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# Connection Network Codes – Introduction to the public consultation of Implementation Guidance Documents

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## 1. Introduction

### Overview of connection codes

The European Connection Network Codes - [Requirements for Generators \(RfG\)](#), [Demand Connection Codes \(DCC\)](#) and [High Voltage Direct Current Connections \(HVDC\)](#) – have been developed in accordance with Regulation (EU) 714/2009 and are cornerstones to fulfil the third energy package.

The first connection network code, which entered into force on 17 May 2016, is the Commission Regulation (EU) 2016/631 of 14. April 2016 establishing a network code on requirements for grid connection of generators (RfG). The Commission Regulations on DCC and HVDC followed after that - (EU) 2016/1388 of 17. August 2016 establishing a network code on demand connection (DCC), entering into force on 18 August 2016, and the Commission Regulation (EU) 2016/1447 of 26. August 2016 establishing a network code on requirements for grid connection of high voltage direct current systems and direct current-connected power park modules (HVDC), entering into force on 8 September 2016 respectively.

In order to support the implementation of network codes at national level, and as required by the codes, ENTSO-E has produced non-binding guidance on implementation, which it is further required to consult on with stakeholders. This guidance is provided through so-called Implementation Guidance Documents (IGDs).

### Legal background for IGDs

Commission Regulation (EU) 2016/631 of 14 April 2016 establishing a network code on requirements for grid connection of generators (RfG), (Article 58), Commission Regulation (EU) 2016/1388 of 17. August 2016 establishing a network code on demand connection (DCC) (Article 56) and the Commission Regulation (EU) 2016/1447 of 26. August 2016 establishing a network code on requirements for grid connection of high voltage direct current systems and direct current-connected power park modules (HVDC) (Article 75) – Non-binding guidance on implementation - stipulate:

1. *No later than six months after the entry into force of this Regulation, the ENTSO for Electricity shall prepare and thereafter every two years provide non-binding written guidance to its members and other system operators concerning the elements of this Regulation requiring national decisions. The ENTSO for Electricity shall publish this guidance on its website.*
2. *ENTSO for Electricity shall consult stakeholders when providing non-binding guidance.*
3. *The non-binding guidance shall explain the technical issues, conditions and interdependencies which need to be considered when complying with the requirements of this Regulation at national level.*

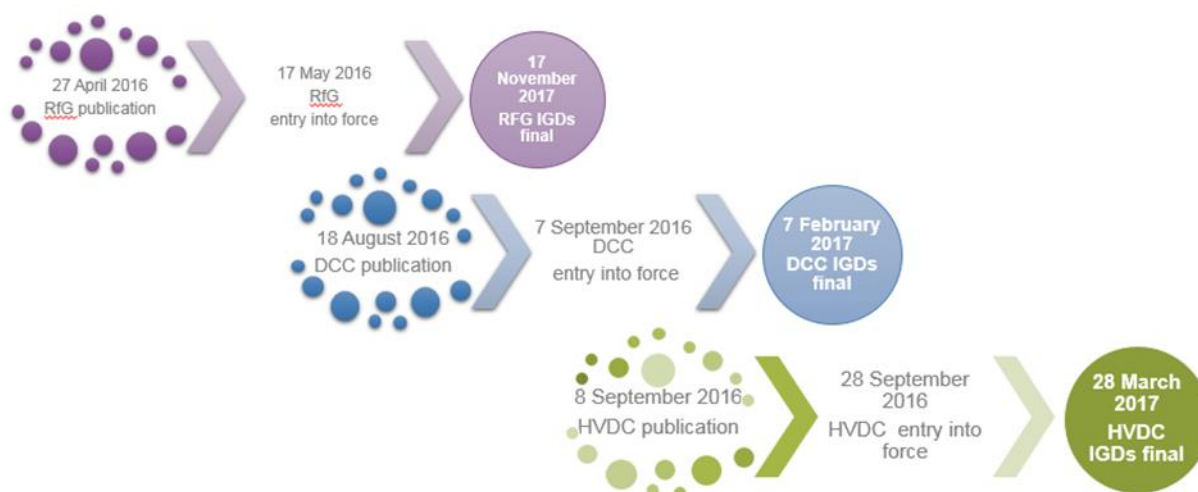


Figure 1: Timeline of adoption of connection network codes and deadlines for publishing different sets of IGDs.

