

ENTSO-E Draft Network Code for Operational Security

A EURELECTRIC Response Paper

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ENTSO-E Draft Network Code for Operational Security

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General Comments

Necessary harmonisation for TSO rules

The Network Codes drafted for cross-border issues on the basis of the Third Energy Package are meant to replace the various national TSO practices with European common rules, necessary for a coordinated operation of the EU power system. Such coordination is the precursor to the internal electricity market, and will contribute to maintaining security of supply in the most efficient way by ensuring better sharing of resources across Europe.

However, the draft Network Code on Operational Security leaves a large autonomy to individual TSOs in each control area (where NRAs/ACER apparently do not play any role) and seems to replicate current national operation rules. This is clearly not in line with the provisions of the Network Code on Capacity Allocation and Congestion Management (CACM), which has been forwarded to ACER for assessment. It is also not consistent with the target model aiming at a single electricity market in Europe that will ultimately require TSOs to act as one, or with the request, in the Framework Guidelines, for harmonisation and standardisation of operational procedures and standards.

In a well-integrated energy market uncoordinated actions by individual TSOs might severely affect the electricity flows across borders and therefore the security of supply of adjacent TSOs or even the whole system. While specific issues (like voltage control and reactive power management) are typically local, they should be the exception rather than the rule. In general, the operational protocol to maintain a secure system in normal and especially in emergency situations should be coordinated at least at regional level. A closely integrated market facing challenges from growing variable power production leaves no room for continued national orientation as promoted in the current draft.

The Network Code on Operational Security is described by ENTSO-E as an umbrella Network Code focusing on common principles applicable to all codes, but it lacks detailed facts and figures explaining such principles and new requirements introduced in other codes. In the same vein, the code contains no requirements for TSOs expressed in exact figures, frequently using wording like “sufficient” or “minimum” instead. In contrast, the Network Code Requirements for Generators (RfG) defines very detailed and concrete requirements regarding frequency and voltage ranges, clearance voltages and times for Fault Ride Through. The Network Code should set clear and comprehensible parameters and clear guidelines for specification at national level where necessary. TSOs must become familiar with all parts of the system for which they bear responsibility; they must know the limits of the system and what to do when the system approaches or surpasses a limit. TSOs should commit to operate their system within the ranges prescribed by existing standards¹. In case of necessary system interventions in a state of alert or emergency, the limits set by the standards should be respected. In the absence of ‘hard limits’ set in accordance with these standards, TSO actions could result in loss of additional generation capacity as a result of disconnection by protection mechanisms or damage to the remaining generation capacity or load if no protection mechanism is in place. Whereas in the former case, the generation units would not be available for a few hours, the latter one could result in the

¹ International Standard IEC 60034-1 for rotating electricity machines, which sets conditions for frequency ranges and voltage ranges in which power generating facilities should function safely.

unavailability of several units of similar type for several months as damaged turbine blades would have to be replaced.

The lack of precision in some articles may result in unjustified strengthening of the TSO role compared to other actors and while not taking into account their roles and responsibilities of others.

Impact on the market and reference to Balancing Framework Guidelines

The Network Code on Operational Security should also take the impact on the market into account. Requirements for and restrictions of market parties must be justified. Interventions outside market rules and agreements should be limited to emergency cases. Systems for remedial actions should be defined in cooperation between TSOs, DSOs and Significant Grid Users. Such systems should include provision of market-based compensation mechanisms to be specified in other codes. Both direct and indirect costs should be taken into account. In such cases, compensation should be foreseen. In this regard the Network Code on Operational Security should specifically refer to the Framework Guidelines on Balancing and to both the Framework Guidelines and the Network Code on CACM, wherever possible.

Coherence among codes & need for clear definitions and requirements

The code includes many cross-references to provisions expected to be defined in other codes (some of them being at this moment in a much earlier stage of drafting). The principle that every code must focus on its specific issue is not followed. For example, the draft Demand Connection network code (DCC) should focus on technical capabilities, but also includes a description of remedial actions for system operation. This is not comprehensible and does not allow the reader to validate such provisions.

Coherence regarding the content and development process of numerous network codes must be ensured, and interactions should be more visible for stakeholders. ENTSO-E should pay particular attention to the clarity and consistency of the network codes. Procedures for compliance and testing and investigation are described in the Requirements for Generators Network Code and the Demand Connection Code but also in this Network Code. Data exchanges regarding the scheduled operation of power plants are described in this Network Code, but also in the Network Code Operational Planning & Scheduling. This will lead to diverging interpretations in practice. Related requirements set in different codes must be properly defined and adjusted without undue duplication to avoid disputes in implementation and interpretation. For example, the provisions on coordination and cooperation of TSOs in this code are far less extensive than in the CACM Network Code.

Clear definitions and requirements are of utmost importance to avoid problems and misinterpretations when the codes are finally implemented at national level. Definitions in different codes should be harmonised and unclear overlap or “double meaning” for the same expression should be avoided as this could lead to major conflicts and legal debates in the implementation of the NCs.

For example, the code uses some terms without clearly defining them, e.g. ‘TSO’, ‘DSO’, ‘Relevant DSO’, ‘Power Generating Facility’, ‘Power Generating Module’. This also applies to the definition of Significant Grid Users where the FG requires the NC to set clear and consistent criteria on their characteristics for influencing the cross-border power system and a transparent decision process to fulfil the criteria of “significance test”. Consistency with definitions in other network codes has to be ensured. It remains unclear throughout

several provisions in the draft NC to which DSO or Significant Grid User they are applicable, thus creating legal uncertainty. Definitions of 'Control Area', 'Responsibility Area' and 'Observability Area' seem to overlap.

For maximal consistency between various network codes, we recommend that ENTSO-E publishes one single dictionary (definition list), containing all definitions that are now fragmented among various codes. This dictionary should be used as a single reference and would thus avoid any ambiguity that can now be observed in various network codes, where different definitions are given for the same terms (e.g. "demand facility" in DCC and OS code). Stakeholders must be involved and properly consulted in the process of drafting such a dictionary, as the clarification of terms may lead to significant changes, including *inter alia* a broadening of the applicability of some requirements.

Last but not least, it should be avoided that information to be provided by Significant Users creates unnecessary double reporting from requirements in different codes. Moreover, the data set to be provided should be clearly defined, harmonised between different codes and delivered only once in order to ensure full coherence and minimise cost expenditure.

Adequate stakeholder involvement

The network codes will impose requirements throughout the entire value chain, including generators, DSOs and demand. We welcome the establishment of the DSO Technical Expert Group, as DSOs will be largely affected by network codes on system operation. Other relevant stakeholders should also be involved much more proactively in the process of drafting the network codes. The establishment of Advisory Stakeholders Groups for drafting the CACM Network Code, Forward Markets Network Code and Electricity Balancing Network Code has not been replicated in the case of the System Operation Network Codes. This difference in consultation approach is difficult to understand.

Roles and responsibilities

Most new generation, in particular renewable, is or will be connected to distribution networks. Similarly, most of the demand side flexibility will be developed within distribution networks. The decentralisation of the electricity system and active distribution networks implies evolving roles and responsibilities of both network users and network operators. Distribution areas need to be considered as systems and no longer as 'mere' networks. DSOs and TSOs will have to cooperate in order to maintain electricity systems in balance and ensure an adequate power quality. Taking this evolution into account, the system operation codes must clarify the roles of TSOs and DSOs in system operation, as also required by ACER FG on System Operation (p. 16).

The EU network codes should only define requirements for DSOs that are needed from the overall system security perspective (see comments on 'Relevant DSO' below), while respecting the following principles:²

1. every system operator is responsible for monitoring and control of their networks in order to ensure operational security;

² EURELECTRIC position paper on Network Codes for System Operation, September 2012

2. any action on generators or demand facilities connected to one network has to be managed by the system operator responsible for that network, even if this action has been requested by another system operator;
3. structural and real-time operational information are provided to the connecting system operator by the connected system operator's substation/Producer/Final Customer. DSOs provide the TSO to whose network they are connected with information about significant users connected to their network. Information on MV and LV users are provided only at aggregated level.

In short, each network operator is responsible for connected customers – loads as well as generation. A situation where a TSO directly or indirectly controls the operation of demand and production units connected to a DSO could have a severe impact on assets and/or connected customers (ie due to increased voltage variations).

DSO Issues

Applicability to 'Relevant DSO' & Cost-benefit analysis

The way the draft network code reads is that it automatically applies to all DSOs while 'Relevant DSO' is referred to in many places of the text. There are two issues in this context:

- The definition 'Relevant DSO' is already used in the network codes on grid connection with a different meaning. For example, in the network code RfG it is defined as *"the DSO to whose Network a Power Generating Module is or will be connected"*.
- The meaning of 'Relevant DSO' is not defined at all. We therefore propose to use "Significant DSO" instead of "Relevant DSO" and insert a clear definition for "Significant DSO".

We acknowledge that the proposed requirements for information exchange between TSO and DSO etc. are/will be necessary for the secure interaction of distribution systems with a high penetration of distributed energy resources (DER) on the one hand and transmission systems on the other. However, due to the diversity of distribution systems and differences in penetration of intermittent distributed generation, a one-size-fits-all approach cannot be applied, as stated in the position paper published earlier². In order to reflect this and ensure the most efficient system solutions, the requirements set forth by this network code shall apply to 'Significant DSOs' – DSOs that influence the transmission system and overall system security. The code should clearly set a mechanism for this decision that the National Regulatory Authority (NRAs) should follow when deciding in a national process following Art 3(3) which DSO is 'Significant'. This mechanism should take into account the voltage of the networks the DSO operates and the level of penetration of DER in its network and be sufficiently forward-looking. This approach would allow for the necessary flexibility and future redefinition of the applicability (DSO 'significance'). It has to be ensured that equivalent situations are treated in the same way in all countries to avoid discrimination. The definition of Significant DSO/Significant Grid User must also be adjusted with the definition from other codes, in particular those stemming from the RfG NC.

The Framework Guidelines require a cost-benefit analysis for requirements deviating from current standards and practices. Taking into account the diversity described above, new requirements for the distribution grid and their users that deviate from existing ones and imply new investments in technology, including requirements for information exchange, should be subject to a mandatory quantitative cost-benefit analysis

at national level in order to achieve the highest cost-efficiency for society. Existing systems should continue to be used as appropriate.

The proposals made on issues related to ‘Significant DSOs’ listed in Annex 1 should be read in the context of the arguments above and the fact that a one-size-does-**not**-fit-all approach should be applied in distribution networks.

Cost-recovery

Any new requirements and tasks set in this network code, for both new and existing facilities, require additional costs, manpower and equipment. Such a cost will arise in particular from requirements on testing and investigation (Chapter 3) and data exchange (Chapter 4). Network operators and users should be able to recover their efficient costs. Efficient DSO costs resulting from necessary adaptations of the existing grid (i.e. new installations) as well as related administrative costs should be recognised by national regulatory authorities. The network code should be coherent with other network codes (i.e. Requirements for Generators, Demand connection code) and clearly state that the costs related to the obligations referred to in this Network Code which have to be borne by regulated Network Operators shall be assessed by National Regulatory Authorities and that 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.

Information exchange, congestion management & voltage control

DSO needs adequate knowledge of the operational data from end users (load and generation) connected to their networks in order to ensure security of supply and quality of service in their networks. As the code already requires, DSO(s) should provide the TSO with the operational information on significant grid users, both generators and demand facilities. TSOs should not act on any individual DER embedded in distribution networks. A parallel data exchange between TSOs and generators demand facilities connected to distribution systems required by the code (articles 26 & 28) would lead to double reporting and double cost. This solution is thus not preferable and should be used only in exceptional cases when it is demonstrated that it is the most cost-efficient option and does not affect the security of any network. In any case the DSO must be fully involved in the exchange of information.

Significant DSOs also need the information on the generation connected to the transmission network in the geographical zones in which they operate (Observability area for the DSO), because changes in that generation can affect the operation of the DSO’s network and may influence the DSO’s network planning. Such information should be provided by the relevant TSO.

Voltage control requires a system approach taking into account both overall system security and optimisation of thermal losses. Requirements for the TSO-DSO connection point should continue to be defined in contracts. Alternatively, the limits on the power factor at the TSO-DSO interface should be subject to a national consultation and a cost-benefit analysis should be carried out (in accordance with art. 3(3)). Adequate contribution of generators connected to the distribution grid is likely to play an important role in managing challenges of voltage and reactive power management in distribution grids.

For more information on the role of DSOs, information exchange, congestion management and voltage control see the EURELECTRIC position paper on ‘Network Codes for System Operation’.

Annex³

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|-------------|------------------|------|--------|--|---|--|--------------|----------------|
| DSO comment | Purpose and obj. | | | (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. | Remark: Reference to Art 2 of Directive 2009/72/EC should mention also DSO responsibility for operating their networks. | The DSOs are also responsible for the Operational Security of their Control Areas. This should be reflected in the different chapters. | legal | fundamental |

^{3 1} VGB Powertech submitted additional detailed comments to the public consultation

