

Load Frequency and Control Network Code

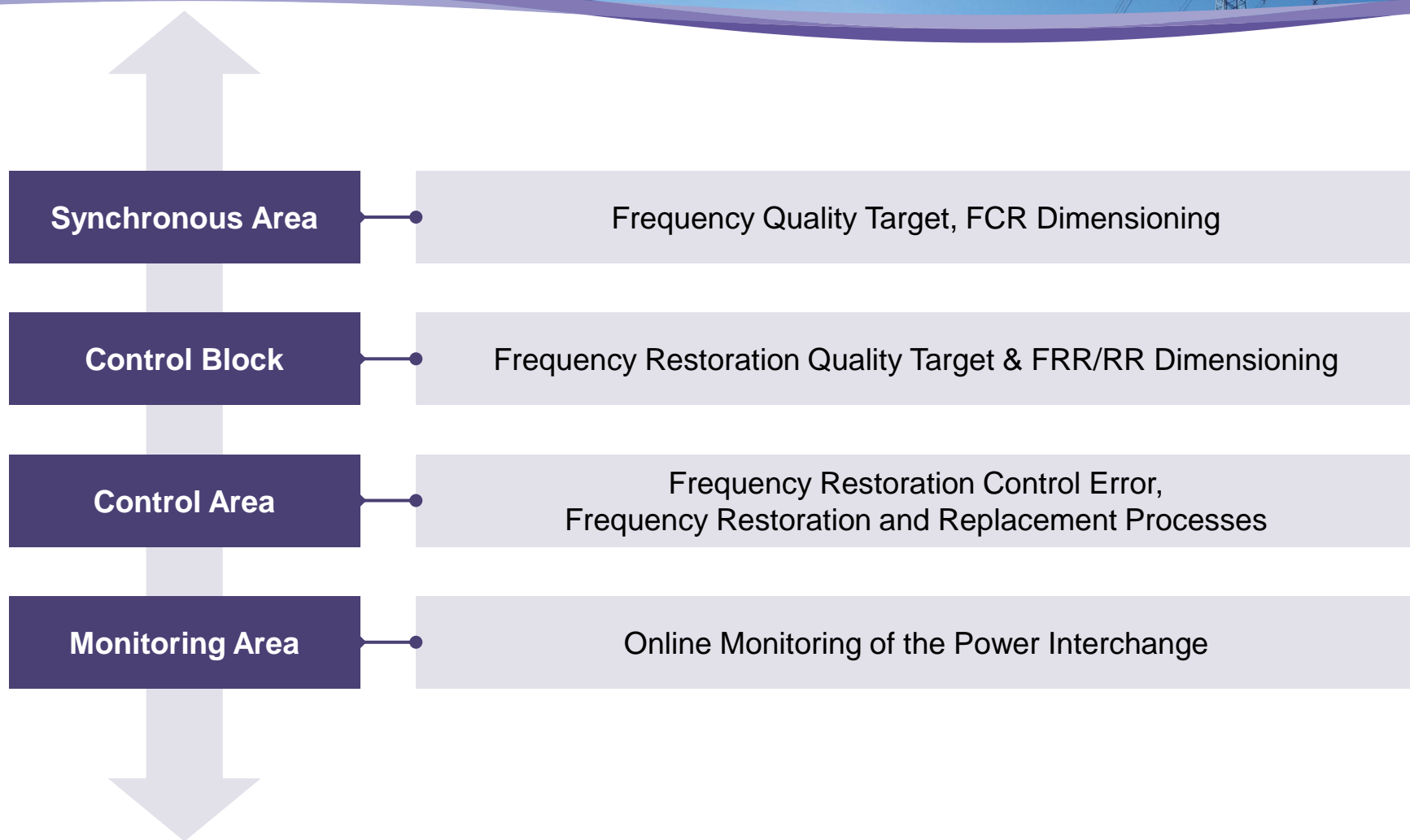
Interface to Balancing Network Code

3rd EBSAG Meeting
26/02/2013

Load Frequency Control & Reserve Network Code (LFC&R)

