

NC implementation: Status & Feedback

WG Belgian Grid (19/5/2016)

P. Buijs

Overview

1. Adoption of the network codes: status
2. Inquiry for non-NC driven changes to the “Federal Grid Code”
3. Feedback on the Expert Group “NC implementation”
4. Next steps: overview

Annex: Stakeholder debate on operational topics (*cf. WG SO*)

+ Intro to “Frequency stability & management” (B. Genêt)

+ Intro to “Short-circuit power” (F. Lazar)

1. Adoption of the network codes: status (status on 17/5/2016)



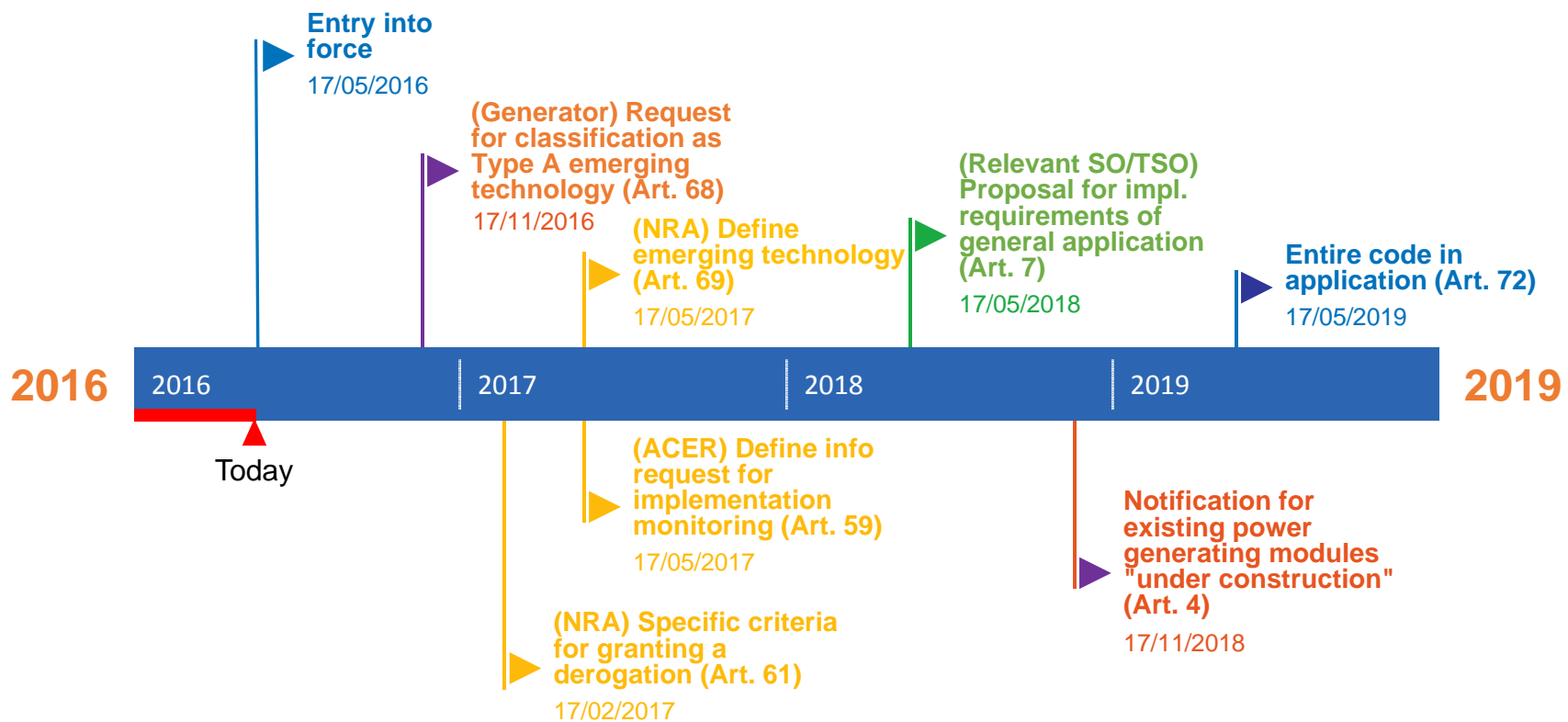
Network Code	Status	Best guess(!) for completing the process, i.e. "entry into force"
Market codes:		
Capacity Allocation and Congestion Management (CACM)	Entered into force	14/8/2015
Forward Capacity Allocation (FCA)	Approved in Comitology (30/10/2015)	October 2016
Electricity balancing (EB)	Pre-comitology	Q1/Q2-2017
Connection codes:		
Requirements for generators (RfG)	Approved in Comitology (26/6/2015)	17/05/2016
Demand Connection Code (DCC)	Approved in Comitology (16/10/2015)	September 2016
HVDC (HVDC)	Approved in Comitology (11/9/2015)	September 2016
Operational codes:		
Operational Security (OS)	Approved in Comitology (4/5/2016)	November 2016
Operational Planning & Scheduling (OPS)		
Load Frequency Control & Reserve (LFCR)		
Emergency & Restoration (E&R)	Comitology ongoing	March 2017