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|-------------|------------------|------|--------|---|--|---|--------------|----------------|
| DSO comment | Purpose and obj. | | | (10) Measuring and monitoring operational parameters in order to estimate the System State is the first step required for activities and applications to maintain Operational Security. State Estimation throughout the EU in a common and coherent way supports communication between Transmission System Operators and where necessary with Distribution System Operators and Grid Users. | (10) Measuring and monitoring operational parameters in order to estimate the System State is the first step required for activities and applications to maintain Operational Security. State Estimation throughout the EU in a common and coherent way supports communication between Transmission System Operators and Significant Distribution System Operators and when necessary with other Distribution System Operators and Grid Users. | Significant DSO with high voltage networks also estimate the System State. These DSOs need measurements and operational parameters from the network above (real-time data). | legal | fundamental |
| DSO comment | Purpose and obj. | | | (12) At a local level, Transmission System Operators should apply voltage control and reactive power management, in order to keep voltages within the Operational Security Limits and to minimize reactive power flows. | (12) At a local level, Transmission System Operators and Significant Distribution System Operators should apply voltage control and reactive power management in their grids in a co-operative way , in order to keep voltages within the Operational Security Limits and to minimize reactive power flows; | Significant DSOs should be able to apply the same management. | legal | fundamental |
| DSO comment | Purpose and obj. | | | (13) Transmission System Operators should deploy short-circuit management in order to calculate the short-circuit currents within and beyond the borders of Control Areas and thus to ensure adequate treatment of short-circuit Faults. | (13) Transmission System Operators and Significant Distribution System Operators should deploy short-circuit management in order to calculate the short-circuit currents within and beyond the borders of Control Areas and thus to ensure adequate treatment of short-circuit Faults. | The DSO responsibility is the short-circuit management in the DSO network. In some cases this is needed for the reserve of power plant supply. | legal | fundamental |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|-------------|------------------|------|--------|--|---|--|--------------|----------------|
| DSO comment | Purpose and obj. | | | (18) The Operational Security of the transmission system and all the activities which contribute to it require an accurate, timely and adequate exchange of data and information. Data exchange should therefore not encounter any barrier between the different actors involved in ensuring the Operational Security. | (18) The Operational Security of the transmission system and distribution system and all the activities which contribute to it require an accurate, timely and adequate exchange of data and information. Data exchange should therefore not encounter any barrier between the different actors involved in ensuring the Operational Security. In the same time data exchange should be limited to necessary data and appropriate formats to ensure the most cost-effective approach. | Significant DSOs should also have the possibility to receive the necessary data and information, because of their responsibilities on their grids. Need for data should be defined taking into account economic basis. | legal | fundamental |
| DSO comment | 1 | 1 | | This Network Code defines the minimum Operational Security requirements and principles for transmission systems applicable to all TSOs, relevant DSOs and Significant Grid Users. | This Network Code defines the minimum Operational Security requirements and principles for transmission systems applicable to all TSOs, Significant DSOs and Significant Grid Users. | "Significant DSO" to be used instead of "Relevant DSO" as Relevant is used in RfG and DCC with a different meaning. | legal | fundamental |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|-------------|------|------|--------|--|---|---|--------------|----------------|
| DSO comment | 1 | 2 | | <p>This Network Code aims at:</p> <p>a) determining common Operational Security requirements and principles;</p> <p>b) ensuring conditions for maintaining Operational Security throughout the EU;</p> <p>c) providing for coordination of system operation;</p> <p>d) determining common requirements for DSOs which are relevant for Operational Security of the transmission system and Significant Grid Users.</p> | <p>This Network Code aims at:</p> <p>a) determining common Operational Security requirements and principles;</p> <p>b) ensuring conditions for maintaining Operational Security throughout the EU;</p> <p>c) providing for coordination of system operation;</p> <p>d) determining common requirements for Significant DSOs which are relevant for Operational Security of the transmission system and Significant Grid Users.</p> <p>e) Determining common requirements for TSOs to ensure Operational Security</p> <p>f) determining common requirement for TSOs which are relevant for Operational Security of Significant DSOs.</p> | <p>Requirements for TSOs need to be clarified in this code. Operational Security concerns both TSOs and Significant DSOs. Significant DSOs need information from TSO, DER and other DSOs to assist with constraint management in their networks that could have an adverse impact on the overall system security.</p> | legal | fundamental |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|-------------|------|------|--------|--|--|---|--------------|----------------|
| DSO comment | 1 | 3 | | In the small isolated systems for which derogation has been granted in application of Article 44 of Directive 2009/72/EC and in the isolated systems which do not present any cross-border network issues or market integration issues, in the absence of transmission system, the provisions of this Network Code shall not apply. DSOs shall nevertheless take fully into account the provisions of this Network Code when adopting their own network codes on Operational Security. | In the small isolated systems for which a derogation has been granted in application of Article 44 of Directive 2009/72/EC, other isolated systems which applied for and are granted a derogation from its NRA and in the isolated systems which do not present any cross-border network issues or market integration issues, in the absence of transmission system, the provisions of this Network Code shall not apply. DSOs shall nevertheless take fully into account the provisions of this Network Code in formulating their own approach to network security. | Not appropriate for DSOs to be forced by this network code to have their own legally binding Network Code. This is a matter for each NRA. | legal | fundamental |
| | 1 | 4 | | In the Spanish isolated systems (SEIE), the references to this Network Code shall not apply and shall be replaced by references to SEIE rules. | - | Delete article, since Spanish isolated systems should not have different requirements to other isolated systems. | legal | fundamental |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|-------------|------|------|--------|---------|---|---|--------------|----------------|
| DSO comment | 2 | | | - | <p>General remark: Clarification of the difference between the different kind of "areas" defined is necessary. There are 4 different kind of area defined:</p> <ul style="list-style-type: none"> - Synchronous area - Observability area, area on which TSO shall implement ...to ensure reliability of the respective Responsibility Area. - Control area, part of the Transmission System controlled by one single TSO. - Responsibility area, also operated by one single TSO. <p>Proposal for redefining Responsibility area and Control area:</p> <p>Responsibility area = all assets for which TSO is responsible for maintaining operational security limits</p> <p>Control Area: territory in which for all access points (be it transmission or distribution grid), the ARP or BRP has a contract with one single TSO</p> <p>This would make all proposed amendments to replace responsibility area by control area unnecessary.</p> | <p>As written, it is difficult to make a difference between control area and responsibility area and between observability area and responsibility area.</p> <p>Should the Observability Area be the same for the Structural data requirements (e.g. Art. 19) and the real-time data requirements (e.g. Art. 20)?</p> <p>Furthermore, the definition of Contingency (which encompasses distribution networks) is totally inconsistent with the definition of Control Area (which is strictly limited to Transmission Systems)</p> | legal | fundamental |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|-------------|------|------|--------|---|--|---|--------------|----------------|
| | 2 | 2 | | Active Power Reserve means the operational reserves available for maintaining the planned power exchange and for guaranteeing secure operation of the transmission system; | Active Power Reserve means the operational reserves available for maintaining the planned power exchange and for guaranteeing secure operation of the Electric System ; | The secure operation must be guaranteed not only in Transmission System but in all Electric System. | technical | fundamental |
| | 2 | 2 | | Blackout State means the state where the operation of part or all of the transmission system is terminated; | Blackout State means the state where the operation of part of all of the Electric System is terminated; | A Blackout not only affects Transmission System but the Electric System. | technical | fundamental |
| | 2 | 2 | | Connection Point means the interface at which the Demand Facility or Power Generating Facility is connected to a transmission or distribution network, or at which the distribution network is connected to a transmission network; | Connection Point means the interface at which the Significant Grid User is connected to a Transmission or Distribution Network, or at which the Distribution Network is connected to a Transmission Network; | This code should only apply to Significant Grid Users. | technical | fundamental |
| DSO comment | 2 | 2 | | Demand Facility means a facility which consumes electrical energy and is connected at one or more Connection Points, to the exclusion of distribution networks and auxiliary supplies of a Power Generating Facility which do not qualify as Demand Facilities; | Demand Facility is a facility which consumes electrical energy and is connected at one or more Connection Points to the Network . For the purpose of avoidance of doubt a Distribution Network and/or Auxiliary Supplies of Power Generating Modules are not a Demand Facility. | Alignment with the definition of Demand Connection code is necessary | technical | fundamental |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|--|------|------|--------|---|--|---|--------------|----------------|
| | 2 | 2 | | Demand Side Management (DSM) means all activities undertaken to encourage Demand Facilities to modify patterns of electricity usage, including the timing and level of electricity demand. DSM covers the complete range of load shape objectives, including strategic conservation and load management, as well as strategic load growth. It does not include energy and load-shaped changes arising from the normal operation of the marketplace or from government-mandated energy-efficiency standards; | Alignment with the definition of NC DCC is necessary - see the DRS definition of the NC DCC: Demand Side Response (DSR) - is demand offered for the purposes of, but not restricted to, providing Active or Reactive Power management, Voltage and Frequency regulation and System Reserve. | This definition is not coherent with the definition of Demand Side Response currently proposed in the NC DCC. The initial definition is too far-reaching. | technical | editorial |
| | 2 | 2 | | definition of existing users (Grid users and DSOs) to be inserted | Same as in NC RfG | logic of application of requirements to existing grid users from RfG has to be included in this code too | | |
| | 2 | 2 | | Normal State means the operational state in which there is a low risk for deterioration of Operational Security of the transmission system | Normal State means the operational state in which there is a low risk for deterioration of Operational Security of the transmission system and allows for non-restrictive market operation | Specification is necessary | technical | fundamental |
| | 2 | 2 | | Grid User means the natural or legal person supplying to, or being supplied with active and/or reactive power by a TSO or DSO; | Grid User means the natural or legal person supplying, or being supplied with, active and/or reactive power by a TSO or DSO; | 'Supplying to' not correct (Grammar). | technical | editorial |
| | 2 | 2 | | N-Situation means the situation where no element of the transmission system is unavailable due to a Fault; | N-Situation means the situation where no element of the Transmission System is unavailable due to a Fault or planned outage. | need clarity on why planned outages are not considered in this code. Also planned outages might lead to N-situation if N-situation is used for planning! | technical | fundamental |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|-------------|------|------|--------|--|--|---|--------------|----------------|
| DSO comment | 2 | 2 | | Observability Area means the area of the relevant parts of the transmission systems, relevant DSOs and neighbouring TSOs, on which TSO shall implement a real-time monitoring and modelling to ensure reliability of the respective Responsibility Area; | Observability Area means the area of the relevant parts of the transmission systems, Relevant DSOs and Neighbouring TSOs, on which TSO or Significant DSO shall implement a real-time monitoring and modelling to ensure reliability of the respective Control Area " | Significant DSO needs also to perform a real-time monitoring and modelling to ensure reliability of its network and to avoid affecting overall system security and cross border flows. This is in line with article 5.2. Reliability of the distribution system is a DSO task. | technical | fundamental |
| DSO comment | 2 | 2 | | Operational Security means the transmission system capability to retain a Normal State or to return to a Normal State as soon and as close as possible, and is characterized by thermal limits, voltage constraints, short-circuit current, frequency reference value and stability limits; | Operational Security means the Electric System capability to retain a Normal State or to return to a Normal State as soon and as close as possible, and is characterized by its thermal limits, voltage constraints, short-circuit current, frequency reference value and stability limits; | Operational Security affects not only the Transmission System capability but also the Electric System capability including the Distribution System capability. | technical | fundamental |
| DSO comment | 2 | 2 | | Operational Security Limits means the acceptable operating boundaries: thermal, voltage, Fault levels, frequency and stability limits; | Remark: clarification needed for using the term 'acceptable'. | What does 'acceptable' mean? Concrete figures for Operational Security Limits are not given, not here, not elsewhere in the code. | technical | fundamental |
| DSO comment | 2 | 2 | | Ordinary Contingency means the non-unusual loss of a transmission system element such as, but not limited to, a single line, a single Power Generating Facility, a single transformer, a single phase-shifting transformer, a voltage compensation installation of 50 MVar or more or a DC link; | Remark: clarification needed. | Ordinary contingency does not include a fault at a bus bar. It is not clear what the consequences of this definition will be. | technical | fundamental |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|-------------|------|------|--------|---------|--|---|--------------|----------------|
| DSO comment | 2 | 2 | | - | Significant DSO means generally a DSO that influences transmission system and overall system security. The National Regulatory Authority shall decide on whether a DSO is Significant or not, based on the assessment that takes into account the voltage of the networks the DSO operates on and the level of penetration of distributed energy resources in its network. | The concept "Significant DSO" is often used across the text but not defined. Diversity of DSOs across Europe has to be taken into account, regarding the voltage they operate and the amount of distributed generation connected to their networks. Significant DSOs may influence overall system security and cross border issue. A one size fits all approach cannot be applied as is not efficient - this should be taken into account when defining rules for DSOs. Mandatory cost benefit analysis for deviating requirements as a condition to applicability at national level. | technical | fundamental |
| | 2 | 2 | | - | Significant TSO: definition to be added. | The concept of "Significant TSO" is often used across the text but not defined. | technical | fundamental |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|-------------|------|------|--------|--|--|--|--------------|----------------|
| DSO comment | 2 | 2 | | <p>Schedule means the reference set of values of energy or power within a future time period and for a resolution time interval. Schedules refer to:</p> <p>a) Commercial exchange between different market participants;</p> <p>b) Generation program of a particular Power Generating Facility or the aggregation of generation programs of a group of Power Generating Facilities, termed also generation schedule;</p> <p>c) Demand program of a particular Demand Facility or the aggregation of consumption programs of a group of Consumption Units, termed also consumption schedule;</p> <p>d) Planned exchange of energy between Market Balance Areas on a given time interval and at a given time resolution. These Market Balance Areas might belong to different Synchronous Areas and might be none neighbouring;</p> <p>e) Aggregated cross-border exchange programme aggregated programme of the exchange across the Control Area borders;</p> | Remark: Align the definition of Schedule between the different system operation codes. | Not 100% in line with the same concept in the NC OP&S. | technical | editorial |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|-------------|------|------|--------|---|--|--|--------------|----------------|
| | 2 | 2 | | Significant Grid User means the pre-existing Grid Users and new Grid Users which are deemed significant on the basis of their impact on the cross border system performances via influence on the Control Area's security of supply including provision of ancillary services; | Significant Grid User means new Grid Users have been identified as significant in a significance test on the basis of their impact on the cross border system performances via influence on the Control Area's security of supply including provision of ancillary services and defined technical parameters over the entire synchronous area. Application of requirements to pre-existing Grid User only to be decided in a special procedure under special conditions | A grid user should be deemed significant only if a defined set of technical parameters is fulfilled. This set of parameters should be the same within the synchronous area. The Framework guideline describes that Significant Grid Users have to be identified in a significance test application to pre-existing users only after a specific procedure as described in RfG for example | technical | fundamental |
| DSO comment | 2 | 2 | | System Operator Employee means the person in charge of the operation of the transmission system in real-time; | System Operator Employee means the person in charge of the operation of the Transmission or Significant Distribution System in real-time; | DSOs are also System Operators. | technical | fundamental |
| DSO comment | 2 | 2 | | Transitory Admissible Overloads means the temporary overloads of transmission system elements or secondary equipment which are allowed for a limited period in case of switching or Fault and which do not cause physical damage to the elements or secondary equipment as long as the defined duration and thresholds are respected; | Transitory Admissible Overloads means the temporary overloads of transmission system elements or secondary equipment (such as ...) which are allowed for a limited period in case of switching or Fault and which do not cause physical damage to the elements or secondary equipment as long as the defined duration and thresholds are respected; | What is meant by "secondary equipment"? Please define. | technical | editorial |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|--|------|------|--------|--|--|---|--------------|----------------|
| | 2 | 2 | | Transmission Line means the system of structures, wires, insulators and associated hardware that carry electric energy from one point to another in an electric power system. Transmission Lines are operated at voltages varying from 50 kV up to 765 kV. One Transmission Line can have one or more Transmission Circuits; | Transmission Line means the system of structures, wires, insulators and associated hardware that carry electric energy from one point to another in an electric power system. One Transmission Line can have one or more Transmission Circuits; | The definition can be misinterpreted - the proposed one could imply that elements operated above 50 kV are transmission lines. | legal | fundamental |
| | 2 | 2 | | - | Transmission System Operator (TSO) - is a natural or legal person responsible for operating, ensuring the maintenance of and, if necessary, developing the transmission 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. | TSO is not defined. In other NCs 'TSO' is defined; proposed definition comes from NC DCC. | technical | fundamental |
| | 3 | 3 | | Where reference is made to this paragraph, the TSO and/or DSO shall, in cooperation with their national regulatory authority, establish the terms and conditions or actions necessary to ensure Operational Security in accordance with... | Where reference is made to this paragraph, the TSO and/or DSO shall, in cooperation with their national regulatory authority and other national authorities (nuclear, water law), establish the terms and conditions or actions necessary to ensure Operational Security in accordance with... | legal obligations for operation of power plants e.g. European and national nuclear safety aspects as well as water management restrictions need to be respected by the establishment of these terms, conditions and actions. Operational security of TSOs and operational security of power generating facilities depend on each other. | | |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|-------------|------|------|--------|--|---|---|--------------|----------------|
| DSO comment | 4 | 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. | The costs related to the obligations referred to in this Network Code which have to be borne by regulated network operators shall be assessed by National Regulatory Authorities. | Alignment with other network codes (RfG, DCC) is necessary. Implementing the code will have a cost, both for the TSO and the DSO. Thus, the DSO should explicitly be included in this article (in line with other NCs). | legal | fundamental |
| | 4 | 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. | 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. Costs arising from changes in system operation shall be assessed by the NRA and borne by the real originator of the cost. | Costs arising from changes in system operation need to be assessed by the NRA and borne by the real originator of the cost. | legal | fundamental |
| DSO comment | 4 | 3 | | If requested by National Regulatory Authorities, regulated 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. | If requested by National Regulatory Authorities, regulated network operators shall , within three months of such a request, use best endeavours to provide such additional information as reasonably requested by National Regulatory Authorities to facilitate the assessment of the costs incurred. | Same justification as for art. 4.1. Implementing the code will have a cost, both for the TSO and the DSO. Thus, the DSO should explicitly be included in this article. | legal | fundamental |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|-------------|------|------|--------|--|--|---|--------------|----------------|
| DSO comment | 5 | 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. | 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 system with which its system is interconnected, DSOs included , sufficient information to ensure the secure and efficient operation, coordinated development and interoperability of the interconnected system. | DSOs are also connected to TSOs and need information to ensure the secure and efficient operation in their systems. | technical | fundamental |
| | 6 | 1 | | Each TSO shall differentiate five System States: | All TSOs shall differentiate within 6 months after the enforcement of this code, five System States based on the following minimum common criteria with parameters established on the European respective regional level: | There should be at least minimum common principles to define the five system states. Criteria should be established on regional level, see also provisions in NC CACM | technical | fundamental |
| | 6 | 1 | a | Normal State: i. frequency, voltage, active and reactive power flows are within the Operational Security Limits defined in accordance with Article 6(5) and (6); ii. active and reactive power reserves are sufficient to withstand Contingencies; and iii. operation is and will remain within Operational Security Limits even after Contingencies from the Contingency List and after effects of Remedial Actions. | Normal State: i. frequency, voltage, active and reactive power flows are within the Operational Security Limits defined in Article ... ii. active and reactive power reserves are sufficient to withstand Contingencies defined in Article ... ; and iii. operation is and will remain within Operational Security Limits defined in the Article ... even after Contingencies from the Contingency List and after effects of Remedial Actions. | Each TSOs when defining the five system states should at least coordinate such scenarios with the other TSOs at regional level. The Operation Security Limits are not defined in Article 6 (5) neither (6). • What is the value of the active and reactive reserves? • What are the Operation Security Limits? | technical | fundamental |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|--|------|------|--------|--|---|--|--------------|----------------|
