

General Scope of Demand Connection Code

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Connection Code (DCC)**

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Reliable Sustainable Connected



Topics

Definition of “cross-border issue”

Significant users

Level of detail

Retroactive Application (Application to Existing Demand Units)

Operational Notification Procedures

Derogations

Compatibility with existing Requirements



What is a cross-border issue?

ACER Framework Guideline on Electricity Grid Connection

A.o. in definition of Significant Grid Users – *“Pre-existing grid users and new grid users which are deemed significant on the basis of their **impact on the cross border system performance** via influence on the control area’s security of supply, including provision of ancillary services.”*

Cross-border issues

(EC) 714/2009 –
Art. 8 (7)

- “The network codes shall be developed for **cross-border network issues and market integration issues** and shall be without prejudice to the Member States’ right to establish national network codes which do not affect cross-border trade”

Context 3rd
Energy Package

- supporting the completion and functioning of the internal market in electricity and cross-border trade
- facilitating the targets for penetration of renewable generation
- maintaining security of supply

ENTSO-E
definition

- All requirements that **contribute to maintaining, preserving and restoring system security** in order to **facilitate proper functioning of the internal electricity market** within and between synchronous areas, and to **achieving cost efficiencies through technical standardization** shall be regarded as “**cross-border network issues and market integration issues**”.

Cross-border issues



Why are even small domestic units considered?

- One domestic user with DSR has a negligible impact on a synchronous area level.
- What if all units failed to provide the correct response to a given stimulus? E.g. Slow disconnection on command of 2,000,000 units of 1kW following a frequency drop of results in an equivalent slow response of a 2000MW generation unit

How can a voltage problem be a cross-border issue?

- A frequency deviation is measured system wide.
- A voltage dip/rise could be a local issue, which can be locally resolved.
- A voltage dip/rise could occur system wide, resulting in a voltage collapse if no **coherent action** is taken. Note: a local measurement cannot identify a starting voltage collapse.
- Power transfer capability is proportional to system voltage, hence transfer capabilities cannot exclude adequate voltage



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

Network Code gives max. thresholds at synchronous system level

- Criteria based on voltage level ($> 110\text{kV}$)
- Transmission connected Demand Facilities and Distribution Networks
- DSR requirements only apply to demand with DSR
 - Temperature controlled devices identified through national NRA consultation process
 - Mandatory capability to be fitted to devices identified through national NRA consultation process



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**.*”

