules, Relevant Demand Facilities, Relevant Non-TSO Owned Interconnectors and Relevant Grid Elements for the following year; and
- b) update the validated Year-Ahead outage plans for all Relevant Power Generating Modules, Relevant Demand Facilities, Relevant Non-TSO Owned Interconnectors and Relevant Grid Elements on the ENTSO-E operational planning data environment which shall serve as the reference up to real time.

Every change to this plan that is requested by any party (barring the results of Forced Outages) can be subject to approval of all concerned parties in accordance with Article 24.

- 17. Each TSO shall provide the concerned Outage Planning Agent with the final Year-Ahead outage plans for the following year of the Relevant Non-TSO Owned Interconnectors, Relevant Power Generating Modules and Relevant Demand Facilities before the 1st December of each year.

Article 24

UPDATES TO THE YEAR-AHEAD OUTAGE PLANNING

- 1. After finalisation of the Year-Ahead outage planning process in accordance with Article 23, and before real-time execution, all Outage Planning Agents and TSOs participating in outage planning shall have the right to initiate an adaptation of the validated outage plan. Each TSO and each Outage Planning Agent shall handle this request for its own assets according to the requirements set forth in the remainder of this article.
- 2. Each Outage Planning Agent who initiates an adaptation of the validated outage plan shall send a change request to the concerned TSO. The concerned TSO shall follow the following procedure:
 - a) receiving the change request;
 - b) detecting Outage Incompatibilities as a result of this change on the validated outage plan of Relevant Grid Elements, Relevant Power Generating Modules, Relevant Demand Facilities and Relevant Non-TSO Owned Interconnectors;
 - c) coordinating with all impacted parties upon detection of Outage Incompatibilities;
 - d) issuing a reasoned decision on the change request:
 - i. the TSO shall reject the change request when all detected Outage Incompatibilities cannot be relieved after coordination;
 - ii. the TSO shall validate the change request when no Outage Incompatibility is detected or remains after coordination;
 - e) incorporation of the validated change request in the validated outage plan and notification of all impacted parties; and
 - f) updating the ENTSO-E operational planning data environment, if the change request is validated.
- 3. Each TSO who initiates an adaptation of the validated outage plan shall follow the following procedure:

- a) detecting Outage Incompatibilities as a result of this change on the validated outage plan of Relevant Grid Elements, Relevant Power Generating Modules, Relevant Demand Facilities and Relevant Non-TSO Owned Interconnectors;
 - b) sending a change request and reporting detected Outage Incompatibilities to all other TSOs of its Outage Planning Region;
 - c) considering additional Outage Incompatibilities related to the change request detected by other TSOs of the concerned Outage Planning Region;
 - d) coordinating with all impacted parties upon detection of Outage Incompatibilities;
 - e) receiving a reasoned decision from all impacted parties on the change request:
 - i. all impacted parties shall reject the change request when all detected Outage Incompatibilities cannot be relieved after coordination;
 - ii. all impacted parties shall validate the change request when no Outage Incompatibility is detected or remains after coordination;
 - f) incorporation of the validated change request in the validated outage plan and notification of all impacted parties; and
 - g) updating the ENTSO-E operational planning data environment if the change request is validated.
4. The Outage Planning Agent of a Relevant Power Generating Module, Relevant Demand Facility or Relevant Non-TSO Owned Interconnector which is declared as in Commissioning shall provide the concerned TSO with a detailed Availability plan and a Generation Schedule or Consumption Schedule as early as possible, and no later than two months before the start of the declared Commissioning period.
5. The Outage Planning Agent of a Relevant Power Generating Module, Relevant Demand Facility or Relevant Non-TSO Owned Interconnector which is declared as in Commissioning shall provide the concerned TSO with an update of the Availability plan, of the Generation schedule and of the Consumption Schedule as early as possible.

Article 25

UPDATE OF YEAR-AHEAD OUTAGE PLANNING IN CASE OF FORCED OUTAGES

1. While respecting the provisions of Article 3(3), each TSO shall establish and manage a coordination process to ensure the Availability or non-Availability of Relevant Non-TSO Owned Interconnectors, Relevant Power Generating Modules and Relevant Demand Facilities in its Control Area in case of Forced Outages and when Operational Security is endangered. When adopting the coordination process, the TSO shall:
 - a) respect technical limits and feasibility of the non-TSO owned interconnectors, Power Generating Modules and/or Demand Facilities;
 - b) motivate its decisions to all affected parties; and
 - c) first use all means reasonably at its disposal to agree on a negotiated solution with the concerned Outage Planning Agent.

