

# Network Code on Connection Requirements applicable to all Generators

*stakeholder meeting EWEA*

6 December 2011  
Düsseldorf



# Meeting objectives

- Communicating planning of the NC RfG planning
- Agreement on basic elements of NC RfG
  - Approach of Significant Users
  - Choice of level of detail of requirements
  - Retro-active application of requirements
  - Deviations from existing standards
- Agreement on specific technical requirements, relevant for wind industry
  - FRT
  - Reactive power capabilities
  - Simulation models
- Next steps

Pilot process

Redrafting based on  
ACER's final framework  
guidelines

Working draft publication

Continued stakeholder  
interaction

Public consultation

Working draft available at  
<http://www.entsoe.eu>

## ENTSO-E Draft Requirements for Grid Connection Applicable to all Generators

27 October 2011

### Notice

This draft represents the conclusion of the preparatory work undertaken by ENTSO-E in the context of the "network code for requirements for grid connection applicable to all generators". The contents of this draft, organised in a manner similar to the anticipated structure of the final network code, reflect the status of the work done by TSO experts as of 18 October 2011, in line with the ACER Framework Guidelines on Electricity Grid Connection published on 20 July 2011. It is based not only on the input of an extensive informal dialogue with stakeholders as well as public workshops that took place during the pilot period between Summer of 2009 and 3 March 2011, the date on which Regulation (EC) 714/2009 entered into force, as well as ongoing formal discussions after the EC mandate letter was received by ENTSO-E on 29 July 2011.

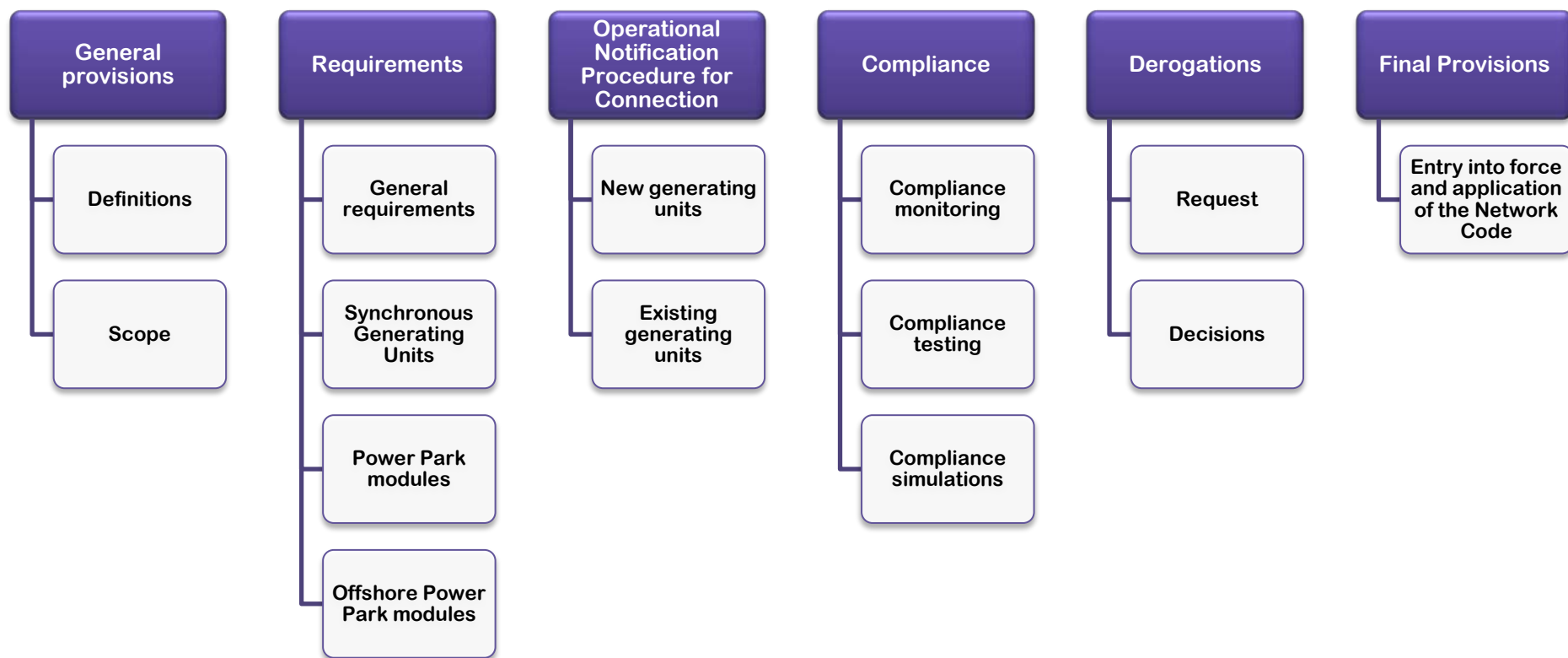
The current early publication of this draft intends to enable the stakeholders to already start assessing in full transparency the results of the informal and formal preparatory work, following the policy option choices according to ACER's framework guidelines.