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***

Level of detail

Harmonization

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

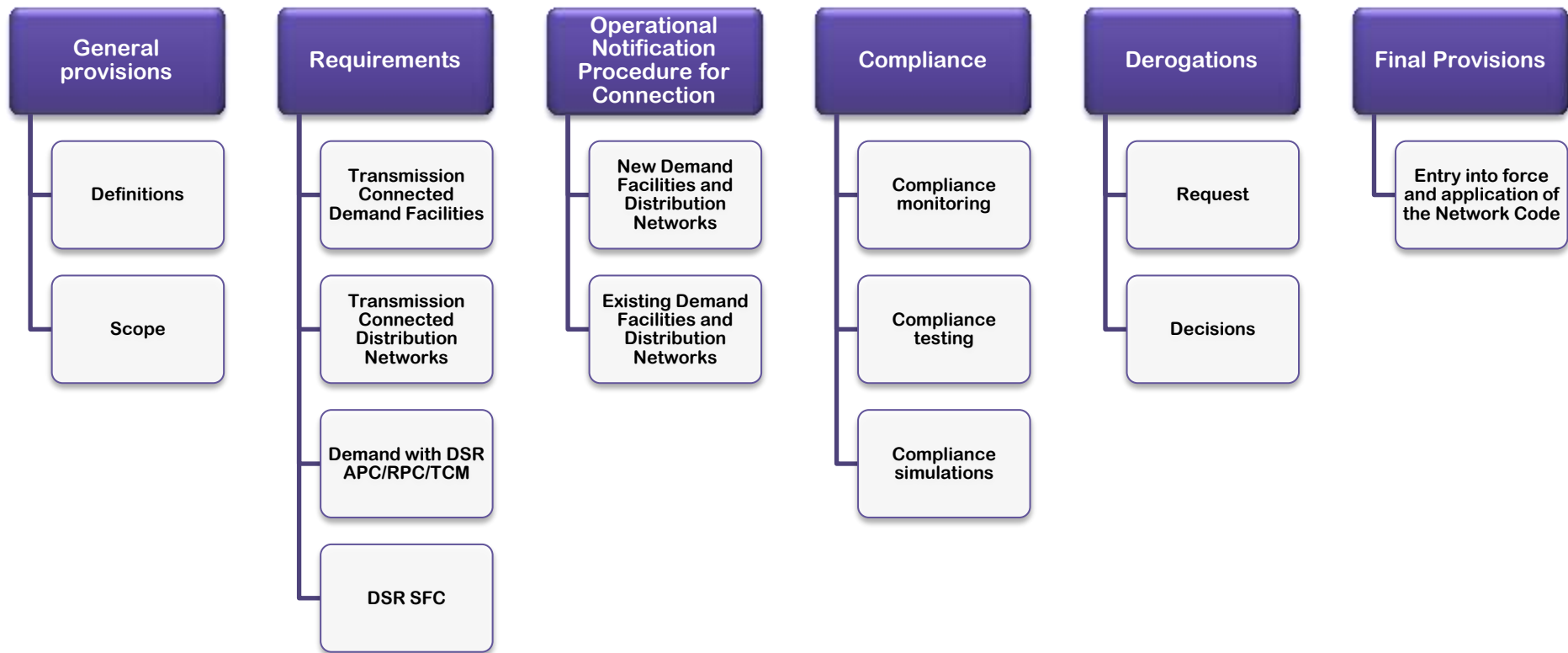
Viewpoint of system security

- 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

Network Code structure





Retroactive 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).”*

Retroactive application

Demand Unit/Distribution Network not yet under construction are considered to be existing, if

- Legally binding contract for main plant is in force
- Evidence is provided within 30 months after entry into force of the code
- Network Operator can request confirmation by NRA

Decision on retroactive application

- On a national basis
- Cost Benefit Analysis process initiated by TSO and supported by stakeholders
- Final approval of retroactive application (based on TSO proposal) by the National Regulatory Authority

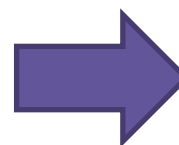
Retroactive application

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 e.g. in reduced demand loss / balancing costs
No/low impact
Significant impact



