“Design of European Balancing Power Markets”

Comments and Sources (Ocker, F., Braun, S. and Will, C.)

- **General information:** ENTSO-E WGAS, Survey on Ancillary services procurement, Balancing market design 2014, January 2015
- **vRES-Share (2014):**
- **RES-Share (Switzerland, 2014):**
  Bundesamt für Energie (BFE), *Schweizerische Statistik der erneuerbaren Energien 2014*

**Austria**

- Part of the FCR cooperation with Austria, Germany, the Netherlands and Switzerland
- Sources:
  - https://www.apg.at/de/markt/netzregelung [22.02.2016]

**Belgium**

- Winner determination for the FCR and FRR is based on an optimization problem (linear goal programming)
- Pricing rule for the RR market is not published
- Sources:

**Czech Republic**

- RR is separated into MR5 (after 5min), MR15 (after 15min) and Rapid RU30 (after 30min)
- Differentiation of positive and negative balancing power: not for MR5/MR30 (only positive) and RU only negative
- Pricing and scoring rule is not published for the FCR
- Energy prices are set separately, hence no energy bid is submitted

- Sources:
Denmark

- Denmark is separated into DK1 (West) and DK2 (East), we consider DK1
- Balancing power qualities in West: FCR (after 30s), FRR (after 15min), Load Frequency Control corresponding to RR (after 15min) and Manual (after 15min); Balancing power qualities in East: Frequency-controlled disturbance reserve corresponding (FCR-N and FCR-D) to FCR (after 30s), Frequency-controlled normal operation reserve corresponding to FRR (after 150s) and Manual corresponding to RR (after 15min)
- Pricing rule in DK1: FCR is priced uniform; energy price depends on market price; FRR not published; Manual is priced uniform
- Scoring rule in DK1: depending on the power bid, the location, technical details and further negotiation
- Pricing rule in DK2: FCR-N/FCR-D is priced pay-as-bid; energy price is regulated; Manual is priced uniform; energy price is regulated
- DK1 and DK2 are part of the cooperation “Nordpoolspot”, consisting of Sweden, Norway, Finland and Denmark

Sources:

Estonia

- FCR is provided by russian TSO, Balancing Reserve (BR) corresponds to FRR (after 15min); Emergency Reserve (ER) corresponds to RR (after 20min)
- Total price with bid unit Euro/MWh

Sources:

Finland

- Part of the cooperation “Nordpoolspot”, consisting of Sweden, Norway, Finland and Denmark
- FCR is divided into FCR normal (FCR-N) and FCR disturbance (FCR-D), in the table FCR-N is presented
- FRR is divided into FRR automatic (FRR-A) and FRR manual (FRR-M)
- There is no RR market
- FCR prices are based on the prices for FRR-M

Sources:
France

- Only for RR there is a market procurement

Sources:

Germany

- Part of the FCR cooperation with Austria, Germany, the Netherlands and Switzerland

Sources:
- https://www.regelleistung.net/ext/ [22.02.2016]

United Kingdom

- England, Wales, Scotland with mutual procurement via National Grid; Northern Ireland and Ireland without market procurement
- Firm Frequency Response (FFR): Low Frequency primary (pos./neg., after 10s, for 20s) corresponds to FCR, Low Frequency secondary (pos./neg., after 30s, for 30min) corresponds to FRR and High Frequency (pos./neg., 10s, permanently); Fast Reserve (FR) (only pos., after 2min, for 15min) corresponds to RR; Short Term Operating Reserve (STOR): (only pos., after max. 2h, for at least mind. 2h)

Sources:
- http://www2.nationalgrid.com/UK/Services/Balancing-services/ [17.02.2016]

The Netherlands

- Part of the FCR cooperation with Austria, Germany, the Netherlands and Switzerland
- There are FRR automatic (FRR-A) and FRR manual (FRR-M)
- Yearly procurement for balancing power, daily procurement for balancing energy
- Pricing rule FCR: UP for balancing power, balancing energy is not compensated
- Pricing rule FRR-A/RR: PaB for balancing power, UP for balancing energy