| | 6 | 1 | b | <p>Alert State:</p> <p>i. frequency, voltage, active and reactive power flows are within their Operational Security Limits defined in accordance with Article 6(5) and (6);</p> <p>ii. reserve requirements are not fulfilled with no means to replace them; and</p> <p>iii. at least one Contingency from the Contingency List can lead to deviations from Operational Security Limits, even after effects of Remedial Actions.</p> | <p>Alert State:</p> <p>i. frequency, voltage, active and reactive power flows are within their Operational Security Limits defined in Article...</p> <p>ii. The consequences for grid users are ...</p> | <p>The Operation Security Limits are not defined in Article 6 (5) neither (6)</p> <ul style="list-style-type: none"> • What are the Operation Security Limits? <p>The consequences for grid users of each State are not described.</p> | technical | fundamental |
| | 6 | 1 | c | <p>Emergency State:</p> <p>i. there is at least one deviation from Operational Security Limits;</p> <p>ii. at least one measure of the System Defence Plan is activated.</p> <p>When Operational Security is endangered because of a major IT problem, the TSO also has to declare Emergency State.</p> | <p>Emergency State:</p> <p>i. there is at least one deviation from Operational Security Limits defined in Article...;</p> <p>ii. at least one measure of the System Defence Plan is activated.</p> <p>iii. The consequences for grid users are ...</p> <p>When Operational Security is endangered because of a major IT problem, the TSO also has to declare Emergency State.</p> | <p>What are the Operation Security Limits?</p> <p>The consequences for grid users of each State are not described. System defence plan: Concrete description with actions is needed. Please describe the content of the system defence plan and its measures..</p> | technical | fundamental |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|--|------|------|--------|--|---|---|--------------|----------------|
| | 6 | 1 | d | <p>Blackout State:</p> <p>i. almost or total absence of voltage in the transmission system and triggering restoration plans</p> | <p>Blackout State:</p> <p>i. almost or total absence of voltage in the transmission system and triggering restoration plans, taking into account following thresholds: ...</p> | <p>A threshold (in MW lost (e.g. 2000 MW) and in time (e.g. > 3 minutes)), perhaps defined at National Level, is required. 0 kV in substation occurs frequently, without speaking about black out. Definition used in the ENTSO-E operational handbook should be considered:</p> <p>'the almost or total absence of voltage in the transmission system and as a consequence of loss of load, disconnection of generating units or in house load operation. A blackout can be partial (if a part of the system is affected) or total (if the whole system is collapsed).'</p> | technical | fundamental |
| | 6 | 1 | e | <p>Restoration:</p> <p>i. frequency, voltage and other operational parameters are brought within the Operational Security Limits defined in accordance with Article 6(5) and (6); and</p> <p>ii. Demand Facilities are connected at a pace decided by the TSOs in charge of restoration, depending on the technical capability and feasibility of the transmission system resources and Power Generating Facility resources.</p> | <p>e) Restoration:</p> <p>i. frequency, voltage and other operational parameters are brought within the Operational Security Limits defined in Article ... ; and</p> <p>ii. Demand Facilities are connected at a pace decided by the TSOs in charge of restoration, depending on the technical capability and feasibility of the transmission system resources and Power Generating Facility resources.</p> <p>iii. The consequences for grid users are ...</p> | <p>The Operation Security Limits are not defined in Article 6 (5) neither (6)</p> <ul style="list-style-type: none"> • What are the Operation Security Limits? <p>The consequences for grid users of each State are not described.</p> | technical | fundamental |
| | 6 | 1bis | | | All the System States shall be in real time publicly available | Transparency will enable grid user to support system security | | |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|--|------|------|--------|--|--|---|--------------|----------------|
| | 6 | 2 | | Each TSO shall monitor in real-time the following parameters on its transmission system: a) active and reactive power flows; b) busbar voltages; c) frequency; d) active and reactive power reserves; e) actual generation and consumption. | Each TSO shall monitor in real-time the following parameters on its transmission system: a) active and reactive power flows; b) busbar voltages; c) frequency; d) actual generation and consumption. | It is not clear which data on reserves should be submitted. Definition of Reactive Power Reserves is missing in the code. There is no need to submit data on power reserves of generating facilities which are not in operation. | technical | fundamental |
| | 6 | 4 | | Each TSO shall endeavour to operate its transmission system within the Operational Security Limits in order to maintain a Normal State. | Each TSO shall endeavour to operate its transmission system within the Operational Security Limits pursuant Article ... in order to maintain a Normal State. | Article 31 clearly mentions TSO responsibility for the Operational Security of its transmission system. Which are these limits? The Operation Security Limits are not defined in Article 6(5) neither (6). | technical | fundamental |
| | 6 | 5 | | For each element of its transmission system, each TSO shall define the Operational Security Limits for: a) admissible voltage ranges, in terms of the strength of insulation and steady state system stability b) admissible short-circuit current ranges in terms of equipment capacity and impedance; and c) admissible power flow limits in terms of thermal rating of the given transmission system elements. For each Interconnection, each TSO shall coordinate with the interconnected TSO to define the Operational Security Limits. | For each element of its transmission system, each TSO shall define in accordance with article 3.3 , the Operational Security Limits for: a) admissible voltage ranges, in terms of the strength of insulation and steady state system stability b) admissible short-circuit current ranges in terms of equipment capacity and impedance; and c) admissible power flow limits in terms of thermal rating of the given transmission system elements. For each Interconnection, each TSO shall coordinate with the interconnected TSO to define the Operational Security Limits. | The impact of the definition of these operational Security Limits could be huge. Therefore, a large consultation is needed. This concerns material limits to be judged by the TSO, rather than engagements towards other parties. It is not a cross border issue and not in relation with other parties, unless we consider interconnection points. TSO have to respect design of existing equipment connected to their grid (DSOs and Grid user); changes relevant for existing equipment have to be proven by a CBA. European and international standards have to be respected. What does “admissible” mean? Please indicate a range or a condition for admissible. | technical | fundamental |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|--|------|------|--------|---|---|--|--------------|----------------|
| | 6 | 6 | | Each TSO shall coordinate with the TSOs operating within its Synchronous Area and define the Operational Security Limits for admissible frequency quality in accordance with the requirements on frequency quality of the [NC LFC&R]. | Frequency has to be kept within International standards | The Operational Security limits should be based on minimum common criteria defined in this code. Frequency requirements should be also defined in this code since the LFC&R NC is still in a very early stage of the drafting process and such requirements cannot be validated. for DSOs and grid users it is absolutely necessary to keep frequency inside international standards as there equipment is designed for this standards | legal | fundamental |
| | 6 | 8 | | <p>If its transmission system is not in a Normal State and that System State is qualified as “wide area” in accordance with Article 6(1), a TSO shall:</p> <p>a) inform all TSOs about the System State of its transmission system via a common awareness system;</p> <p>b) provide additional information on the elements of its transmission system which area part of the Observability Area of the affected TSOs; and</p> <p>c) coordinate the joint Remedial Actions which are taken by the affected TSOs.</p> | NOTE : If article not deleted, OK to suggest specific thresholds for operational limits, but 10% for voltage is far too high (especially at interconnection points). 2 - 3% is more realistic. International standards should be respected. | <p>What does “wide area” mean? Is not defined in Article 6(1).</p> <p>What is a 'common awareness system'? It would be better to mention, as stated in art.6 sub12c : “means of communication between control centres of TSO’s”.</p> | technical | editorial |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|-------------|------|------|--------|--|--|---|--------------|----------------|
| | 6 | 9 | | When preparing and implementing a Remedial Action which has an effect on other TSOs, a TSO shall cooperate with the affected TSOs to assess the impact of its Remedial Action within and outside its Responsibility Area and coordinate with affected TSOs to select the action which is in accordance with the principle of optimisation between the highest overall efficiency and lowest total cost for all involved parties. Each affected TSO shall provide all the information necessary for this cooperation. | All TSOs of each Capacity Calculation Region shall agree on the use of cross control area remedial actions. Each affected TSO shall provide all the information necessary for this cooperation. | Consistence with Article 39 of the CACM NC. | technical | fundamental |
| DSO comment | 6 | 9 | | When preparing and implementing a Remedial Action which has an effect on other TSOs, a TSO shall cooperate with the affected TSOs to assess the impact of its Remedial Action within and outside its Responsibility Area and coordinate with affected TSOs to select the action which is in accordance with the principle of optimisation between the highest overall efficiency and lowest total cost for all involved parties. Each affected TSO shall provide all the information necessary for this cooperation. | When preparing and implementing a Remedial Action which has an effect on other TSOs, a TSO shall cooperate with the affected TSOs to assess the impact of its Remedial Action within and outside of its Control Area and coordinate with affected TSOs to select the action which is in accordance with the principle of optimisation between the highest overall efficiency and lowest total cost for all involved parties. Each affected TSO shall provide all the information necessary for this cooperation | At this level coordination should be assessed at transmission levels. | technical | fundamental |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|-------------|------|------|--------|--|---|---|--------------|----------------|
| DSO comment | 6 | 10 | | When preparing and implementing a Remedial Action, a TSO shall, when necessary, cooperate with the Significant Grid Users and DSOs. Each Significant Grid User or DSO shall execute the instructions given by the TSO to support maintaining Operational Security of the transmission system, without undue delay. Unless decided otherwise by the TSO, the relevant DSO shall communicate the instructions of the TSO to the Significant Grid Users if the latter is connected to the distribution network. | When preparing and implementing a Remedial Action, a TSO shall, when necessary, cooperate with the Significant Grid Users and Significant DSOs. DSOs shall participate in the preparation and implementation of the Remedial Action if an affected element is within or connected to distribution network. Each Significant Grid User or DSO shall execute the instructions given by the TSO to support maintaining Operational Security of the Transmission System, without undue delay. The Significant DSO shall communicate the instructions of the TSO to the Significant Grid Users if the latter is connected to the distribution network unless a different procedure is agreed between the Significant DSO and the TSO. Any such instructions has to be in accordance with the commercial and contractual agreements in place, including for procurement of ancillary services and/ or related plans for emergency cases . | This formulation can be understood as an action decided by TSOs on one significant grid user on the network. For instance, in case of need for curtailment on TSO network, TSO should send a signal to Significant DSO, unless both parties agree differently - it cannot be a unilateral decision by the TSO. No formal operational relationship between TSO and generators connected at the distribution level. DSOs are responsible for Operational Security in their Networks. If DSOs are not considered at this level overall system security could be affected. All instructions issued to generators by TSOs and DSOs must comply with the terms of the connection/contractual agreements, including ancillary services agreements e.g. for instructions relating to frequency control, reserve and voltage control. | technical | fundamental |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|--|------|------|--------|--|--|--|--------------|----------------|
| | 6 | 10 | | When preparing and implementing a Remedial Action, a TSO shall, when necessary, cooperate with the Significant Grid Users and DSOs. Each Significant Grid User or DSO shall execute the instructions given by the TSO to support maintaining Operational Security of the transmission system, without undue delay. Unless decided otherwise by the TSO, the relevant DSO shall communicate the instructions of the TSO to the Significant Grid Users if the latter is connected to the distribution network. | <p>When preparing and implementing a Remedial Action, a TSO shall, <u>when necessary</u>, cooperate with the Significant Grid Users and DSOs. Each Significant Grid User or DSO shall execute the instructions given by the TSO to support maintaining Operational Security of the transmission system, without undue delay. Unless decided otherwise by the TSO, the Significant DSO shall communicate the instructions of the TSO to the Significant Grid Users if the latter is connected to the distribution network.</p> <p>According the principle of non-discrimination and transparency, a TSO shall provide information about all planned and taken remedial actions to the market participants. Information to be disclosure shall be the reason that cause the use of the remedial actions, the MW used and the costs involved in an aggregated mode.</p> <p>Cost arising from remedial actions to the Significant Grid User have to be borne by the instructing TSO.</p> | <p>Transparency will enable grid user to support system security Any Costs arising from remedial actions to the Significant Grid User have to be borne by the instructing TSO</p> <p>How is "when necessary" defined?</p> <p>Should communication refer to NC CACM instead of making eventually unclear double definition?</p> | technical | fundamental |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|--|------|------|--------|--|--|---|--------------|----------------|
| | 6 | 11 | | While respecting the provisions of Article 3(3), each TSO shall define the threshold of significance of the Significant Grid Users, depending on the following parameters of the transmission system under the TSO's responsibility: a) size of the transmission system; b) number and size of Power Generating Facilities and Demand Facilities connected to the transmission system; and c) generation mix. | While respecting the provisions of Article 3(3), the threshold of significance of the Significant Grid Users shall be the same across an entire synchronous area. | A power generation facility owner cannot be held responsible for the generation mix within a region and therefore be treated differently than other grid users. | technical | fundamental |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|--|------|------|--------|--|---|---|--------------|----------------|
| | 6 | 12 | | <p>Each TSO shall ensure the availability, reliability and redundancy of the following critical tools and facilities, which are required for system operation:</p> <p>a) facilities for monitoring of the System State of the transmission system, including State Estimation applications;</p> <p>b) means for controlling switching;</p> <p>c) means of communication between control centres of TSOs;</p> <p>d) means of communication between the control centres of a TSO and of DSOs, Power Generating Facility Operators and Demand Facilities, on the issues of balancing, Ancillary Services, transmission system defence, Restoration and on the delivery and coordination of real-time operational data;</p> <p>e) tools for Operational Security analysis.</p> | <p>Each TSO shall ensure the availability, reliability and redundancy of the following critical tools and facilities, which are required for system operation:</p> <p>a) facilities for monitoring of the System State of the transmission system, including State Estimation applications;</p> <p>b) means for controlling switching;</p> <p>c) means of communication between control centres of TSOs;</p> <p>d) existing means of communication between the control centres of a TSO and of DSOs, Power Generating Facility Operators and Demand Facilities (according to chapter 4), on the issues of balancing, Ancillary Services, transmission system defence, Restoration and on the delivery and coordination of real-time operational data as required by provisions in this code or other relevant regulation ;</p> <p>e) tools for Operational Security analysis.</p> | <p>Communication requirements are defined in Chapter 4. This article refers to requirements that are already running. "Existing" reflects much better this situation.</p> | technical | fundamental |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|-------------|------|------|--------|--|---|---|--------------|----------------|
| DSO comment | 6 | 13 | | Each TSO shall adopt an Emergency Plan which shall be reviewed at least annually and updated as required or following any significant change of critical tools and facilities or relevant system operation conditions. | Each TSO shall adopt an Emergency Plan which shall be reviewed at least annually and updated as required or following any significant change of critical tools and facilities or relevant system operation conditions. Parts of the Emergency plan shall be shared with DSOs and Significant Grid Users to the extent to which they are affected. | The "significant grid user" definition is already considering the significance of these users. Also, to be effective, where emergency plans involve third parties, those parties must be fully engaged. | technical | fundamental |
| | 6 | 15 | | Each TSO shall perform Operational Security analysis based on the forecast and real-time system operation parameters. | Each TSO shall perform Operational Security analysis based on the forecast and real-time system operation parameters, considering when applicable [OP&S NC]. | Security analysis previous to real-time is deeply developed in OP&S NC, that should be put in context here. | technical | fundamental |
| | 6 | 16 | | For Operational Security analysis in operational planning, each TSO shall use information on network, load and generation based upon a Common Grid Model. | For Operational Security analysis in operational planning, each TSO shall use information on network, load and generation based upon a Common Grid Model, as described in [OP&S NC]. | This is described in OP&S NC, that should be put in context here. | technical | fundamental |
| | 6 | 17 | | - | In case of a Blackout State, TSOs shall properly inform generators, DSOs, consumers about it and the next steps in solving the issue in the framework of the agreed plan to overcome black outs. In case of reiterative Alert State in the system, TSOs shall prepare an assessment to analyse the causes and propose solutions, related to future investment needs. | The actions taking by the TSOs in each of the 5 System states are not described. The case of having recurrent Alert States should trigger an in depth assessment of the causes. Actions in case of black-outs have to be agreed up-front in a common plan | technical | fundamental |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|--|------|------|--------|--|--|--|--------------|----------------|
| | 7 | | | Frequency Control Management | Remark: Check the consistency of article 7 with the NC on Load Frequency Control, and eventually delete this chapter to avoid overlaps. Check also reference to RfG. | NC on Load Frequency Control defines quality and reserves and not real time tools. Load frequency control is supposed to be dealt with in the NC on Load Frequency Control. | technical | fundamental |
| | 7 | 2 | | Each TSO shall monitor in real-time the frequency and the Area Control Error or an equivalent parameter. | - | Delete article, merge with 7.2. Article 7.3 and 7.2. should be integrated because they are telling more or less the same. | technical | editorial |
| | 7 | 3 | | Each TSO shall monitor generation and exchange schedules, power flows, node injections and other parameters relevant for detecting a risk of a frequency deviation and, in co-ordination with other TSOs of its Synchronous Area, take joint measures to limit their effects on the transmission system balance. | Each TSO shall monitor generation and exchange schedules, power flows, node injections and other parameters relevant for detecting a risk of a frequency deviation and, in co-ordination with other TSOs of its Synchronous Area, take joint measures to limit their effects on the transmission system balance. | Article 7.3 and 7.2. should be integrated because they are telling more or less the same. Also demand power flows should be monitored. | technical | editorial |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|-------------|------|------|--------|---|---|--|--------------|----------------|
| | 7 | 4 | | <p>Each TSO shall activate, or set up conditions necessary to ensure the activation of, active power reserves at different time-frames, in order to maintain:</p> <p>a) the balance of demand and supply of its Control Area;</p> <p>b) its Area Control Error, or an equivalent parameter at the Set-Point value;</p> <p>c) the frequency within the range defined for its Synchronous Area.</p> | <p>Each TSO in coordination with the other TSOs within the Capacity Calculation Region shall activate, or set up conditions necessary to ensure the activation of, active power reserves at different time-frames, in order to maintain:</p> <p>a) the balance of demand and supply of its Control Area;</p> <p>b) its Area Control Error, or an equivalent parameter at the Set-Point value;</p> <p>c) the frequency within the range defined for its Synchronous Area.</p> | TSOs need to coordinate and inform other TSOs within their region in an integrated Balancing market. | technical | fundamental |
| DSO comment | 7 | 5 | | Each TSO shall implement the necessary Remedial Actions, including Demand Side Management or Load Shedding in order to maintain the frequency quality within Operational Security Limits in its Responsibility Area. | Each TSO shall implement the necessary Remedial Actions, including Demand Side Management or Load-Shedding in order to maintain the frequency quality within Operational Security Limits in its Responsibility Area. If demand is connected to distribution network, affected DSO shall participate in the process. The applied Load Shedding schemes shall be harmonised within each synchronous area. | Not involving DSOs in DSM connected to their network could jeopardize security of supply and the quality of service of distribution networks. This could also affect overall system security and cross border flows. More details needed. Harmonization for load shedding schemes is needed. | technical | fundamental |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|-------------|------|------|--------|---|---|--|--------------|----------------|
| | 7 | 6 | | All Power Generating Facilities shall remain connected at least within the frequency and time ranges defined in the [NC RfG] | All Power Generating Facilities which are Significant Grid Users and where requirements from RfG are applicable shall endeavour to remain connected at least within the frequency and time ranges defined in the [NC RfG]. | The NC RfG makes a formal differentiation between existing and new plants, 1. This code should not specify requirements for Users which are not defined as Significant. 2. All Power Generating Facilities shall use best endeavours to remain connected but must have the right to disconnect if necessary to protect plant integrity. This will depend on the prevailing conditions, such as magnitude and duration of abnormal frequency, output, possibly together with combination of abnormal voltage, and also the history of abnormal conditions experienced by the plant. Also, most existing plants will not be designed in accordance with the RfG ranges. 3. The RfG code is by default only valid for New Build Plants and not for existing ones. rements | technical | fundamental |
| DSO comment | 7 | 7 | | Notwithstanding the provisions of Article 7(5), a DSO, Power Generating Facility or Demand Facility shall automatically disconnect at specified frequencies if required by the relevant TSO or DSO. The relevant TSO and DSO shall define the terms and settings for automatic disconnection while respecting the provisions of Article 3(3), Article 7(6) and the requirements specified for the whole Synchronous Area in the [NC RfG]. When the DSO defines this terms and settings, it shall obtain the TSO's approval. | Notwithstanding the provisions of Article 7(5), a DSO, Power Generating Facility or Demand Facility shall be automatically disconnected at specified frequencies if required by the Significant TSO or DSO. The Significant TSO and DSO shall define the terms and settings for automatic disconnection while respecting the provisions of Article 3(3), Article 7(6) and the requirements for operational security specified for the whole Synchronous Area in the [NC RfG]. | Settings shouldn't be approved by the TSO, but agreed upon between the DSO and the TSO. This code should not specify requirements for operators and Users which are not defined as Significant. Any changes to existing Facilities will incur costs and must be fully justified in a CBA. | technical | fundamental |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|-------------|------|------|--------|---|---|--|--------------|----------------|