Merged in one guideline

1. Adoption of the network codes: status

Main timings RfG

Indicative overview, for precise requirements: please consult the RfG-code



2. Inquiry for non-NC driven changes to the “Federal Grid Code”

As presented on WG Belgian Grid 25/3/2016:

4. Inquiry for non-NC driven changes to the “Federal Grid Code”

As already announced on UG Plenary of 2/7/2015, via the Users’ Group (in practice: WG Belgian Grid):

- Elia will facilitate the creation of an inventory of requests for amending the Federal Grid Code beyond the changes required by the NC implementation.
- Proposed end date for submitting “requests”: 31/5/2016 by e-mail to usersgroup@elia.be
- Unless mentioned explicitly, all received inputs are considered “non-confidential”.
- The inventory will be handed over to the FOD and in all transparency communicated the Users’ Group. FOD can then judge which request should be dealt with according to which priority, planning, etc.

Proposal to extend deadline for stakeholder “requests”
until Friday 8 July.

3. Feedback on the Expert Group “NC implementation”

On 26/4 two Expert Group sessions took place:

- « **Voltage Control & Reactive Power management** » (session 2)
 - Approval of the minutes from the Experts Group Session 1 of 25/2/2016
 - Presentation by Elia of updated proposal
 - Position BGA on Voltage Control & Reactive Power management

- « **Robustness & Fault Ride Through** » (session 1)
 - Introduction by Elia

3. Feedback on the Expert Group “NC implementation”

Voltage Control & Reactive Power management

- **Presentation by BGA**
 - General principles, such as linked to the (contractual) framework, role of TSO vs role of generators, minimizing overall costs,...
 - Insight in which cost categories are impacted by voltage & reactive power requirements (CAPEX & OPEX)
 - Several remarks and questions as feedback and input

3. Feedback on the Expert Group “NC implementation”

Voltage Control & Reactive Power management

- Third session planned
- Probably a fourth session needed as well

- **Presentation by Elia (and Synergrid)**
 - Open questions previous Experts Group meeting
 - Compensation reactive needs of the grid
 - Link setpoints and existing regulation (FTR-C10/11)
 - Application to a specific case (nuclear unit with PSS)
 - Other questions dealt with during other parts of Elia ppt
 - Figures on future evolutions
 - View on reactive power needs and how this may evolve
 - View on scenario for reactive power “contributors”
 - Implementation of Requirements for Generators to cover needs
 - Increase reactive capabilities on type A/B units (ppt by Synergrid, incl. link C10/11)
 - Adapted reactive control on DSO connected units (*not yet presented*)
 - Optimize reactive capabilities on new type C/D generators (*not yet presented*)

3. Feedback on the Expert Group “NC implementation”

Robustness & Fault Ride Through

- **Presentation by Elia**

- Introduction of the topic: Asset protection and system robustness
- Fault-ride-through capabilities, key factors
- Preliminary impact evaluation

→ In the 26/4-session the focus was on principles to be used for calibrating the FRT requirements outlined in the code. Next session the goal is to propose actual requirements, within the margins set by the code.

4. Next steps: overview



Special workshop: 6 September 2016 (9-14h)

- Discussion on the process so far
- Intermediate wrap-up from the perspective of “significant grid users”
- Results of the inquiry for non-NC driven changes to the “Federal Grid Code”

Expert Group meetings currently planned for:

- **30 May 2016 (14-17h)**
 - Reactive power management & Voltage (3rd session)
 - Robustness & FRT (2nd session)
- **7 June 2016 (14-17h)**
 - Frequency stability & management (1st session)
 - Short-circuit power (1st session)
- **14 September 2016 (9-12h)**
 - Robustness & FRT (3rd session, *if needed*)
 - Frequency stability & management (2nd session)
 - Short-circuit power (2nd session)

Pending

- Topic Information Exchange
- Topic Protection & Control
- Closing any ongoing topic

→ Doodles pending for 2 more meetings

- early October
- end of November

→ Not unlikely that a third slot will be needed, depending on progress in the earlier meetings

Annex: Stakeholder debate on operational topics (cf. WG SO/EMD 27/4/'16)

On 27 April 2016 a presentation was given in WG SO/EMD on the proposal for stakeholder involvement for the operational codes (OS GL & NC E&R).

