



ENTSO-E connection network codes Implementation guidance documents

Joint DSO response paper

August 2016

Questionnaire

Rate-of-change- of- frequency withstand capability (RoCoF)

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.

The full IGD can be accessed here https://consultations.entsoe.eu/system-development/entso-e-connection-codes-implementation-guidance-d/consult_view

1. For this IGD please give us your comments on:

Do you consider this IGD helpful to reasonably support the national implementation process?

Please select only one item

☒ Yes ☐ No

Does the content of the IGD cover the technical issues of this topic appropriately?

Please select only one item

☒ Yes ☐ No

Comments on the technical information within this IGD

The IDG clearly indicates the interest of having the same value for each synchronous zone to ensure stability of the network. It also indicates the need of integrating uncertainties on system characteristics when defining the Rocof capabilities.

General (other) comments

Making non-mandatory requirements at European level mandatory in a country

Its objective is to give guidance on how to proceed, when deciding if a non-mandatory requirement should be made mandatory in a specific country where the need for this requirement can be demonstrated.

The full IGD can be accessed here https://consultations.entsoe.eu/system-development/entso-e-connection-codes-implementation-guidance-d/consult_view

2. For this IGD please give us your comments on:

Do you consider this IGD helpful to reasonably support the national implementation process?

Please select only one item

☒ Yes ☐ No

Does the content of the IGD cover the technical issues of this topic appropriately?

Please select only one item

☐ Yes ☒ No

Comments on the technical information within this IGD

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General (other) comments

A complete list of the non-mandatory requirements (and classified as exhaustive or non-exhaustive requirements) would be useful for all stakeholders.

Cost-benefit analysis

The purpose of this IGD is to collate the main considerations when preparing national processes for implementing CBAs, including the benefit of input from third parties.

The full IGD can be accessed here https://consultations.entsoe.eu/system-development/entso-e-connection-codes-implementation-guidance-d/consult_view

3. For this IGD please give us your comments on:

Do you consider this IGD helpful to reasonably support the national implementation process?

Please select only one item

☒ Yes ☐ No

Does the content of the IGD cover the technical issues of this topic appropriately?

Please select only one item

☐ Yes ☒ No

Comments on the technical information within this IGD

The IGD indicates the cost and benefit categorisations. The three items include only cost/benefits for TSOs and power generating modules. However, applying some requirements could also affect Distribution System Operators (costs or benefits). Therefore, they should also be part of the cost/benefits items.

General (other) comments

A series of dedicated workshops is needed to define CBA methodology accepted by all stakeholders.

Parameters of non-exhaustive requirements

Its objective is to give a general overview on the non-exhaustive parameters of the NC RfG, DCC and HVDC which will need a national choice and to provide a general guidance on these parameters. Specific guidelines on some technical issues are foreseen in other IGDs (e.g. Voltage issues, Frequency parameters, restoration issues).

The full IGD can be accessed here https://consultations.entsoe.eu/system-development/entso-e-connection-codes-implementation-guidance-d/consult_view

4. For this IGD please give us your comments on:

Do you consider this IGD helpful to reasonably support the national implementation process?

Please select only one item

☒ Yes ☐ No

Does the content of the IGD cover the technical issues of this topic appropriately?

Please select only one item

☐ Yes ☒ No

Comments on the technical information within this IGD

This IGD summarises general aspects that need to be taken into account when defining non-exhaustive requirements, for example, this IGD states that the relative amount of RES will impact a number of parameters, but no example or procedures are proposed to help Member States to define them.

General (other) comments

These tables could be provided to the participants in the Grid Connection ESC. This overview should then indicate for the non-exhaustive requirements the intention (in a first stage) / decision (in a second stage) of each Member States.

Compliance monitoring

Its objective is to give guidance on the compliance of equipment connected to the system with the technical requirements forming part of the Connection Network Codes and as detailed within these.

The full IGD can be accessed here https://consultations.entsoe.eu/system-development/entso-e-connection-codes-implementation-guidance-d/consult_view

5. For this IGD please give us your comments on:

Do you consider this IGD helpful to reasonably support the national implementation process?

Please select only one item

☒ Yes ☐ No

Does the content of the IGD cover the technical issues of this topic appropriately?