The formal consultation is expected to be organised in the first quarter of 2012, during which period stakeholders will have the option to provide comments via the web-based ENTSO-E consultation tool. After due consideration of these comments in an open and transparent manner in compliance with Article 10 of Regulation (EC) 714/2009, ENTSO-E will adopt its "network code for requirements for grid connection applicable to all generators" and submit it to ACER.

### Disclaimer

This draft does not represent a firm, binding and definitive ENTSO-E position on the contents, the structure, or the prerogatives of the "network code for requirements for grid connection applicable to all generators" and on which a formal public consultation will be organised by ENTSO-E according to Regulation (EC) 714/2009.

# Network Code structure



# Network Code requirements



## Prescriptive requirements

- The Network Code lays down requirements and specific parameters
- ***E.g. frequency disconnection***

## Framework requirements

- The Network Code gives a coherent approach to formulate requirements
- Avoids divergence of requirements throughout Europe
- Specific setting of parameters based on a given legal framework, e.g. NRA approval, consultation, in mutual agreement, other Network Codes, ...
- ***E.g. reactive power provision***

## Principle requirements

- High level requirement on functionality
- Specific implementation prescribed by other agreements, national legislation, Network Codes, ...
- ***E.g. information exchange***



# What is a Significant Grid User?

ACER Framework Guideline on Electricity Grid Connection

- *“The network code(s) developed according to these Framework Guidelines shall define appropriate **minimum standards and requirements applicable to all significant grid users.**”*
- *“The minimum standards and requirements shall be defined for each type of significant grid user and shall take into account the voltage level at the grid user’s connection point. The network code(s) shall specify the **criteria and methodology** for the definition of significant grid users. These shall be based on a predefined set of parameters which measure the degree of their **impact on cross-border system performance** via influence on control area’s security of supply, including provision of ancillary services (“significance test”)...”*



# Significant users



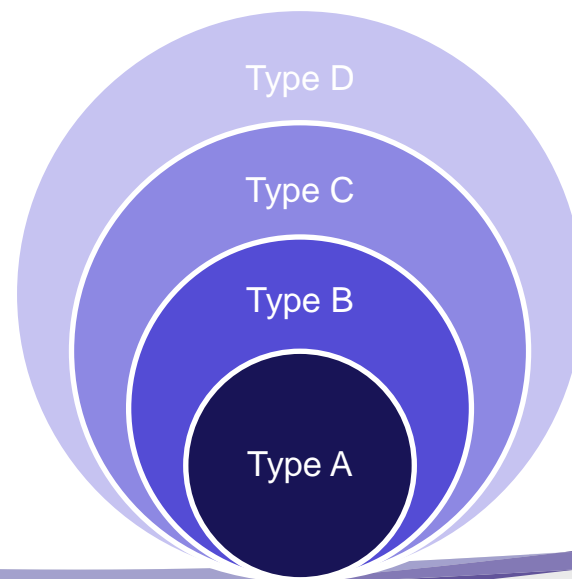
- **Generator capabilities are formulated from a system performance perspective, independent from technology**
- **Need to be able to cope with evolutions in generation mix**
- **Significance is regarded per requirement**

Europe wide balancing services

Refined and controllable dynamic response

Automated response, operator control, information

Common failure mode for all plants (frequency)



# Significant users



## Network Code gives max. thresholds at synchronous system level

- Criteria based on voltage level ( $> 110\text{kV} \rightarrow \text{Type D}$ ) and MW capacity (table)
- Decision at national level by National Regulatory Authority

Synchronous Area	maximum capacity threshold from which on a Generating Unit is of Type B	maximum capacity threshold from which on a Generating Unit is of Type C
Continental Europe	0.1 MW	10 MW
Nordic	1.5 MW	10 MW
Great Britain	1 MW	10 MW
Ireland	0.1 MW	5 MW
Baltic	0.1 MW	5 MW