- As already foreseen, operational codes to be taken on board in ongoing expert groups
- One new expert group to be foreseen: Information exchange
- Some aspects (mainly NC E&R) to be discussed directly in WG SO
- LFCR-aspects are covered in TF Balancing

For information: in annex the slides presented during WG SO/EMD of 27/4/'16

Annex: Presentation given in WG SO/EMD on 27 April 2016

Implementation of EU Network Codes

Operational Network Codes

Proposal towards the Elia Users' Group (WG System Operation) on how to engage into a stakeholder debate concerning topics covered by the Operational Guideline and NC E&R

P. Buijs

April 2016

Overview

1. Introduction & Organisation

- Context and Goal
- Organisational principles
- Expert Group “Implementation of EU Network Codes”

2. Operational Guideline – Operational Security

3. Operational Guideline – Operational Planning and Scheduling

4. Operational Guideline – Load Frequency Control & Reserves

5. NC Emergency & Restoration

Introduction & Organisation

Context and Goal

Context

- EU network codes are maturing, incl. the operational codes/guidelines.
- EU network codes require (a sometimes extensive) national implementation.
- For such national implementation involving all stakeholders is key.
- Via the Users' Group and with support from the Federal Administration (FOD/SPF) Elia has launched an initiative for such stakeholder debate (as already discussed in WG Belgian Grid and in the Plenary meeting of the Users' Group).
(cf. next slides for the practicalities of this initiative)

Goal of this presentation

- Provide an overview of all 'topics' covered by the operational guideline (OS/OPS/LFCR) and NC E&R requiring any form of further stakeholder involvement.
- Propose at which level (EU, EU Region, Belgium) the stakeholder debate should take place, incl. propose for which topics discussion in the 'Expert Group Implementation NCs' would be needed.

Organizational principles

(for all NCs, not just the operational guidelines/code)

To optimise impact, we would recommend that the main stakeholder involvement takes place at the most relevant level for each NC topic (EU, EU Regional, Belgium).

- **Several “Operational topics” have a EU/EU Regional scope (which is also logical given their XB scope).**
 - Elia recommends all stakeholders to participate as much as possible in the stakeholder fora organized at EU/EU Regional levels.
 - The UG WG SO could serve as platform to report on the progress at non-Belgian levels, as it has been doing in the past (e.g. during the drafting stage of the network codes).
 - If stakeholders’ issues specifically linked to the Belgian context are not adequately incorporated at the EU Regional/EU-level, Elia could try to pick them up via Users’ Group WG SO.
 - If considered convenient later (tbd), it might be useful to set up an expert group discussing the actual amendments to BE docs, when “contents” are fully frozen

- **For Operational topics with a specific national angle (e.g. degrees of freedom left by the code), the Users’ Group serves as discussion platform (via the Expert Group and/or relevant WG)**

The Expert Group “Implementation EU Network Codes”

- A process has been agreed upon with DG Energy (FOD/SPF) aiming at a consistent and coherent implementation of network codes in Belgium involving stakeholders
- The process has been discussed with the stakeholders
- The process starts from the network code content and aims initially at the Federal Grid Code and other relevant documents (legislation, contracts, ...)
- The Elia Users’ Group facilitates the discussion with all stakeholders while respecting competences of all authorities and without any intention to interfere with any ‘official’ process.
- The approach being followed in the Expert Groups is as follows:
 - Step 1: content-oriented discussion on specific topics: which (technical) solution do we aim for?
 - Step 2: How to best integrate this solution into the legislative, contractual,.. framework?
 - Step 3: Discussion lead to a proposal for amending the Federal Grid Code or other relevant documents

Note: One topic could be covered by several network codes. In such case, only one Expert Group for this topic will be organized covering all its aspects. (e.g.: significant grid user, reactive power management and voltage, information exchange,...)