- 1. Frequency Quality**
- 2. Load-Frequency Control Structure**
- 3. Frequency Containment Reserves**
- 4. Frequency Restoration Reserves**
- 5. Cross-Border Exchange and Sharing of Reserves**
- 6. Co-operation with DSO**
- 7. Synchronous Time Control**

Process Responsibility Structure

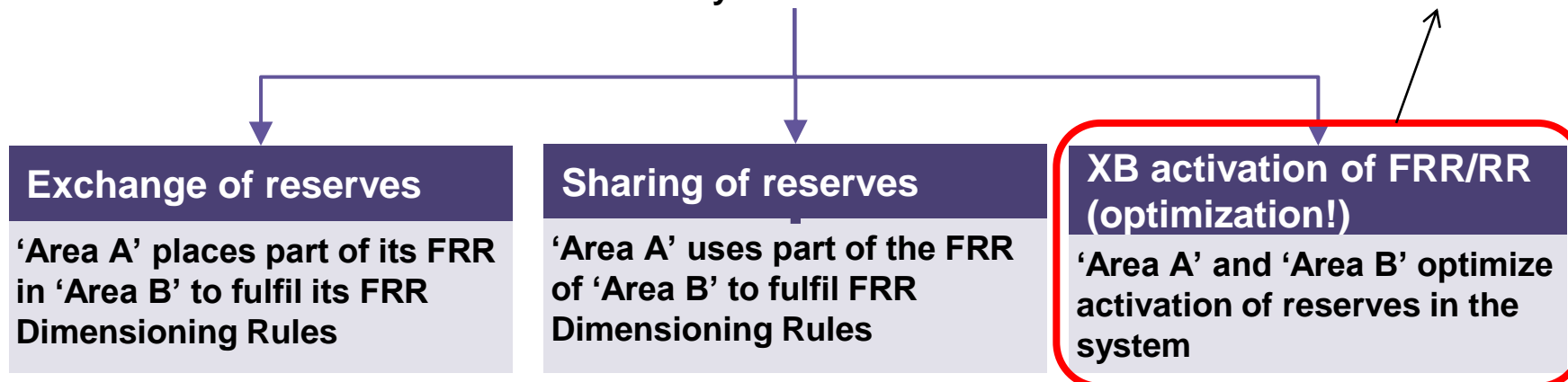


Exchange and Sharing of reserves - general

NC LFC&R sets **technical limits**, required to ensure Operational Security, while leaving a maximum of flexibility to the market for XB cooperation. The NC LFC&R must ensure:

- a sufficient amount of reserves within the system
- an even distribution of reserves within the system

