Nordic balancing stakeholder seminar

November 7, 2018
Moderator: Henrik Glette, Statnett
Agenda

10.00-10.10  Welcome, practicalities and agenda
10.10-10.30  The Nordic balancing cooperation and the roadmap
10.30-12.00  The new Nordic Balancing Model
              From frequency regulation to mACE
              aFRR and mFRR capacity markets
              aFRR and mFRR activation markets and links to European platforms
              15 min imbalance settlement period
12.00-13.00  Lunch break
13.00-13.40  The new Nordic Balancing Model continues
              Plan for involvement of stakeholders
              Presentation from National Regulatory Agency representative
13.40-14.45  Panel discussion with stakeholders and NBSC member:
              How will the market participants be affected and how should stakeholders be involved in
              the development?
14.45-15.00  Summary and conclusions
The Balancing Cooperation and Roadmap

10.10-10.30 am

Niclas Damsgaard, chair Nordic Balancing Steering Committee (NBSC)
A changing power system drives the need for a new balancing model

The frequency quality in the Nordic power system has gradually deteriorated

▪ More renewable generation resulting in more frequent, less predictable and larger imbalances within the operational hour
▪ More HVDC interconnectors and more frequent changes in cross-border flows
▪ Closure of conventional thermal power plants (incl. nuclear) reduces system inertia
▪ Bottlenecks within and between bidding zones prevent efficient use of hydro power for balancing between areas

In addition to the system changes there are also regulatory changes.
Business as usual is not an alternative

To handle the changing power system and enable the energy transformation several actions are needed

▪ General increase of digitalization and automation
  Faster and larger variability implies a need for general increased digitalization and automation. Also necessary to handle decentralized resources as suppliers of ancillary services.

▪ 15 minute imbalance settlement periods
  Allows consumption and production to follow each other more closely and reveals value of flexibility.

▪ Nordic Balancing Model based on modernized ACE (mACE)
  New balancing model to ensure operational security and efficient market
The Nordic Balancing Model covers capacity and energy activation markets for FRR

First generation
- Common Nordic capacity market for automatic FRR (aFRR)
  Under development. Go live Q3 2019
- Common Nordic capacity market for manual FRR (mFRR)
  Go live Q4 2019 (preliminary)
- Common Nordic energy activation market for mFRR
  Go live Q2 2020

Second generation
- Common Nordic energy activation market for aFRR
  Go live Q1 2021
- European standard product for mFRR
New roles in the Nordic Balancing Model

- CSP delivers services to all the Nordic TSOs
- CSP responsible for IT development to support the common services
- Market design etc. decided jointly by all TSO

- Each TSO responsible for local activities
- Increased national responsibility compared with current model

Common tasks:
- Dimensioning process
- Common aFRR capacity market
- Common mFRR capacity market
- Common mFRR activation optimization function
- Nordic security function
- Price and TSO-TSO cost calculation
- Reporting
- Transparency

TSO tasks:
- Collect bids
- Settlement TSO-TSO
- Settlement BSPs and BRPs
- Grid model
- Update balancing energy exchange plans
- Bottleneck review
- Redispatch/ internal bottlenecks
- Imbalance prognosis
- Activation request
- Local merit order list and manual bid activation
- mFRR ordering
- ACE calculation
- aFRR controller
- aFRR activation towards BSPs

Common service provider (CSP): Svenska kraftnät and Statnett

National TSOs: Energinet, Fingrid, Statnett, Svenska kraftnät
Agile development with detailing and specifications along the way

Regulatory approvals

Market design, Operational methods and processes

IT development

High level market design

Clarification of details

Operation

Sprint 1

Sprint 2

...

Go-live
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<th>Year</th>
<th>Event</th>
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<td>2019</td>
<td>Q2 2019</td>
<td>Manual operator decisions from the frequency leader</td>
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<td>Q4 2019</td>
<td>Pro-rata aFRR based on frequency</td>
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<td>Balancing Power exchange based on todays principles</td>
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<td>2020</td>
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<td>Common capacity market mFRR</td>
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<td>M1B - roles Q2 2020</td>
<td>Nordic AOF for mFRR</td>
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<td>Nordic AOF for aFRR</td>
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<td>Balancing Power exchange based on 15 min resolution (TSO-TSO)</td>
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<td>Partly ACE-based balancing (mFRR)</td>
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<td>M1A - IT Q1 2020</td>
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<td>New Imbalance Price</td>
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<td>M2 - aFRR Q1 2021</td>
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<td>ACE based Balancing</td>
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The new Nordic Balancing Model

