Study Committee C5

Electricity Markets and Regulation

Paper 1009_2022

The Nordic Balancing Model: Redefining Balancing for a Renewable Future

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Statnett SF

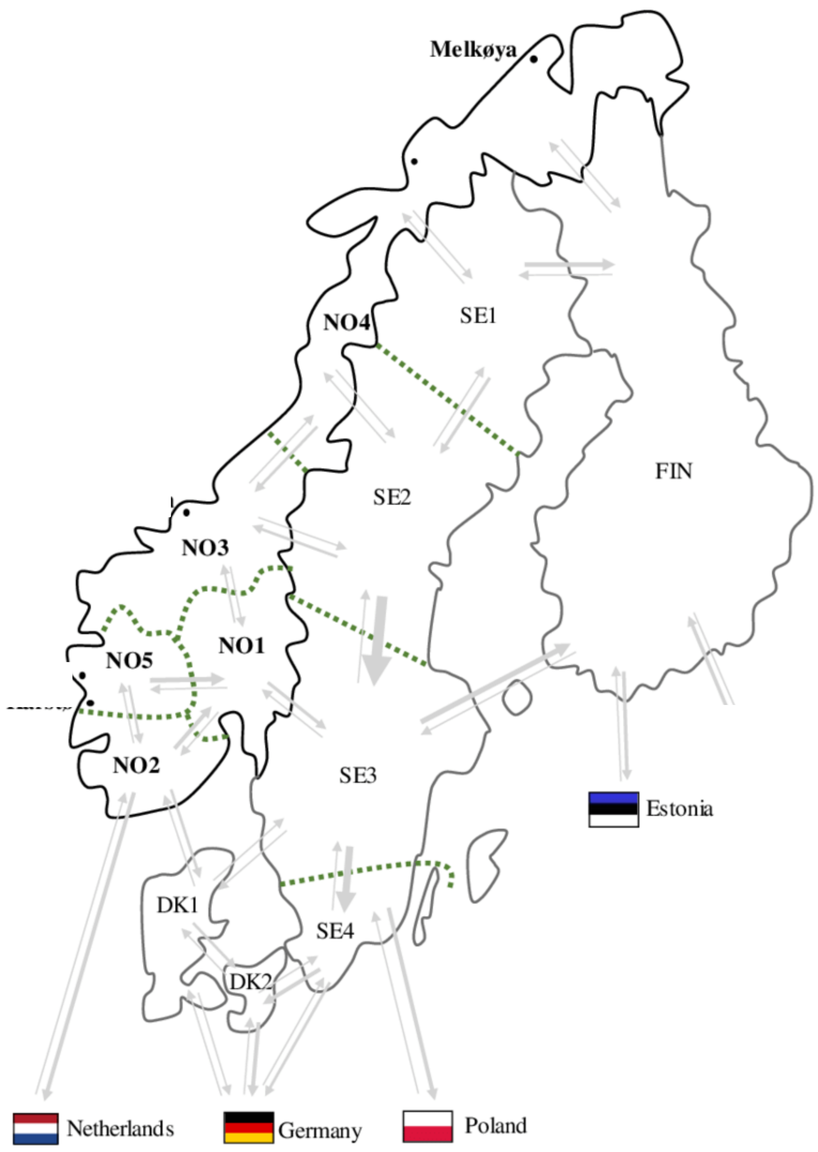
Motivation

Challenges for the present Nordic control structure:

- Significant increases in HVDC exchange capacity with the European continent, causing new flow patterns and faster variations
- Increased wind power production with similar effects as above as well as reduced predictability
- New developments in market integration, balancing platforms, 15 minutes ISP, automation and decision support are hard to implement with the current practices.

