PILOT 2: FCR COOPERATION

BSG MEETING

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07.06.2017, BRUSSELS, ENTSO-E PREMISES
Content

- Load-Frequency-Control and FCR
- Road to current FCR Cooperation
- System structure and operational responsibilities
- Experience from the market
- Market and cooperation characteristics
- Future development
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Frequency containment reserves (FCR) - Primary Control

- Characteristics:
  - Stabilizing the frequency
  - Decentralized: Frequency measurements in the power plant
  - Automatic activation on the turbine controller

- Procurement:
  - 3’000 MW (Reference incident) in Continental Europe
  - Distribution to countries by ENTSOE
  - Obligation or market based
  - Cross border exchange of balancing capacity
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Road to current FCR Cooperation
History of the projects

<table>
<thead>
<tr>
<th>Year</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011:</td>
<td>Start project Swissgrid-German TSO</td>
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<tr>
<td>2012:</td>
<td>Project for common auction between APG and Swissgrid</td>
</tr>
<tr>
<td>2013:</td>
<td>Project with TenneT NL/energinet.dk to join German-Swiss auction</td>
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<tr>
<td>2014:</td>
<td>Project to merge cooperations</td>
</tr>
<tr>
<td>26.07.2016:</td>
<td>1st common auction with max. 70% of Belgian demand</td>
</tr>
<tr>
<td>12.03.2012:</td>
<td>1st common auction of German and a share of Swiss demand</td>
</tr>
<tr>
<td>03.07.2013:</td>
<td>1st common auction of Austrian and rest of Swiss demand</td>
</tr>
<tr>
<td>07.01.2014:</td>
<td>1st common auction of German and parts of Swiss and Dutch demand</td>
</tr>
<tr>
<td>07.04.2015:</td>
<td>1st common auction with full German, Swiss and Austrian and 2/3 of Dutch demand</td>
</tr>
<tr>
<td>10.01.2017:</td>
<td>1st common auction with full French demand</td>
</tr>
</tbody>
</table>
Overview of the FCR Cooperation

• 10 TSOs from 7 countries current member of the cooperation

• Common demand of 1.4 GW for 2017 in common auction (almost half of the ENTSOE wide demand)

• Further coupling of Denmark planned
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System layout

- Systems / Layer according to functionality:
  - Central clearing system (CCS)
  - Bidding on national/regional auction systems
  - Interface from TSOs to suppliers unchanged

- The CCS is a separate module with full flexibility
- Easy adaption of principles and extension
- No dependencies from interfaces with market participants
Operational responsibilities

- Cooperation according to TSO-TSO Model
- TSOs operate their national/regional auction systems
- Sole responsibilities for BSPs (contracting, controlling and settlement) in its Control Area by the respective connecting TSO
- Each TSO sends its demand to its national/regional central clearing system
- Overall demand = sum of TSO demand
- Bids selected through a common algorithm
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FCR price development of participating countries

<table>
<thead>
<tr>
<th>Start DE+ CH (25 MW)</th>
<th>DE/CH+ NL (35 MW)</th>
<th>Start cooperation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start AT/CH</td>
<td>DE/CH/NL NL 35-&gt;70 MW</td>
<td></td>
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</tbody>
</table>

Common market leads to converging prices for all cooperation partners
Joining of Elia and RTE

- Price volatility reduced
- Slight price decrease
- Higher liquidity
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Market characteristics

• Week base product Monday to Sunday (168 hours)
• Market design allows difference in products and procedures between TSOs
• Symmetric, divisible and indivisible offers
• Minimum 1MW, resolution 1MW
• Weekly auction with Gate closing time (GCT) on Tuesday W-1 @15h
• Market Clearing is based on cost minimization considering:
  • Limit of maximum import / export for each country
  • Individual products
Cooperation characteristics

- Fair governance
- Hybrid properties – divisible bids, block and conditional bids
- Own “in-house” development, flexible system and SW architecture, processes and market clearing algorithm
- The payment to market participants is pay-as-bid
- No need for the cross-border capacity allocation
- No balancing energy involved
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Potential for future market development

- FCR cooperation indicates following benefits:
  - socio economic benefit for the participating countries
  - increased robustness of supply
  - positive influence on security of supply

- TSOs and NRAs of the countries involved have identified a set of priorities regarding cooperation evolutions

- An improved market design could
  - Ease the access for smaller market players
  - Improve the investment signals
  - Strengthen the international market integration
  - Increase socioeconomic benefits
Relevant articles from EB GL for FCR proposal

— Article 33.1: TSOs have to develop a proposal for the establishment of common and harmonised rules and processes for the exchange and procurement of FCR within the FCR cooperation.
— Article 65: This proposal shall be submitted to NRAs at the entry into force of GLEB.
— Article 10.4: This proposal shall be subject to regional consultation.
— Article 5.3.b: The proposal is subject to approval by all concerned NRAs.
— Article 5.6: NRAs have 6 months to reach a common decision to approve or not to approve the proposal.
— Article 1.1: The scope for FCR concerns common rules procurement and settlement of FCR.
— Article 6.1: 2 months for amended TSO proposal and 2 months for NRA decision
Public consultation

- After the public consultation in February TSOs have worked on the conclusions that were published on the 1. of June

- NRAs informed the TSOs that the approval process will be done on the legal basis of GLEB. A second public consultation on the detailed proposal will therefor be carried out in September 2017, based on the TSOs conclusions regarding the evolution of FCR cooperation market design:

  - Package A consists in introducing indivisible bids in all countries, removing exclusive bids in Switzerland and changing the TSO-BSP settlement to marginal pricing. It can be implemented end of 2018 at earliest

  - Package B consists in implementing daily auction with 4h products. It can be implemented end of 2019 at earliest
Thank you for your attention

07.06.2017,
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YEARLY IMPORTS AND EXPORTS

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<tr>
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