Electricity Balancing Pilot Project 1 – Imbalance Netting, CMO/CMF for aFRR and mFRR
1. Scope of the Pilot Project
2. mFRR-Product
3. IT-Implementation of the mFRR-CMO
4. Summary
## General Framework

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#### Optimisation Functionalities

**Activation of Reserves**

- Imbalance Netting
- aFRR-Assistance
- mFRR-Assistance
- RR-Assistance
## General Framework

### Technical Implementation

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### Optimisation Functionalities

**Activation of Reserves**

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**Assistance is not related to costs!**

*Only improvement of frequency quality!*

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### General Framework

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Scope of Pilot Project 1

Technical Implementation

Control Scheme
Real-Time Data Exchange
Optimization Functions
Congestion Management

Optimisation Functionalities

Activation of Reserves
Procurement of Reserves
Amount of Reserves

Imbalance Netting
FCR-CMF
aFRR-CMF
Dimensioning
Sharing

aFRR-Assistance
aFRR-CMO
mFRR-CMF
RR-CMF

mFRR-Assistance
mFRR-CMO

RR-Assistance
RR-CMO

Pilot Project 1 - implemented
Pilot Project 1 - implemented but not submitted
(► Pilot Project on FCR)
Two Pilot Projects in Two Bullet Points

Participants

Focus

- Demonstration of full optimisation potential of a TSO-TSO cooperation in all fields of balancing
- Cooperation with other Pilot Projects (NORDIC, BE/NL, CH/AT)
1. Scope of the Pilot Project

2. mFRR Procurement and Activation

3. IT-Implementation of the mFRR-CMO

4. Summary
mFRR – Procurement

Dimensioning and Procurement
- German TSOs jointly dimension and procure mFRR (and aFRR)
- Indicative reserve amounts: aFRR ≈ 2.2 GW, mFRR ≈ 2.5 GW
- Fully harmonised requirements and market frameworks

Bids for mFRR
- are submitted day-ahead for 4h validity blocks (e.g. 4:00 – 8:00)
- consist of a capacity price and a energy price
- have minimum size of 5 MW (increment 1 MW)
- may be indivisible (as long as ≤ 25 MW)

Bid Selection
- mFRR capacity - daily auction (at 10:00) for all German TSOs – the bids with the cheapest capacity price are selected
- mFRR activation - selection of the cheapest energy prices among the bids accepted in the auction
# mFRR – Main Technical Requirements

## Pooling
- Pooling of single units located in one LFC Area is allowed
- One provider can operate more than one mFRR pool
- The providers have to provide information on planned “location” of capacity

## Full Activation Time and Delivery
- Capability to fully activate or deactivate the bid capacity within 15 min at any time (within the validity period of the bid)
- Capability to deliver the full bid capacity during the whole validity period of the bid

## Activation and Settlement
- mFRR activation can be triggered immediately (UCTE terminology - “direct tertiary control”) or for specific quarters of an hour (usual case), regardless of that,
- the activation request and settlement are based on schedules
mFRR – Request and Physical Activation

Case 1) Activation request received >22.5 minutes in advance to the activated quarter hour

- Request becomes “binding”

Time stamp of the mFRR request

Requested energy

Activation Request

physical activation
mFRR – Request and Physical Activation

Case 1) Activation request received >22.5 minutes in advance to the activated quarter hour

Case 2) Activation request received between 22.5 and 7.5 min in advance to the activated quarter hour
mFRR – Request and Physical Activation

Case 1) Activation request received >22,5 minutes in advance to the activated quarter hour

Case 2) Activation request received between 22,5 and 7,5 min in advance to the activated quarter hour

Case 3) Activation request received “too late” (special case)

Time stamp of the mFRR request

Requested energy

physical activation
1. Scope of the Pilot Project 1

2. mFRR-Product

3. IT-Implementation of the mFRR-CMO

4. Summary
mFRR-CMO

MOLS-TSO-Client
(4)

Schedule management systems (4)

Accounting systems (4)

mFRR-Settlement

Activation of mFRR

Schedules

Abrufdaten

Schedules

mFRR-Provider
(approx. 40)

Provider Data
Auction Results

Activation Request
Acknowledgement

...
Communication of Activation Requests

Process

- TSO enters the required power
- The MOLS determines the cheapest bids under consideration of availability and congestions and …
- … sends the activation orders and schedules

Experience

- The communication between MOLS and the mFRR provider is implemented via Activation Files (XML) which are digitally signed, compressed and encrypted
- The SSH-FTP protocol enables proof that a file was stored

Basic Principle of the IT-Implementation

- Activation File sent by MOLS
- Acknowledgement File sent by mFRR-Provider
- Software of the Provider
- SSH-FTP-Server of the mFRR-Provider
- SSH-FTP-Server of MOLS
- MOLS
MOLS is Extensible

... by adding additional TSOs

... by adding additional mFRR-Providers

... by adding additional mFRR-Providers
mFRR-CMO – Concept for further Cooperations

- **Tendering System DE**
- **Tendering System TSO X**
- **CMOL Interface**
- **CMOL** Common Merit Order List
- **MOT DE** Merit Order Tool DE
- **MOT TSO X**

Activities:
- Supplier
- Activation orders
- Accepted bids
- Competition data
- Activation orders

Integration:
- Master data
- Activation orders
- Accepted bids
1. Scope of the Pilot Project 1

2. mFRR-Product

3. IT-Implementation of the mFRR-CMO

4. Summary
Example for a TSO-TSO model

- Joint dimensioning, joint procurement and joint activation based on a CMO for all mFRR providers

The mFRR product combines the possibility to activate full mFRR capacity at any time (typically not needed) and scheduled based activation

Simple settlement and energy exchange between TSOs

- Feasibility study with NORDIC
- Feasibility study with BE/NL