- <http://www.elia.be/en/users-group/Implementation-EU-Network-Codes>

Operational Guideline

Operational Security (OS)

Operational Guideline

Operational Security (OS)

This part is not only relevant for SO, but also for LFCR & OPS.

General Provisions : Part 1 (common for OS, OPS and LFCR)

Subject matter, scope, Definitions, Regulatory aspects and approval, Publication, Recovery of costs, Stakeholder involvement & public consultation, Confidentiality obligations, Agreement with TSOs not bound by this Network Code , monitoring and annual report

Art. 1 - 17

Operational Security Requirements : Title1

System states, remedial actions and operational security limits

Short circuit management
Voltage control and Reactive power management
Power flow management

Contingency analysis and handling
Protection and dynamic stability analysis

Art. 18 - 39

Data exchange : Title 2

- General requirements on data exchange
- Information exchange between TSOs, DSOs and SGUs

Art. 40 - 53

Compliance : Title 3

- Role&Responsabilities
- Operational testing

Art. 54 - 57

Training : Title 4

Art. 58 - 61

Operational Guideline

Operational Security (OS)

Topic (cf. previous slide)	Main level for stakeholder interaction (EU, EU regional, national)	Expert Group (if any)	Timing
Significant Grid Users	National	Specific Expert Group reporting WG Belgian Grid → <i>“Significant grid users” already initiated via WG Belgian Grid</i>	1st iteration ongoing (2nd iteration Q4 2016)
Asset protection & system robustness (e.g. system states, contingency analysis)	EU, EU regional	WG SO <u>for info</u>	
Voltage control and Reactive power management	National	Specific Expert Group already reporting WG Belgian Grid → <i>“Reactive power mgt & Voltage control” already initiated via WG Belgian Grid</i>	Start Feb 2016
Operational Planning & Ex-Post activities	EU, EU regional	-	
Operational Information Exchange	EU, national	Specific Expert Group on this topic to be created	Start Sept 2016
Compliance verification	National	To be covered by every specific technical topic to ensure coherence	-

Operational Guideline

Operational Security (OS)

Significant Grid Users (art. 1)

- Several articles of this NC mention direct 'contact & actions' between TSO and SGUs
- The SGUs (new and/or existing) for Belgium need to be defined in order to assess the impact of this code on the current practices

Voltage control and reactive power management

- Each TSO shall agree, with the transmission connected DSOs and the transmission connected significant grid users, about voltage ranges at the connection points below 110 kV if those voltage ranges are relevant for maintaining operational security limits.
- Each SGU and DSO which is transmission connected shall maintain the reactive power set-points, power factor ranges and voltage set-points for voltage control in the range as agreed with its TSO

Operational Guideline

Operational Security (OS)

Operational information exchange

- TSOs shall jointly agree on key organisational requirements, roles and responsibilities in relation to data exchange. Those organisational requirements, roles and responsibilities shall apply to all data exchange provisions
- TSOs, DSOs and SGUs will have to implement the data exchange detailed in the data exchange title

Compliance verification

- Operational compliance verification are highly linked with the conformity and compliance testing foreseen when connecting new grid user, but will address how compliance testing may be required by TSO or may be applied by Grid Users during the life cycle of the assets

Operational Guideline

Operational Planning and Scheduling (OPS)

Guideline on Transmission System Operation

Operational Planning & Scheduling

PART 1. General Provisions : Part 1 (common for OS, OPS and LFCR)

Subject matter, scope, Definitions, Regulatory aspects and approval, Publication, Recovery of costs, Stakeholder involvement & public consultation, Confidentiality obligations, Agreement with TSOs not bound by this Network Code , monitoring and annual report

Art. 1 - 17

Title 1. Data for operational security analysis in operational planning

- Building scenarios
- Individual and Common Grid Models

Art. 64 - 71

Title 2. Operational security analysis

- Performing coordinated security analysis
- Setting up remedial actions
- Regional Security Coordinators

Art. 72 - 81

Title 3. Outage coordination

- Outage coordination regions
- Determination of relevant assets for outage coordination
- Development and update of availability plans of relevant assets
- Execution of availability plans