## Objectives of IGDs

The main objective of the implementation guidance is to support system operators in the process of determination on national level of non – exhaustive requirements during the national implementation. The objectives of the implementation guidance documents are:

- to facilitate a common understanding of technical issues specified in the connection network codes, in context of new technologies and new requirements (e.g. synthetic inertia)
- to deliver broader explanations and background information and to illustrate interactions between requirements,
- to recommend coordination/collaboration between network operators (TSO) where either explicitly required by the connection codes or reasonably exercised from a system engineering perspective,
- to give guidance to national specifications for non-exhaustive requirements, and
- to express the need of further harmonisation beyond what is requested by the CNCs when reasonable from a system engineering perspective.

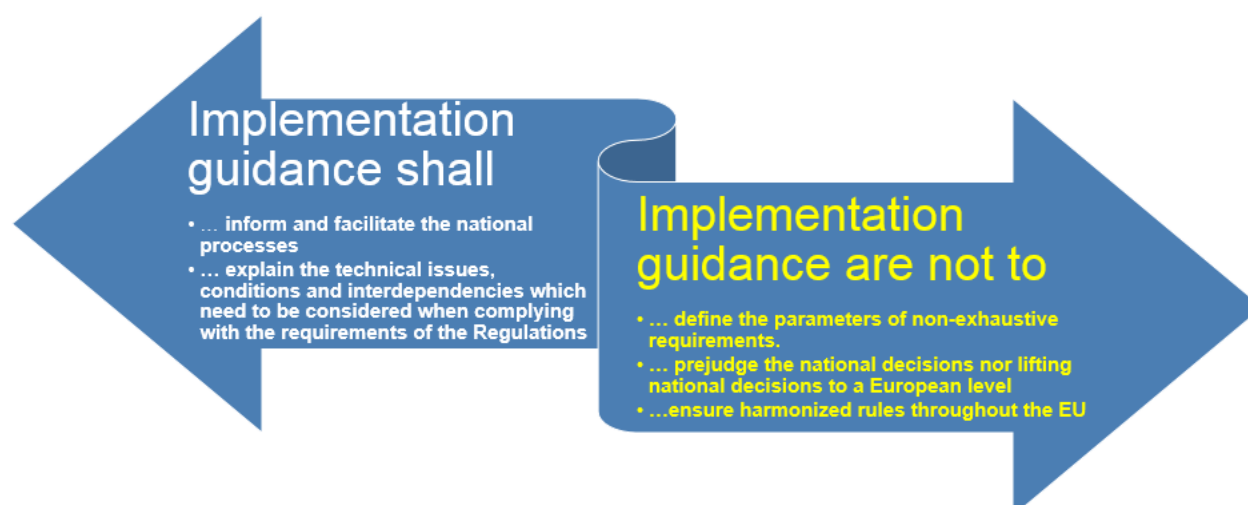


Figure 2: Scope of IGDs

## Target audiences

IGDs are written for TSO staff who works and applied different connection codes.

## How have IGDs been drafted?

The IGDs were drafted by ENTSO-E experts taking account of the input received from stakeholders during the process as follows:

- [23 September 2015 workshop](#) - stakeholders were informed of the intent to draft IGDs and gave their initial views on how they saw this being accomplished. They wished to be strongly involved in the process. Consequently ENTSO-E organised ahead of the entry into force of the codes:
- A [survey on Stakeholders' priority](#) issues for IGDs. This survey took place between 25 December 2015 and 22 January 2016. As a result ENTSO-E has taken on board further topics for IGDs. The outcomes of the survey were presented in the workshop on 29 February 2016.
- A [public stakeholder workshop on 29 February 2016](#) with the objective of defining the content of IGDs to address each of the priority issues previously identified. The outcomes can be accessed on the event site.
- [1 July – 15 August 2016](#) – ENTSO-E publishes draft IGDs for consultation from the RfG perspective. The [comments received](#) supported the update of the IGDs which ENTSO-E published on 17 November 2016 according to the RfG regulation.
- A [public stakeholder workshop on 13 September 2016](#) aimed at checking the ENTSO-Es understanding of the stakeholders' consultation comments and to gather additional feasible suggestions.
- [8 December 2016 – 16 January 2017](#) - consultation of the updated IGDs from the DCC and HVDC perspective. The [outcomes](#) of this second consultation further enhanced the IGDs and ENTSO-E published these new/updated IGDs on March 8.