COST	BENEFIT	ACTION
		1
		2
		2
		3

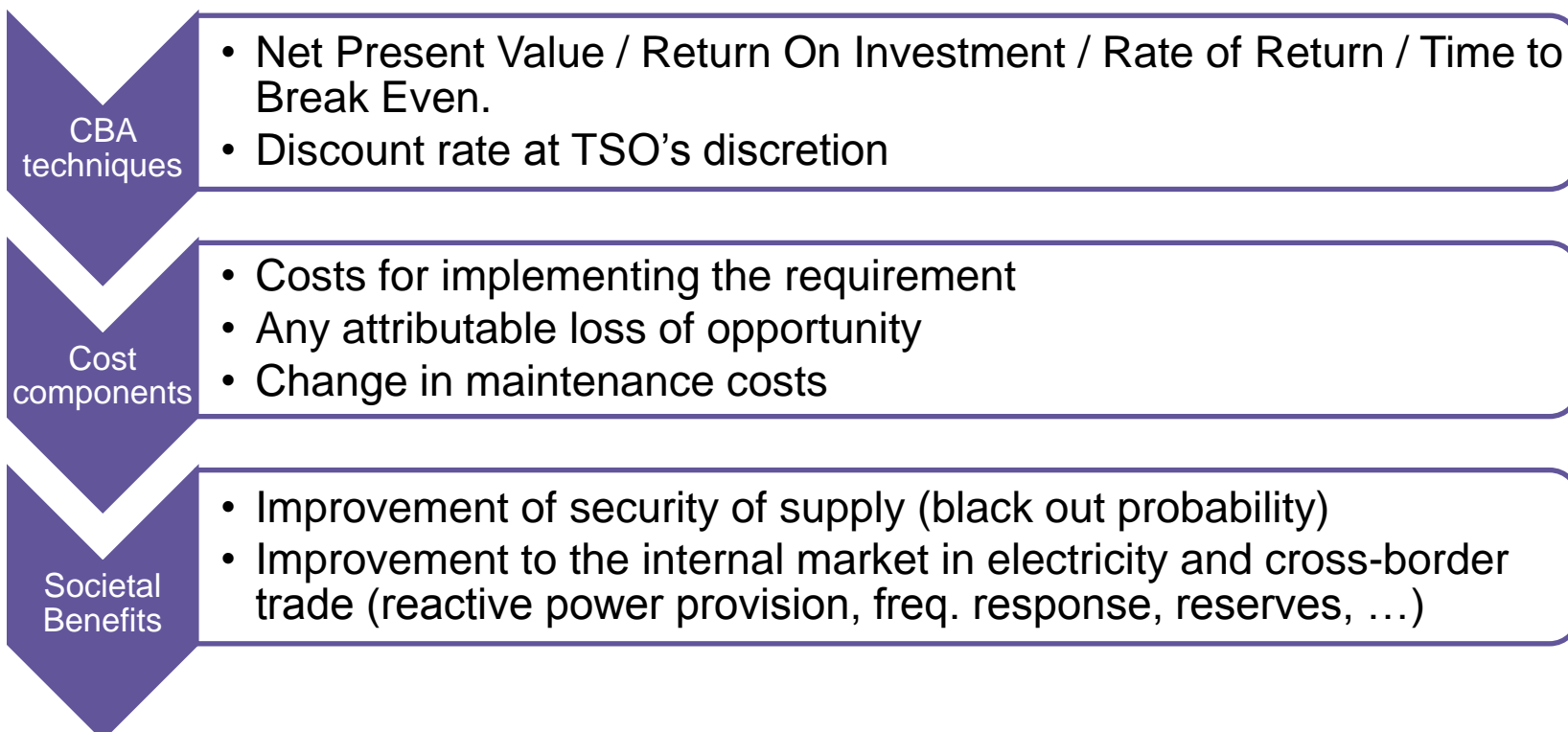
1: Analyse retrofit via Stage 2 CBA

2: Make further judgment; check against ENTSO-E library

No further action

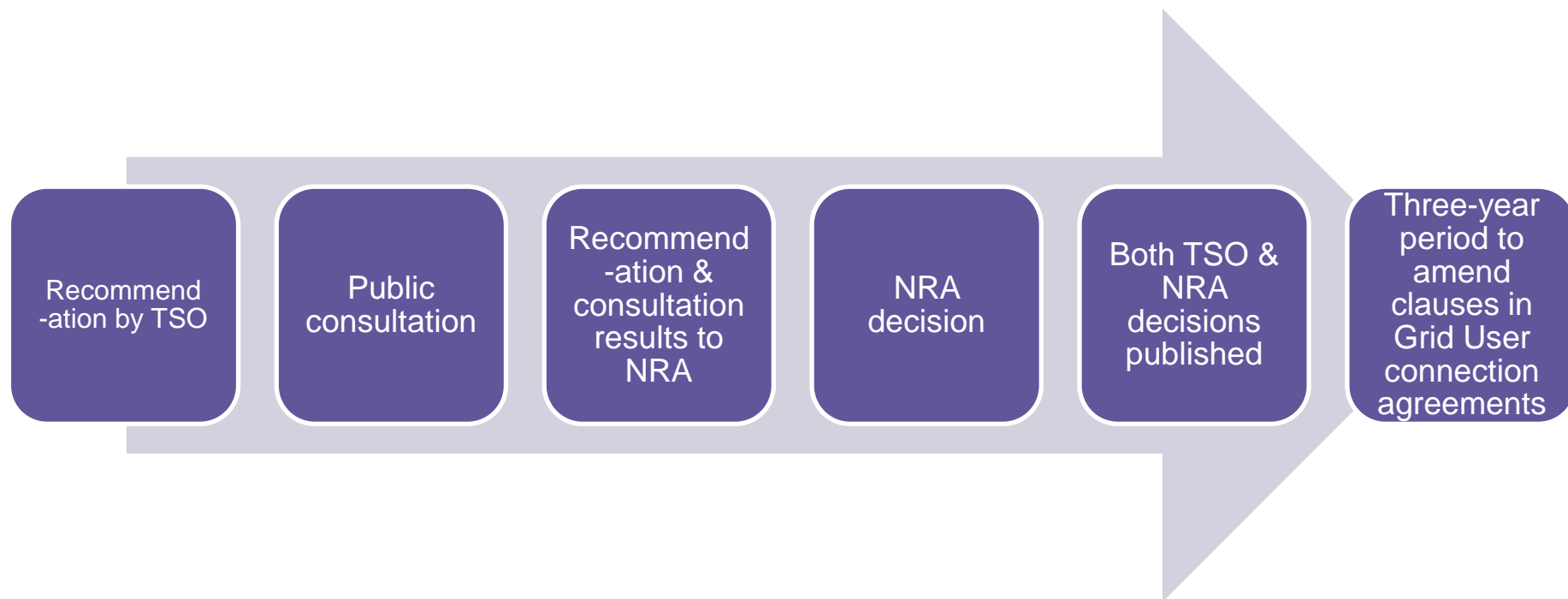
Retroactive application

Green light: reasonable prospect of justifying retroactive application ⇒ quantitative CBA (stage 2)



Retroactive application

If CBA justifies retroactive application for a user or a class of users



Retroactive application

- **If retroactive application for a requirement is not enforced**
 - Existing Demand Facility/Distribution Network remains bound by technical requirements pursuant to national legislation or by contractual agreements
- **National legislation**
 - may remain in force, in case it refers to requirements not covered by the Network Code
- **If national legislation is repealed**
 - Existing Demand Facility/Distribution Network remains bound by technical requirements pursuant to national legislation such as it was the day before it ceased to be in force
- **Former derogations to national legislation**
 - are not valid as derogation for the European Network Code, but provide evidently useful information



How is the connection of new Demand Facilities /Distribution Network connections notified?

ACER Framework Guideline on Electricity Grid Connection

- *“The network code(s) shall contain provisions committing TSOs and DSOs to publish and transparently communicate the detailed procedure for the **initiation of new connection, including, inter alia, required documents, timing, methodologies, responsibilities, etc.** This information shall also address the relevant grid access issues, which will be dealt with in more detail in the future Framework Guidelines for grid access.”*

Operational Notification



- **DSR - 1000V and below**