NC Balancing



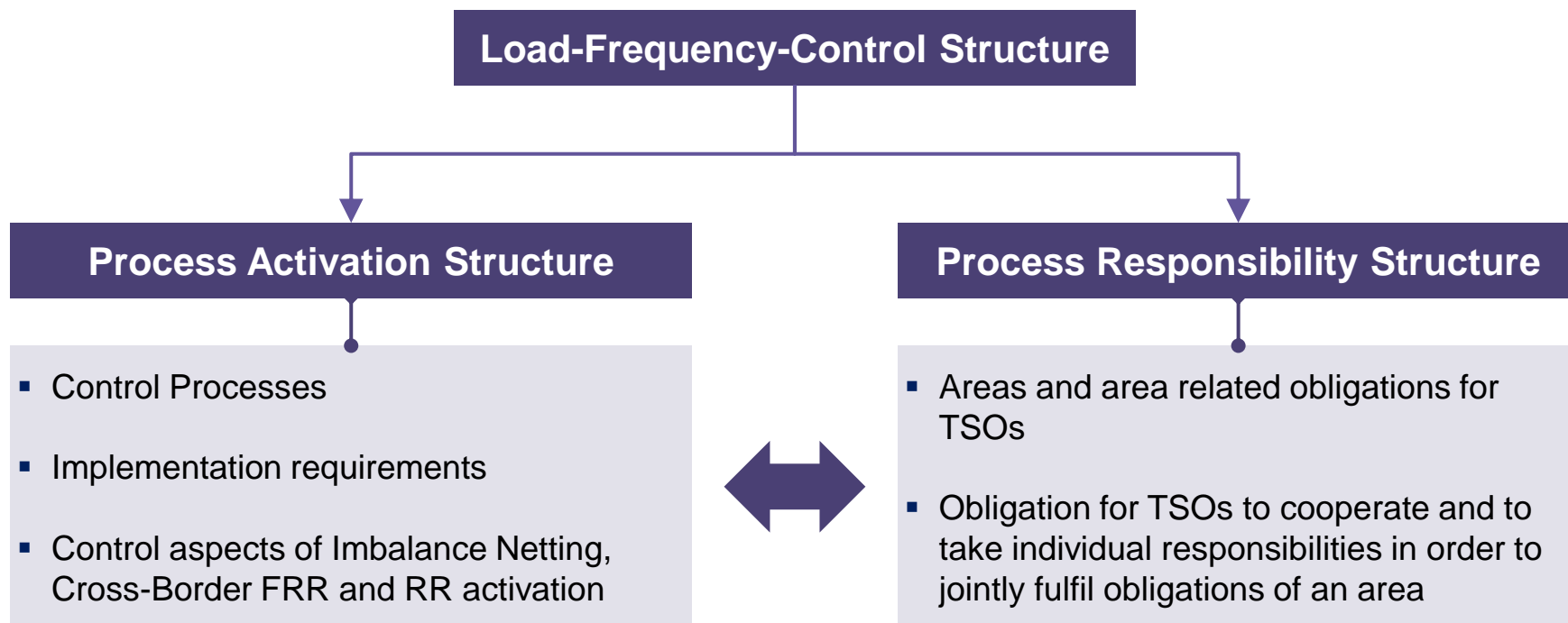
FCR*

FRR

RR

- Within a Synchronous Area (RG CE):
 - Rules for exchange and sharing of reserves between Control Blocks
 - No rules for sharing and exchange within CB (determined by TSOs of CB themselves)
 - * FCR is shared per definition in a Synchronous Area (joint obligation)
- Cross-Synchronous Areas:
 - Exchange of FCR – not Sharing (except GB – IR)
 - For Exchange and Sharing of FRR / RR between Control Block similar rules apply

Load-Frequency-Control Structure



Requirements only for **technical** aspects

Relationship between Balancing and LFC&R

- LFC&R sets the frequency requirements to maintain the Quality of Supply of the Power system.
- LFC&R sets the technical requirements to ensure the frequency quality.

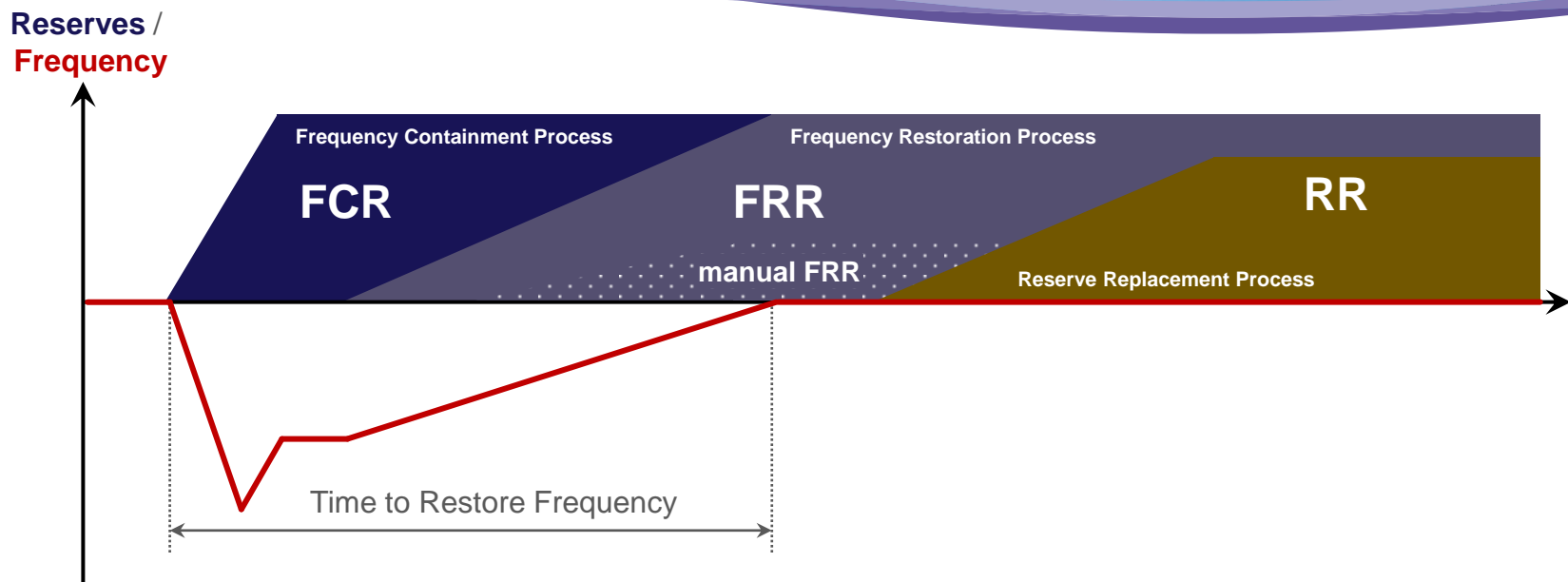
How that is provided and done is in the Balancing Code