Art. 82 - 103

Title 4. Adequacy

- Control Area adequacy analysis & reporting

Art. 104 - 107

Title 5. Ancillary services

- Monitoring of ancillary services
- Reactive power ancillary services

Art. 108 - 109

Title 6. Scheduling

- Scheduling processes
- Schedule coherency verification

Art. 110 - 113

Title 7. ENTSO-E Operational Planning Data Environment

Art. 114 - 117

Guideline on Transmission System Operation *Operational Planning & Scheduling*

- The main principle should be to **integrate discussions in the existing processes** leading to the necessary amendments of existing “documents” (e.g. CIPU)
- The actual topics for discussion depend on the actual approved guideline after **comitology**

Specific topics requiring national stakeholder **discussion**:

Topic	Timing for stakeholder debate	Main (most likely) impact
Availability plans (contents)	June 2016 via WG SO <i>(Linked to the re-signing of the CIPU-contracts for 2017)</i>	Maybe CIPU
Outage planning process	June 2016 via WG SO <i>(Linked to the re-signing of the CIPU-contracts for 2017)</i>	CIPU
Reactive power monitoring	Specific Expert Group reporting WG Belgian Grid → <i>“Reactive power management & voltage control”</i> <i>already initiated via WG Belgian Grid</i>	

In general, Elia will continue to inform stakeholders via the WG’s of the Users’ Group on evolutions as in the past, e.g. with respect to elements to be discussed at EU level.

From OPS, some specific topics emerge for which stakeholders will be **informed**:

- Determination of relevant assets for outage planning (→ matter discussed at EU-level)
- Regional adequacy assessments

Guideline on Transmission System Operation

Operational Planning & Scheduling

Contents of Availability Plans

- All requirements are mainly in line with current practices in Belgium (already foreseen in CIPU-process)
- Some changes will be needed, mainly the status per quarter hour in the day-ahead nomination process and possibly an additional “testing” status.
- These changes are in line with evolutions detected and discussed earlier bilaterally with ARPs. To be discussed and followed-up in WG SO.

Outage Planning Process

- All requirements are mainly in line with current practices in Belgium (already foreseen in CIPU-process). No impact on financial compensations (not covered in the Guideline)
- Deadline for revision plans will need to be shifted with e.g. two weeks.

Guideline on Transmission System Operation

Operational Planning & Scheduling

Determination of relevant assets for Outage Planning

- Methodology and thresholds will be developed on EU level. Stakeholder interaction will also be organized on that level. Local reporting + discussion can be held in WG SO
- Very low probability of impact on Belgian stakeholders as expectations are that only a subset of CIPU units will be affected. Relevant demand facilities in Belgium are not expected.
- Should Relevant demand facilities be identified in Belgium the necessary processes need to be discussed locally (WG SO)

Guideline on Transmission System Operation

Operational Planning

Adequacy Assessments

- No further requirements impacting stakeholders
- General progress on this topic and discussions on methodology, outputs, reportings, etc. can be held in the WG SO on an ad-hoc basis.

Reactive power monitoring

- Still to be assessed if requirements impact current practices in Belgium
- Potential impact on TSO-DSO interfaces and data exchange

Operational Guideline

Load Frequency Control and Reserves (LFCR)

NC LFCR - Load Frequency Control & Reserves

General Provisions : Part 1 (common for OS, OPS and LFCR) Subject matter, scope, Definitions, Regulatory aspects and approval, Publication, Recovery of costs, Stakeholder involvement & public consultation, Confidentiality obligations, Agreement with TSOs not bound by this Network Code , monitoring and annual report		Art. 1 - 17
1. Operational Agreements - SA, LFC-block, LFC-area, Monitoring area - Sharing & Exchange, Imbalance netting, XB FRR & RR activation		Art. 118 - 126
2. Frequency Quality - Frequency & FRCE quality target parameters - Data collection, monitoring & ramping restrictions		Art. 127 - 138
3. LFC Structure - Frequency containment & restoration control processes - FCP, aFRP, mFRP, RRP, imbalance netting	Art. 139 - 151	4. Operation of LFC - System states related to system frequency Art. 152
5-6-7. FCR - FRR - RR - Dimensioning - Technical minimum requirements & prequalification process		Art. 153 - 162
8. Exchange & sharing of reserves - Within & between Synchronous Areas for FCR, FRR, RR - XB activation of FRR & RR		Art. 163- 180
9. Time control process - SA agreement to control average frequency via setpoint		Art. 181
10. Cooperation with DSOs - Reserve providing units connected to DSO-grid		Art. 182
11. Transparency of information - General requirements for exchange & sharing of information about Agreements, Quality, FCR, FRR, RR		Art. 183 - 190
Annexes - Quality targets, minimum FCR requirements - FCR, FRR, RR exchange limits		Annex II - VII

Operational codes

LFCR - Load Frequency Control & Reserves

- The main principle should be to **integrate discussions in the existing processes** leading to the necessary amendments of existing “documents” (e.g. GFA, Balancing Rules)
- The actual topics for discussion also depend on the update of “**Policy 1**” and the actually approved guideline after **comitology**
- Further **detailed analysis of existing agreements** (e.g. iGCC) to be done with potential (but limited?) impact.

