Demand Connection Code

Discussion CECED

Demand Side Response – System Frequency Control

Conf call

29 February 2012

entsoe

Reliable Sustainable Connected

ENTSO-E association

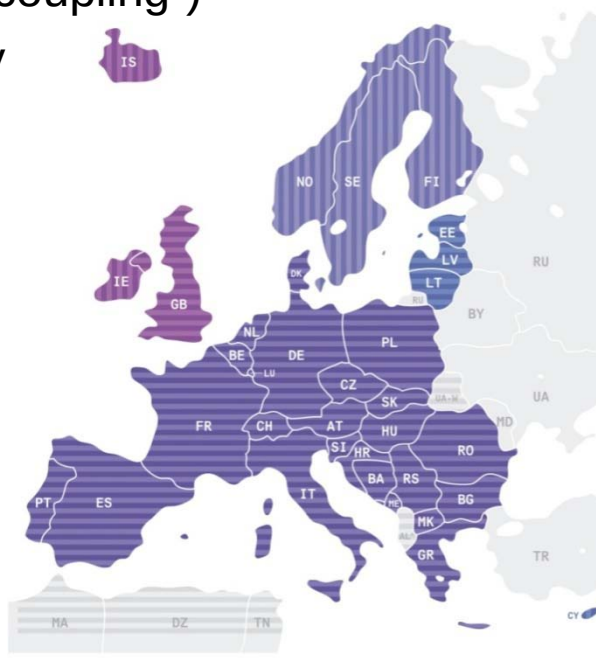
Key activities set out in Regulation 714/2009 (on cross-border electricity trade, part of the 3rd Internal Energy Market Package)

- Deliver **network codes**
- Deliver **network plans** European / regional view of system needs (“TYNDP”)
- Deliver crucial aspects of **market integration** (“market coupling”)
- **R&D Plan** (fully included in EEGI – European Electricity Grid Initiative, part of the SET Plan)

Through its members deliver the **infrastructure** to:

- enable markets to function,
- secure energy supply,
- meet climate change objectives through connecting RES

Represents **41 members from 34 countries**



Why European Network Codes?

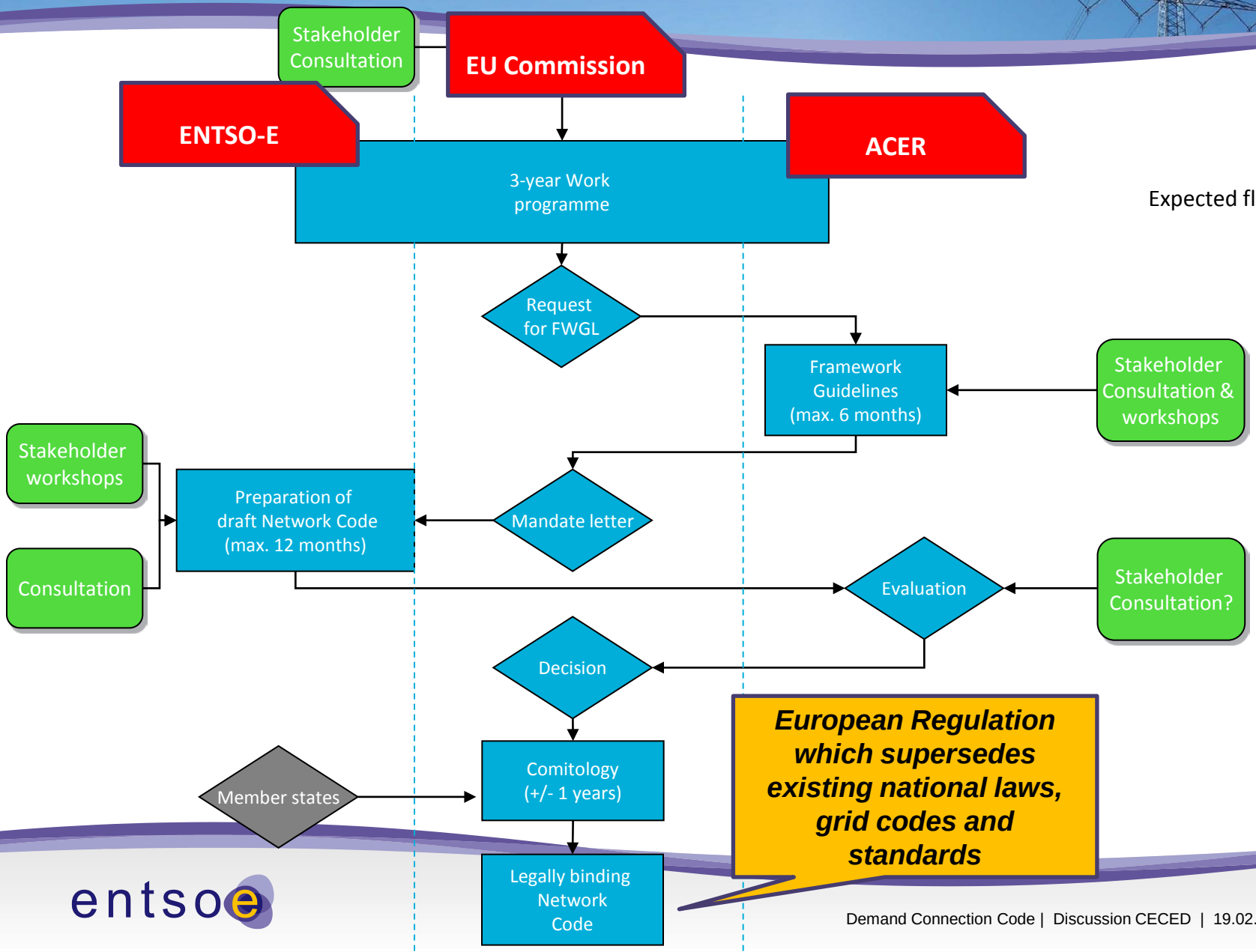
The development of *European wide Network Codes* in various domains by

- bringing together the expertise of diverse stakeholders;
- in an open and transparent process;
- creating a coherent approach on common issues.

is a crucial enabler of *Europe's Energy goals* in

- increasing the amount of renewables;
- guaranteeing an adequate Security of Supply;
- contributing to an Internal Energy Market.

How are Network Codes developed?



Network Codes ahead – Regulation (EC) 714/2009

Article 8 – Tasks of ENTSO-E

6. "The network codes … cover the following areas, taking into account, if appropriate, regional specificities:"

FWGL System Operation

FWGL Grid Connection

FWGL System Operation

FWGL CACM

a. network security and reliability rules incl. rules for technical transmission reserve capacity for operational network security;

b. network connection rules;

c. third-party access rules;

d. data exchange and settlement rules;

e. interoperability rules;

f. operational procedures in an emergency;

g. capacity-allocation and congestion-management rules;

h. rules for trading related to technical and operational provision of network access services and system balancing;

i. transparency rules;

j. balancing rules incl. network-related reserve power rules;

k. rules regarding harmonised transmission tariff structures incl. locational signals and inter-transmission system operator compensation rules; and

l. energy efficiency regarding electricity networks.

Network Code presently under development

NC on Requirements for Generators

- EC mandate letter received on 29 July 2011
- At the moment under formal public consultation
- Submission date to ACER: end of June 2012

NC on Capacity Allocation and Congestion Management

- EC mandate letter received in September 2011
- Public consultation expected to start in March 2012
- Submission date to ACER: end of September 2012

Demand Connection Code

- **EC mandate letter received on 5 January 2012**
- **Public consultation expected to start end of April 2012**
- **Submission date to ACER: early January 2013**
- **Closely aligned with NC on Requirements for Generators**

Demand Connection Code – present status

Stakeholder meetings:

- ***DSO Technical Expert Group***: 7 meetings to date, starting already in July 2011
- ***IFIEC***: European association of industrial energy customers
- ***CENELEC***: in the context of Mandate 490
- All relevant (bilaterally agreed) documents of meetings will be published

Preliminary scope document published on website

Next steps

- Work program 2012 to be published shortly
- Invitation for stakeholder user group
- First public workshop planned for April 2012

For latest info on the status & next steps:

- https://www.entsoe.eu/resources/network-codes/demand-connection/

ACER's framework guidelines on electricity grid connections:

- *"The network code(s) shall set out **necessary minimum standards and requirements** to be followed when connecting a consumption unit to the grid, to **enable demand response** and/or participation of consumption units in other grid services, on a contractually-agreed basis. The responsibility for the compliance of the features and performance of the equipment with the requirements set by the TSO or DSO shall be with the consumption unit."*

- *"The network code(s) shall provide for regular re-assessment (including public consultation) of the "significance test" and cost-benefit analysis to cope with **evolving system requirements** (e.g. penetration of renewable energy sources, smart grids, distributed generation**, household demand response**, etc.)."*

ACER's Initial Impact Assessment on framework guidelines on electricity grid connections (12 July 2010):

- *"…there is a need for **harmonised responses from system users** (generation and demand) across synchronous areas, **to avoid or at least minimise the impact of widespread system faults** and ensure secure and optimal system operation, to ensure equitable treatment in the connection of generators and consumers."*

- *" …to establish an appropriate connection regime demand response, **specific grid connection requirements for demand response grid users should be developed** complementary to the general minimum standards for all users, especially taking into account future demand side participation in balancing and providing respective services to the SOs."*

Demand Response in the present Demand Connection Code

Demand Side Response is distinguished by different System Reserve categories to provide response to frequency and voltage fluctuations, namely:

Voluntary services

a) **Demand Side Response Active Power Control (DSR APC);**

b) **Demand Side Response Reactive Power Control (DSR RPC);**

c) **Demand side Response Transmission Constraint Management (DSR TCM); and**

Mandatory service

d) **Demand Side Response System Frequency Control (DSR SFC)**

Demand Response in the present Demand Connection Code

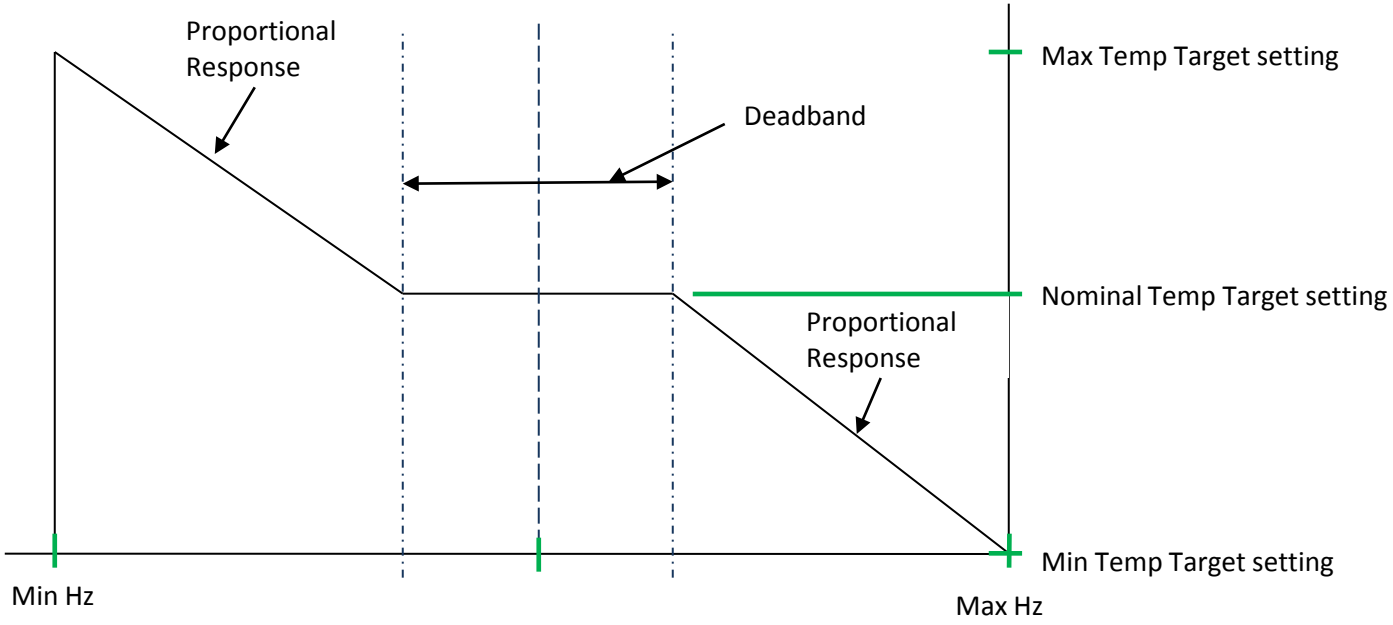
Voluntary services

- If the customer decides to offer these, then a set of mandatory requirements needs to be complied with.
- Requirements focus on capabilities: information exchange, controllability
- When a service is to be delivered and how this is remunerated, is not in the scope of this code, but is left to market codes, market developments, bilateral agreements, etc…

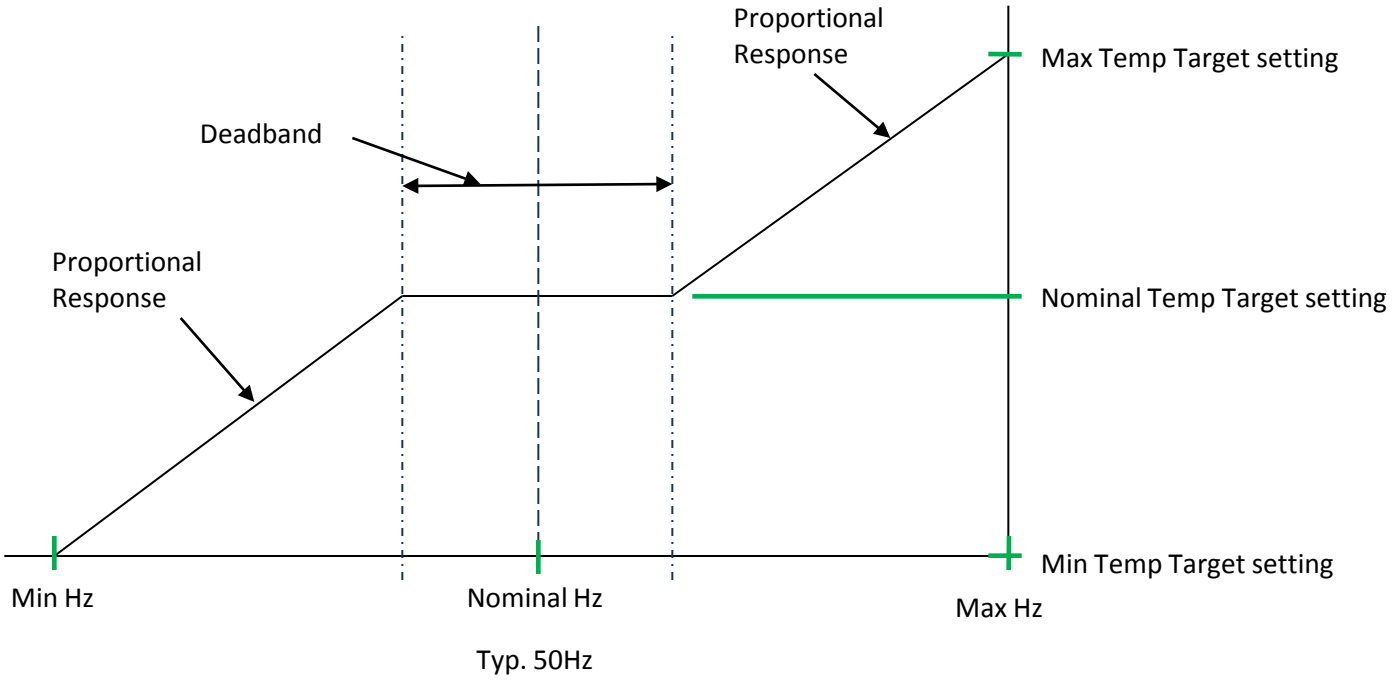
Mandatory service on System Frequency Control

- For all temperature controlled devices (see next slides & draft code sent)

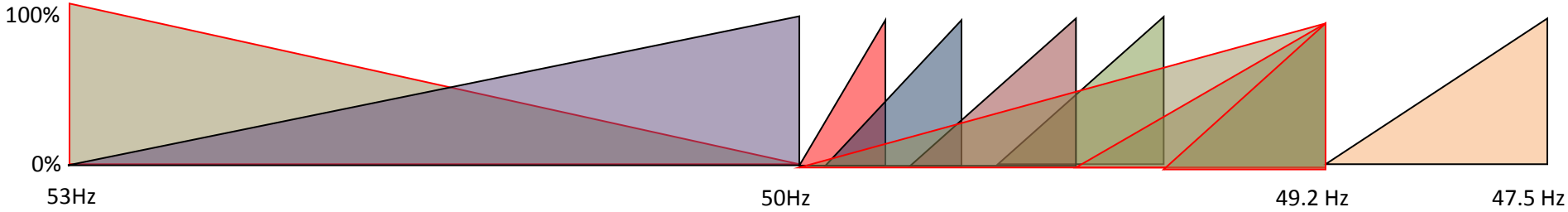
Cooling


Proportional
Response
Deadband
Max Temp Target setting
Nominal Temp Target setting
Proportional
Response
Min Temp Target setting
Min Hz
Max Hz

Heating


Proportional
Response
Max Temp Target setting
Deadband
Proportional
Response
Nominal Temp Target setting
Min Temp Target setting
Min Hz
Nominal Hz
Max Hz
Typ. 50Hz

Objective



- Reduce generation producing energy
- DSR SFC
- Primary Operating Reserve
- Secondary Operating Reserve
- Tertiary Operating Reserve
- Existing DSR demand disconnection
- Low Frequency Demand Disconnection

Demand Side Response – System Frequency Control

- **Boundaries are set in hysteresis control to avoid noticeable impact on customers if activated.**
- **Additional defense measure in case of frequency deviations**
- **Activated after all reserves (ancillary services) are depleted**
- **Activated before first stage of system demand disconnection is initiated in order to prevent this**
- **How often will this response be activated? Rarely, once every X years under present system conditions.**
- **Note that the power system evolves rapidly with an increasing penetration of volatile, low inertia renewables resources.**

Demand Side Response – System Frequency Control

Is it worth it?

- **Preliminary cost benefit analysis is promising**
- **Input of CECED is requested to verify main assumptions**
  - What is the cost impact per unit for implementation of this autonomous frequency based hysteresis control?
  - Is there a difference amongst certain temperature control based devices for this implementation from a technical viewpoint.
  - Any other remarks?
- **Demand response is an often debated topic in many fora. Has a similar concept ever been assessed before?**

Further discussion