 - Installation – simple tick sheet document
- **DSR – Above 1000V not transmission connected**
 - Alternative single stage operational notification process possible set by RNO
 - Use of Demand Side Response Unit Document
- **Transmission connected DN's and Demand Facilities**
 - Full 3 stage operational notification process

Operational Notification Procedure

EON

- Energisation Operational Notification ...
 - Permission to energise internal network

ION

- Interim Operational Notification ...
 - Permission to operate temporarily

FON

- Final Operational Notification ...
 - Permission to operate unconditionally

LON

- Limited Operational Notification ...
 - Permission to operate temporarily with constraints

... to be issued by the Relevant Network Operator

Operational Notifications



EON

- Grid connection facilities are established
- Operational procedures and responsibilities are agreed

ION

- Data and study review process completed:
 - Itemized compliance statement by the Demand Facility or Distribution Network Owner
 - Technical data submitted
 - Type certificates provided where admissible for compliance
 - Simulation models and studies on performance submitted
 - Compliance tests specified
- Duration limited to 24 months maximum
- Achievement of full compliance to be expected in this period

Operational Notifications



FON

- Full compliance achieved
- In case of incompatibility with requirements: derogation granted and compliance with the provisions of the derogation achieved

LON

- Temporary modifications or loss of capabilities with relevance to compliance with the network code
- Equipment failure leading to non-compliance with the network code
- Responsibilities and timescales for resolution (max. 12 months)
- Suspension of FON
- Prolongation by means of derogation