| DSO comment | 8 | 1 | | In accordance with Article 6(4), each TSO shall endeavour to maintain the voltage and reactive power flows within Operational Security Limits. Each TSO shall monitor, control and maintain voltage levels and reactive power flows of its transmission system in real-time to protect equipment and maintain Voltage Stability of the transmission system. Each TSO shall be able to ensure adequate instantaneous reactive power reserve in order to secure the technical functioning of the transmission system and to restore a Normal State following a Contingency from the Contingency List. | In accordance with Article 6(4), each TSO shall endeavour to maintain the voltage within Operational Security Limits. Each TSO shall monitor, control and maintain voltage levels of its transmission system in real-time to protect equipment and maintain Voltage Stability of the transmission system. Each TSO shall be able to ensure adequate instantaneous reactive power reserve in order to secure the technical functioning of the transmission system and to restore a Normal State following a Contingency from the Contingency List. | Operational security limits do not define any reactive power flow limits. | technical | fundamental |
| | 8 | 2 | | In accordance with Article 6(5), directly connected TSOs shall define the voltage and/or reactive power flow limits on the Interconnections between their networks in order to use the reactive power resources in the most effective way and ensure adequate voltage control. | In accordance with Article 6(5), directly connected TSOs shall define within 6 months after the enforcement of this code the voltage and/or reactive power flow limits on the Interconnections between their networks in order to use the reactive power resources in the most effective way and ensure adequate voltage control. In case, after that period, TSOs do not reach an agreement, ACER in cooperation with the TSOs should find an agreement within 6 months. | Who decides if the affected TSOs do not agree? No reference to NRAs neither to ACER. | technical | fundamental |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|-------------|------|------|--------|--|--|---|--------------|----------------|
| DSO comment | 8 | 3 | | Each TSO shall coordinate Operational Security analysis with all affected TSOs in order to ensure respecting of the Operational Security Limits of voltages in its Responsibility Area and within the Responsibility Areas of these other TSOs. Each TSO shall perform Operational Security analysis based on the forecast and real-time operational parameters. | Each TSO shall coordinate Operational Security analysis with all affected TSOs in order to ensure respecting of the Operational Security Limits of voltages in its Control Area and within the Control Areas of these other TSOs. Each TSO shall perform Operational Security analysis based on the forecast and real-time operational parameters. | At this level coordination should be assessed at transmission levels. | technical | fundamental |
| | 8 | 4 | | Each Significant Grid User or DSO shall maintain reactive power limits at the Connection Point to the transmission system in a range defined in accordance with Article 6(5). | Each Significant Grid User connected to the Transmission Network shall maintain reactive power limits at the Connection Point to the transmission system in a range defined in accordance with NC RfG and NC DCC. The TSO shall produce or procure reactive power. | Not acceptable. Issue is covered by NC RfG or NC DCC. Reactive Power is to be procured as an ancillary service or to be produced by the Network Operator. | | |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|-------------|------|------|-------------------|---|---|---|--------------|----------------|
| DSO comment | 8 | 4 | new b) & c) | Each Significant Grid User or DSO shall maintain reactive power limits at the Connection Point to the transmission system in a range defined in accordance with Article 6(5). | <p>b) Each Significant Grid User connected to the Significant Distribution network shall maintain voltage, reactive power or power factor set-points for voltage control optimization in accordance with article 3(3). Set point of significant grid users connected to transmission will be defined by TSOs and significant grid users connected to distribution will be defined by DSOs.</p> <p>c) Each Significant DSO shall cooperate with the relevant TSO to maintain reactive power limits at the Connection Point to the transmission system in a range defined in accordance with Article 6(5).</p> | <p>We suggest splitting article 8.4 to consider significant grid users in a specific article. Regarding DSOs comments are being considered at article 8.12.</p> <p>Reactive compensation at the TSO-DSO connection point is not a suitable tool for maintenance of operational security. The reactive power flow is a result of balancing between voltages in TSO network and DSO network.</p> <p>It can provide alternative to transmission network development but at the cost of important investments and operational costs (losses) and constraints in distribution networks.</p> <p>Imposing it through the NC without appropriate CBA, it would result in a mere transfer of costs from TSOs to DSOs.</p> <p>All possible and additional solutions for regional control of reactive power and voltage must be considered. Decision on the reactive power exchange between TSO and DSO should be based on the result of a national CBA. In the latter case, agreement between TSOs and DSOs should be required. Any additional DSO costs need to be recovered. Where today conditions are defined in bi-lateral agreements this system should be kept.</p> <p>The incurred costs need to be assessed by the NRA and borne by the real originator of the cost.</p> | technical | fundamental |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|-------------|------|------|--------|--|--|--|--------------|----------------|
| | 8 | 5 | | All Power Generating Facilities shall remain connected at least within the voltage and time ranges defined in the [NC RfG]. | All Power Generating Facilities which are deemed as Significant Grid Users shall endeavour to remain connected at least within the voltage and time ranges defined in the [NC RfG]. | see art 7.6 | | |
| DSO comment | 8 | 6 | | Notwithstanding the provisions of the Article 8(4), a Power Generating Facility or Demand Facility shall automatically or manually, disconnect at specified voltages in the specified timeframe if required by the relevant TSO or DSO. The relevant TSO and DSO shall define the terms and settings for automatic disconnection while respecting the provisions of Article 3(3), Article 8(5) and the requirements specified for the whole Synchronous Area in the [NC RfG]. When the DSO defines this terms and settings, it shall obtain the TSO's approval. The relevant TSO and DSO shall insert these terms and settings for automatic disconnection in a contractual agreement with the Power Generating Facility Operators and/or Demand Facilities. | Notwithstanding the provisions of the Article 8(4), a Power Generating Facility or Demand Facility shall automatically or manually, disconnect at specified voltages in the specified timeframe if required by the Significant TSO or DSO. The respective TSO and DSO shall define the terms and settings for automatic or manual disconnection while respecting the provisions of Article 3(3), Article 8(5) and the requirements specified for the whole Synchronous Area in the [NC RfG]. For distribution network connected facilities, DSO will define the terms of the disconnection and informing TSO who could propose modifications if Transmission system security is affected. | Reactive compensation at the TSO-DSO connection point is not a suitable tool to maintain operational security. | technical | fundamental |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|-------------|------|------|--------|---|---|--|--------------|----------------|
| | 8 | 7 | | Each TSO shall use all available reactive power resources to ensure effective reactive power management within its Responsibility Area and maintain the voltage and reactive power Operational Security Limits. | In accordance with article 6(5), each TSO shall use reactive power resources in its network necessary to ensure effective reactive power management within its Responsibility Area and maintain the voltage and reactive power Operational Security Limits. Each TSO shall produce or procure the reactive power his network needs, both in normal operation and in disturbed mode. The incurred costs need to be assessed by the NRA and borne by the real originator of the cost. | Available reactive power is unclear. Reactive Power is to be procured as an ancillary service or to be produced by the Network Operator. | technical | fundamental |
| DSO comment | 8 | 7 | new b) | | Each Significant DSO (just in its operated network), shall use all available reactive power resources necessary to ensure effective reactive power management within the Observability Area and within the Operational Security Limits. | It can provide alternative to transmission network development but at the cost of important investments and operational costs (losses) and constraints in distribution networks. The incurred costs need to be assessed by the NRA and borne by the real originator of the cost. | technical | fundamental |
| DSO comment | 8 | 8 | | Each TSO shall prepare Remedial Actions to cope with the potential or identified deviation from the voltage Operational Security Limits. The effectiveness of Remedial Actions shall be evaluated by the TSO. When the Remedial Actions are found ineffective, the TSO shall either adjust its Remedial Actions to render them effective or apply pre-fault Remedial Actions. | In accordance with article 3.3, each TSO shall prepare Remedial Actions to cope with the potential or identified deviation from the voltage Operational Security Limits. If distribution network is affected, the Significant DSO shall participate in the process. | Imposing it through the NC without appropriate CBA, it would result in a mere transfer of costs from TSOs to DSOs. | technical | fundamental |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|--|------|------|--------|---|---|--|--------------|----------------|
| | 8 | 8 | | Each TSO shall prepare Remedial Actions to cope with the potential or identified deviation from the voltage Operational Security Limits. The effectiveness of Remedial Actions shall be evaluated by the TSO. When the Remedial Actions are found ineffective, the TSO shall either adjust its Remedial Actions to render them effective or apply pre-fault Remedial Actions. | Each TSO shall prepare Remedial Actions to cope with the potential or identified deviation from the voltage Operational Security Limits. The effectiveness of Remedial Actions shall be evaluated by the NRAs, which should be informed on an annual basis of the remedial actions used by the TSO. When the Remedial Actions are found ineffective, the TSO shall either adjust its Remedial Actions to render them effective or apply pre-fault Remedial Action. The TSO shall inform the NRAs about the new adjustments. | All possible and additional solutions for regional control of reactive power and voltage must be considered. Decision on the reactive power exchange between TSO and DSO should be based on the result of a national CBA. In the latter case, agreement between TSOs and DSOs should be required. Any additional DSO costs need to be recovered. | technical | fundamental |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|-------------|------|------|--------|---|----------|---|--------------|----------------|
| DSO comment | 8 | 9 | | <p>Each TSO shall monitor the respecting of operational voltage limits by Power Generating Facility Operators and Demand Facilities within its Responsibility Area, using real-time measurements of at least three of the following quantities:</p> <p>a) voltages; b) currents; c) active and reactive power flows; and d) node injections and withdrawals.</p> <p>These quantities, measured within the Observability Area of each TSO, shall refer to:</p> <p>e) transmission system elements; f) Power Generating Facilities connected to the transmission system; g) Demand Facilities connected to the transmission system; and h) aggregated values of Power Generating Facilities and Demand Facilities connected to a distribution system.</p> | - | Delete this article - all this is already included in Chapter 4 on data exchange. | technical | editorial |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|-------------|------|------|--------|--|---|--|--------------|----------------|
| DSO comment | 8 | 10 | | Each TSO shall operate or direct the operation of reactive power resources within its Responsibility Area including blocking of automatic voltage/reactive power control of transformers, voltage reduction and load-shedding measures, in order to maintain Operational Security Limits, to prevent out-of-limit voltage variations and to prevent voltage collapse of the transmission system. | Each TSO shall operate or direct the operation of reactive power resources connected to its grid within its Control Area including blocking of automatic voltage/reactive power control of transformers, voltage reduction and load-shedding measures, in order to maintain Operational Security Limits, to prevent out-of-limit voltage variations and to prevent voltage collapse of the transmission system. | DSO is responsible for managing the reactive power flows in its network. | technical | fundamental |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|-------------|------|------|--------|--|--|---|--------------|----------------|
| DSO comment | 8 | 12 | | Each TSO and each DSO shall maintain voltage and reactive power flows within the defined limits at the interconnection points between the transmission system and the distribution networks. If voltage deterioration jeopardizes Operational Security or threatens to develop into a voltage collapse, the TSO may direct DSOs and Significant Grid Users to block automatic voltage/reactive power control of transformers and/or to follow other Voltage Control instructions. As a consequence of these measures directed by the TSO, the DSO may have to disconnect Demand Facilities and/or Power Generating Facility Operators to avoid jeopardising the transmission system. | In accordance with existing bilateral agreements or values defined in a procedure following art 3(3), each TSO and each Significant DSO shall agree and maintain voltage, reactive power flows or power factor ranges at the interconnection points between the transmission system and the distribution networks. If voltage deterioration jeopardizes Operational Security or threatens to develop into a voltage collapse, the TSO may direct DSOs and Significant Grid Users to block automatic voltage/reactive power control of transformers and/or to follow other Voltage Control instructions. As a consequence of these measures directed by the TSO, the DSO may have to disconnect Demand Facilities and/or Power Generating Facility Operators to avoid jeopardising the transmission system. Should such actions lead to damages to these facilities, the costs have to be covered by the TSO. | <p>In a lot of countries exchange of reactive power between TSO and DSO is governed by bilateral agreement and this should not change. An adequate CBA is needed for this requirement and reference to art. 3(3) should thus be added. Reactive power flows at the interconnection points between the Transmission and Distribution Networks shouldn't have limits to maintain voltage limits at these points. Voltage control requires a system approach (overall system security and losses optimisation). If Significant DSO does not participate, security standards may be not fulfilled at DSO voltage levels and losses may be not optimised. Sub-optimal investments might be triggered.</p> <p>A blockage of voltage/reactive power control at the interconnection points might lead to inadmissible voltage level and damages to distribution network connected facilities. As there are contractual obligations between the DSO and its connected partners on voltage ranges this might lead to compensation claims.</p> <p>The costs should be covered by the TSO as the initiator of the blockage of automatic regulation mechanism. The blockage should only be allowed to avoid a voltage collapse.</p> | technical | fundamental |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|-------------|------|------|--------|---------|--|--|--------------|----------------|
| DSO comment | 8 | 13 | | - | Significant Power Generating facilities connected to DSO network shall cooperate with the Relevant DSO in voltage control management in accordance with article 3(3). | Without this, DSO would not be able to maintain voltage and reactive power at the T/D connection point. Voltage control requires a system approach in order to minimize losses. The incurred costs need to be assessed by the NRA and borne by the real originator of the cost. | technical | fundamental |
| | 8 | 15 | | | Occurrences of events (and their frequency) out of following voltage ranges shall be agreed between the Relevant Network Operator and PGF Owners in accordance with the following scheme: o Voltage at connection point within -5% / +5% of the Reference Voltage during >99.9% of the time o Outside this range, an agreement with the PGF Owner or Consumer is needed. | Hard figures to monitor TSO and DSO responsibilities should be mandatory. | technical | fundamental |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|-------------|------|------|--------|---|---|--|--------------|----------------|
| DSO comment | 9 | 1 | | In accordance with Article 6(4), each TSO shall maintain the short-circuit current within Operational Security Limits. Each TSO shall endeavour to ensure within its Responsibility Area, that the short-circuit current does not exceed the limits of the short-circuit capability of circuit breakers and other equipment and that the short-circuit current is not lower than the current required for correct operation of the protection equipment at any time. This condition has to be fulfilled for all Fault types and for all protection equipment, with a deviation from this condition allowed only during switching sequences. | In accordance with Article 6(4), each TSO shall maintain the short-circuit current within Operational Security Limits. Each TSO shall endeavour to ensure within its Control Area, that the short-circuit current does not exceed the limits of the short-circuit capability of circuit breakers and other equipment and that the short-circuit current is not lower than the current required for correct operation of the protection equipment at any time. This condition has to be fulfilled for all Fault types and for all protection equipment, with a deviation from this condition allowed only during switching sequences. | The security limits for the short-circuit current are maintained by DSO at distribution level. | technical | fundamental |
| | 9 | 3 | | Each TSO shall perform the short-circuit current and power calculation according to the best available data and its own practice approaches or according to IEC 60909. | Remark on using IEC standard as a reference. | IEC standards are used in this code as a reference of good practise while in the NC RfG IEC standards are not respected. | technical | fundamental |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|-------------|------|------|--------|---|---|--|--------------|----------------|
| DSO comment | 9 | 5 | | Each TSO shall perform short-circuit calculations in order to evaluate the impact of neighbouring transmission systems and connected distribution networks on the short-circuit current level. If the impact of a connected distribution network is significant, the distribution network has to be modelled in the transmission short-circuit calculations with the level of detail which is needed for successful calculations, using where applicable the equivalents with sufficient degree of detail and accuracy. | In accordance with Article 6(4) , each TSO shall perform short-circuit calculations in order to evaluate the impact of neighbouring Transmission Systems and connected Distribution Networks on the short-circuit current level. The short-circuit current shall not exceed the limits of the short-circuit capability of circuit breakers and other equipment and the short-circuit current shall not be lower than the current required for correct operation of the protection equipment at any time. If the impact of a connected Distribution Network is significant, the Distribution Network has to be modelled in the transmission short-circuit calculations with the level of detail which is needed for successful calculations (Observability Area), using where applicable the equivalents with sufficient degree of detail and accuracy. | It should be restricted to “observability area” network defined by NRA in coordination with TSO and DSO. Is the correct calculation the only object of a higher short-circuit current? Quick recovery after fault? | technical | fundamental |
| | 10 | | | Congestion and power flows management | Power flows management | The term "Congestion" used in the title is neither defined, nor used in the articles. It may not be needed | | |
| | 10 | 1 | | Each TSO shall endeavour to maintain the active power flows within Operational Security Limits in accordance with Article 6(4). | Each TSO shall maintain the power flows within Operational Security Limits in accordance with Article 6(5). | Reactive power should be also monitored and being within the Operational Security Limits. The Operational Security Limits are defined in Article 6(5). | technical | fundamental |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|-------------|------|------|--------|---|--|--|--------------|----------------|
| | 10 | 2 | | Each TSO shall coordinate Operational Security analysis with all affected TSOs in order to ensure the respecting of the Operational Security Limits of power flows in its Responsibility Area. Each TSO shall perform Operational Security analysis based on the forecast and real-time operational parameters. | Each TSO shall coordinate Operational Security analysis with all affected TSOs, at least at regional level , in order to ensure the respecting of the Operational Security Limits of power flows in its Responsibility Area. Each TSO shall perform Operational Security analysis based on the forecast and real-time operational parameters. This analysis shall be submitted to the NRAs in annual basis and shall be publicly available. | Coordination shall be at minimum at regional level. NRAs shall be informed about the state of play of congestions and the analysis performed by the TSOs. | technical | fundamental |
| DSO comment | 10 | 2 | | Each TSO shall coordinate Operational Security analysis with all affected TSOs in order to ensure the respecting of the Operational Security Limits of power flows in its Responsibility Area. Each TSO shall perform Operational Security analysis based on the forecast and real-time operational parameters. | Each TSO shall coordinate Operational Security analysis with all affected TSOs in order to ensure the respecting of the Operational Security Limits of power flows in its Control Area. Each TSO shall perform Operational Security analysis based on the forecast and real-time operational parameters. | The security limits for the power flows are maintained by DSO at distribution level. | technical | fundamental |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|--|------|------|--------|---|--|--|--------------|----------------|
| | 10 | 3 | | Each TSO shall adopt and implement Remedial Actions to cope with the potential or identified deviation from the power flow Operational Security Limits in N-Situation and be prepared to set-up the necessary Remedial Actions for coping with (N-1)-Situation. | Each TSO shall adopt and implement Remedial Actions to cope with the potential or identified deviation from the power flow Operational Security Limits in N-Situation and be prepared to set-up the necessary Remedial Actions for coping with (N-1)-Situation. All TSOs of each Capacity Calculation Region shall agree on the use of cross control area remedial actions. | Consistent with the Article 39 of CACM NC. The use of a Remedial Actions shall be coordinated cross control areas. | technical | fundamental |
| | 10 | 4 | | If after a Contingency when the steady-state operation is re-established, the transmission system is not compliant with the (N-1)-Criterion, the TSO shall initiate Remedial Actions to recover compliance with the (N-1)-Criterion as soon as reasonably practicable. If there is a risk of a post Contingency disturbance propagation involving neighbouring TSOs or enhanced probability of further Faults, the TSO shall initiate Remedial Actions as soon as possible. | If after a Contingency when the steady-state operation is re-established, the transmission system is not compliant with the (N-1)-Criterion, the TSO shall as soon as possible initiate Remedial Actions to recover compliance with the N-1 Criterion | If the system is not in compliance with the N-1 criterion, TSO shall initiate remedial actions. It is not clear how the risk of a contingency propagation is assessed by the TSOs. | technical | fundamental |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|--|------|------|--------|---|---|--|--------------|----------------|
| | 10 | 5 | | <p>Non-compliance with the (N-1)-Criterion is acceptable:</p> <p>a) during switching sequences;</p> <p>b) if it only has local consequences within the TSO Responsibility Area; and</p> <p>c) during the time period required to activate the Remedial Actions.</p> | <p>Non-compliance with the (N-1)-Criterion is generally acceptable:</p> <p>a) during switching sequences; and</p> <p>b) during the time period required to activate the Remedial Actions.</p> <p>If non-compliance has the potential for an adverse impact on grid users, then it is only acceptable subject to the agreement of 1) the Grid users and 2) the NRA. This could be achieved by a public consultation and derogation process for the TSO</p> | <p>TSO should guarantee always the compliance with (N-1) criterion.</p> <p>A continuous risk even for a national system is not acceptable</p> <p>It is not justifiable for TSOs to be able to grant derogations to themselves from Operational Security rules if there are potentially adverse impacts (either safety or commercial impacts) on Users, without any agreement by Users and the NRA.</p> | technical | fundamental |