2. In case of Forced Outage of a Relevant Power Generating Module, a Relevant Demand Facility or a Relevant Non-TSO Owned Interconnector, the Outage Planning Agent shall inform as soon as possible the concerned TSO of this Forced Outage and provide him with information on:
 - a) the reason of the Forced Outage;
 - b) the expected duration of the Forced Outage; and
 - c) the impact of the Forced outage on the Availability of other assets under his responsibility.
3. When one or several Forced Outages referred to in Article 25(2) jeopardize the Operational Security of its Transmission System, a TSO shall inform the Outage Planning Agents of the Relevant Power Generating Facilities, Relevant Demand Facilities and Relevant Non-TSO Owned Interconnectors of the motivated limit in the duration above which Operational Security will no longer be fulfilled without Load Shedding. Outage Planning Agents of the Relevant Power Generating Facilities, Relevant Demand Facilities and Relevant Non-TSO Owned Interconnectors shall endeavour to respect this limit or shall motivate their deviation from the limit to the concerned TSO.
4. In case of Forced Outage of one or several of its Relevant Grid Elements, a TSO shall inform all other impacted TSOs as soon as possible and shall provide the following information:
 - a) the reason of the Forced Outage;
 - b) the expected duration of the Forced Outage; and
 - c) the impact of the Forced Outage on the Availability of other elements of its transmission system.
5. When one or several Forced Outages referred to in Article 25(4) jeopardize the Operational Security of the Transmission System of a TSO, the impacted TSO shall inform the concerned TSO of the motivated limit in the duration above which it is not able to ensure Operational Security without Load Shedding. The concerned TSO shall endeavour to respect this limit or motivate its deviation from the limit to the impacted TSO(s).
6. Following all updates to the outage planning due to Forced Outages and in accordance with the timeframe established in [Regulation on Transparency and provision of information in electricity market], the concerned TSO shall update the ENTSO-E operational planning data environment with the most recent information.

Article 26

REAL-TIME EXECUTION OF THE OUTAGE PLANNING

1. Each Outage Planning Agent shall ensure that all Relevant Power Generating Modules under its responsibility which are deemed available are ready to produce electricity in accordance with their declared technical capabilities when necessary to maintain

Operational Security without Load Shedding, being restricted to possible constraints as for example start-up delays, and barring Forced Outages.

2. Each Outage Planning Agent shall guarantee that all Relevant Generating Modules and Relevant Demand Facilities under its responsibility that were deemed unavailable do not produce or respectively consume electricity.
3. Each TSO and Outage Planning Agent responsible for a Relevant Non-TSO Owned Interconnector shall ensure that all Relevant Grid Elements including Relevant Non-TSO Owned Interconnectors that were declared as being available have to be ready to transport electricity pursuant to their declared technical capabilities when necessary to maintain Operational Security without Load Shedding, being restricted to possible constraints as for example switching delays, and barring Forced Outages.
4. If specific grid-related conditions apply for the execution of a planned grid outage in accordance with Article 23(7), the concerned TSO shall assess if these conditions are met before real-time execution of the outage. If not, the planned outage, or a part thereof, shall not be executed.
5. Before executing planned outages of Relevant Grid Elements, Relevant Power Generating Modules, Relevant Demand Facilities or Relevant Non-TSO Owned Interconnectors which would jeopardize the Operational Security, and upon request from a TSO, each concerned party shall delay the corresponding outage according to the instructions of the TSO.
6. Before executing a planned test during the Commissioning period of Relevant Grid Elements, Relevant Power Generating Modules, Relevant Demand Facilities or Relevant Non-TSO Owned Interconnectors which would jeopardize Operational Security, and upon request from a TSO, each concerned party shall delay the corresponding test according to the instructions of the TSO.
7. Each Outage Planning Agent shall inform the TSO as soon as possible in case of a deviation from the validated outage plan and shall provide at least the reason for and the duration of the deviation.
8. Each TSO shall inform all impacted parties as soon as possible in case of a deviation from the validated outage plan, at least including the reason for and the duration of the deviation.