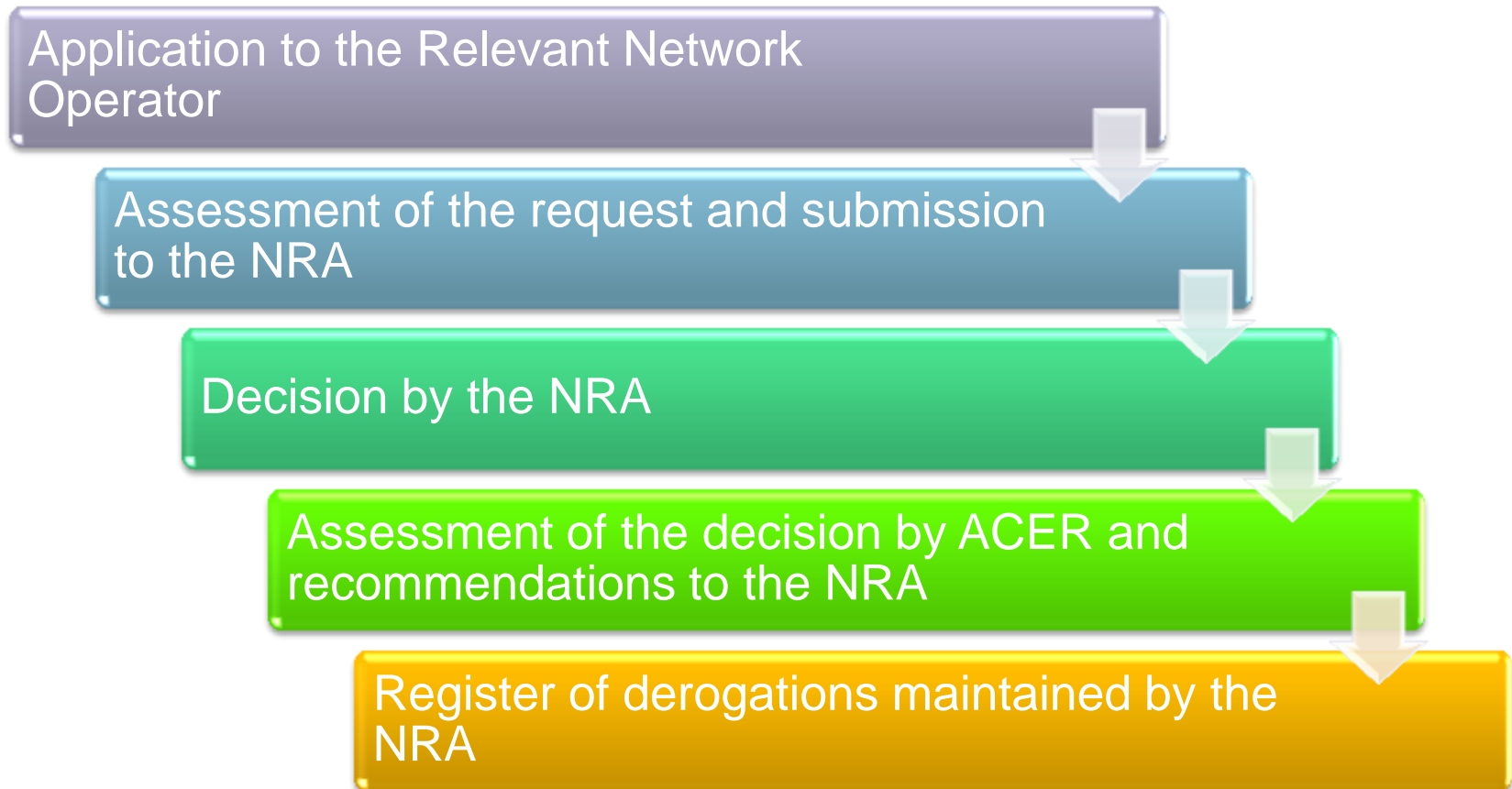


Are derogations possible and how are they approved?

ACER Framework Guideline on Electricity Grid Connection

- “The network code(s) developed according to these Framework Guidelines shall describe the *process and criteria for applying for derogation*. This process is applicable to pre-existing (and in exceptional cases new) significant grid users.”
- “The derogation process shall be transparent, non-discriminatory, non-biased, well documented and *based on the cost-benefit analysis* performed by the TSO.”
- “The network code(s) may provide that *derogation from all or some of the minimum standards and requirements* may be granted to classes of pre-existing (and, in exceptional cases, new) significant grid users, non-discriminatorily, *without the cost-benefit analysis* being performed, if the TSO submits to the NRA a reasoned request and *the exemption from the cost-benefit analysis is authorised by the NRA*.”

Procedure for derogations



Compatibility with existing Requirements

DCC requirements will obviously differ from individual countries existing requirements



Five new key requirements to most countries:

1. Demand Side Response Switched [DSR APC/RPC/TCM]
2. Demand Side Response Autonomous [DSR SFC]
3. Reactive Power Requirements
4. Voltage Requirements
5. Frequency Requirements



Two new areas of application new to most countries:

Operation Notification Stages three approaches

1. DSR < 1000V – Simple 'tick' sheet installation document
2. DSR ≥ 1000V – Single stage process possible
3. Transmission – Full three stage process

Compliance for DSR



***Thank you for your attention
Questions?***