Sources:

Hungary

- Payment of FRR and RR depends on quality assessment: "Responding" (CP&EP), "Partially Responding" (only EP) und "Non-Responding" (no compensation)

Sources:
- https://www.hupx.hu/en/Product%20info/Electricity/Pages/intraday.aspx [17.02.2016]
Iceland

- Spinning reserves corresponds to **FCR and FRR** are used either for frequency control, i.e. to offset any imbalance between generation and demand during normal operations, or to counteract major imbalances following disturbances.
- Unlike spinning reserves, reserve power is not immediately available, because the reserve power stations are not started up until they are clearly needed. Reserve power is divided into ‘Fast Reserve’, which is available within 15 minutes and corresponds to **RR**, and ‘Slow Reserve’, which takes longer to get on-stream.
- Total price with bid unit Euro/MWh, calculation per hour.

Sources:
- http://www.landsnet.is/english/transmissionandmarket/balancingenergy/ [17.02.2016]
- http://www.landsnet.is/english/transmissionandmarket/systemoperations/ [17.02.2016]

Italy

Sources:
- http://www.mercatoelettrico.org/En/Mercati/MercatoElettrico/MPE.aspx [17.02.2016]

Latvia

- The FRR market is manual (FRR-M).
- Prices for FRR-M are calculated on a monthly basis.

Sources:

Lithuania

- The FRR market is manual (FRR-M).
- Total price with bid unit Euro/MWh, pricing rule: weighted average of accepted bids.

Sources:

Norway

- Part of the cooperation “Nordpoolspot”, consisting of Sweden, Norway, Finland and Denmark.
- There are FCR night (symmetric, FCR-N) and FCR day (±, FCR-D).
- There are FRR automatic (FRR-A) and FRR manual (FRR-M).
- FCR-N/FCR-D/FRR-A: UP for power, balancing energy payment depends on price for FRR-M.

Sources:
Poland
- Power prices are based both on contracts/auctions
- Energy Prices are set each day, depending on the energy bids
Sources:

Portugal
- Energy price for the FRR is based on the price for the RR
Sources:

Romania
- RR is separated into Fast (after 30min) and Slow (depending)
- Total price with bid unit Ron/MWh
Sources:

Sweden
- Part of the cooperation “Nordpoolspot”, consisting of Sweden, Norway, Finland and Denmark
- FCR is divided into FCR normal (FCR-N) and FCR disturbance (FCR-D), in the table FCR-N is presented
- FRR is divided into FRR automatic (FRR-A) and FRR manual (FRR-M)
- There is no RR market
- Energy price for the FCR-N, FCR-D and FRR-A is based on the price for the RR
- FRR-M is priced uniform for both the energy and power bid
Sources:

Switzerland
- Part of the FCR cooperation with Austria, Germany, the Netherlands and Switzerland
Sources:
- https://www.regelleistung.net/ext/static/prl [22.02.2016]
- https://www.swissgrid.ch/swissgrid/de/home/experts/topics/ancillary_services.html [22.02.2016]
Serbia
- There is no FCR-market
- Balancing power is procured both bilateral (dominant supplier) and with an auction; balancing power procured with the auction is used first
- Total price with bid unit Euro/MWh, orientation towards RR-activation and/or total price from dominant supplier

Sources:
- [http://www.ems.rs/electricity-market/electricity-balancing-market/?lang=en](http://www.ems.rs/electricity-market/electricity-balancing-market/?lang=en) [22.02.2016]

Slovenia
- FRR is divided into FRR automatic (FRR-A) and FRR manual (FRR-M)

Sources:
- [http://www.bsp-southpool.com/intraday-market.html](http://www.bsp-southpool.com/intraday-market.html) [22.02.2016]

Spain
- Spain is considered without the islands
- There is an additional upward power reserve (positive, after 30min)
- Energy price for the FCR is based on the price for the RR

Sources: