



**Joint Response
to ENTSO-E consultation on HVDC and DCC
Implementation Guidance Documents**

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INTRODUCTION

- J Europe currently has three connection network codes: Requirements of Generators (RfG), Demand Connection Code (DCC) and High Voltage Direct Current (HVDC). RfG entered into force on 17 May 2016, DCC on 7 September 2016, and HVDC on 8 September 2016.
- J The Member States have the obligation to implement these codes no later than three years after their entry into force. Within this timeframe the Member States have two years to define the national specifications for the so-called **non-exhaustive requirements**.
- J In order to support the implementation at national level and also in line with the legal requirements of these network codes ENTSO-E has drafted a set of 18 non-binding implementation guidance documents which have been put forward for consultation. These guidance documents are addressed to the transmission system operators and other system operators concerning the elements of the codes requiring national decisions. They shall explain the technical issues, conditions and interdependencies which need to be considered when complying with the requirements of this Regulation at national level.
- J ENTSO-E has consulted these IGDs from the RfG perspective from 1 July to 15 August 2016. The comments received resulted in the update of the IGDs which were published on 17 November 2016. Now, ENTSO-E starts the consultation of the updated IGDs from the DCC and HVDC perspective, consultation which will close on 16 January 2017. Based on the outcomes of this second consultation ENTSO-E will further update the IGDs and will publish these updates on 7 March 2017.

Questionnaire

Comment the IGD Rate-of-change-of-frequency withstand Capability

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://www.entsoe.eu/Documents/Network%20codes%20documents/NC%20RfG/161116_IGD_RoCoF%20withstand%20capability_for%20publication.zip

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

The IDG clearly indicates the interest of having the same value for each synchronous zone to ensure stability of the network. It is also indicated the need of integrating uncertainties on system characteristics when defining the RoCoF capabilities. However, no information regarding the measurement of RoCoF is provided.

General (other) comments

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Comment the IGD 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://www.entsoe.eu/Documents/Network%20codes%20documents/NC%20RfG/161116_IGD_Making%20Requirements%20Mandatory%20at%20National%20Level_for%20publication.pdf?Web=1

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

IGD explains the reasons for having non-mandatory requirements as mandatory requirements in a country. It also details aspects to be taken into account as already existing requirements or national system characteristics.

General (other) comments

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Comment the IGD 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://www.entsoe.eu/Documents/Network%20codes%20documents/NC%20RfG/161116_IGD%20Guidance%20on%20CBAs_for%20publication.rar

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 IGD was first developed for the RfG code. All examples are made according to the RfG code. It should focus more on the issues faced in the DCC code.

The IGD indicates the cost and benefit categorisations. It is based on the RfG code. 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.

The comments and proposals, delivered by stakeholders during the workshop on November, 21st in 2016 are not implemented. The IGD in its current form would need changes to support the national implementation process.

General (other) comments

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Comment the IGD 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://www.entsoe.eu/Documents/Network%20codes%20documents/NC%20RfG/161116_IGD_General%20guidance%20on%20parameters_for%20publication.pdf?Web=1

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

This IGD summarises general aspects that need to be taken into account when defining non-exhaustive requirements but there is no detail on the method to be used for each parameter.

General (other) comments

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Comment the IGD 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://www.entsoe.eu/Documents/Network%20codes%20documents/NC%20RfG/161116 IGD Guidance%20on%20Compliance for%20publication.rar](https://www.entsoe.eu/Documents/Network%20codes%20documents/NC%20RfG/161116%20IGD%20Guidance%20on%20Compliance%20for%20publication.rar)

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

The IGD emphasises the need of equipment certificates for type A for notification procedure and compliance monitoring for RfG. Only little information is given about DR (Demand Response) notification procedure and compliance monitoring. This is an essential part of the DCC code: more information would be welcome.

General (other) comments

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Comment the IGD 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://www.entsoe.eu/Documents/Network%20codes%20documents/NC%20RfG/161116_IGD_Reactive%20power%20management%20at%20T%20and%20D%20interface_for%20publication.pdf?Web=1

9. 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 PGMs are connected to the distribution network reactive power levers available on the distribution networks will probably be reduced and investing in reactive power compensation equipment will become more important.