10.30-12.00 am
From frequency regulation to mACE

Gunnar E. Nilssen, Statnett
Development for balancing philosophy

> 2000
ACE in each country

2000 – 2020/2021
Frequency control

From 2020/2021
mACE

More efficient use of resources
Netting of imbalances
Merit order bid list

Digitalization of balancing
Better control with flows
More clear responsibilities
mACE control – efficient trade and netting

Imbalances and available reserves in each bid-area are optimized in a central algorithm. This secures:

- optimized use of grid capacity
- efficient exchange of balancing products
- fair settlement between buyers and sellers
mFRR in mACE control

- The TSO request mFRR activation for their LFC areas and decide ATC for exchange
- Requests are optimized in the mACE platform
  - Calculates and distributes the optimal reserve activation
  - Regards ATCs, bid prices, netting etc.
  - Local TSO will activate the bids
- Resembles the European MARI platform
aFRR in mACE control

Local LFC controller
- One controller per LFC Area (11x)
- Calculates the local aFRR demand
- Send request for activation to mACE controller
- Receives correction signal for ACE calculation from mACE controller
- Activates the local BSPs according local ACE.

mACE controller
- Collect aFRR requests from local LFC controllers
- Calculates the optimal activation in the LFC block
- Regards bottlenecks, bid prices, netting etc.
- Send correction signal for ACE calculation to local LFC controller
- Resembles the European Picasso platform
Dimensioning of FRR

Gunnar E. Nilssen, Statnett
Four steps towards the new Nordic Balancing Model

1. **Dimensioning of Frequency Restoration Reserve (FRR)**
   TSOs in a LFC block assess the need for available reserves for each LFC area to ensure operational security.

2. **Capacity market**
   The TSO procure balancing capacity to secure availability of balancing energy bids.

3. **Energy market and activations**
   Combine all balancing energy bids across Europe and activate in merit order.

4. **Settlement**
   Results in a correct price signal to BRP and BSP.
Dimensioning of FRR

- Imbalances in each LFC area is starting point
- Needs to consider congestions
- Needs to consider energy market result(s)
- Netting of capacity requirements is possible in "common balancing areas"
- Congestions are directional, different conditions up-regulation / down-regulation
Dimensioning of FRR

Statistics for historical imbalances

Methodology for FRR dimensioning

Saturation in FRR activation

Congestions in the grid
aFRR and mFRR capacity markets

2 Capacity markets

Rebecca Nilsson, Svenska kraftnät
FRR capacity markets

Today
- aFRR - capacity procured nationally
- aFRR – energy activation pro rata on an Nordic level
- mFRR capacity procured nationally
- mFRR - Nordic energy activation market

Tomorrow
- Common Nordic capacity markets for both mFRR and aFRR
- Common Nordic and European energy activation market for both mFRR and aFRR
Main features of FRR capacity markets

Input

1. TSO request of FRR (MW per area)
2. Nordic bids in a common merit order list
3. Day-ahead prognosis (prices per area and flows per border)
Main features of FRR capacity markets

Output

1. Reserved FRR-capacity [MW/LFC area]
2. Reserved transmissions capacity [MW/LFC area border]
3. Capacity remuneration to BSP [EUR/MW]
Status of FRR capacity markets

aFRR capacity market
- External consultation of methodology proposals for reservation of CZC and rules and processes
- Ongoing work in WG to take care of stakeholder comments form the consultation
- Send methodology proposals to Nordic NRAs (end of November)

mFRR capacity market
- Nordic TSO work has just started
- Market design will be out on external consultation and will also need approval from NRAs
aFRR and mFRR activation markets and links to European platforms

3 Energy market and activations

Fredrik Wik, Svenska kraftnät
From a Nordic to a European balancing market

The transition needs major changes
Nordic Balancing Model paves the way for balancing market integration

- European balancing market is based on balancing need and delivery on LFC area level, same as bidding zones in day-ahead.
- Allows precise and optimized activation based on available grid capacity
- An imbalance can be handled
- ...proactively (just before real-time) by mFRR or...
- ...reactive (during real-time) by aFRR
European market coupling overview

1. BSP Offers to TSO
2. TSO Bids and Needs
3. Algorithm + CMO
4. XB Capacity
5. Selected Bids, Netted needs, XB exchanges
6. Settlement
7. National Balancing Mechanism

Energy market and activations
European market coupling overview

The European market coupling requires an increased automation and harmonised balancing processes:

- Continuously update transmission capacities
- Security check on submitted bids
- Forecast on proactive needs