Please select only one item

☐ Yes ☒ No

Comments on the technical information within this IGD

The IGD emphasises the need for equipment certificates for type A for notification procedure and compliance monitoring. For types B/C/D it is also possible to use equipment certificates in the notification process instead of relevant tests or simulations. The IGD also summarizes simulations and tests required for types B/C/D for compliance assessment.

General (other) comments

The IGD speaks about equipment certificates, but does not explain what their content is, or how they are elaborated. In addition, it is unclear how equipment certificate could be used considering there are no standards to link them to.

Further explanation on this point would be very useful.

Reactive power management at transmission/distribution interface

The purpose of this IGD is to collate the main considerations associated with the 3 requirements in NC DCC for reactive power exchange, including changing needs to regulate voltage as embedded RES capacity increases and availability of transmission based capacity reduces.

The full IGD can be accessed here https://consultations.entsoe.eu/system-development/entso-e-connection-codes-implementation-guidance-d/consult_view

6. For this IGD please give us your comments on:

Do you consider this IGD helpful to reasonably support the national implementation process?

Please select only one item

☒ Yes ☐ No

Does the content of the IGD cover the technical issues of this topic appropriately?

Please select only one item

☐ Yes ☒ No

Comments on the technical information within this IGD

The link between the choices made at national level for the thresholds for Types B, C & D power generating modules in the T/D reactive power requirements should be more emphasised. If only types A & B are connected to the distribution network there will not be many reactive power sources available on the distribution networks apart from investing in reactive power compensation equipment's. Annex 2 of the IGD should be more detailed (assumptions, requirements...). It gives an example of a cost benefit analysis in Ireland which cannot be taken for granted anywhere else.

General (other) comments

As mentioned in the IGD, the reactive power compensation needs depend on the local situation. It is therefore difficult to justify the same reactive requirements at T/D interface in national power systems. More flexibility should be left on the implementation of these requirements in order to optimise the corresponding investments.

In addition, we disagree with the "system characteristics" section. We propose to include the wording below to express in a better way the issues that should be considered to properly locate reactive compensation equipment:

"The consequences of greater contribution from Renewable Energy Sources (RES) in context of system voltage and availability of reactive power capability has to be considered.

(...)

*Furthermore, per unit cost of static reactive compensation equipment (reactors or capacitor banks) is typically increasing with the voltage level at which it is connected. **Nonetheless, it should be also noted that the size of the compensation equipment and the voltage level are related; large equipment is designed for HV and VHV levels and vice versa. Therefore, one single 150 MVar capacitor bank at VHV or HV level can be much more cost-effective than a dozen of 10 MVar capacitor banks at MV level because smaller sizes requires a much more higher number of breakers, relays and auxiliary components than the higher size banks.***

(...)

*Overall system performance is improved, either technically or economically, if appropriate measures are taken concerning reactive power management **for transmission connected distribution networks or demand facilities at the connection point.** Reactive power delivered where needed is more cost effective, allowing also for loss reduction, higher active power loading, less need for system reinforcements and lower capital cost of lower voltage installation. Voltage stability is also recognized as an important basis for system security. The Cost Benefit Analyses (CBA) provided in the "Call for Stakeholder Input" and supplemented by additional synchronous areas analysis (see FAQ 22) have shown that from a socio-economic viewpoint the total cost to meet the DSO system need for reactive power is lower if the reactive compensation is undertaken lower down in the system (closer to the demand) **than if invested at the higher voltage level.** The results of this CBA are shown in Annex 2. **However, it should be considered that locating reactors or capacitors banks "closer to the demand" does not imply necessarily to place them at the same voltage level".***

Reactive power requirement for PPMs & HVDC converters at low / zero active power

Its objective is to give guidance on considerations relevant to defining the need for reactive power at low active power operation, including impact of otherwise switching capability on and off whenever an active power is exceeded or gone below, as the power source (e.g. wind) or set-point varies.

The full IGD can be accessed here https://consultations.entsoe.eu/system-development/entso-e-connection-codes-implementation-guidance-d/consult_view

7. For this IGD please give us your comments on:

Do you consider this IGD helpful to reasonably support the national implementation process?

Please select only one item

☐ Yes ☐ No

Does the content of the IGD cover the technical issues of this topic appropriately?

Please select only one item

☐ Yes ☐ No

Comments on the technical information within this IGD

General (other) comments

Post fault active power recovery

Its objective is to give guidance on the purpose of these requirements and on how to proceed when implementing the requirements on post-fault active power recovery for Type B Synchronous Power Generating Modules, Type B Power Park Modules and HVDC systems.