Annex 2 of the IGD should be more detailed (assumptions, requirements, etc.). It gives an example of CBA in Ireland which cannot be taken for granted anywhere else.

General (other) comments

As mentioned in the IGD, the reactive power compensation needs to 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.

Comment the IGD 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://www.entsoe.eu/Documents/Network%20codes%20documents/NC%20RfG/161116_IGD_Reactive%20power%20management%20at%20T%20and%20D%20interface_for%20publication.pdf?Web=1

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

Not applicable to DCC.

General (other) comments

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Comment the IGD 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://www.entsoe.eu/Documents/Network%20codes%20documents/NC%20RfG/161116_IGD_Reactive%20power%20management%20at%20T%20and%20D%20interface_for%20publication.pdf?Web=1

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

Not applicable to DCC.

General (other) comments

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Comment the IGD 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://www.entsoe.eu/Documents/Network%20codes%20documents/NC%20RfG/161116_IGD_Reactive%20power%20management%20at%20T%20and%20D%20interface_for%20publication.pdf?Web=1

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

Not applicable to DCC.

General (other) comments

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Comment the IGD 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://www.entsoe.eu/Documents/Network%20codes%20documents/NC%20RfG/161116_IGD_Reactive%20power%20management%20at%20T%20and%20D%20interface_for%20publication.pdf?Web=1

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 No

Comments on the technical information within this IGD

Not applicable to DCC.

General (other) comments

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Comment the IGD 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://www.entsoe.eu/Documents/Network%20codes%20documents/NC%20RfG/161116 IGD Reactive%20power%20management%20at%20T%20and%20D%20interface for%20publication.pdf?Web=1](https://www.entsoe.eu/Documents/Network%20codes%20documents/NC%20RfG/161116%20IGD%20Reactive%20power%20management%20at%20T%20and%20D%20interface%20for%20publication.pdf?Web=1)

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 IDG emphasises the needed collaboration in the choice of these parameters within a synchronous area and the need of having coherent values for different connection codes. Technical problems of different technologies are summarized as well as manufacturers' issues with combined requirements.

General (other) comments

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Comment the IGD 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://www.entsoe.eu/Documents/Network%20codes%20documents/NC%20RfG/161116_IGD_Reactive%20power%20management%20at%20T%20and%20D%20in%20interface_for%20publication.pdf?Web=1

15. 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

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Comment the IGD 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://www.entsoe.eu/Documents/Network%20codes%20documents/NC%20RfG/161116_IGD_Reactive%20power%20management%20at%20T%20and%20D%20interface_for%20publication.pdf?Web=1

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

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Comment the IGD 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://www.entsoe.eu/Documents/Network%20codes%20documents/NC%20RfG/161116_IGD_Reactive%20power%20management%20at%20T%20and%20D%20interface_for%20publication.pdf?Web=1

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

Not applicable to DCC.

General (other) comments

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Comment the IGD 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://www.entsoe.eu/Documents/Network%20codes%20documents/NC%20RfG/161116_IGD_Reactive%20power%20management%20at%20T%20and%20D%20interface_for%20publication.pdf?Web=1

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

Not applicable to DCC.

General (other) comments

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Comment the IGD 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://www.entsoe.eu/Documents/Network%20codes%20documents/NC%20RfG/161116_IGD_Reactive%20power%20management%20at%20T%20and%20D%20interface_for%20publication.pdf?Web=1

19. 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

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Comment the IGD Real time data and communication

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://www.entsoe.eu/Documents/Network%20codes%20documents/NC%20RfG/161116_IGD_Reactive%20power%20management%20at%20T%20and%20D%20interface_for%20publication.pdf?Web=1

20. 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 makes 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 DCC code in terms of information to be sent to the relevant TSO or the relevant system operator.

General (other) comments

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Comment the IGD 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://www.entsoe.eu/Documents/Network%20codes%20documents/NC%20RfG/161116_IGD_Reactive%20power%20management%20at%20T%20and%20D%20interface_for%20publication.pdf?Web=1

21. 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

Not applicable to DCC.

General (other) comments

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