Chapter 5

ADEQUACY

Article 27

CONTROL AREA ADEQUACY

1. While respecting the provisions of Article 3(3), each TSO shall establish criteria and principles of Adequacy. Each TSO shall perform an Adequacy analysis in its Control Area by assessing against these criteria and principles whether the connected generation and import capabilities meet the load under different operational scenarios referred to in Article 27(2).
2. When proceeding to this Adequacy analysis, each TSO shall:
 - a) use the latest outage plan and the latest available data for:
 - i. generation capacities and their Availability; and
 - ii. available import and export Cross-Border Capacities.
 - b) take into account through statistical analysis the levels of power assessed for at least:
 - i. Power Generating Modules;
 - ii. renewable generation; and
 - iii. load.
 - c) take into account the available import transmission capacity from directly connected TSO's;
 - d) assess the probability and expected duration of a lack of Adequacy and the expected amount of undelivered electricity resulting from such a deviation.
3. Each TSO shall inform:
 - a) its NRA under conditions established by Article 28 and Article 29; and
 - b) directly connected TSOs when imports are needed to satisfy its Control Area Adequacy.
4. Each TSO shall publish the results of the Adequacy analysis referred to in Article 27(1) and the related information in accordance with [Regulation on Transparency and provision of information in electricity market].

Article 28

PAN-EUROPEAN SYSTEM ADEQUACY SEASON-AHEAD

1. All TSOs shall perform a Pan-European Adequacy Seasonal Outlook using a common methodology for at least summer and winter period in accordance with Article 27(1). The methodology shall at least include:
 - a) the criteria used to define the set of operational scenarios by Control Area, taking into account their probability of occurrence;
 - b) the criteria used to combine these operational scenarios by Control Area to build a set of Pan-European scenarios, taking into account their probability of occurrence;
 - c) the methods to assess the Adequacy of each Control Area taking into account Pan-European scenarios and the available Cross Border Capacities for exchanges of electricity; and
 - d) the data to be exchanged between TSO's.
2. When updating the common methodology referred to in Article 28.1, ENTSO-E shall:
 - a) organise workshops in order to collect comments from the stakeholders;
 - b) deliver answers to stakeholders' comments; and
 - c) consult ACER.
3. ENTSO-E shall publish the methodology referred to in Article 28.1.
4. Each TSO shall apply the updated methodology 6 months after publication by ENTSO-E.

Article 29

CONTROL AREA ADEQUACY UNTIL AND INCLUDING WEEK AHEAD

1. Each TSO shall monitor changes on power generation Availability and on load estimations on a regular basis and perform as necessary an updated Adequacy assessment in accordance with the Article 27.
2. If Adequacy is not ensured as a result of this monitoring referred to in Article 29, the TSO shall provide updated information to the concerned NRA and to the affected TSO's.

Article 30

CONTROL AREA ADEQUACY DAY AHEAD AND INTRADAY

1. Each TSO shall perform an Adequacy analysis on a Day-Ahead and Intraday basis by using:
 - a) Market Participant Schedules in accordance with the applicable national legal framework;

- b) forecast for load;
 - c) renewable generation forecast;
 - d) required active power reserves;
 - e) Cross Border capacities; and
 - f) Power Generating Modules Availability and capabilities.
2. Each TSO shall evaluate:
- a) the maximum level of import and export capacity compatible with its Control Area Adequacy;
 - b) the expected duration of a potential absence of Adequacy; and
 - c) the level of load shedding required in the absence of Adequacy.
3. If Adequacy is not fulfilled according to analysis referred to in Article 30(1) each TSO shall publish the results of the Adequacy analysis referred to in Article 30(1) and the evaluations referred to in Article 30(2)(b).