- To ensure frequency quality and system security there must be providers with capability to provide reserve.
 - LFC&R: Reserve Capability technical requirements and rules.
 - RFG: technical requirements of providers.
 - EB: outlines the products from the providers required to provide the reserve and how they will be initiated.
- TSO-TSO Cross Border Exchange of Reserve.
 - LFC&R: Capability and System Security considerations to be able to achieve this.
 - EB: outlines the products and how it will done.

BACKUP



Process Activation Structure



- Frequency Containment Process → Stabilization
- Frequency Restoration Process → Regulate to Set-Point Value
- Reserve Replacement Process → Restore FRR

Frequency Quality Target Parameters

For each synchronous area

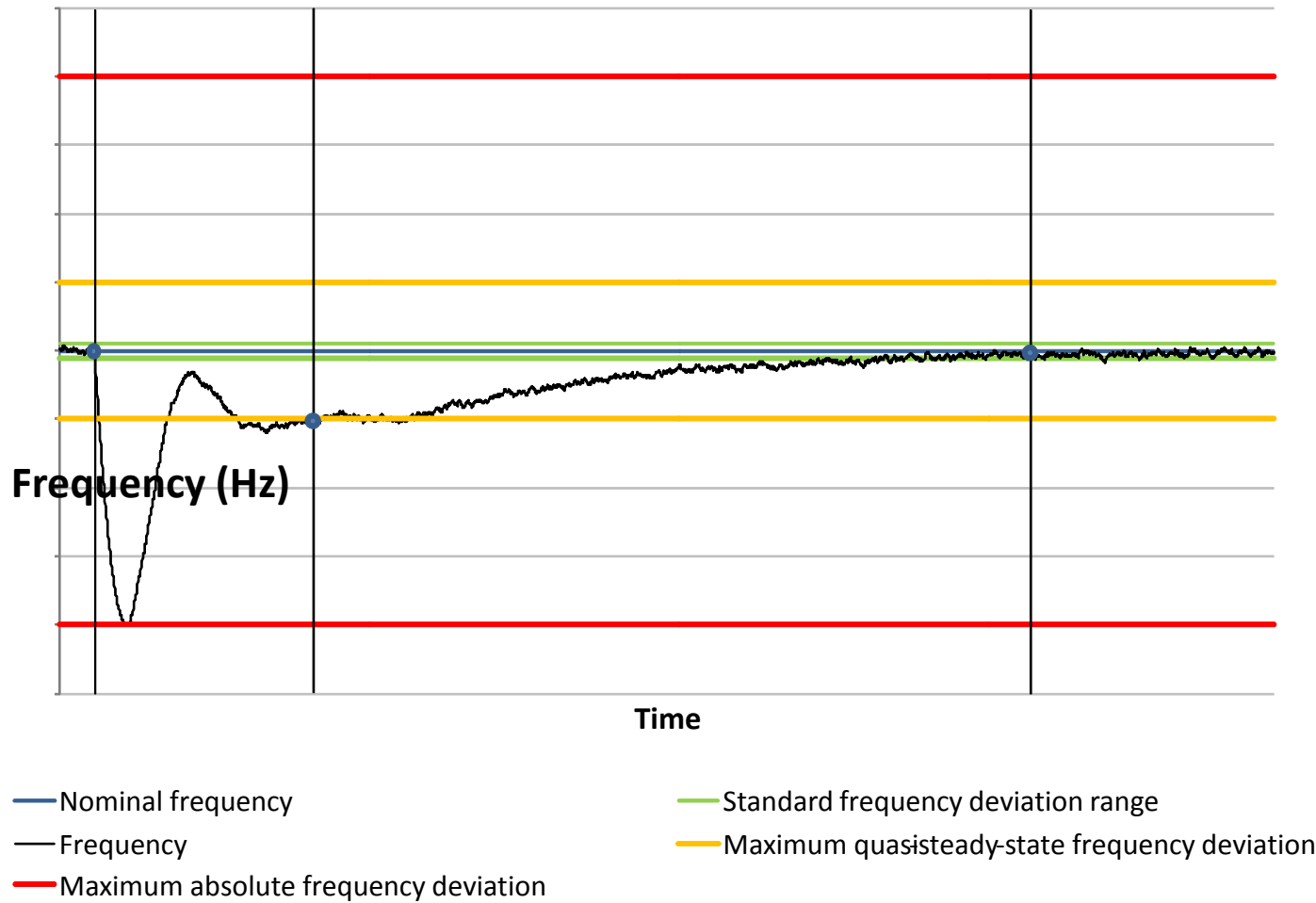
	Baltic	Continental Europe	Great Britain	Ireland	Nordic
Nominal frequency	50 Hz	50 Hz	50 Hz	50 Hz	50 Hz
Standard frequency range	±50 mHz	±50 mHz	±200 mHz	±200 mHz	±100 mHz
Maximum instantaneous frequency deviation	±400 mHz	±800 mHz	±800 mHz	±1000 mHz	±800 mHz
Maximum steady-state frequency deviation	±200 mHz (+/-400 mHz but no longer than 72 min. per 24 h)	±200 mHz	±500 mHz	± 500 mHz	±500 mHz