| | 10 | 5 | b | if it only has local consequences within the TSO Responsibility Area; | if it only has local temporary consequences for a limited time during one day within the TSO Responsibility Area;... | Noncompliance with the (N-1) Criterion should be the exception and not the daily practice, otherwise network expansion needs to be planned and constructed. | | |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|-------------|------|------|--------|---|---|--|--------------|----------------|
| DSO comment | 10 | 6 | | In accordance with Article 10(7) and (8), each TSO shall be entitled to re-dispatch available Power Generating Facilities and Demand Facilities connected to the transmission system or to the distribution networks if it is necessary to prevent deviations from the power flow Operational Security limits in the transmission system. | In accordance with Article 10(7) and (8), each TSO shall be entitled to Re-dispatch available Significant Power Generating Facilities and Demand Facilities connected to the Transmission Network or to Significant Distribution Networks through the corresponding DSO if it is necessary to prevent deviations from the power flow Operational Security limits in the Transmission System, in accordance with article 3.3. Re-dispatch instructions shall always be issued in accordance with commercial arrangements (e.g. the Balancing Principles Statement). | DSOs should do this re-dispatch to all the power generating facility operators and demand facilities connected to the networks they manage. TSO mustn't give instructions directly. It is necessary to ensure that no re-dispatch takes place outside the relevant commercial frameworks which are used in some countries to purchase balancing and other ancillary services, including re-dispatch, on commercial terms. Otherwise, these commercial / market frameworks will be undermined. | technical | fundamental |
| | 10 | 6 | | In accordance with Article 10(7) and (8), each TSO shall be entitled to re-dispatch available Power Generating Facilities and Demand Facilities connected to the transmission system or to the distribution networks if it is necessary to prevent deviations from the power flow Operational Security limits in the transmission system. | In accordance with Article 10(7) and (8), each TSO Each TSO shall be entitled to re-dispatch available Power Generating Facilities and Demand Facilities based on bilateral contractual agreements applicable to its Control Area if it is necessary to prevent deviations from the power flow Operational Security limits in the transmission system . | Re-dispatching of available Generation shall only be possible based on a contractual agreement between TSO and owner of Generation facilities | | |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|-------------|------|------|--------|--|---|--|--------------|----------------|
| DSO comment | 10 | 8 | | While respecting the provisions of Article 3(3), each TSO shall define Re-dispatch measures in coordination with DSOs before real-time to determine those Grid Users connected to distribution networks which may be re-dispatched. Each TSO shall inform the affected DSO of Re-dispatch measures affecting Power Generating or Demand Facilities connected to its distribution networks. | While respecting the provisions of Article 3(3), each TSO shall define Re-dispatch measures in coordination with DSOs before real-time to determine which Significant Grid Users connected to distribution networks which may be re-dispatched, taking into account the security of the distribution network. Each TSO shall inform the affected DSO of Re-dispatch measures affecting Power Generating or Demand Facilities connected to its Distribution Networks, who will execute it if distribution network is not jeopardized. Otherwise, the affected DSO will provide TSO with an equivalent effect at T/D connection point with an action that is safe for the distribution network. | Re-dispatch measures to be evaluated by DSO, otherwise overall system security and cross border flows may be affected. The Re-dispatch measures affecting the connected distribution networks shall maintain the operational security of the distribution network. To clarify that this applies only to Significant Grid Users and not to all Grid Users. Re-dispatch measures have to be in line with agreed defence plans or other remedial action plans as defined in a procedure following Art 3.3 respecting basic rules agreed on regional level and in line with provisions in NC CACM | technical | fundamental |
| | 10 | 9 | | Unless market based pricing for Re-dispatch exists, affected Grid Users shall ex-ante provide Re-dispatch costs to the relevant TSOs and also to DSOs if DSOs are involved in Re-dispatch. This information shall be treated as confidential and be shared only between the TSOs, the DSOs involved in the Re-dispatch measures and relevant NRAs. | In principle all Re-dispatch measures shall be economically organised and executed by using market based principles and pricing procedures. Unless market based pricing for Re-dispatch exists, affected Grid Users may ex-ante provide Re-dispatch costs short-term offers to the relevant TSOs and also to DSOs if DSOs are involved in Re-dispatch. This information shall be treated as confidential and be shared only between the TSOs, the DSOs involved in the RE-dispatch measures and relevant NRAs. | Due to the highly flexible field of application e.g. balancing services and the seasonal availability of water in different regions, it is not possible to deliver ex-ante information on price estimation of re-dispatch costs of Hydro Power Plants. Price estimations on re-dispatching costs are only available just before real time. | | |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|-------------|------|------|--------|---|--|---|--------------|----------------|
| DSO comment | 10 | 10 | | Each TSO shall monitor power flows within its Responsibility Area and on its Interconnections based on the real-time telemetry and measurements from its own Responsibility Area and from the Responsibility Areas of the TSOs within its Observability Area. | Each TSO shall monitor power flows within its Control Area and on its Interconnections based on the real-time telemetry and measurements from its own Control Area and from the Control Areas of the TSOs within its Observability Area. | DSO is responsible for monitoring power flows in its distribution network. | technical | fundamental |
| DSO comment | 10 | 12 | | <p>Each TSO shall perform power flow Operational Security analysis in real-time, based on real-time measurements of voltages, currents, power flows, injections and withdrawals in its own Observability Area, of:</p> <p>a) transmission system elements;</p> <p>b) Power Generating Facilities and Demand Facilities connected to transmission system;</p> <p>c) relevant aggregated values of Power Generating Facilities and Demand Facilities connected to distribution systems.</p> | <p>Each TSO shall perform power flow Operational Security analysis in real-time, based on real-time measurements of voltages, currents, power flows, injections and withdrawals in its own Observability Area, of:</p> <p>a) transmission system elements;</p> <p>b) Power Generating Facilities and Demand Facilities connected to transmission system;</p> <p>c) aggregated values of Power Generating Facilities and Demand Facilities connected to a Distribution System provided by DSO at T/D connection point.</p> | <p>DSO is responsible for maintaining operational security in its network, so DSO has to monitor all the connected elements, and provide the information at the point where TSO is affected, the connection point.</p> <p>To be able to include not measurable effects, also simulations can be used.</p> | technical | fundamental |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|-------------|------|------|--------|-----------------------------------|--|---|--------------|----------------|
| DSO comment | 10 | 14 | | Add new Article | In accordance with article 3(3), each Significant DSO shall be entitled to Re-dispatch available Power Generating Facilities and Demand Facilities connected to the Distribution Networks if it is necessary to prevent deviations from the power flow Operational Security limits in the Distribution System. | Transmission Operational limits and, therefore, overall system security and cross border flows may be affected by Security limits in Distribution Networks. The costs shall be borne by the real originator (in case of under dimensioning of the network, these costs are an incentive to strengthen the Network). | technical | fundamental |
| DSO comment | 10 | 15 | | Add new Article | In accordance with article 3(3), each Significant DSO shall be entitled to use flexibility offerings and curtailment from available Power Generating Facilities and Demand Facilities connected to the Distribution Networks if it is necessary to prevent deviations from the power flow Operational Security limits in the Distribution System. | Transmission Operational limits and, therefore, overall system security and cross border flows may be affected by Security limits in Distribution Networks. The costs shall be borne by the real originator (in case of under dimensioning of the network, these costs are an incentive to strengthen the Network). | technical | fundamental |
| DSO comment | 11 | | | CONTINGENCY ANALYSIS AND HANDLING | Remark: a periodicity to share information between TSOs and DSOs (bidirectional communication) should be defined in order to accomplish the reciprocity principle. Also, the use of the term "contingency" should be clarified. The code needs to be improved taking in consideration necessities from operability of power plants by respecting the points given in the justification | The definition of Contingency refers only to the Control Area, but the term Control Area is not used at all-in this article. Article 11 uses mainly the term Observability Area. Please clarify. | technical | fundamental |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|-------------|------|------|--------|---|---|--|--------------|----------------|
| DSO comment | 11 | 2 | | Each TSO shall perform Contingency analysis on the basis of the forecast and real-time system operation parameters. Each TSO shall ensure that potential deviations from the (N-1)-Criterion which are identified by the Contingency analysis of Internal and External Contingencies in its Responsibility Area do not endanger the Operational Security of its transmission system or of the interconnected transmission systems. TSO can decide not to apply Remedial Actions considered as too expansive in accordance with its national legislation if the potential Disturbances are local and they do not impact the Operational Security of the interconnected transmission systems. | Each TSO shall perform Contingency analysis on the basis of the forecast and real-time system operation parameters. Each TSO shall ensure that potential deviations from the (N-1)-Criterion which are identified by the Contingency analysis of Internal and External Contingencies in its Responsibility Area do not endanger the Operational Security of its Transmission System or of the interconnected Transmission Systems. TSO can decide not to adopt and implement costly Remedial Actions in accordance with its local rules and procedures if the potential Disturbances are local and they do not impact the Operational Security of the interconnected Transmission Systems and the operational security of the grid users connected. | It is not acceptable that a TSO has the right to not react at emergency situations if international trade is not endangered. Who/How is decided the impact on the international trade? Remedial Actions should be taken into account although the potential Disturbances are local if they impact the Operational Security of the "local" Electric System. DSOs network shouldn't be the N-1 of Transmission Network unless it is properly defined and paid for. It is not acceptable to ignore Remedial Actions if this may result in unreasonably adverse impacts on Grid Users. Hence, an assessment is required to compare the costs of the actions against the benefits of the actions. Clear definition/ criteria of "too expansive" is necessary probably only technical issues to be mentioned | technical | fundamental |
| DSO comment | 11 | 4 | a | Each TSO shall classify Contingencies for its own Responsibility Area. | Each TSO shall classify Contingencies for its own Control Area. | DSO is in charge of managing the contingencies in its network. | technical | fundamental |
| | 11 | 9 | | Each TSO shall use in its Contingency analysis a Common Grid Model gathering information on its own network and at least Demand and Power Generation Facilities and network elements of the neighbouring transmission systems | Each TSO shall use in its Contingency analysis the Common Grid Model gathering information on its own network and at least Demand and Power Generation Facilities and network elements of the neighbouring transmission systems | Only one Common grid Model. | technical | editorial |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|-------------|------|------|--------|---|--|---|--------------|----------------|
| DSO comment | 11 | 10 | | In order to perform Contingency analysis and other Operational Security analyses, each TSO shall use and provide to the other TSOs the consumption and generation forecast for its Responsibility Area. | In order to perform Contingency analysis and other Operational Security analysis, each TSO shall use and provide to their connected DSOs and other TSOs the consumption and generation forecast for its Responsibility Area. | DSOs need information to operate their distribution system. | technical | fundamental |
| DSO comment | 11 | 11 | | Each TSO shall ensure that the model of its Observability Area used for Contingency analysis is based upon a sufficient amount of accurate real-time data and gathers information on its own network and at least Demand and Power Generation Facilities and network elements of the neighbouring transmission systems. | Each TSO shall ensure that the model of its Observability Area used for Contingency analysis is based upon a sufficient amount of accurate real-time data and gathers information on its own network and at least Demand and Power Generation Facilities connected to Transmission System and network elements of the neighbouring Transmission Systems. | Demand and Power Generation Facilities connected to Transmission System are relevant to contingency analysis. The demand and power generation facilities connected to Distribution System shouldn't be considered unless they were in the Observability Area. | technical | fundamental |
| DSO comment | 11 | 12 | | Each DSO and Significant Grid User shall cooperate and deliver all information for Contingency analysis as requested by the TSO, including forecast and real-time data, with possible data aggregation in line with Article 25(1). | Each Significant DSO and Significant Grid User shall cooperate and deliver necessary information for Contingency analysis as requested by the TSO, in accordance with article 3.3 including forecast and real-time data, with possible data aggregation in line with the Article 25(1) of this NC. TSO will deliver all necessary information to each Significant DSO. | 1. TSO's requests should be agreed with the Parties and the NRA, in accordance with 3.3 2. TSOs should also deliver information to DSO and define periodicity of this information interchange. | technical | fundamental |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|-------------|------|------|--------|---|--|---|--------------|----------------|
| | 11 | 14 | | Each TSO shall contribute to establishing a Common Grid Model within its Synchronous Area. This contribution shall include the data for the Common Grid Model according to the defined quality and timeframes established in the [NC OPS]. Each Significant Grid User shall provide and update regularly the data required by their TSO for the CGM in accordance with Articles 15 to 28. | Each TSO shall contribute to establishing the Common Grid Model within its Synchronous Area. This contribution shall include the data for the Common Grid Model according to the defined quality and timeframes established in the [NC OPS]. Each Significant Grid User shall provide and update regularly the data required by their TSO for the CGM in accordance with Articles 15 to 28. | Only one Common grid Model. | technical | editorial |
| | 11 | 19 | | Each Significant Grid User connected to the transmission system shall, after a de-synchronisation, obtain the permission from its TSO to re-synchronise. | Each Significant Grid User connected to the transmission system shall, after a de-synchronisation, obtain the permission from its TSO to re-synchronise. In the same way, TSO should inform the Significant Grid User connected to the transmission system before re-connect a transmission system element. | A Significant Grid User could be seriously affected when a TSO re-connect a transmission element | technical | editorial |
| DSO comment | 11 | 20 | | After de-synchronization and when requested by a TSO, each DSO shall ensure that each relevant Significant Grid User connected to the distribution network and identified by the TSO obtains the permission to re-synchronize from its DSO and from its TSO via its DSO prior to its re-synchronization. | Where the TSO wishes to propose any regime whereby Significant Grid Users need to obtain TSO or DSO permission before resynchronization, the TSO shall make such a proposal accompanied by an appropriate cost benefit analysis for approval by the NRA. | There is currently no systematic way for enabling this. So any proposal needs to have a full CBA before it becomes binding law. | technical | fundamental |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|-------------|------|------|--------|------------|--|---|--------------|----------------|
| DSO comment | 11 | 21 | | - | If concerned facilities are connected to distribution networks, affected Significant DSO should be considered in the process of Contingency analysis and Handling. | Not involving Significant DSO in the process affecting its network could endanger distribution network. This could affect overall system security and cross border flows. | technical | fundamental |
| | 12 | | | Protection | General remark: a balance between TSO and generator is not respected. An example is this article that does not impose to TSOs clearance times for faults, but generators have to be able to withstand faults with well-defined time periods. | - | technical | fundamental |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|--|------|------|--------|---|--|--|--------------|----------------|
| | 12 | 1 | | Each TSO shall endeavour to ensure the correct functioning of protection of its equipment through updates of the settings of protection relays if the network topology or operational conditions change. Each TSO shall continuously analyse and when necessary change the functioning of its protection relays or review the protection concept. | Each TSO shall endeavour to ensure the correct functioning of protection of its equipment through updates of the settings of protection relays if the network topology or operational conditions change. Each TSO shall continuously analyse and when necessary change the functioning of its protection relays or review the protection concept. Each TSO shall foresee the necessary protective equipment within its network in order to efficiently and effectively protect network equipment as well as the electrical equipment from grid users and generating facilities from any fault on the network or operations by the TSO or DSO. | Endeavour' is too vague for a network code. TSOs should not only ensure the correct functioning and operate the protection, but also provide (i.e. plan, integrate, invest, install, update, ...) protective equipment's (monitoring devices, relays, etc.) that not only protects the network itself but also the electrical equipment and generating units connected to the grid. Generators are allowed to protect their generation assets from any damaging phenomena on the grid, but should not be imposed to foresee protective equipment that in fact are used for grid purposes. For instance - ROCOF relays: are only useful to reduce complexity to restore the grid after an incident and it could be doubted if this kind of protection is helpful in case of a system emergency when all generating units need to remain connected to the grid as long as possible - Vector Jump relays: are only useful when the grid operator neglects to check the synchronicity between different parts of his grid he wishes to (re)connect to each other. In fact, as generators we should demand from TSO's that at the connection point we never experience a vector shift of more than 10° | technical | Fundamental |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|--|------|------|--------|--|--|---|--------------|----------------|
| | 12 | 2 | | Each TSO shall endeavour to operate the protection of its transmission system with Set-Points that ensure reliable, fast and selective fault clearing, including backup protection for fault clearing in case of malfunction of the main protection system or primary equipment. | Each TSO shall endeavour to operate the protection of its transmission system with Set-Points that ensure reliable, fast and selective fault clearing, including backup protection for fault clearing in case of malfunction of the main protection system or primary equipment. | 'Endeavour' is too vague for a network code | | |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|--|------|------|--------|--|--|--|--------------|----------------|
| | 12 | 4 | | <p>If a TSO is using a System Protection Scheme, the TSO shall:</p> <p>a) perform analysis in order to ensure that each SyPS acts selectively, reliably and effectively. In the analysis of SyPS, the TSO shall evaluate the consequences for the transmission system in the event of an incorrect SyPS function, taking into account the interaction with affected TSOs;</p> <p>b) verify that the SyPS has a comparable reliability as the protection relays used for the protection of primary equipment;</p> <p>c) operate the SyPS within the Operational Security Limits determined in accordance with Article 6(5) and (6); and</p> <p>d) coordinate SyPS functions, activation principles and Set-Points with affected TSOs and affected Grid Users.</p> | <p>If a TSO is using a System Protection Scheme, the TSO shall:</p> <p>a) perform analysis in order to ensure that each SyPS acts selectively, reliably and effectively. In the analysis of SyPS, the TSO shall evaluate the consequences for the transmission system in the event of an incorrect SyPS function, taking into account the interaction with affected TSOs;</p> <p>b) verify that the SyPS has a comparable reliability as the protection relays used for the protection of primary equipment;</p> <p>c) operate the SyPS within the Operational Security Limits determined in accordance with Article 6(5) and (6); and</p> <p>d) coordinate SyPS functions, activation principles and Set-Points with affected TSOs, affected Grid Users and Significant DSOs</p> <p>e) ensure the SyPS efficiently and effectively protects the electrical equipment from grid users and generating facilities from any fault on the network or operations by the TSO or DSO, for instance by avoiding vector shifts of more than 10° when operations are performed within the grid</p> | <p>Significant DSOs should be considered because they are not Grid Users (article 2 Grid User Definition).</p> <p>TSOs should not only ensure the correct functioning and operate the protection, but also provide (i.e. plan, integrate, invest, install, update, ...) protective equipment's (monitoring devices, relays, etc.) that not only protects the network itself but also the electrical equipment and generating units connected to the grid. Generators are allowed to protect their generation assets from any damaging phenomena on the grid, but should not be imposed to foresee protective equipment that in fact are used for grid purposes. For instance</p> <ul style="list-style-type: none"> - ROCOF relays: are only useful to reduce complexity to restore the grid after an incident and it could be doubted if this kind of protection is helpful in case of a system emergency when all generating units need to remain connected to the grid as long as possible - Vector Jump relays: are only useful when the grid operator neglects to check the synchronicity between different parts of his grid he wishes to (re)connect to each other. In fact, as generators we should demand from TSO's that at the connection point we never experience a vector shift of more than 10° | technical | fundamental |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|-------------|------|------|--------|--|--|---|--------------|----------------|
| | 13 | 4 | | Each TSO shall coordinate with the other TSOs of its Synchronous Area to establish the methodology used within this Synchronous Area to calculate the minimum percentage of generation from Power Generating Facility with synchronous generators which is required to be procured at any times for maintaining stability and Operational Security. While respecting the provisions of Article 3(3), each TSO shall be entitled to define this minimum percentage. | | Clarification: is this a new ancillary service called inertia? How it will be purchased? | technical | fundamental |
| | 14 | 1 | | ...responsibility, perform operational testing when required and participate ... | ... responsibility, perform operational testing as far as reasonably achievable when required and participate ... | There are test which need a big effort or even can't be provided by existing plants (e.g. respect to ageing etc.) | technical | fundamental |
