Network Codes
– hvilken betydning får dette for Norge

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The European process
Implementing the directive

NB Operational codes are through public consultation and with ACER
The European process
Framework Guidelines

The final Framework Guidelines on Electricity System Operation were adopted by the Agency on 2 December 2011. They cover the following topics, from highest to lowest priority:

- Operational Security
- Operational Planning and Scheduling
- Load-Frequency-Control
- Requirements For Generators
- Demand Connection
- Emergency and Restoration
- New Applications
The European process
Inter-dependancy of the network Codes

- Security criteria
- Reserve monitoring and balancing objectives
- System states

- Technical frequency criteria per SA
- Technical limits for x-border
- Process response requirements for products and localisation rules

- Capacity allocation principles (DA+ID)
- Capacity mechanism methodology
- Congestion management mechanism

Control structure, TSO responsibilities, reserve processes and dimensioning criteria

Product for x-border balancing and CMO price setting mechanisms
Operational Security

The main goal of the Network Code is to keep the European interconnected Transmission system in continuous operation. The main provisions are:

- System states [normal, disturbance, emergency]
- Frequency control management [umbrella for NC LFC&R]
- Voltage control and Reactive power management
- Short circuit current management
- Power flow management
- Contingency analysis and handling
- Protection
- Dynamic stability management
- Operational training and certification
Load Frequency Control & Reserves

Scope

Defines the minimal reserve requirements and principles, applicable to all TSOs, Reserve Connecting DSOs and Reserve Providers.

This Network Code aims at:

- A satisfactory level of System Frequency quality and efficient utilisation of the power system and resources
- Coherent coordination of the power systems in real-time operation
- Dimensioning, requirements and principles for FCR, FRR and RR
- Common requirements for cross-border exchange, sharing, activation and sizing of reserves.
PROVIDER

Entity operating a Reserve Providing Unit or a Reserve Providing Group

Reserve Providing Unit

A single generating or demand facility providing reserves types FCR, FRR or RR to a TSO and fulfilling the operational requirements of the Reserve Connecting TSO;

Reserve Providing Group

A conglomeration of generating and/or demand facilities, located in the area of one single Reserve Connecting TSO together providing reserves of kind FCR, FRR or RR to a TSO and which together fulfil the requirements of the Reserve Connecting TSO;
Load Frequency Control & Reserves

Impact FCR

- Requirement for a FCR Provider to ensure that monitoring of the FCR activation of the generating and/or demand facilities within a Reserve Providing Group is possible (Art. 28/4)

- FCR Prequalification Process (Art. 28/4,5,6)
  - To assess the fulfilment of the technical and availability requirements
  - Process Management: Connecting TSO responsibility

- FCR Activation proportional to frequency deviation (Art. 28/7)

- Data to be delivered by an FCR Provider (Art. 28/9)
  - status ON/OFF, time-stamped values of scheduled/instantaneous active power with/without FCR activation, droop; on request of the TSO in real time

- Continuous Availability – exception: unplanned outage (Art. 29/4)
  - limit for size of a single unit / single electrical node
  - replacement within determined time

- FCR Activation (Art. 29/6)
  - unlimited capability as long as Frequency deviation persists
  - limited capability as long as Frequency deviation persists unless energy reservoir is exhausted

Statnett
Load Frequency Control & Reserves

Impact FRR\textsuperscript{1} [Frequency Restoration Reserves]

- Technical Minimum Requirements (Art. 31/1)
  - Automatic FRR: maximum activation delay: 30s
- Data to be delivered by an FRR provider per unit (Art. 31/1)
  - Activated FRR
  - Reference power
- Complementary Technical Requirements per LFC Block (Art. 31/2)
  - FRR Full Activation Time (automatic/manual)
  - Availability requirements
  - Ramp rate
  - ……
- Complementary Technical Requirements for Providers and Units per Connecting TSO possible (Art. 31/2)
  - To assess the fulfilment of the technical and availability requirements
  - Process Management: Connecting TSO responsibility
Load Frequency Control & Reserves
Interfacing to market codes

LFC&R and Balancing NC are Siamese twins!

LFC&R defines:
  – Geographic requirements
  – Types of reserves and response needs
  – Dimensioning methodology [volume needed]

Balancing defines:
  – Standard products [time to full activation, energy]
  – Common Merit Order mechanism [link CACM]
  – Shall not hinder implementation of new applications
Load Frequency Control & Reserves

Exchange and Sharing

Within and between Synchronous Areas

Exchange:
- Does not impact total system capacity
- Applicable for FCR, FRR and RR
- Geographic limits set for maintaining system security

Sharing:
- Does impact total capacity
- Priority rights should interconnector trip
- Applicable for FRR and RR
Load Frequency Control & Reserves
Impact on providers

Some requirements:
- Pre-qualification required for delivery of FCR and FRR
- Energy reservoir limits the provision of FCR
- Frequency sensitivity ≤ 10mHz
- Supply real-time measurements for FRR
- Ramping coordination between generation, demand and load

Some benefits:
- Nordic frequency parameters remain
- European dimensioning likely to increase reserve volumes
- Group of units allowed for FRR and RR [Unit >1.5MW]
HARMONISATION

MORE MONITORING

PHYSICS RULES!

EQUAL TREATMENT

ITS LAW!

TRANSPARENCY

SYSTEM SECURITY

OBLIGATIONS

Smartgridkonferansen - Trondheim 10 September 2013 - Network Codes – hvilken betydning får dette for Norge
Nordic implementation remains!