Auctions:
- mFRR each 15 (or 1) minutes
- aFRR each 4 seconds

Electronic activation:
- Update exchange plans
- Update transmission capacities
- Settlement
15 min imbalance settlement period

4 15 minute imbalance settlement period

Maria Joki-Pesola, Fingrid
Shorter imbalance Settlement period makes the energy system more cost effective

Europe is going through an energy transition which needs changes in the electricity market:

- More intermittent RES production
- Less conventional production
- More integration – more HVDC interconnectors

15 ISP gives bigger role for market players in balancing of the energy system:

- BRPs will have more incentives to balance themselves
- European harmonisation – increased trading opportunities in balancing markets and ID market
- Efficient use of interconnectors

15 min imbalance settlement period
European Balancing Guideline is setting the time schedule

The European Balancing Guideline entered into force 18 December 2017 – implementation by 18 December 2020

- By **three years** after the entry into force of this Regulation, all TSOs shall apply the **imbalance settlement period of 15 minutes** in all scheduling areas while ensuring that **all boundaries of market time unit shall coincide with boundaries of the imbalance settlement period**.

- The integration of balancing energy markets **should facilitate the efficient functioning of the intraday market** in order to provide the possibility for market participants to balance themselves as close as possible to real time. **Only the imbalances remaining after the end of the intraday market should be balanced by TSOs with the balancing market**. The harmonisation of the imbalance settlement period to 15 minutes in Europe should support intraday trading and foster the development of a number of trading products with same delivery windows.
Changes in the balancing market

▪ 15 min mFRR and aFRR price for all areas
  ▪ 15 min bid volumes
  ▪ 15 min bid prices
▪ 15 min imbalance price for all areas
▪ 15 min TSO-TSO settlement of balancing energy and imbalances

15 min ISP  15 min mFRR  15 min ID market
The Nordic Higher Time Resolution Project

15 min imbalance settlement period

Nordic PM Forum

Nordic Balancing Model Program

Fingrid
Svk
Statnett
Energinet

eSett
Some of the decisions are made in a national level

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<th>Svenska krafntä</th>
<th>Statnett</th>
<th>Energinet</th>
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<td>Go live Q3 2021, preprocessing in Svk system or eSett</td>
<td>Go live Q1 2019, profiling in hub</td>
<td>In operation, profiling in hub</td>
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<td>Most likely eSett</td>
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<td>Ministry and regulator</td>
<td>Regulator (not EU member)</td>
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More information

In each country we organise webinars, stakeholder meetings and seminars.

National projects can be followed by the internet pages in each country

Project managers are happy to answer questions

- Svenska kraftnät: Nordine.Aboudrar@svk.se
- Energinet: XHCI@energinet.dk (Hans Christensen)
- Statnett: Anders.Moe@statnett.no
- Fingrid: Maria.Joki-Pesola@fingrid.fi
The new Nordic Balancing Model (cont.)

13.00-13.40 pm
Plan for involvement of stakeholders

Jakob Aldrin, Project Manager Nordic Balancing Cooperation
Compliance

Relationships

Communication and information
The Nordic Balancing Model (NBM) is a framework for managing stakeholders in a project. It is represented in a pyramid-like structure with the following levels:

1. **Partnership** - Highest level, requiring the most effort and involving stakeholders with high interest and influence.
2. **Participation** - Requires moderate effort and involves stakeholders with high interest and some influence.
3. **Consultation** - Requires less effort than partnership or participation, and involves stakeholders with high interest.
4. **Push communications** - Requires the least effort, and involves stakeholders with low interest and some influence.
5. **Pull communications** - Requires the least effort, and involves stakeholders with low interest.

The model suggests that as you move down the pyramid, the effort required decreases, and the number of stakeholders increases, while the level of influence and interest reduces.
▪ Survey
  ▪ Evaluation of this seminar
  ▪ Input

▪ Contact:
  ▪ Program manager: Jakob.Aldrin@svk.se
  ▪ PMO: Karin.styf@svk.se

NordicBalancingModel.net
Presentation by NRA representative

Forsyningstilsynet: The NRAs’ approval process

Peter Christian Olsen, Forsyningstilsynet
The NRAs’ approval process

"The painless process"

• The TSOs publish the drafted terms and condition methodology (TCM) in public consultation.

• The NRAs prepare a shadow opinion to the drafted TCM in parallel with the TSOs’ public consultation. The shadow opinion is an informal feedback on the TSOs’ drafted methodology.

• The TSOs submit the TCM for the NRAs approval. The submission must include the TSOs’ consideration of the received consultation answers.

