



European Network of
Transmission System Operators
for Electricity

DEMAND CONNECTION CODE – PRELIMINARY SCOPE

22.02.2012

1	CONTEXT	3
2	DEMAND CONNECTION CODE GENERAL PRINCIPLES	3
3	DEMAND CONNECTION CODE SCOPE.....	4
4	DEMAND CONNECTION CODE SPECIFIC REQUIREMENT PRINCIPLES	5

1 CONTEXT

On 5 January 2012 ENTSO-E received a mandate letter¹ from the EC to develop a network code on 'DSO and Industrial load grid connection rules' within ACER's Framework Guidelines on Electricity Grid Connections² (published 20 July 2011). This code is being covered by ENTSO-E in a draft Demand Connection Code. In line with the mandate this network code is to be submitted to ACER within a time period of twelve months.

In the preliminary phase prior to receiving this mandate, ENTSO-E discussed the scope on which to draft this code internally and in bilateral meetings with relevant European stakeholder associations:

- DSO Expert Group: work program of five meetings
- IFIEC
- CENELEC (in the context of the EC mandate 490 on smart grid deployment)

This document intends to enable the stakeholders to already start assessing in full transparency the results of the informal and formal preparatory work, following the policy option choices according to ACER's framework guidelines. This publication also allows for stakeholders who have not yet been in contact with ENTSO-E on the topic of this code to raise their potential interest.

This scope document is considered a working document and does not represent a firm, binding and definitive ENTSO-E position on the contents, the structure, or the prerogatives of the "Demand Connection Code" and on which a formal public consultation will be organised by ENTSO-E according to Regulation (EC) 714/2009.

2 DEMAND CONNECTION CODE GENERAL PRINCIPLES

- The Demand Connection Code sets out the requirements that must be met for the connection of Demand Users. This covers Demand customers (including Industrial) connected to both Transmission and Distribution which are significant in the perspective of cross-border impact and market integration, as well as Distribution System Operators.
- Only functional requirements ('capabilities') are prescribed by this code, not the specific application in system operation or markets.
- These requirements are to be functional in nature defining capabilities in performance terms and build upon the high level requirements set out in the ACER Framework Guidelines on 'Electricity Grid Connections'.
- The Demand Connection Code is closely linked to the 'Network Code on Requirements for Grid Connection applicable to all Generators'³ which is based on the same Framework Guidelines. The Demand Connection Code will follow similar principles for existing users notifications and derogations.
- Capability requirements are set at the connection point as if no generation is present. Generator capabilities are prescribed in the Network Code for "Requirements for Grid Connection applicable to all Generators". In case a distribution network or demand facility has embedded generation, the combination of both sets of design requirements allows for adequate system performance at the connection point under various conditions.

¹ https://www.entsoe.eu/fileadmin/user_upload/library/consultations/Network_Code_DCC/mandate_ENTSO-E_DSO_and_Load_connection.pdf_1_.pdf

² http://www.acer.europa.eu/portal/page/portal/ACER_HOME/Communication/News/110720_FGC_2011E001_FG_Elec_GrConn_FINAL.pdf

³ <https://www.entsoe.eu/resources/network-codes/nc-rfg/>

- The Demand Code strives for equitable treatment of all users. It maintains a technology neutral approach.
- Several levels of detail will be given in code requirements.
 - Prescriptive requirements with single European parameter values or thresholds;
 - Framework requirements with ranges of parameters to be set at national level;
 - Principle requirements with specific requirements to be set at national level.
- The quality of the connection (for example the number of circuits or transformers required to connect a user) is not in the scope of this code.
- DSOs are treated as significant users in this code.
- Closed distribution systems are covered in line with the relevant prescriptions of the 3rd Energy Package.
- Functional requirements in this code are to be supported by a level of standardization to deliver more specific applications and details.

3 DEMAND CONNECTION CODE SCOPE

The scope of the Demand Connection Code is based on ACER's Framework Guidelines.