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Chapter 6

ANCILLARY SERVICES

Article 31

ANCILLARY SERVICES

1. Each TSO shall endeavour to prevent Disturbances and blackouts on its Control Area and on the Control Area of TSOs of its Synchronous Areas by monitoring the Availability of Ancillary Services and using sufficient Ancillary Services in real-time to guarantee the Operational Security and the requirements set by the [NC OS] and [NC LFC&R].
2. At least for active and reactive power, either on an autonomous basis or in coordination with other TSOs, each TSO shall:
 - a) design and set up procedures for the procurement of Ancillary Services while respecting the provisions of Article 3(3);
 - b) monitor on the basis of data provided in accordance with Chapter 4 [OS NC] that the level and location of available capacity of Ancillary Services allows to fulfil operational security; and
 - c) manage the designed procedures and endeavour to procure the level of Ancillary Services required while respecting the provisions of Article 3(3).
3. In accordance with the [Regulation on Transparency and provision of information in electricity market] and while respecting all relevant confidentiality requirements, each TSO shall publish the level of Ancillary Services required, including but not limited to the level of required active power Ancillary Services.
4. If active power Ancillary Services are exchanged between Control Areas the affected TSOs shall establish a procedure in accordance with [NC LFC&R] and [NC Balancing].
5. Power Generating Facility Operators and Demand Facility Operators shall provide the relevant Ancillary Services as contractually agreed upon with the concerned TSO in time, with the agreed upon quantities per product and in the correct format.
6. Each TSO shall communicate the available level of active power Ancillary Services to other TSOs upon their request.

Article 32

REACTIVE POWER ANCILLARY SERVICES

1. Each TSO shall assess from Year-Ahead until real time whether its available reactive power sources are sufficient to ensure the Operational Security of the transmission system.
2. In order to increase the efficiency in operation of the elements of its transmission, each TSO shall monitor:
 - a) the available reactive power capacities of Power Generating Facilities in accordance with Articles 13, 16 and 17 of [NC RfG];
 - b) the available equipment dedicated to delivering or absorbing reactive power; and
 - c) the ratio of active and reactive power at the border between Transmission and distribution networks.
3. Each TSO shall ensure that the Voltage Control of its transmission system for all events includes in its Contingency List and for year-ahead scenarios covering at least:
 - a) peak and off peak loads situations;
 - b) situation with high and low level of renewable energy sources; and
 - c) generation patterns affecting voltage profiles.
4. When the level of reactive power Ancillary Services is not sufficient to ensure the Operational Security of the transmission system, each TSO shall:
 - a) inform affected TSOs;
 - b) establish internal or Cross Control Area Remedial Action; and
 - c) give the priority to the Remedial Actions in accordance with Article 6(9) of the [NC OS].

Chapter 7

SCHEDULING

Article 33

ESTABLISHMENT OF SCHEDULING PROCESSES

1. Each Power Generating Facilities Operator, Demand Facilities Operator, Market Participant and Market Coupling Operator to which requirements for scheduling in accordance with the applicable national legal framework apply shall appoint a Scheduling Agent.
2. Each TSO operating a Market Balance Area shall establish the provisions necessary to process Schedules, provided from Scheduling Agents, in accordance with the applicable national legal framework.

Article 34

NOTIFICATION OF SCHEDULES WITHIN MARKET BALANCE AREAS

1. Each Scheduling Agent within a Market Balance Area shall submit to the concerned TSO operating the Market Balance Area in accordance with the national legal framework the following Schedules:
 - a) Generation Schedules;
 - b) Consumption Schedules;
 - c) Internal Commercial Trade Schedules; and
 - d) External Commercial Trade Schedules.
2. Each Scheduling Agent of a Market Coupling Operator shall submit Schedules to the concerned TSOs operating a Market Balance Area in accordance with the applicable national legal framework. These Schedules include:
 - a) Net Position related to the Market Balance Area;
 - b) External Commercial Trade Schedules as:
 - i. multilateral exchange between the Market Balance Area and a group of other Market Balance Areas involved in a market coupling; or
 - ii. bilateral exchange between the Market Balance Area and another Market Balance Areaas requested by concerned TSOs;
 - c) Internal Commercial Trade Schedules between Scheduling Agents of Market Coupling Operators and Scheduling Agents of Nominated Electricity Market Operators, if requested by concerned TSOs.

3. Before adopting an External TSO Schedule, all involved TSOs shall agree on the content of such an External TSO Schedule.

Article 35

COHERENCE OF SCHEDULES

1. No later than 12 months after the entry into force of this Network Code, each TSO operating a Market Balance Areas shall implement provisions to ensure its area internal balance for Generation Schedules, Consumption Schedules, External Commercial Trade Schedules and External TSO Schedules.
2. No later than 12 months after the entry into force of this Network Code all TSOs operating Market Balance Areas within Synchronous Area shall implement a process to ensure that all Schedules between all Market Balance Areas within Synchronous Area are balanced, including areas whose operators have no legal obligation to respect this Network Code. This process includes at least:
 - a) the bilateral agreement of External Commercial Trade Schedules and External TSO Schedules between Market Balance Areas; and
 - b) the verification that all Aggregated Netted External Schedules within Synchronous Area sum up to zero.
3. Each Scheduling Agent of a Market Coupling Operator shall follow the process described in Article 35(2)(b) and provide requesting TSOs with the values of External Commercial Trade Schedules of each Market Balanced Area involved in market coupling in the form of Aggregated Netted External Schedules.