➢ As a result, the **frequency quality** has been weakened

➢ **Congestion management** becomes increasingly challenging for the operators



New Nordic Balancing Model

- 15-minute Market Time Unit (MTU) and Imbalance Settlement Period (ISP)
- Each TSO responsible for sufficient reserve capacity **in each bidding zone** (BZ)
- New **dimensioning** rules for aFRR and mFRR based on statistical analysis
- Exchange of **balancing capacity**
- **Reservation of transmission capacity** for balancing capacity
- **Proactive** activation of **mFRR** by European balancing platform
- Each TSO **economically responsible** for BZ imbalances
- **Reactive** activation of **aFRR** by European balancing platform

Conclusion

- Overhaul of Nordic Balancing needed
- Present manual approach not suitable for the future
- Manual reserves (mFRR) remain the cornerstone in Nordic balancing
- New Nordic Balancing Model with high degree of automation also of manual reserves
- Pave the way for integration with European balancing platforms

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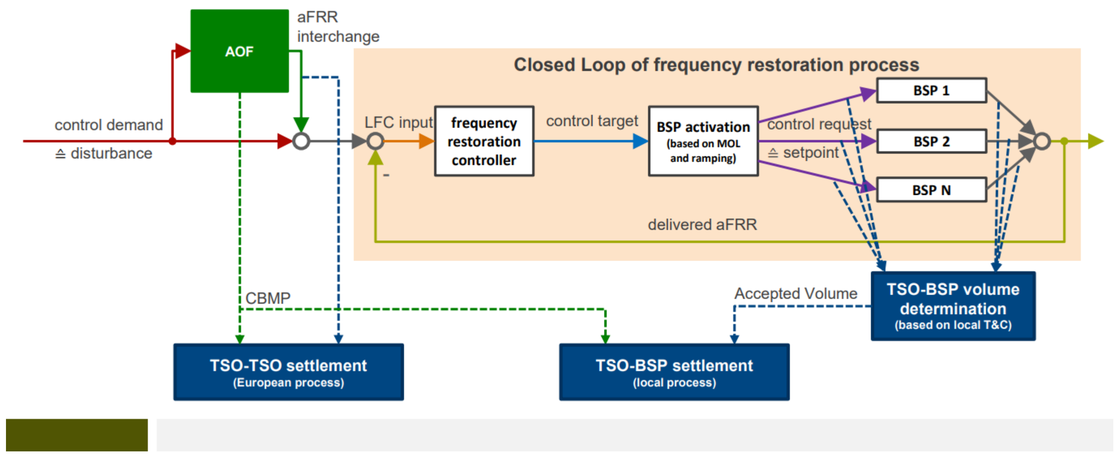
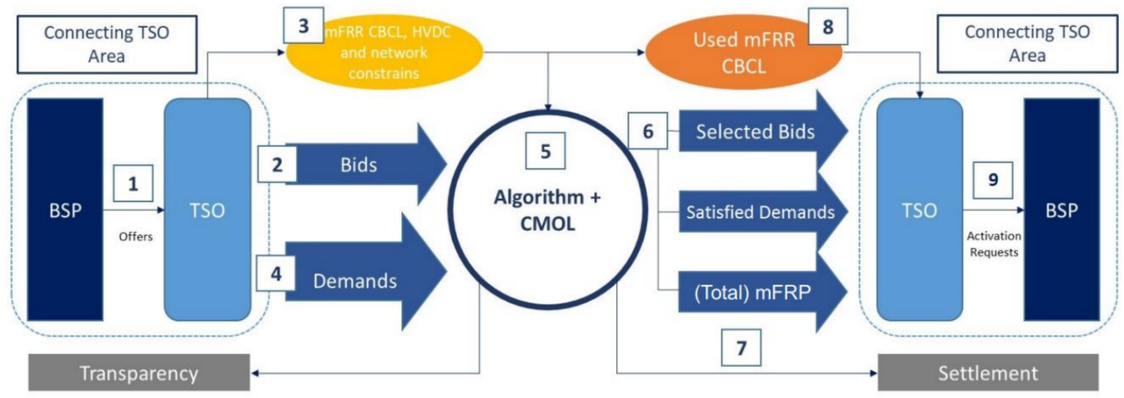
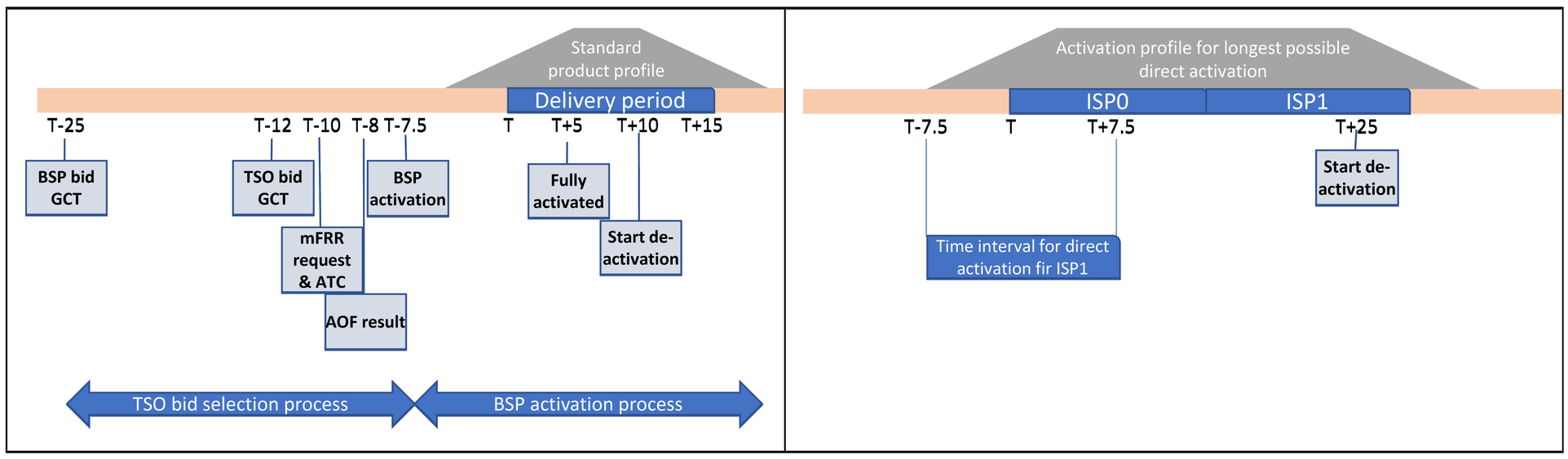
European platform aFRR: PICASSO