Specific topics requiring national stakeholder discussion in the TF Balancing:

Topic	Timing for stakeholder debate	Main (most likely) impact
Dimensioning rules for downward mFRR needs	In principle discussion should take place in the context of dossier “volumes 2018” <i>(subject to actual timings of LFCR)</i>	- General Framework Agreement - Balancing rules - Dossier Volumes
FCR from storage units	Q4 2016 for first discussion, allowing sufficient time for “documents” to be amended <i>(subject to actual timings of LFCR)</i>	- General Framework Agreement - Balancing rules
FCR/aFRR/mFRR product requirements, such as: - Technical connection criteria - Prequalification process harmonization - Rules for refusal of reserve providers	Q4 2016 for first discussion, allowing sufficient time for “documents” to be amended <i>(subject to actual timings of LFCR)</i>	- General Framework Agreement - Balancing rules
Insufficient reserves procurement or exhaustion reserves (e.g. escalation / backup procedures compliant?)	Q4 2016 for first discussion, allowing sufficient time for “documents” to be amended <i>(subject to actual timings of LFCR)</i>	- General Framework Agreement - Balancing rules - ... (Note: wait for Policy 1 “SA OA”)

Operational codes

LFCR - Load Frequency Control & Reserves

In general, Elia will continue to inform stakeholders on evolutions as in the past.

From LCFR, some specific topics emerge for which **TF Balancing will be informed:**

- New FRCE-targets
- Insufficient reserves procurement or exhaustion reserves: escalation/back-up procedure
- Coordinated actions to reduce FRCE in alert state
- TSO-DSO related issues when relevant for other stakeholders (e.g. information exchange, prequalification, potential ramping restrictions)
- Transparency & monitoring needs (RT-monitoring of FRCE)



NC Emergency & Restoration

NC Emergency & Restoration

1. General Provisions

Subject matter and scope, Definitions, Regulatory aspects and approval, Recovery of costs, Consultation and coordination, Confidentiality obligations, Agreement with TSOs not bound by this Network Code

Art. 1 - 8

2. System Defence Plan

- Design, implementation & activation of the System Defence Plan
- System protection schemes
- System defence plan procedures

Art. 9 - 20

3. Restoration Plan

- Design, implementation & activation of the Restoration Plan
- Re-energisation procedure & strategy
- Resynchronization procedure and strategy
- Frequency management procedure

Art. 21 - 32

4. Market interactions

- Procedure, rules and conditions for suspension and restoration of market activities
- Communication procedure
- Settlement principles

Art. 33 - 37

5. Information exchange and communication, tools and facilities

- Information exchange and communication
- Tools and facilities

Art. 38 - 40

6. Compliance and review

- Compliance testing of TSO, DSO and SGU capabilities
- Compliance testing of system defence plan & restoration plan

Art. 41 - 49

7. Implementation

- Monitoring & stakeholder involvement

Art. 50 - 51

8. Final Provisions

- Amendments & entry into force

Art. 52 - 53

NC Emergency & Restoration

- **NC E&R on market interaction lacks maturity.** Starting too early with stakeholder debate would not be beneficial (e.g. market interactions)
- For many aspects the implementation of NC E&R is **to be integrated in existing processes**, e.g. changes to the system defense and system restoration plans.
- Overall, **integration with other topics** from other codes is sought when useful.