Article 36

PROVISION OF INFORMATION TO OTHER TSOs

1. Each TSO shall calculate and provide any requesting TSO with:
 - a) Aggregated Netted External Schedules; and
 - b) Netted Area AC Position when the Market Balance Area is interconnected to other Market Balance Areas via AC transmission links.
2. When required for the creation of Common Grid Models, in accordance with Article 13(2), each TSO operating a Market Balance Area shall provide any requesting TSO with:
 - a) Generation Schedules; and
 - b) Consumption Schedules.

Chapter 8

ENTSO-E OPERATIONAL PLANNING DATA ENVIRONMENT

Article 37

GENERAL PROVISIONS

1. No later than 24 months after the entry into force of this Network Code, ENTSO-E shall develop and administer an ENTSO-E operational planning data environment for the storage of all relevant information for operational planning.
2. All TSOs shall define a standardised data format for the data exchanges taking place. The description of this data format shall be an integral part of the ENTSO-E operational planning data environment.
3. Each TSO shall be responsible for providing and updating the relevant information to this environment.
4. All TSOs and RSCIs shall have access to all information contained on the ENTSO-E operational planning data environment.

Article 38

GRID MODELS & SECURITY ANALYSIS

1. The ENTSO-E operational planning data environment shall allow access to all Individual Grid Models and related relevant information for all relevant time horizons defined in this Network Code and in the [NC CACM].
2. All Common Grid Models shall be made available on the ENTSO-E operational planning data environment.
3. For the Year-Ahead time horizon, the following information shall be made available on the ENTSO-E operational planning data environment:
 - a) description of the scenarios referred to in Article 7;
 - b) Year-Ahead Individual Grid Model per TSO and per scenario defined in accordance with Article 8; and
 - c) Year-Ahead Common Grid Model per scenario defined in accordance with Article 10.
4. For the Day-Ahead and Intraday time horizons, the following information has to be included:
 - a) Day-Ahead and Intraday Individual Grid Models per TSO and per forecast time period as described in Article 13;

- b) Scheduled Exchanges at the relevant time instances per Control Area or per Control Area Border, whichever is deemed relevant by the TSOs, and per DC Interconnection;
- c) Day-Ahead and Intraday Common Grid Models per forecast time period as described in Article 13; and
- d) list of the prepared and agreed upon pre-fault and post-fault Remedial Actions identified to cope with Cross-Border Constraints.

Article 39

OUTAGE PLANNING

1. The ENTSO-E operational planning data environment shall contain a module for the storage and sharing of all relevant information for coordinated outage planning.
2. This information shall include at least:
 - a) planned outages of Relevant Grid Elements including at least all information described in accordance with Article 22(3);
 - b) planned outages of Relevant Power Generating Modules including, but not limited to, outage period, eventual Commissioning period and lost generation capacity;
 - c) planned outages of Relevant Demand Facilities including, but not limited to outage period, eventual Commissioning period and lost load; and
 - d) planned outages of Relevant Non-TSO Owned Interconnectors including, but not limited to outage period, specific conditions for execution of the outage and restitution time.

Article 40

SYSTEM ADEQUACY

1. The ENTSO-E operational planning data environment shall allow the access and sharing of all relevant information for coordinated Adequacy analysis.
2. This information shall include at least:
 - a) the season-ahead system Adequacy data provided by the individual TSOs; and
 - b) the season-ahead Pan-European system Adequacy analysis report.

Chapter 9

FINAL PROVISIONS

Article 41

AMENDMENT OF CONTRACTS AND GENERAL TERMS AND CONDITIONS

Within three years after the entry into force of this Network Code, each relevant TSO, DSO and each relevant Significant Grid User shall amend all relevant clauses in contracts and/or relevant clauses in general terms and conditions relating to the grid connection of New Power Generating Modules, 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 42

ENTRY INTO FORCE

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

It shall apply as from the day of expiration of a 2 year period following its publication.

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