• The NRAs publish the TCM for public consultation.

• The NRAs approve the submitted TCM.

Stakeholder input is important to better understand the TCMs’ impact on the markets
"Bump in the road"

- If the TSOs do not submit the TCM within the deadline – determined in the appropriate network codes and guidelines – the draft TCM(s) shall be sent to NRAs and ACER. ACER informs the Commission, who shall take appropriate measures.

- If the NRAs do not accept the submitted TCM, they can send a request for amendment (RfA).

- If the NRAs do not manage to agree on the approval of the submitted TCM, or if they send a common request to ACER about the situation, ACER’s director will make the decision after having secured a positive opinion (2/3) from the Board of Regulators (BoR).

- A NRA can request an opinion from ACER on the application of the network rules and guidelines or the Regulation 714/2009.
The NRAs’ approval process

National, regional and Pan European approvals

• Regional or Pan European approval: The NRAs cooperate and coordinate closely.
  • At Nordic level the cooperation is done within NordREG.
    • Related to NBM the NordREG EB TF is chaired by Thomas Vom Braucke from DUR (tvbr@forsyningstilsynet.dk)
    • At Nordic level the formal decisions are made at European Regulators Regional Forum (ERRF).
    • At EU level the formal decisions are made at European Regulators Forum (ERF).

• National approval: There are no rules on cooperation.
The NRAs’ approval process of TCMs submitted according to NBM

Approval process refering to network codes, guidelines or national law

• The Nordic Balancing Model (NBM) is partly based on mandatory and voluntary development plans.

• In our understanding some of these plans shall be approved according to the current network codes and guidelines, while others should be approved according to national law.

• The TSOs are working on mapping, which development plans respectively refers to the network codes, guidelines and national laws.

• Where appropriate and where possible under national law, the NRAs will aim to work closely together and give the TSOs our join input to ensure appropriate solutions for the Nordic Market
The NRAs’ approval process

Questions?
The NRAs’ approval process

Thank you for your attention

Peter Christian Olsen
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+45 41 71 53 98
How will market participants be affected and how should stakeholders be involved in the development?

Panel discussion:
Sebastian Sundberg, Head of Physical Trading, Fortum
Håkon Egeland, Head Adviser Market Policies & Regulatory Affairs, Statkraft
Conny Johansson, Energy Manager Sweden, Stora Enso
Martin Schröder, Chief Special Adviser, Dansk Energi
Asta Sihvonen-Punkka, NBSC member, Fingrid

Moderator: Henrik Glette, Statnett
Fortum and the new Nordic Balancing concept

• The new Nordic balancing concept seen as positive and we expect the Baltic states to be included in the cooperation
  – Real time market data to all and a “level playing field” is a must
  – One price – one balance
  – Involvement of all stakeholders in development crucial

• We welcome harmonization of products and rules over national borders enabling
  – Use of same processes and tools for all Nordic market players
  – Common technical specifications and validation processes
  – Entry of new market players and scalability of new business models

• Fortum must ensure that our portfolio and systems are adapted to new requirements
NORDIC BALANCING STAKEHOLDER SEMINAR

Håkon Egeland
Head Adviser Market Policies & Regulatory Affairs
How will market participants be affected and how should stakeholders be involved in the development

- Expect significant impact on several IT system (=costs) and working routines
- Hope to earn more money
- Many processes, miss clear overview of how different (uncoordinated) TSO processes effect us and how to adapt to them in a rational way
  - Ongoing both by Entso-E (difficult to follow), Nordic TSO (important that harmonized and well coordinated) and national level (satisfactory but still challenging)
- Wondering to what extent we can participate in a truly Nordic and European balancing market
  - Important that trading capacity is used in an optimal way and as far as possible in a market based way
- Would like a timeline with the different processes, how they interfere with each other and expected consultation and decision stages
Stora Enso in Nordic Energy Market

- Total we refine 10 TWh of electricity together with Wood to valuable products
- In some mills we have a possibility to act in the markets
- In Sweden we have a site with a total storage capacity of 2000 MWh of electricity and the chargers are at the level of 200 MW

The “Battery” electrolyte contains water and wood fiber

The “Charger” use 18 MW each

At this site we have 4

This site:
Battery 700 MWh
Charger 70 MW
Summary and conclusions
Stay updated

- Visit our web site: http://nordicbalancingmodel.net
- Contact NBM Program
  - Program Manager Jakob Aldrin: jakob.aldrin@svk.se
  - Program Management Office (PMO): karin.styf@svk.se