- Regular input and updates from stakeholders on their expectations for the IGDs and regular updates on the next steps within the European [Connection codes Stakeholder committee](#).

The IGDs were drafted from a topic perspective and therefore most of them cover more than one connection code simultaneously.

**ENTSO-E experts are willing and committed to proceed to the drafting of new IGDs (e.g. the High Penetration of Power Electronic Interfaced Power Sources (HPoPEIPS)) or improvements of current ones in order to support the process of implementation of all the NCs at the early stages of it.**

**Similar process regarding stakeholder involvement and consultations is/will be followed for any new or updated IGDs that is produced beyond the legally required period of 6 months.**

## How to respond to this consultation?

ENTSO-E has prepared the consultation in a transparent and open manner. When drafting the IGDs, the expectations of the relevant stakeholders have been taken into consideration **within their participation to dedicated Expert Groups established by ENTSO-E or by means of a stakeholder survey and a subsequent workshop**. In line with this strategy, the next two years of national implementation shall be accompanied by continuous stakeholder interaction primarily at national level, but supplemented through the European connection codes Stakeholder Committee, and by other means of stakeholder interaction (e.g. further workshops) where necessary.

The current IGD consultation is scheduled as follows:

**5 April – 5 May 2017** – ENTSO-E publishes four (4) draft IGDs for consultation – one new and three consequent updates (please see the list below). The comments received will support the update of the IGDs.

**Note:** The IGDs **Fault current contribution from PPMs & HVDC converters, Need for synthetic inertia (SI) for frequency regulation and Rate-of-change-of-frequency (RoCoF) withstand capability** have been subject to the recent consultation between [8 December 2016 – 16 January 2017](#) and the relevant [outcomes](#) have been published on March 8.

**Small adjustments to the above-mentioned IGDs were made for reasons of alignment with the results of the new IGD on High Penetration of Power Electronic Interfaced Power Sources (HPoPEIPS)**

**This note aims at helping the stakeholders and participants to this consultation being more targeted to their feedback**

## 2. List of Implementation Guidance Documents

### Style of IGDs

ENTSO-E has recently developed and/or improved four IGDs (as per list below). The IGDs were developed in an easy to read and short format and focus on the most relevant information of each topic. Each IGD includes information on the legal framework (Codes & Articles), objectives of the IGD, interdependencies between/in the codes, system and technology characteristics, further information, and recommendations on collaboration between the system operators at different levels and between them and grid users.

## List of IGDs

No	Titles of IGD	Status	Short descriptions
1	High Penetration of Power Electronic Interfaced Power Sources (HPoPEIPS)	New	This IGD focuses on an overview of resilience issues related to the system technical challenges of operating a power system with high penetration of RES. This document deals with necessary capabilities to manage low Total System Inertia (TSI) and also with other system challenges arising from operation with low overall system strength such as low short-circuit power and low dynamic voltage support.
2	Fault current contribution from PPMs & HVDC converters	Updated	Its objective is to give guidance on the purpose of these requirements and on how to design these specific requirements for power park modules or HVDC systems connected to distribution or transmission networks to deliver an adequate reactive current injection during short circuits and after fault clearing when the voltage has not recovered.
3	Need for synthetic inertia (SI) for frequency regulation	Updated	The purpose of this IGD is to define under what system circumstances synthetic inertia should be considered including considerations of forward needs, what are the alternatives, how could the functional requirements be defined and what is the readiness of technologies.
4	Rate-of-change-of-frequency (RoCoF) withstand capability	Updated	Its objective is to give advice on what considerations are appropriate before selecting a national value for RoCoF withstand for generators within scope of RfG. Consider also the relevance of the fully exhaustive withstand values in NC HVDC for both HVDC and for HVDC connected PPMs.