# What is the appropriate level of detail for Network Code requirements?

ACER Framework Guideline on Electricity Grid Connection

*“Furthermore, the network code(s) shall define the requirements on significant grid **users in relation to the relevant system parameters contributing to secure system operation**, including:*

- *Frequency and voltage parameters;*
- *Requirements for reactive power;*
- *Load-frequency control related issues;*
- *Short-circuit current;*
- *Requirements for protection devices and settings;*
- *Fault-ride-through capability; and*
- *Provision of ancillary services.*

...

*The network code(s) shall set out how the TSO defines the technical requirements related to **frequency and active power control and to voltage and reactive power management**.”*

# Level of detail



## Harmonization

- Favored by manufacturers: larger market for same product
- Favored by project developers: less resources to engineering
- Concern by project developers: excuse for increased prices
- Note: Harmonization is no objective in itself (3rd Energy Package)

## Viewpoint of system security

- Different needs in each synchronous zone
- Different need of details in all requirements

## Conclusion

- Level of detail differs per requirement
- General principles as well parameter settings exist in the Network Code



# Retro-active application?

ACER Framework Guideline on Electricity Grid Connection

*“The applicability of the standards and requirements to pre-existing significant grid users shall be decided on a national basis by the NRA, based on a proposal from the relevant TSO, after a public consultation. The TSO proposal shall be made on the basis of a sound and transparent quantitative **cost-benefit analysis** that shall demonstrate the socio-economic benefit, in particular of retroactive application of the minimum standards and requirements ... The **format and methodology or principles** of the cost-benefit analysis shall be prescribed by the network code(s).”*

# Retro-active application



## Considered as an Existing Generation Unit if

- Legally binding contract for main part of the generator is provided
- Within 6 months after entry into force of the code
- Can be audited by the Relevant Network Operator

## Decision on retro-active fitting

- On a national basis
- Cost Benefit Analysis (two-stage 'traffic light') process initiated by TSO
- Final decision to approve retro-active fitting (based on TSO proposal) by the National Regulatory Authority

# Retro-active application

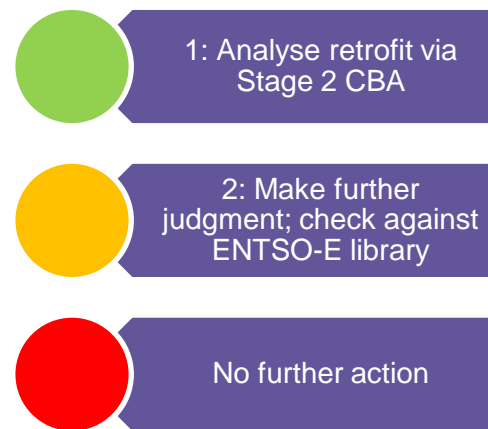
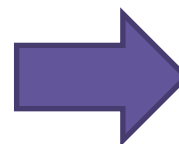


A full quantitative CBA is a resource intensive process

➔ A filtering (CBA stage 1) is performed based on engineering review

Cost of modification
Insignificant
Significant

Benefit in reduced demand loss / balancing costs
No/low impact
Significant impact