European platform mFRR: MARI



Activation modes and timeline



Scheduled and Direct Activation

Area Control Error

- ACE = Δ(Net Position) – λ·Δf
- Nordic system has not used ACE since 2020
    - Common frequency based balancing
- Reintroducing ACE per Bidding Zone
- Support from other Bidding Zones

Transmission Capacity

- ATC – NTC - AAC
- Transmission capacity remaining from previous markets is available for balancing

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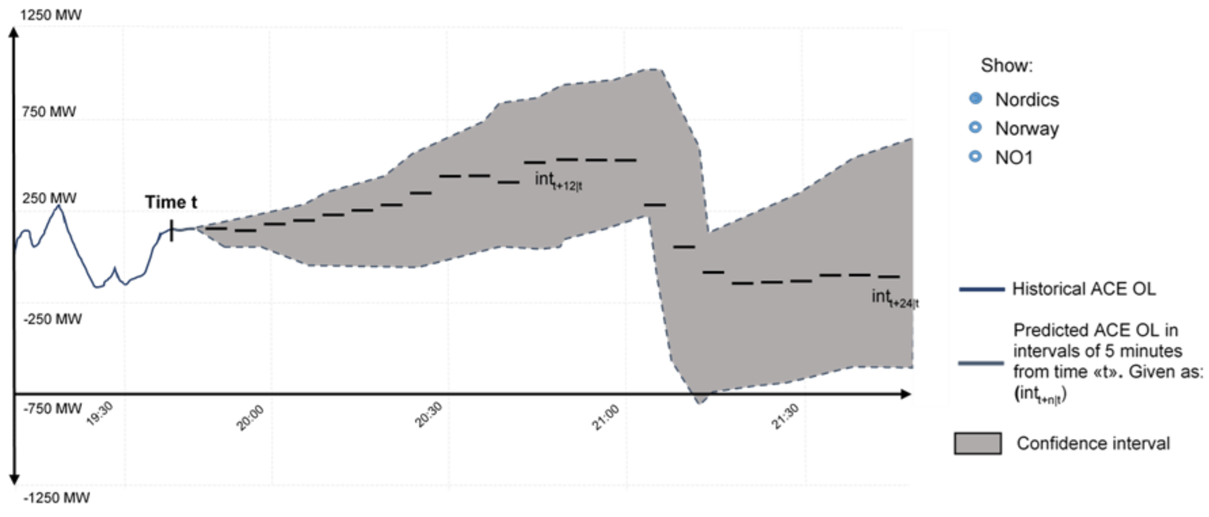
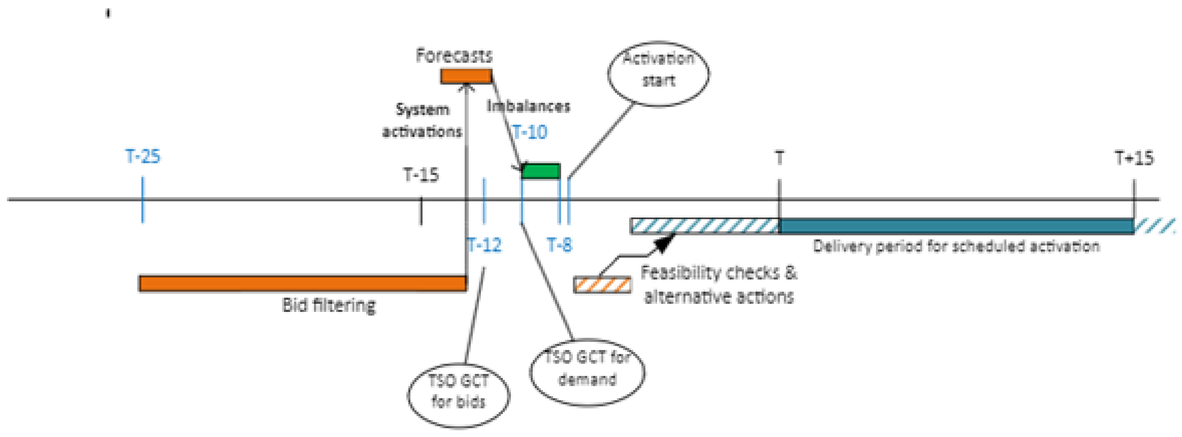
Imbalance forecast and mFRR request



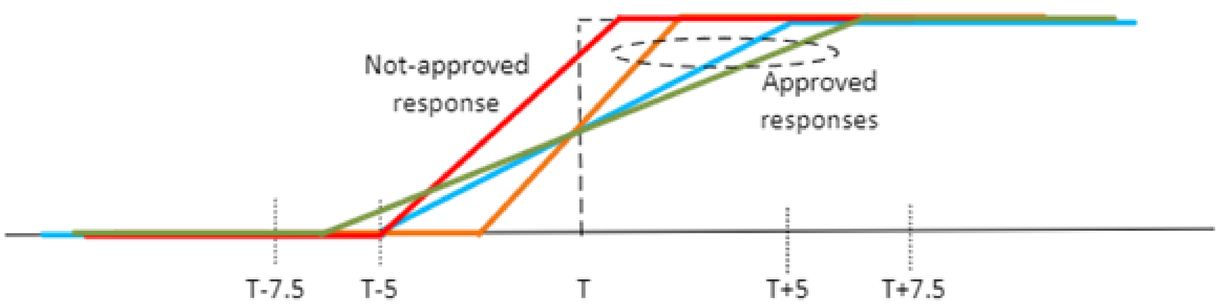
Detailed time line



Period shift

- Huge structural (deterministic) imbalances at period shifts today
- Expected to be reduced by 15' ISP
- Automatic procedure developed within NBM
- Balancing bids used, bids selected after balancing
- Necessity will be evaluated after introduction of 15' ISP

Bid activation



Implementation

1. Preparation for automated operation pre 15 min ISP
2. Automated operation pre 15 min ISP
3. 15-minute ISP and preparation for MARI
4. Connection to MARI