| DSO comment | 14 | 2 | | Each TSO retains the right, based on operational monitoring, continuously, or periodically for subsequent periods of time, to evaluate by data recording, examination and analysis, a Significant Grid User's compliance with its connection and operating conditions in accordance with Article 14(3), declared availability and contracted provision of Ancillary Services. It does not require advance notification from a TSO to Significant Grid Users. | Each TSO or Significant DSO retains the right, based on operational monitoring, continuously, or periodically for subsequent periods of time, to evaluate by data recording, examination and analysis, a Significant Grid User's compliance with its connection and operating conditions in line with Article 15(3), declared availability and contracted provision of Ancillary Services. It does not require advance notification from a TSO or DSO to Significant Grid Users. | Significant Grid User connected to Distribution System should be managed by DSO. | technical | fundamental |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|--|------|------|--------|---|--|---|--------------|----------------|
| | 14 | 2 | | Each TSO retains the right, based on operational monitoring, continuously, or periodically for subsequent periods of time, to evaluate by data recording, examination and analysis, a Significant Grid User's compliance with its connection and operating conditions in accordance with Article 14(3), declared availability and contracted provision of Ancillary Services. It does not require advance notification from a TSO to Significant Grid Users. | Each TSO retains the right, based on operational monitoring, continuously, or periodically for subsequent periods of time, to evaluate by data recording, examination and analysis, a Significant Grid User's compliance with its connection and operating conditions in accordance with Article 14(3), declared availability and contracted provision of Ancillary Services. It does not require advance notification from a TSO to Significant Grid Users. | This requirement is disproportionate. Significant Grid User are deemed compliant after initial compliance testing. To guarantee compliance over lifetime is in the remit of the Generation Facility, not in the remit of the TSO. | technical | fundamental |
| | 14 | 3 | | Each TSO shall monitor the quality of the response of Power Generating Facilities to active and reactive power Set Points and the response of Power Generating Facilities providing Frequency Containment Reserve to frequency deviations and Faults. | | Monitoring of active and reactive power set-points of Power Generating Facilities is not in the remit of the TSO. Monitoring of ancillary services should be treated in the NC on LFCR. | technical | fundamental |
| | 14 | 6 | | After connection to the Transmission or distribution network, each Significant Grid User shall carry out the tests specified by the relevant TSO or by the relevant TSO and DSO to which the Significant Grid User is connected, to confirm that their plant and apparatus meets the requirements for connection to the transmission system or distribution network and that the Significant Grid User is complying with its declared capability of Ancillary Services in accordance with the requirements of the [NC RfG]. | Clarification of relation with RfG necessary, probably to be deleted in RfG as not relevant at the time of connection | These requirements are already written into the NC RfG and NC DCC. Not needed here. | technical | fundamental |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|-------------|------|------|--------|--|---|---|--------------|----------------|
| | 14 | 7 | | The TSO, DSO or Significant Grid User responsible for the test shall establish a test plan for each intended test. | - | These provisions should be tackled in the NC RfG. No, if it is to be done after connection it has to be in this code! | technical | fundamental |
| | 14 | 10 | | Each TSO shall have Operational Security of its own transmission system and Responsibility Area as its main concern during testing. Any test may be postponed or interrupted due to unplanned system conditions as assessed by the TSO. | add: Any test may be postponed or interrupted due to an unplanned risk arising for operational safety or other major negative impact on an affected power generating facility or DSO. | Also security of power plants and distribution grid has to be taken in consideration | technical | fundamental |
| | 14 | 9 | | Each TSO shall carry out the necessary analysis and planning to ensure that tests in its Responsibility Area are carried out in a manner that minimizes the impact on Operational Security and economic operation of the interconnected transmission systems. | Each TSO shall carry out the necessary analysis and planning to ensure that tests in its Responsibility Area are carried out in a manner that minimizes the impact on Operational Security and economic operation of the interconnected transmission systems and Power Generating Facilities. | Especially for Run-on-River Hydropower Plants it is of importance to perform Test only in dry season, expecting low flow on rivers and therefore minimizing economic impact on such power plants. | | |
| DSO comment | 14 | 11 | | Each TSO can request additional tests to be performed by the DSOs or Significant Grid Users, if they are deemed necessary to maintain and develop operational procedures, to train staff, or to acquire information of transmission system or equipment behaviour under certain system conditions. | add/change: The involved parties can agree on additional tests to be performed by Significant DSOs or ... with adequate justification..... Additional tests are only possible when that is in line with the safety understanding of the requested plant - the TSO takes over the liability for the plant during the additional tests. | Too general. TSO has possibility to require anything. Others articles are more precise and are sufficient. The involved parties can agree on additional tests to be performed ... The reasons for that are not adequate justifications for additional tests. Only possible when that is in line with the safety understanding of the requested plant - the TSO takes over the liability for the plant during the additional tests, because its at his request and therefore at his risk. | technical | fundamental |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|-------------|------|------|--------|--|--|---|--------------|----------------|
| DSO comment | 14 | 12 | | In case of System State degradation, the TSO of the transmission system in which the testing is performed shall be entitled to stop the testing and deploy any measures to return to a Normal State as soon as | add: Power Generating Facilities and/or DSOs are entitled to stop the test if the operational safety of the plant/ their installations is threatened or affected. | Significant grid users should be able to stop the tests when the safety of their equipment is affected. | technical | fundamental |
| | 14 | 13 | | Each Significant Grid User requesting permission for testing from the TSO, shall provide all necessary information and allow reasonable time for the TSO to plan for the test, taking into account the impact on system operation, the scope of and procedure for the test. | - | Delete this article: if the system state is publicly available, grid users can know that are endangering the system and before starting test they will contact the TSO for coordination | technical | fundamental |
| DSO comment | 14 | 15 | | After an incident classified as level 2 according to the common incidents classification scale adopted by ENTSO-E by application of the Article 8(3)(a) of the Regulation (EC) N°714/2009, the TSOs involved shall carry out a joint investigation to analyse the reasons for the incident and to adjust the existing operational procedures, if required. | After an incident classified as level 2 according to the common incidents classification scale adopted by ENTSO-E by application of the Article 8(3)(a) of the Regulation (EC) N°714/2009, and identified as The TSOs involved shall carry out a joint investigation to analyse the reasons for the incident and to adjust the existing operational procedures, if required. | Please specify what an incident level 2 in this code is. | technical | editorial |
| DSO comment | 14 | 17 | | TSO shall provide to affected TSOs at least the following information on the test: a) details and timing of the test; b) plans for accommodation of the test. | TSO shall provide to affected TSOs and Significant DSOs at least the following information on the test: a) details and timing of the test; b) plans for accommodation of the test. | Significant DSOs need this information too. | technical | fundamental |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|--|------|------|--------|---|--|---|--------------|----------------|
| | 15 | 3 | | Each TSO shall be entitled to gather the information on generation, consumption, schedules, balance positions, planned outages and substation topologies and its own forecasts, required for the Operational Security analysis. This information shall be transformable into the nodal injections and withdrawals on its own transmission system model. | Each TSO shall be entitled to gather the following information: ... This information shall be transformable into the nodal injections and withdrawals on its own transmission system model. | Please provide greater detail on which type of data and when it shall be delivered. | technical | fundamental |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|-------------|------|------|--------|---|--|--|--------------|----------------|
| DSO comment | 15 | 4 | | <p>Each TSO shall adhere to the organisational requirements, roles and responsibilities in relation to the data exchange, which are agreed upon and implemented at the level of ENTSO-E for all TSOs. This shall encompass the following issues:</p> <p>a) obligations among the TSOs to communicate without undue delay to all neighbouring TSOs, any changes in the protection settings, thermal limits and technical capacities at the interconnections between the their Control Areas;</p> <p>b) obligations of the Relevant DSOs to inform without undue delay their TSOs of any changes in the data and information scope and contents from Chapter 4 of this Network Code;</p> <p>c) obligations of the Significant Grid Users connected to the transmission system to inform their TSO about any relevant change in the scope and contents of the relevant data from Chapter 4 of this Network Code.</p> | <p>Each TSO shall adhere to the organisational requirements, roles and responsibilities in relation to the data exchange, which are agreed upon and implemented at the level of ENTSO-E for all TSOs, and in line with article 3.3. This shall encompass the following issues:</p> <p>a) obligations among the TSOs to communicate without undue delay to all neighbouring TSOs and impacted DSOs, any changes in the protection settings, thermal limits and technical capacities at the interconnections between the their Control Areas;</p> <p>b) obligations of TSO and Significant DSOs to inform each other upon previous agreement and without undue delay of any changes in the data and information scope and contents from Chapter 4 of this Network Code;</p> <p>c) obligations of the Significant Grid Users connected to the transmission system to inform their TSO about any relevant change in the scope and contents of the relevant data from Chapter 4 of this Network Code.</p> | <p>For a) It is the reciprocal of the obligation of the DSO.</p> <p>For b) DSO is responsible for maintaining operational security in its network, so he has the need of knowing any change in the scope of the information. Otherwise overall system security and cross border flows may be affected.</p> <p>Previous agreements and technically constrains shall be considered between DSO and TSO, in order to avoid unnecessary additional costs or contradict existing agreements.</p> | technical | fundamental |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|-------------|------|------|--------|---|---|--|--------------|----------------|
| DSO comment | 16 | 1 | | <p>Neighbouring TSOs shall exchange the structural information related to the Observability Area including at least:</p> <p>a) substations' regular topologies and other relevant data by voltage level;</p> <p>b) transmission lines;</p> <p>c) transformers connecting the DSOs, Demand Facilities and generators' block-transformers of Power Generating Facilities;</p> <p>d) phase-shifting transformers;</p> <p>e) high voltage DC lines; and</p> <p>f) reactors, capacitors and Static VAR Compensators.</p> | <p>Neighbouring TSOs shall exchange the structural information related to the TSO Observability Area, which shall comprise at least:</p> <p>a) substations' regular topologies and other relevant data by voltage level;</p> <p>b) transmission lines;</p> <p>c) transformers connecting the DSOs, Demand Facilities and generators' block-transformers of Power Generating Facilities;</p> <p>d) phase-shifting transformers;</p> <p>e) high voltage DC lines; and</p> <p>f) reactors, capacitors and Static VAR Compensators.</p> | Observability area could involve DSO or TSO. Therefore in this article should be clarified that this observability area applies to TSOs. | technical | fundamental |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|--|------|------|--------|---|---|---|--------------|----------------|
| | 16 | 4 | | <p>In order to support coordinated Dynamic Stability Assessment, each TSO shall, when required in accordance with article 13(2), exchange with other relevant TSOs the necessary data for DSA. Concerning Power Generating Module, the TSO shall provide the necessary data on:</p> <p>a) electrical parameters of the alternator including direct permanent and transient impedances; b) step up transformer description; c) minimum and maximum reactive power</p> | <p>In order to support coordinated Dynamic Stability Assessment, each TSO shall agree with the Power Generating Facility and, when required in accordance with article 13(2), exchange with other relevant TSOs the necessary data for DSA. This data exchange should be agreed on with the Power Generating Facility Operator and the Power Generating Facility Operation shall be informed about this. Concerning Power Generating Module, the TSO shall provide the necessary data on:</p> <p>a) electrical parameters of the alternator including direct permanent and transient impedances; b) step up transformer description; c) minimum and maximum reactive power</p> | <p>Any Data Exchange to other TSOs has to be transparent to the Power Generating Facilities where this data originates from.</p> <p>The values on minimum and maximum reactive power are not constant and depend on operating conditions.</p> | technical | fundamental |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|-------------|------|------|--------|--|---|--|--------------|----------------|
| DSO comment | 17 | 2 | | <p>Each TSOs shall exchange with its neighbouring TSOs the following data related to the Observability Area referred:</p> <p>a) actual topology;</p> <p>b) active and reactive power in line bay;</p> <p>c) active and reactive power in transformer bay;</p> <p>d) active and reactive power in Power Generating Facility bay;</p> <p>e) active and reactive injections and withdrawals of generation, demand and subsequent DSOs;</p> <p>f) regulating positions of transformers, including phase-shifting transformers;</p> <p>g) measured or estimated busbar voltage;</p> <p>h) reactive power in reactor and capacitor bay or from a static VAR compensator; and</p> <p>i) restrictions on active and reactive power supply capabilities with respect to the Observability Area.</p> | <p>Each TSOs shall exchange with its neighbouring TSOs the following data related to the TSO Observability Area referred:</p> <p>a) actual topology;</p> <p>b) active and reactive power in line bay;</p> <p>c) active and reactive power in transformer bay;</p> <p>d) active and reactive power in Power Generating Facility bay;</p> <p>e) active and reactive injections and withdrawals of generation, demand;</p> <p>f) regulating positions of transformers, including phase-shifting transformers;</p> <p>g) measured or estimated busbar voltage;</p> <p>h) reactive power in reactor and capacitor bay or from a static VAR compensator; and</p> <p>i) restrictions on active and reactive power supply capabilities with respect to the Observability Area.</p> | <p>Observability area could involve DSO or TSO. Therefore in this article should be clarified that this observability area applies to TSOs.</p> <p>Need to clarify what this means and why DSOs are cited in e).</p> | technical | fundamental |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|-------------|------|------|--------|--|---|--|--------------|----------------|
| DSO comment | 18 | 1 | | Each TSO shall define the Observability Area of the distribution networks connected to its transmission system which are relevant to accurately and efficiently determine the System State of the transmission system. | In agreement with the concerned DSO and in accordance with article 3.3 each TSO shall define the Observability Area of the distribution networks connected to its transmission system which are relevant to accurately and efficiently determine the System State of the transmission system. Relevant DSOs shall define as well the observability area of the transmission System and neighbouring DSOs to accurately and efficiently determine the system state of the distribution system. | TSO has to provide relevant necessary data (Structural data, Operational planning & scheduling data and Real-time data) to DSOs. Otherwise overall system security and cross border flows may be affected. | technical | fundamental |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|-------------|------|------|--------|--|---|--|--------------|----------------|
| DSO comment | 18 | 2 | | <p>Each DSO connected to the transmission system shall provide to its TSO the structural information related to the Observability Area referred to in Article 18(1) including, but not limited to, :</p> <p>a) substations directly connected to the transmission system, by voltage; b) lines connected to the substations from a) above; c) transformers from the substations from a) above; d) Power Generating Facilities and Demand Facilities of relevance for the Operational Security of the transmission system; and e) reactors and capacitors of relevance for the Operational Security of the transmission system.</p> | <p>Each DSO connected to the transmission system shall provide to its TSO the structural information related to the Observability Area referred to in Article 18(1) including:</p> <p>a) substations directly connected to the transmission system, by voltage; b) lines connected to the substations from a) above; c) transformers from the substations from a) above; d) Significant grid users; and e) reactors and capacitors of relevance for the Operational Security of the transmission system. TSO shall also provide the same structural information to Significant DSO regarding the part of the Transmission System affecting distribution network.</p> | <p>Check the consistency of this article with the previous articles to avoid overlaps. All this information is already required in other articles. It may not be necessary to ask for them twice.</p> <p>At the meantime, it must be noted that the exchange of information has to be reciprocal. If DSO does not know the info, distribution network operational security could be affected, and then overall system security and cross border flows may be affected.</p> <p>For d) For cross border performances via influence on the Control Area's security of supply /Transmission system Operational Security.</p> | technical | fundamental |
| DSO comment | 18 | 3 | | <p>Each DSO connected to the transmission system shall provide the TSO with updated structural information of the elements of the Observability Area every time it changes.</p> | <p>Each DSO connected to the Transmission System shall provide the TSO with updated structural information of the elements of the Observability Area every time it changes. Significant DSOs shall define as well the observability area of the transmission System and neighbouring DSOs to accurately and efficiently determine the system state of the distribution system.</p> | <p>Significant DSO needs also to perform a real-time monitoring and modelling to ensure reliability of its network and to avoid affecting overall system security and cross border flows. Reciprocity principle: data exchange DSO to TSO and TSO to Significant DSO. TSO's parameters may change on a connexion point (i.e. all parameters necessary to the connexion agreement (ex:Pcc, Voltage min and max, Activ Power capacity,...)).</p> | technical | fundamental |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|-------------|------|------|--------|---|---|--|--------------|----------------|
| DSO comment | 18 | 4 | | Each DSO exchanging the data with the TSO shall also provide historical data of up to three years in the past if necessary and required by the TSO. | Each DSO exchanging the data with the TSO shall also provide historical data of up to three years in the past if necessary, available, not contradicting with previous agreements | Previous agreements and technically constrains shall be considered between DSO and TSO, in order to avoid unnecessary additional costs or contradict existing agreements. | technical | fundamental |
| DSO comment | 19 | | | Relevant real-time data exchanged between TSOs and DSOs within the TSO's responsibility area | <p>Real-time data exchanged between TSOs and significant DSOs within the TSO's observability area</p> <p>General comment on art. 19: For operational security it is more important how the load flow occurs in the transmission network, than how the load flow occurs in the distribution network.</p> <ul style="list-style-type: none"> - load flow of a Transmission line 1600 MVA - Load flow in a transformer 380/110 - 300 MVA - load flow in a 110 kV line 120 MVA | The word 'Significant' could make confusion due to its utilization within the document in other articles. Moreover, the title reads "responsibility area" while the content of the article refers to the observability area. | technical | editorial |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|-------------|------|------|--------|---|---|---|--------------|----------------|
| DSO comment | 19 | 1 | | <p>Each DSO connected to the transmission system shall provide in real-time to its TSO the information related to the Observability Area referred to in Article 18(1), which is relevant for the Operational Security of the transmission system comprising:</p> <p>a) actual topology; b) active and reactive power in line bay; c) active and reactive power in transformer bay; d) active and reactive power injection in Power Generating Facility bay; e) active and reactive power withdrawals and injections of any subsequent DSOs and of Demand Facilities; f) tap positions of transformers; g) busbar voltages; and h) reactive power in reactor and capacitor bay.</p> | <p>Where the TSO has made an appropriate case and CBA that has been accepted by the NRA, each Significant DSO connected to the Transmission System shall provide in real-time to its TSO the information related to the Observability Area referred to in Article 18(1), which is relevant for the Operational Security of the Transmission System comprising:</p> <p>a) actual topology of connexion point; b) active and reactive power in line bay; c) active and reactive power at the connexion point; d) active and reactive power withdrawals and injections of any subsequent Relevant DSOs and of Significant Grid Users</p> <p>e) busbar voltages at connexion point.</p> | <p>The real time provision of much of this information is a new requirement. Such requirements will lead to significant costs for DSOs. A CBA is needed to demonstrate the return on the new investment to achieve these ends. If the CBA is positive, a transitional period of several years would be necessary.</p> <p>For d) and e): Why would the TSO need to know about the withdrawals of a DSO connected at LV to the host DSO?</p> <p>For a) to h): Not very clear. DSO has to provide TSO aggregated data if necessary, and no detail.</p> | technical | fundamental |
| DSO comment | 19 | 2 | | - | The same data regarding Significant DSO Observability area shall be provided by the TSO to the Relevant DSO. | If DSO does not know the info, distribution network operational security could be affected, and then overall system security and cross border flows may be affected. | technical | fundamental |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|--|------|------|--------|---|--|--|--------------|----------------|
| | 20 | 1 | | <p>Each type D Power Generating Facility Operator according to Article 3 of the [NC RfG] shall provide at least the following data to the TSO:</p> <p>a) general data of the power plant which are relevant for Operational Security;</p> <p>b) turbine and Power Generating Facility data including time for cold and warm start;</p> <p>c) data for short-circuit calculation;</p> <p>d) Power Generating Facility transformer data;</p> <p>e) Frequency Containment Reserve data according to the definition and needs of the [NC LFR];</p> <p>f) Frequency Restoration Reserve data, according to the definition and needs of the [NC LFR]for plants that participate in this service;</p> <p>g) data necessary for Restoration;</p> <p>h) data and model necessary for performing dynamic simulation in the format specified by the TSO according to Article 13;</p> <p>i) protection data; and</p> <p>j) reactive power control capability;</p> | Clarification and justification is needed. Common agreement / regulation following Art 3.3 needed. | <p>Data is a very general term. Please specify in greater detail of data which shall be delivered. We believe there is insufficient information for a Network Code.</p> <p>References to the LF&R are impossible to be evaluated since this code is a much preliminary phase</p> | technical | fundamental |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|--|------|------|--------|--|---|---|--------------|----------------|