COST	BENEFIT	ACTION
		1
		2
		2
		3

# Retro-active application



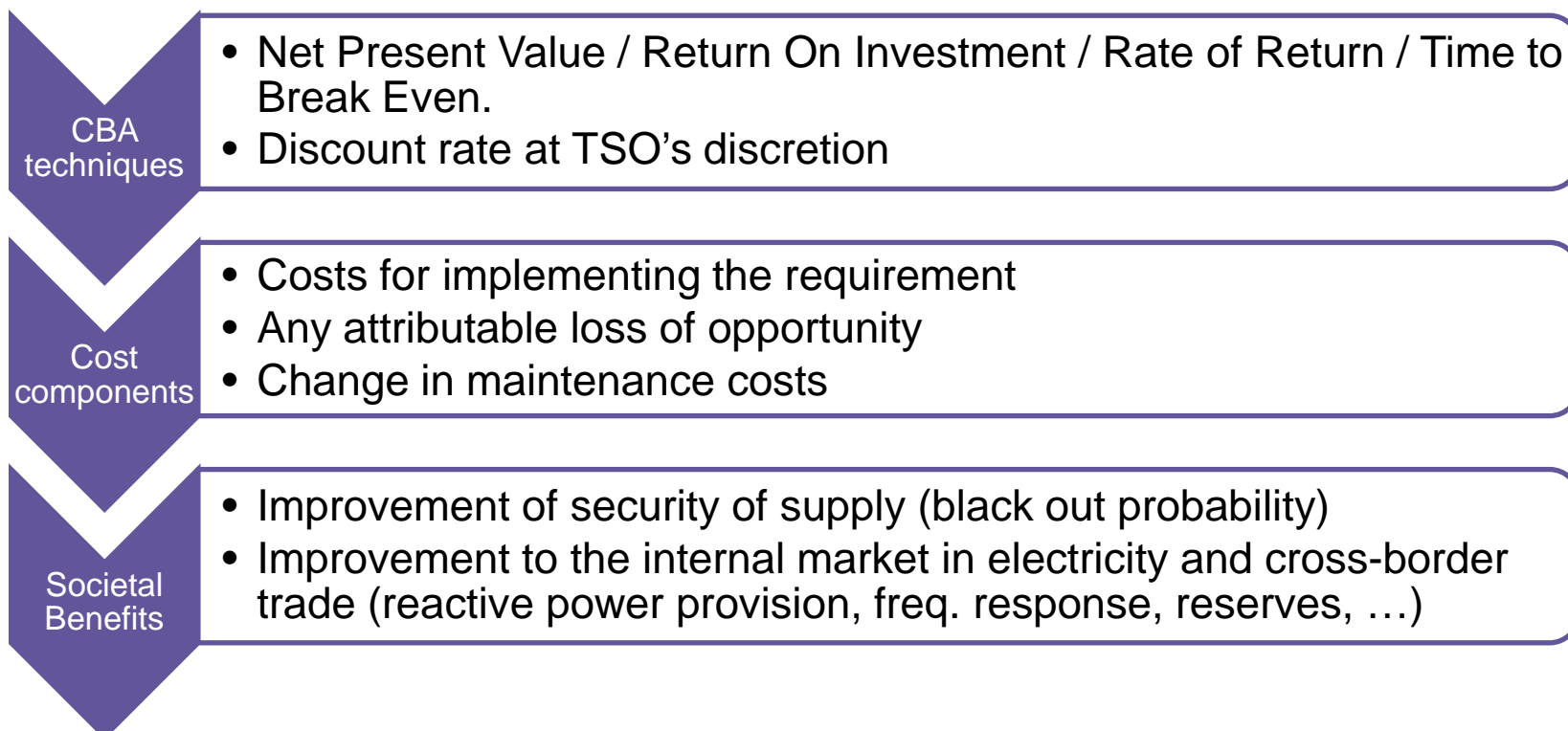
Examples	Cost	Benefit	Action
Reactive capability for large old generators different to new code, but not dramatically less Q range than code.			No further action
Generator narrow frequency range. Plant ok for full range, but require frequency trip settings change.			Quantitative CBA
Solar PV: Trip at modest system frequency deviation. Implement frequency range change and LFSM (at 50.2-50.5Hz).		Cont. Eur.	Quantitative CBA
		Other area	Further review
Limited frequency range of domestic CHP, volume modest			Further review
Early wind farms with inadequate reactive capability and reactive control facilities, as well as inadequate FRT capability		Great Britain	No further action
		Spain	Further review