The full IGD can be accessed here https://consultations.entsoe.eu/system-development/entso-e-connection-codes-implementation-guidance-d/consult_view

8. For this IGD please give us your comments on:

Do you consider this IGD helpful to reasonably support the national implementation process?

Please select only one item

☒ Yes ☐ No

Does the content of the IGD cover the technical issues of this topic appropriately?

Please select only one item

☐ Yes ☒ No

Comments on the technical information within this IGD

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General (other) comments

The explanation of this IGD seems rather focused on the justification for the need of these requirements, than on the implementation guidance.

Fault current contribution from PPMs & HVDC converters

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.

The full IGD can be accessed here https://consultations.entsoe.eu/system-development/entso-e-connection-codes-implementation-guidance-d/consult_view

9. For this IGD please give us your comments on:

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Please select only one item

☒ Yes ☐ No

Does the content of the IGD cover the technical issues of this topic appropriately?
Please select only one item

☐ Yes ☒ No

Comments on the technical information within this IGD

The technical description of this IGD does not describe the possible impact on the distribution network protection system when PPM connected to radially operated distribution networks provides fault currents. Even though it could have a positive impact on the voltage stability on the transmission network, it could also alter the distribution network protection plan.

General (other) comments

Need for synthetic inertia for frequency regulation

The purpose of this IGD is to define under what system circumstances SI 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.

The full IGD can be accessed here https://consultations.entsoe.eu/system-development/entso-e-connection-codes-implementation-guidance-d/consult_view

10. For this IGD please give us your comments on:

Do you consider this IGD helpful to reasonably support the national implementation process?

Please select only one item

☐ Yes ☐ No

Does the content of the IGD cover the technical issues of this topic appropriately?

Please select only one item

☐ Yes ☐ No

Comments on the technical information within this IGD

General (other) comments

Frequency related parameters for non-exhaustive requirements

Its objective is to give guidance on considerations on national choices for all frequency related non-exhaustive aspects.

The full IGD can be accessed here https://consultations.entsoe.eu/system-development/entso-e-connection-codes-implementation-guidance-d/consult_view

11. For this IGD please give us your comments on:

Do you consider this IGD helpful to reasonably support the national implementation process?

Please select only one item

☒ Yes ☐ No

Does the content of the IGD cover the technical issues of this topic appropriately?

Please select only one item

☐ Yes ☒ No

Comments on the technical information within this IGD

The IGD emphasises the needed collaboration in the choice of these parameters within a synchronous area, so we expect a detailed proposal based on real arguments and on experiences. Technical problems of generating units are summarised as well as manufacturer's issues with combined requirements.

General (other) comments

The IGD does not contain any proposal to harmonise at the level of the synchronous area. Where will it be defined? At the ESC? Or it will be defined without stakeholders' involvement?

Instrumentation, simulation models and protection

Its objective is to give guidance on considerations for how to add practical details at national level on these aspects / processes.

The full IGD can be accessed here https://consultations.entsoe.eu/system-development/entso-e-connection-codes-implementation-guidance-d/consult_view

12. For this IGD please give us your comments on:

Do you consider this IGD helpful to reasonably support the national implementation process?

Please select only one item

☐ Yes ☐ No

Does the content of the IGD cover the technical issues of this topic appropriately?

Please select only one item

☐

Yes

☐

No

Comments on the technical information within this IGD

General (other) comments

Voltage-related parameters for non-exhaustive requirements

Its objective is to give guidance on considerations on the non-exhaustive voltage parameters of the NC RfG, DCC and HVDC needed to make the national choices.

The full IGD can be accessed here https://consultations.entsoe.eu/system-development/entso-e-connection-codes-implementation-guidance-d/consult_view

13. For this IGD please give us your comments on:

Do you consider this IGD helpful to reasonably support the national implementation process?

Please select only one item

☐

Yes

☐

No

Does the content of the IGD cover the technical issues of this topic appropriately?

Please select only one item

☐

Yes

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No

Comments on the technical information within this IGD

General (other) comments

Determination of the thresholds for Types B, C & D power generating modules

The purpose of this IGD is to collate the main considerations in defining lower MW boundaries for the type B, C and D as defined in the NC RfG.

The full IGD can be accessed here https://consultations.entsoe.eu/system-development/entso-e-connection-codes-implementation-guidance-d/consult_view

14. For this IGD please give us your comments on:

Do you consider this IGD helpful to reasonably support the national implementation process?