| | 20 | 1 | | <p>Each type D Power Generating Facility Operator according to Article 3 of the [NC RfG] shall provide at least the following data to the TSO:</p> <p>a) general data of the power plant which are relevant for Operational Security;</p> <p>b) turbine and Power Generating Facility data including time for cold and warm start;</p> <p>c) data for short-circuit calculation;</p> <p>d) Power Generating Facility transformer data;</p> <p>e) Frequency Containment Reserve data according to the definition and needs of the [NC LFR];</p> <p>f) Frequency Restoration Reserve data, according to the definition and needs of the [NC LFR] for plants that participate in this service;</p> <p>g) data necessary for Restoration;</p> <p>h) data and model necessary for performing dynamic simulation in the format specified by the TSO according to Article 13;</p> <p>i) protection data; and</p> <p>j) reactive power control capability;</p> | <p>Each type D Power Generating Facility Operator according to Article 3 of the [NC RfG] shall provide at least the following data to the TSO:</p> <p>a) general data of the power plant which are relevant for Operational Security;</p> <p>b) -</p> <p>c) data for short-circuit calculation;</p> <p>d) Power Generating Facility transformer data;</p> <p>e) -</p> <p>f) -</p> <p>g) data necessary for Restoration;</p> <p>h) data and model necessary for performing dynamic simulation in the format specified by the TSO according to Article 13;</p> <p>i) protection data; and</p> <p>j) reactive power control capability;</p> | <p>Start and Stop time data is not relevant: Delete</p> <p>Data according to NC on LFC control should be treated in NC on LFC and is only to be delivered for Units participating on the market on ancillary services: Delete e,f</p> <p>Dynamic models are not available for existing power plants</p> | technical | fundamental |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|--|------|------|--------|---|---|---|--------------|----------------|
| | 20 | 2 | | <p>Each type B and C Power Generating Facility Operator according to Article 3 of the [NC RfG] which is directly connected to the transmission system shall at least provide the following data to the TSO:</p> <p>a) general data of the power plant which are relevant for Operational Security;</p> <p>b) data for short-circuit calculation;</p> <p>c) Frequency Containment Reserve data;</p> <p>d) Frequency Restoration Reserve data for plants that participate in this service;</p> <p>e) protection data;</p> <p>f) reactive power control capability; and</p> <p>g) data necessary for performing dynamic simulation, if required by the TSO and in the format specified by the TSO according to Article 13.</p> | <p>Clarification needed</p> <p>Each type B and C Power Generating Facility Operator according to Article 3 of the [NC RfG] which is directly connected to the transmission system shall at least provide the following data to the TSO:</p> <p>a) general data of the power plant which are relevant for Operational Security;</p> <p>b) data for short-circuit calculation;</p> <p>c) -</p> <p>d) -</p> <p>e) protection data;</p> <p>f) reactive power control capability; and</p> <p>g) data necessary for performing dynamic simulation, if required by the TSO and in the format specified by the TSO according to Article 13.</p> | <p>Data is a very general term. Please specify in greater detail of data which shall be delivered. We believe there is insufficient information for a Network Code.</p> <p>Data according to NC on LFC control should be treated in NC on LFC and is only to be delivered for Units participating on the market on ancillary services: Delete c,d</p> <p>Dynamic models are not available for existing power plants</p> | technical | fundamental |
| | 20 | 3 | | <p>While respecting the provisions of Article 3(3), a TSO may request any Power Generating Facility Operator directly connected to the transmission system to provide further data needed for Operational Security analysis.</p> | Delete | <p>This paragraph does not foresee any limits, therefore it is disproportionate</p> | technical | editorial |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|--|------|------|--------|--|--|--|--------------|----------------|
| | 20 | 4 | | Each TSO shall inform the Power Generating Facility Operators directly connected to the transmission system, about those changes in the transmission system topology, which affect such Power Generating Facility Operators. | add: TSOs, DSOs and Significant Grid Users will agree jointly about planned changes of the grid. The impact on grid restoration and emergency plans such as re-energisation between black start capabilities and NPP needs to be assessed and adjusted if necessary. Already in the planning phase of topology changes the impacts of the changes needs to be respected. | Not only the TSO's topology, it can be the DSO's as well. Even in the planning phase, it should already be communicated between all affected parties. Coordinated procedure necessary when grid topology changes are planned between TSO's and DSO's already at the planning phase of projects, the impact on grid restoration and emergency procedures and re-energisation between black start capabilities and nuclear plants needs to be investigated before changes happen. | | |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|-------------|------|------|--------|---|--|--|--------------|----------------|
| DSO comment | 20 | 5 | | <p>Each Interconnection owner shall provide at least the following data to the TSO:</p> <p>a) general data of the AC or HVDC Interconnection; b) transformers' data; c) data on filters and filter banks; d) reactive compensation data; k) data necessary for performing dynamic simulation; l) protection data; and e) reactive power control capability.</p> | <p>Each Interconnection owner shall provide at least the following data to the TSO, upon previous agreement and if technically feasible:</p> <p>a) general data of the AC or HVDC Interconnection; b) transformers data; c) data on filters; d) reactive compensation data; e) data necessary for performing simulation; f) protection data; and g) reactive power control capability.</p> | <p>Correction of the lettering. Point l) m) and e) should be replaced by e), f) and g)</p> <p>Previous agreements and technically constrains shall be considered between DSO and TSO, in order to avoid unnecessary additional costs or contradict existing agreements. For instance, the need of installation of new equipment's in systems that are not critical for the overall operation security of the system.</p> <p>Data necessary for performing dynamic simulation is not current practice in many DSOs. This additional requirement will increase the cost of the system. The decision on the dynamic data exchange between TSO and DSO should be based on the result of a national CBA. In the latter case, agreement between TSOs and DSOs should be required. Any additional DSO costs need to be recovered.</p> | technical | editorial |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|--|------|------|--------|---|---|--|--------------|----------------|
| | 21 | 1 | | Each type D Power Generating Facility Operator according to Article 3 of the [NC RfG] shall inform the TSO without delay about its scheduled unavailability or active power restriction, forecast scheduled active power output, active power reserves amount and availability. | Each type D Power Generating Facility Operator according to Article 3 of the [NC RfG] shall inform the TSO without delay about its scheduled unavailability or active power restriction in line with the relevant provisions in NC CACM. On the DA and ID each type D Power Generating Facility Operator shall provide with the forecast scheduled active power output, active power reserves amount and availability. . In the same way, Power Generating Facility Operator should be informed by TSO when a Transmission System Element connected to the generator is not available. | Clarification Active power reserves are within the scope to the balancing market and need not be available to TSOs. Transmission System Information is very outstanding for the generators | technical | fundamental |
| | 21 | 2 | | Each type D Power Generating Facility Operator according to Article 3 of the [NC RfG] shall provide to the TSO, as a minimum, its scheduled active and reactive consumption on the Day-Ahead and Intraday basis, including any changes of these schedules. | - | Delete this article because we have merge it with 21.1 | technical | fundamental |
| | 21 | 4 | | Each type D Power Generating Facility Operator according to Article 3 of the [NC RfG] shall provide to the TSO any forecast restriction in the reactive power control capability, reactive power reserves amount and availability. | Each type D Power Generating Facility Operator according to Article 3 of the [NC RfG] shall provide to the TSO any forecast restriction in the reactive power control capability reactive power reserves amount and availability. | The terminology reactive power reserve does not seem to make any sense. Available reactive power range seems to be more suitable. | technical | fundamental |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|-------------|------|------|--------|---|--|---|--------------|----------------|
| DSO comment | 21 | 7 | | Each Interconnection owner shall provide the following data to the TSOs: a) scheduled unavailability or active power restriction; b) scheduled unavailability or forecast restrictions of filter banks or reactive compensation that form part of the Interconnection; and c) scheduled active power transfers and reactive output levels. | Each Interconnection owner shall provide the following data to the TSOs, if technically feasible : a) scheduled unavailability or active power restriction; b) scheduled unavailability or forecast restrictions of filter banks or reactive compensation that form part of the Interconnection; and | Scheduled active and reactive powers transfers are unpredictable in DSO Networks with a high amount of decentralised generation (Wind or solar). Therefore, this theoretical schedule would be imprecise. All possible and additional solutions must be considered. | | |
| | 22 | 1 | | Each type D Power Generating Facility Operator according to Article 3 of the [NC RfG], including Power Generating Facilities own consumption, shall provide the TSO in real-time the following information: a) position of the circuit breakers; b) active and reactive power at the high voltage side of the transformer; and shall provide in real-time or periodically with time stamping the information on active power reserve. | Each type D Power Generating Facility Operator according to Article 3 of the [NC RfG], including Power Generating Facilities own consumption, shall provide the TSO in real-time the following information: a) position of the circuit breakers; b) active and reactive power at the high voltage side of the transformer; and shall provide in real-time or periodically with time stamping the information on active power reserve. In the same way, TSO shall provide Real-Time Data (Active and Reactive Power and position of circuit breakers) to Power Generating Facilities connected to the Transmission System | Active power reserves are within the scope to the balancing market and need not be available to TSOs. IN addition, precision is needed: a) Which circuit breaker? The position of all circuit breakers in the generating unit? b) This is the duty of the TSO not of the Power Generating Facility. Real Time information regarding the Transmission System directly connected to the generators is essential | technical | fundamental |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|-------------|------|------|--------|--|--|--|--------------|----------------|
| | 22 | 2 | | Each type B and C Power Generating Facility Operator according to Article 3 of the [NC RfG], including Power Generating Facilities own consumption, which is directly connected to the transmission system, shall provide the TSO in real-time or periodically with time stamping at least the following information: a) position of the circuit breakers; b) active and reactive power at the high voltage side of the transformer; and c) active power reserve | precision necessary to cover existing units properly | Justification with CBA is required. | | |
| DSO comment | 23 | | | Structural data exchanged between DSOs and generating facilities connected to the distribution system | Structural data exchanged between significant DSOs and generating facilities connected to the distribution system | The article should apply only for Significant DSOs. Consistency with other network codes should be ensured (all these information are already required in compliance and notification procedures within the network code RfG). | technical | fundamental |
| | 23 | | | Structural data exchanged between DSOs and generating facilities connected to the distribution system | | Please specify in greater detail which data shall be delivered. | technical | fundamental |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|-------------|------|------|--------|--|--|--|--------------|----------------|
| DSO comment | 23 | 1 | | <p>Each type B, C and D Power Generating Facility Operator according to Article 3 of the [NC RfG] shall provide the following data to the DSO:</p> <p>a) general data of the power plant which are relevant for Operational Security: installed capacity and primary energy source or fuel type; b) turbine and Power Generating Facility data including necessary time for cold and warm start; c) transformer data; d) Frequency Containment Reserve data; e) Frequency Restoration Reserve data for plants that participate in this service; f) data necessary for Restoration; g) protection data; h) reactive power control capability; i) remote access to the circuit breaker; and j) data and model of Power Generating Facility in the format specified by the TSO according to Article 13.</p> | <p>Each type B, C and D Power Generating Facility Operator according to Article 3 of the [NC RfG] shall provide the following data to the DSO:</p> <p>a) general data of the power plant which are relevant for Operational Security: installed capacity and primary energy source or fuel type; b) turbine and Power Generating Facility data including necessary time for cold and warm start; d) Frequency Containment Reserve data; e) Frequency Restoration Reserve data for plants that participate in this service; f) data necessary for Restoration; g) protection data; h) reactive power control capability; i) remote access to the circuit breaker; and j) data and model of Power Generating Facility in the format specified by the TSO according to Article 13.</p> | <p>c) included in a), thus not needed.</p> <p>Remarks: This chapter mixes data's, functions (remote access), it has to be simplified, precise and detailed.</p> <p>B,C and D relate to Modules, not facilities. Due to inappropriate definitions in NC RfG.</p> | technical | fundamental |
| DSO comment | 23 | 2 | | - | Significant Power Generating Facility Operators shall inform their DSO about any relevant change in the scope and contents of the data of this article. | Network model should be updated to ensure control and supervision of distribution networks and, therefore, the overall system security and cross border flows. | technical | fundamental |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|-------------|------|------|--------|--|--|--|--------------|----------------|
| DSO comment | 25 | | | real-time data exchanged between DSOs and generators connected to the distribution system | Real-time data exchanged between significant DSOs and generators connected to the distribution system | The article should apply only for relevant DSOs. | technical | fundamental |
| | 25 | | | Real-time data exchanged between DSOs and generators connected to the distribution system | | Please specify in greater detail which data shall be delivered. | technical | fundamental |
| DSO comment | 25 | 1 | | <p>Each Significant Grid User which is a type B, C or D Power Generating Facility according to Article 3 of the [NC RfG] shall provide to the DSO in real-time the following information:</p> <p>a) status of the switching devices and circuit breakers at the Connection Point;</p> <p>b) active and reactive power flows, including the direction, and voltage at the Connection Point; and</p> <p>c) remote disconnection capability of the circuit breaker.</p> | <p>Remark: Should be aligned with 9.5.d.1 of the NC RfG.</p> <p>b) active and reactive power flows, including the direction, current and voltage at the Connection Point; and</p> | <p>This allows for periodic data transfer with time stamping. It should be clear if this is to be retrospective. It is not in the NC RfG, but it needs to be harmonized here.</p> <p>Current is very important in distribution networks for control and supervision and for redundancy.</p> | technical | fundamental |
| DSO comment | 26 | 1 | | Power Generating Facility Operators and DSOs shall provide to the TSO all the information described in Articles 23 to 25 if requested by the TSO. | To be deleted | This information will be provided via DSO. All the required info from generators connected to distribution level to TSO would be provided via DSO, in order to look for the efficiency of the system. DSOs and TSOs network models should have the same data within the shared part of their observability areas in order to be consistent at the security analysis. | technical | fundamental |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|-------------|------|------|--------|--|--|--|--------------|----------------|
| DSO comment | 26 | 2 | | A TSO may request further data from any Power Generating Facility Operator connected to the distribution network, if this is necessary for Operational Security analysis, or if, after aggregation of data, the significance of a particular Power Generating Facility is raised in terms of Operational Security. | To be deleted | This information will be provided via DSO. All the required info from generators connected to distribution level to TSO would be provided via DSO, in order to look for the efficiency of the system. DSOs and TSOs network models should have the same data within the shared part of their observability areas in order to be consistent at the security analysis. | technical | fundamental |
| | 27 | 2 | | Each Demand Facility directly connected to the transmission system shall communicate to the TSO, as a minimum, its scheduled active and reactive consumption on a day-ahead and intraday basis, including any changes of these schedules. | Each Demand Facility directly connected to the transmission system shall communicate to the TSO, as a minimum, its scheduled active and reactive consumption on a day-ahead and intraday basis, including any changes of these schedules. | Is not possible to know reactive consumption. | technical | fundamental |
| DSO comment | 28 | 1 | | Each Demand Facility connected to the distribution network which participates in demand side response shall communicate to its DSO and TSO in real-time the minimum and maximum active power which can be curtailed and active and reactive power at the high voltage side of the transformer. | Each Demand Facility connected to the distribution network which participates in demand side response shall communicate to its Significant DSO, who will send the relevant information to the TSO in real-time the minimum and maximum active power which can be curtailed and active and reactive power at the high voltage side of the transformer. | In order to not to duplicate communication channels, DSO should gather the requested information and provide it to TSO. | technical | fundamental |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|-------------|------|------|--------|--|---|--|--------------|----------------|
| DSO comment | 28 | 3 | | Each Demand Facility connected to the distribution network which participates in DSM shall communicate to its DSO and TSO in real-time the active and reactive power at the high voltage side of the transformer | Each Demand Facility connected to the distribution network which participates in DSM shall send to its Significant DSO who will send it the TSO in real-time the active and reactive power, upon agreement if it technically feasible, at the Connection Point. | <p>In order not to duplicate communication channels, DSO should gather the requested information and provide it to TSO.</p> <p>Previous agreements and technical constraints shall be considered between DSO and TSO, in order to avoid unnecessary additional costs or contradict existing agreements. For instance, there is no need of new installation of measurement equipment's in the high voltage side of the connection point, where there are already measurement equipment in the low voltage side of the transformer. Also, this is unclear in cases where the high voltage side of the transformer do not belong to the DSO or demand facility. In accordance with NC DCC, active and reactive Power is measured at the Connection Point.</p> | technical | fundamental |
| DSO comment | 29 | 11 | | TSO shall co-ordinate with DSOs, Power Generating Facility Operators and directly connected Demand Facilities to ensure TSO offline training regarding the impact of users' systems is as comprehensive as reasonably practical and reflects the latest developments in systems and equipment. TSOs and Significant Grid Users may run joint offline training simulations or training workshops for their System Operator Employees to enhance co-operation and understanding. | TSO shall co-ordinate with DSOs, Power Generating Facility Operators and directly connected Demand Facilities to ensure TSO offline training regarding the impact of users' systems is as comprehensive as reasonably practical and reflects the latest developments in systems and equipment. TSOs, DSOs and Significant Grid Users may run joint offline training simulations or training workshops for their System Operator Employees to enhance co-operation and understanding. | DSOs should be able to join offline training simulations or training workshops. DSOs are not Grid Users. | technical | fundamental |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|-------------|-------------|------|--------|--|--|---|--------------|----------------|
| | 30, 31 & 32 | | | | Compliance procedures are already defined in NC RfG and DCC. Therefore, there is no need to define them in this code. Reference should be made to the respective codes and articles. Separation creates unclarity for implementation. | See proposal | | |
| | 30 | 1 | | Each Significant Grid User or DSO shall ensure that its facilities are compliant with the requirements from this Network Code, which are relevant for their connection and interaction with the transmission system | Each Significant Grid User shall ensure that are compliant with the requirements from this Network Code in the commissioning time, which are relevant for their interaction with the transmission system | Capabilities of the facilities regarding the connection are established in DCC NC This article is about Significant Grid Users, not about DSOs. A change in the network Code leading to retrofit actions and costs have to handle a different way. This is of high importance especially for new investments. | | |
| DSO comment | 30 | 2 | | Before initiating any modification, each Significant Grid User shall notify to the relevant TSO or DSO any planned modification of its technical capabilities which could have an impact on its compliance with the requirements of this Network Code. | Before initiating any modification, each Significant Grid User shall notify to the operator of which network he is connected to any planned modification of its technical capabilities which could have an impact on its compliance with the requirements of this Network Code. | If the Significant Grid User is connected to Distribution System, any planned modification of its technical capabilities must be notified to its DSO. | | |
| DSO comment | 30 | 3 | | Each Significant Grid User shall notify to the relevant TSO or DSO any operational disturbance on its facility which could have an impact on its compliance with the requirements of this Network Code as soon as possible and without any delay after its occurrence. | Each Significant Grid User shall notify to the relevant TSO and DSO any operational disturbance on its facility which could have an impact on its compliance with the requirements of this Network Code as soon as possible and without any delay after its occurrence. | If the Significant Grid User is connected to Distribution System, any planned modification of its technical capabilities must be notified to its DSO. | technical | fundamental |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|-------------|------|------|--------|--|--|---|--------------|----------------|
| DSO comment | 30 | 4 | | In order to allow the relevant TSO or DSO to evaluate and mitigate where necessary the risks to the transmission system or distribution networks, each Significant Grid User shall notify to the relevant TSO or DSO any foreseen test schedules and procedures to verify compliance of a Significant Grid User's facility with the requirements of this Network Code. The relevant TSO or DSO shall approve these foreseen test schedules and procedures prior to their launch. | In order to allow the relevant TSO and DSO to evaluate and mitigate where necessary the risks to the transmission system or distribution networks, each Significant Grid User shall notify to the relevant TSO and DSO any foreseen test schedules and procedures to verify compliance of a Significant Grid User's facility with the requirements of this Network Code. The relevant TSO and DSO shall approve these foreseen test schedules and procedures prior to their launch. | If the Significant Grid User is connected to Distribution System, DSO must be notified and must approve test schedules and procedures prior to their launch. | technical | fundamental |
| DSO comment | 30 | 5 | | The Significant Grid User shall enable the participation of the relevant TSO or DSO in such tests. The relevant TSO or DSO shall have the right to record the performance of the facilities of the Significant Grid Users. | The Significant Grid User shall enable the participation of the relevant TSO and DSO in such tests. The relevant TSO and DSO shall have the right to record the performance of the facilities of the Significant Grid Users. | If the Significant Grid User is connected to Distribution System, DSO must be enabled. | technical | fundamental |
| | 31 | 2 | | The relevant TSO or DSO shall assess and where necessary request to witness the testing of the compliance of a Significant Grid User's facility with the requirements of this Network Code at any time throughout the lifetime of the Significant Grid Users' facility. | The relevant TSO or DSO shall assess and where justified request to witness the testing of the compliance of a Significant Grid User's facility with the requirements of this Network Code. The reason for such a testing needs to be justified in a report that TSO will send to its NRAs | It is not acceptable that TSO has the right to assess whenever considers without justification, the compliance of the grid users and to request compliance tests and simulations. The justification needs to be reported to the NRAs who will decide if the test needs to be done or not. | technical | fundamental |