# Retro-active application

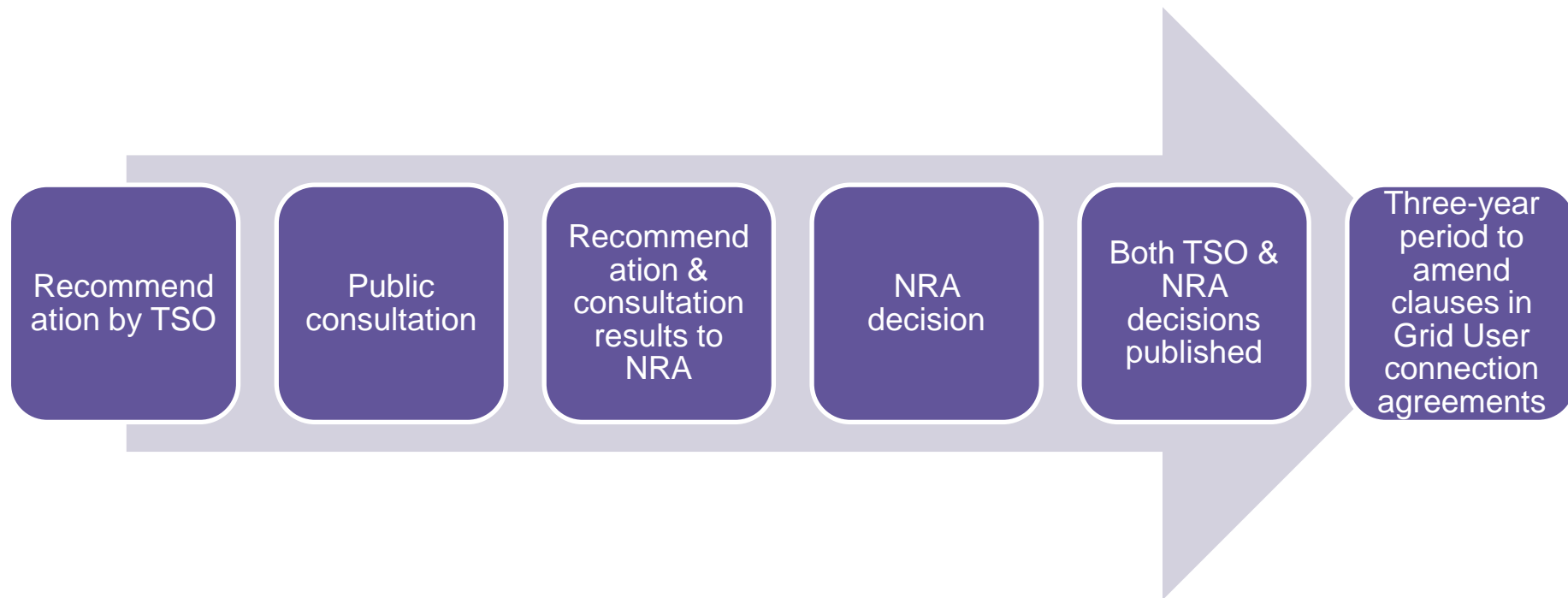


**Green light:** reasonable prospect of justifying retro-active fitting  
⇒ quantitative CBA (stage 2)



# Retro-active application

**If CBA justifies retro-active application for a user or a class of users**





- **If retro-activity for a requirement is not enforced**

- Existing Generating Unit remains bound by technical requirements pursuant to national legislation or by contractual agreements.

- **If national legislation is repealed**

- Existing Generating Unit (in case of no retrofitting) remains bound by technical requirements pursuant to national legislation such as it was the day before it ceased to be in force.

- **National legislation**

- may remain in force, in case it refers to requirements not covered by the Network Code

- **Former derogations to national legislation**

- are not valid as derogation for the European Network Code, but provide evidently useful information



**Does the Network Code deviate  
significantly from existing  
standards?**

# Deviations from existing requirements

**The European Network Code will evidently show deviations from existing grid codes**

Deviation	Impact
Number of requirements	Modest for most countries
Strictness and range of requirements	Modest for most countries
Units affected by the requirements	Harmonization of requirements to smaller units (also distribution level)
Compliance procedures and tests	Intensity increases

# Deviations from existing requirements



ENTSO-E network code is drafted, based on best practices and existing grid codes throughout Europe

Earlier versions of the network code have been challenged in a public consultation (pilot process) and various bilateral discussions

All comments have been thoroughly assessed and if needed integrated in the code

ENTSO-E states that the Network Code does not impose significant variations from existing standards and grid codes

Stakeholders are invited to comment on this if needed in the public consultation (Q1/2012)





# Next steps



- ACER published its final FWGL with delay on July 20th 2011
- EC sent an invitation letter to ENTSO-E on July 29th 2011 requesting a code in line with the FWGL
  - exempting the connection of DSOs and industrial loads → new invitation expected beginning 2012;
  - to be submitted to ACER by end of March 2012 → on the reason that due to the pilot process experience, less than 12 months are required
- Submission postponed to end of June 2012
  - To allow sufficient time for adaptation fo the code
  - To allow stakeholder involvement before entering in public consultation.

## ➤ Next steps

- Public consultation (two months) starts end of January 2012
- ENTSO-E review of all comments, response and adaptation fo the code if needed in Q2/2012
- Submission to ACER in June 2012