Specific topics requiring **national stakeholder discussion** in the WG SO and/or dedicated expert groups:

Topic	Timing for stakeholder debate
Significant Grid Users	Specific Expert Group reporting to WG Belgian Grid → <i>“Significant grid users” already initiated via WG Belgian Grid</i>
Information exchange	Specific expert group for this topic to be created, linked to GL Operational security but also to connection codes
Autonomy of voice communication	<i>Directly via WG SO</i>
System defense and system restoration plan	After NC entry into force via consultation process as foreseen in the NC
Defense service provider & restoration service provider	To be initiated Q4 2016 via WG SO
Compliance testing	To be covered by every specific technical topic to ensure coherence

From E&R, some specific topics emerge for which stakeholders will be **informed** or it will be discussed at later stage which kind of debate is needed:

- Market interaction (→ more maturity needed at EU level)
- Automatic over-frequency control scheme (→ EU regional matter, not national)

Significant Grid Users (art. 1)

- Several articles of this NC mention direct 'contact & actions' between TSO and SGUs (and Defence/Restoration Service Providers)
- The SGUs (new and/or existing) for Belgium need to be defined in order to assess the impact of this code on the current practices

Defence Service Provider & Restoration Service Provider (art. 9 & 21)

- TSO shall define the terms and conditions on a contractual basis
- To be checked, if needed, how to implement in the current Belgian practices

System Defence Plan (art. 9)

- Design in consultation with relevant DSOs, Significant Grid Users, neighbouring TSOs and other TSOs in the Synchronous Area
- TSO shall mention the measures that need to be implemented by the DSO, identified Significant Grid Users & Defence Service Providers, including the implementation deadlines for each listed measure
- Activation in coordination with DSOs, identified Significant Grid Users and Defence Service Providers

Frequency Deviation Procedure (art. 13)

- Activation of Demand Side Response from Defence Service Providers, before activation of the automatic Low Frequency Demand Disconnection scheme
- Disconnection of Energy Storage, acting as load connected to its network, before activation of the automatic Low Frequency Demand Disconnection scheme
- To be checked with current Belgian practices

Automatic under-frequency control scheme (art. 14)

- General principles are in line with Belgian practices, but need for more volume and the role of the DSO will likely increase in the future
- Major changes:
 - Volume of Total Load to be disconnected is higher than in current design
 - Increase of total number of involved substations
 - Move towards more flexibility in the future (e.g. minimising disconnection of decentralised generation)

Automatic over-frequency control scheme (art. 15)

- This will require an evolution in current Belgian practices, as far as needed
- Consultation with other TSOs is needed to harmonize parameters of such a scheme (SPD SG).
- Legal and contractual context needed

Restoration Plan (art. 21)

- Design in consultation with relevant DSOs, Significant Grid Users, neighbouring TSOs and other TSOs in the Synchronous Area
- TSO shall mention the measures that need to be implemented by the DSO, identified Significant Grid Users & Restoration Service Providers, including the implementation deadlines for each listed measure
- Activation in coordination with DSOs, identified Significant Grid Users and Restoration Service Providers
- TSO shall identify all substations which are essential for its Restoration Plan procedures

Market interactions (art. 33 to 37)

- TSO shall define rules and conditions for suspension and restoration of market activities
- Communication procedure detailing tasks and actions expected from each party during suspension and restoration of market activities
- Development of specific rules and conditions for imbalance settlement and settlement of balancing energy during market suspension

Information exchange (art. 38)

- Each TSO shall, in due time, provide information during Emergency, Blackout or Restoration State to DSOs, identified SGUs, Defence/Restoration Service Providers & neighbouring TSOs
- TSO shall be entitled to gather information from DSOs, identified SGUs, Restoration Service Providers when in Emergency, Blackout or Restoration State
- To be checked with the current Belgian practices

Autonomy of voice communication and substations essential for restoration (Art. 39 & 40)

- The code requires from each DSO, identified SGU, TSO & Restoration Service Provider:
 - at least one redundant voice communication system
 - at least one voice communication system with autonomy of 24h+
 - exceptions possible for Type A or B PGM, if agreed upon with TSO
- Substations essential for Restoration Plan: operational for 24h+
- Additional investments will be needed for both Network Operators and SGUs.
- Directly linked with the investment that ELIA is proposing as part of investment program 2016-2020

Compliance testing (art. 42 to 49)

- TSO shall define a test plan in consultation with DSOs, identified Significant Grid Users, Defence/Restoration Service Providers for testing the capabilities and equipment used in the System Defence and Restoration Plan.
- Black Start Capability tests shall be executed at least every three years
- TSO shall test measures of its Restoration Plan based on computer simulation, using DSO-data, at least every five years.
- Each DSO and TSO shall execute testing on the Low Frequency Demand Disconnection relays implemented on its installation
- TSO, DSOs, identified Significant Grid Users and Restoration Service Providers shall test;
 - the communication systems at least every year
 - the backup power supply of their communication systems at least every five years
- To be implemented in the current Belgian practices