Please select only one item

☒ Yes ☐ No

Does the content of the IGD cover the technical issues of this topic appropriately?

Please select only one item

☐ Yes ☒ No

Comments on the technical information within this IGD

The IGD summarises the technical differences which will apply between the different types (A/B/C/D) of power generating modules. This helps the national implementation by clearly defining the differences between each type.

However, the IGD does not give any methodologies that could help set up the limits. Methodologies describing the following items could be helpful:

- future frequency capacities requirements,
- the future reactive power requirements
- the description of the future needs in terms of voltage ride through stabilities
- the future needs in terms of power injection observability

General (other) comments

The different power generating types endorse different technical requirements which can be totally different (example for type B: observability and voltage ride through capabilities). Having integrated such different requirements can make the choice of thresholds difficult. For example, a power system could need low threshold for type B to improve power production observability, but voltage ride through capabilities cannot be applied for small power generating modules.

Reactive power control mode

This IGD gives guidance relating to the choice of control mode for reactive power and allowing the selection to reflect the national / local needs. When choosing relevant national parameters, considerations include how to link from steady-state operation to dynamic fast fault current contribution.

The full IGD can be accessed here https://consultations.entsoe.eu/system-development/entso-e-connection-codes-implementation-guidance-d/consult_view

15. For this IGD please give us your comments on:

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Please select only one item

☒ Yes ☐ No

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Please select only one item

☐ Yes ☒ No

Comments on the technical information within this IGD

The different possibilities of reactive power control are described in the IGD. However the method to choose between the three options and the choice of control parameters is not described in the document. Regarding the link between RfG and DCC requirements for reactive power, it is important to remember that types of distribution network will determine reactive power sources available at the interface.

General (other) comments

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Harmonisation

Its objective is to give a general overview on further harmonisation via the national implementation process. Reflecting that a system engineering view and associated collaboration is driving this process. Could standards help to create desired further harmonisation?

The full IGD can be accessed here https://consultations.entsoe.eu/system-development/entso-e-connection-codes-implementation-guidance-d/consult_view

16. For this IGD please give us your comments on:

Do you consider this IGD helpful to reasonably support the national implementation process?

Please select only one item

☐ Yes ☒ No

Does the content of the IGD cover the technical issues of this topic appropriately?

Please select only one item

☐ Yes ☒ No

Comments on the technical information within this IGD

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General (other) comments

This IGD does not really bring anything new. Its relevance can be questioned.

Real time data, communication and redundancy

Its objective is to give a general overview of the different categories of information flows (e.g. DSO-TSO, DSO-DSO, DSO-Generating unit) and its purposes.

The full IGD can be accessed here https://consultations.entsoe.eu/system-development/entso-e-connection-codes-implementation-guidance-d/consult_view

17. For this IGD please give us your comments on:

Do you consider this IGD helpful to reasonably support the national implementation process?

Please select only one item

☒ Yes ☐ No

Does the content of the IGD cover the technical issues of this topic appropriately?

Please select only one item

☐ Yes ☒ No

Comments on the technical information within this IGD

The IGD should make a clear link with the Operational Guidelines and the E&R network code. The application of the requirements on these operational codes will be based on the requirements established in the application of the RfG code in terms of information to be sent to the relevant TSO or the relevant system operator.

General (other) comments

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Special issues for Type A generators

Its objective is to give guidance on how to deal with small units largely “off the shelf” with less individual engineering and considerations but that could represent a significant share of the installation present in a country.

The full IGD can be accessed here https://consultations.entsoe.eu/system-development/entso-e-connection-codes-implementation-guidance-d/consult_view

18. For this IGD please give us your comments on:

Do you consider this IGD helpful to reasonably support the national implementation process?

Please select only one item

☒ Yes ☐ No

Does the content of the IGD cover the technical issues of this topic appropriately?

Please select only one item

☒ Yes ☐ No

Comments on the technical information within this IGD

The IDG emphasises the need for equipment certification based on standards as a proof of compliance. Regarding the choice of parameters, its impact of protection scheme has been identified and the choices will need to be coherent. The IGD considers that CENELEC standards fix the worst case values of frequency ranges and ROCOF and that all equipment will fulfil these requirements even if national values are different. For other frequency parameters, the co-ordination within the synchronous area is emphasised.

General (other) comments