- | | |
|---|-------------------------------|
| ▪ Frequency and voltage parameters; | Section 2.1 |
| ▪ Requirements for reactive power; | Section 2.1 |
| ▪ Load-frequency control related issues; | Section 2.1 |
| ▪ Short-circuit current; | Section 2.1 |
| ▪ Requirements for protection devices; | Section 2.1 |
| ▪ Balancing capabilities and provision of ancillary services; | Section 2.1, 2.1.1, and 2.1.2 |
| ▪ Equipment requirements at connection point; | Section 2.1.1 and 2.1.2 |
| ▪ Disconnection/Islanding/Reconnection | Section 2.1.3 |
| ▪ Instructions provide by TSO/DSO to user; | Section 2.1.2 and 3.2 |
| ▪ Information/Data exchange | Section 3 |
| ▪ Compliance; | Section 2.4 |
| ▪ Derogation; | Section 2.2 |
| ▪ Enforcement period | Section 2.3 |

4 DEMAND CONNECTION CODE SPECIFIC REQUIREMENT PRINCIPLES

A number of requirement specific principles have been identified as follows:

Frequency and voltage parameters

- The Demand Connection Code will take direction from the frequency and voltage ranges for the European synchronous areas as prescribed in the 'Network Code on Requirements for Grid Connection applicable to all Generators'.
- The capability of significant demand users to remain connected is relevant from the perspective of system stability.
- The voltage range capability of users equipment can become significant at and above 110kV and the need for requirements will therefore be considered in drafting the Network Code.

Requirements for reactive power

- Reactive compensation is most cost-effectively provided at the point of need.
- For equitable treatment of demand users a maximum European reactive power range should be a requirement of the Network Code.
- Specific reactive requirements for users should be decided by the relevant system operator (within the maximum range)
- Reactive power ranges should allow for the effective use of the reactive power capabilities required of embedded generation.

Load-frequency control related issues

- Low Frequency Demand Disconnection (LFDD) requirements necessary for European Co-ordination are part of the Network Code, harmonizing existing requirements in Europe.
- Low Voltage Demand Disconnection (LVDD) requirements are part of the Network Code responding to the recent ENTSO-E report⁴ recommendations harmonizing existing requirements in Europe.
- LVDD and On Load Tap Changer (OLTC) Transformer Blocking are to be used in tandem.
- LFDD/LVDD/OLTC shall be co-ordinated and necessary information will be exchanged.

Short-circuit current

- Short circuit ratings of equipment must not be exceeded.
- Short circuit contribution must be provided for protection operation/quality (i.e. EMC)/stability.
- Short circuit information must be given to TSO/DSO.
- System Operators are to inform demand users of what to expect from the system.

Requirements for protection devices and equipment at connection point

- Standards of connection (e.g. 1 or 2 circuits, capacity of circuits, etc) are not in the scope of this code, but left to national standards/ regulation/procedures.
- Equipment requirements are not specified as section but as part of each requirement where relevant, i.e.
 - Need for communications equipment within signals section
 - Automatic disconnection under controls
 - Relays within protection
 - Monitoring equipment within monitoring requirements
 - etc
- Equipment requirements are specified at the highest functional level allowing for evolution of technology and standards.

⁴ https://www.entsoe.eu/fileadmin/user_upload/library/publications/entsoe/RG_SOC_CE/RG_CE_ENTSO-E_Defence_Plan_final_2011_public_110131.pdf

Disconnection/Islanding/Reconnection

- Islanding issues vary and therefore application requirements in the Network Code should be flexible.
- Reconnection should be allowed following agreement with Relevant System Operator.
- Synchronism devices are to be fitted as specified by Relevant System Operator.
- Capability for automatic disconnection from network must be provided - with the application and method to be specified.

Demand management capabilities, balancing capabilities and provision of ancillary services

- Relevant services shall be either mandatory or voluntary dependant on type of service. When voluntary services are agreed on, the relevant requirements in the Network Code will become mandatory.
- Envisaged services in the code could be
 - Frequency Regulation (LFDD i.e. binary on/off)
 - Frequency Regulation (Active power modulation control autonomous)
 - Frequency Regulation (Active power control System Operator controlled)
 - Very fast Frequency Regulation (Active power controlled System Operator controlled)
 - Voltage Control (LVDD i.e. binary on/off)
 - Voltage Control (Reactive power control System Operator controlled)
 - Transmission Constraints Management
- Capabilities required in this code should not exclude or limit potential future market developments on ancillary services.

Instructions provide by TSO/DSO to user

- Instruction procedures are not covered in this Network Code.
- The Network Code will specify capabilities to provide/receive instructions and as a consequence some of the principles/rights for instructions i.e.
 - Set points for voltage control
 - Disconnection/Reconnection
 - Compliance – tests/procedural steps
 - Monitoring
- Manual operation will not be excluded. Response times can be specified where relevant.

Information/Data exchange, modernization and equipment replacement, derogation, compliance, enforcement period

- The Demand Connection Code will be in line with the 'Network Code on Requirements for Grid Connection applicable to all Generators' on these topics where relevant.