| | Art. | Par. | S.par. | Initial | Proposed | Justification | Comment Type | Comment Nature |
|--|------|------|--------|--|---|---|--------------|----------------|
| | 31 | 3 | | Upon request from the relevant TSO or DSO, the Significant Grid User shall carry out compliance tests and simulations at any time throughout the lifetime of the Significant Grid User's facility and in particular after any Fault, modification or replacement of any equipment which could have an impact on the Significant Grid User's facility compliance with the requirements of this Network Code. | Upon request from the Significant TSO or DSO, the Significant Grid User shall carry out compliance tests and simulations after any Fault, modification or replacement of any equipment which could have an impact on the Significant Grid User's facility compliance with the requirements of this Network Code. | It is not acceptable that TSO has the right to assess whenever considers without justification, the compliance of the grid users and to request compliance tests and simulations. The justification needs to be reported to the NRAs who will decide if the test is necessary | technical | fundamental |
| | 31 | 4 | | <p>The relevant TSO or DSO shall make publicly available the list of information and documents to be provided as well as the requirements to be fulfilled by the Significant Grid User in the framework of the compliance testing. Such list shall at least cover the following information, documents and requirements:</p> <p>a) all documentation and certificates to be provided by the Significant Grid User;</p> <p>b) details of the technical data of the Significant Grid User facility with relevance for the system operation;</p> <p>c) requirements for models for steady-state and Dynamic Stability Assessment;</p> <p>d) studies by the Significant Grid Users demonstrating expected steady-state performance and Dynamic Stability Assessment outcome.</p> | <p>The Significant TSO or DSO shall make publicly available the list of information and documents to be provided as well as the requirements to be fulfilled by the Significant Grid User in the framework of the compliance testing. Such list shall at least cover the following information, documents and requirements:</p> <p>a) all documentation and certificates to be provided by the Significant Grid User;</p> <p>b) requirements for models for steady-state and Dynamic Stability Assessment;</p> | It is not acceptable that the Power Generating Facility has to communicate the internal settings of its speed and voltage control system. Dynamic Modelling is not necessary for every Significant Grid User | technical | fundamental |



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