- Target number of minutes outside the Standard Frequency Range
- Numbers do not apply to very small Island Systems (e.g. Sardinia)

For each Control Block

- Standard Frequency Restoration Error Range
- Target number of time intervals outside the Standard Frequency Restoration Error Range (resolution Time to Restore Frequency)

Synchronous Area: Frequency Parameters



- “Technical System Parameters” describe the system behaviour and are a matter of fact
- “Requirements for Market Parties” should be the same

=> as a result the “Frequency Concept” will be variable (as a consequence of different system size, time parameters etc.)

Processes for Frequency Quality Evaluation



Data Collection and Delivery Process

At least 1 TSO responsible per Synchronous Area

Criteria Application Process

1 TSO as Synchronous Area Monitor per SA and 1 TSO as Control Block Monitor per CB

The Frequency Evaluation Criteria shall comprise:

- Values to compare with the Frequency Quality Target Parameters
- Statistical values for the frequency of the SA
- Statistical values for the Frequency Restoration Error of the CB
- ...

Result Publication Process

Reporting and publishing on a common web-site

Main Aspects of Frequency Containment Reserve

Determination of FCR Volume (Total / Shares)

- Common approach for dimensioning of total FCR per Synchronous Area based on risk assessment considering behaviour of load and generation and Market Induced Imbalances (covering of probable imbalances; minimum FCR = Reference Incident)
- Determination of individual shares for TSOs on basis of shares of net generation/ consumption

Determination of required Properties

- Exact requirements for FCR properties that are considered to be stable (minimum accuracy of frequency measurement, minimum insensitivity of the controllers, FCR full activation time, FCR full activation deviation)
- Joint definition of additional properties per synchronous area (example: FCR activation delay)

Reserve Providing Units / Groups

- FCR Providing Unit may consist of more than one generating / demand facility ("Group")
→ respective requirements by the Connecting TSO; example: Batteries
- Definition of maximum concentration of FCR in a FCR Providing Unit and per electrical node