Unlocking flexibility

The role of the aggregator

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But aren't we already flexible in Norway?

Norwegian market actors, especially hydropower (96% of the electricity mix) and industry has a long tradition of providing flex services. ..but new technology enables different types of flex and a broader range of actors.

Development is also driven by regulatory framework and the demand for flexibility in grid operation.

http://energiteknikk.net/2018/01/soker-digitale-gevinster-i-vannkraft
The Nordic power system has an increasing demand for flexibility.

More and different types of demand

Total rotational energy ("inertia") in the system is affected ("sum of all rotational mass")
A failure in the grid has a larger impact potential if the inertia is low

Less rotational mass (inertia) in the system (a "light" system")

- increases the **speed** of the frequency drop
- increases the **magnitude** of frequency drop

If the frequency falls below 49.0 Hz – automatic load shedding will start!
Barriers using flexibility – seen from the grid
The consumer's toolbox and incentives

- Power tariff schemes
- Energy markets
  - More variation in spot price
  - Improved price signals (hourly/quarterly settlement)
- Quarterly settlement provides incentives for intraday trade
- Balancing markets

Move consumption
Reduce consumption
Balancing markets handles imbalances and unexpected events

Primary reserves, FCR
Secondary reserves, automatic FRR
Tertiary reserves, manual FRR (Regulating power)

1MW
5-30s og 2-3 min

5MW
2 min

10MW
15 min

Rotational energy, inertia
Time of activation

Aggregation: To combine multiple resources (to a bid) and offer this flexibility to a market

Aggregator: Offers aggregated resources to a market
New versus existing providers of balancing services

"It's the lack of business potential which is stopping new market actors, not the market requirements"

"New and small units meet barriers in the market requirements, such as high minimum bid size"

- Equal requirements
- Market access
- Transparency
- Operational security
New report provides an introduction to Statnett's balancing markets and their development

- New technology, new regulatory framework provides opportunities and challenges
- Both Statnett, DSOs, new and existing market actors can and must be innovative
- The report provides an overview over markets, roles and how these are changing
- Norwegian (English summary)

http://www.statnett.no/Kundeportal/Kundeinformasjon/Roller-i-balansemarkedene/
Enabling market access: Balance responsible party and Balance service provider

Balance responsible party (BRP) means a market participant or its chosen representative responsible for its imbalances

Balance service provider (BSP) means a market participant with reserve-providing units or reserve-providing groups able to provide balancing services to TSOs.
Way forward towards implementation

First, EBGL has to be implemented into Norwegian law..

..however the other Nordic TSOs published proposals for BSP and BRP terms and conditions before the summer. Implementation is earliest end 2019.

- Dialogue with nordic TSOs, DSOs and market actors about possible solutions
- When it's time: Incremental process

- BSP in Norway today must be BRP or cooperate with the BRP of the consumer
- Right now we prioritize BSP aggregation solutions with single BRP - multiple BRPs is further ahead
The aggregator as a BSP

• Nordic TSO report: Unlocking flexibility

• 4 models tested in pilots and in markets

http://www.statnett.no/Media/Nyheter/Nyhetsarkiv-2018/Mer-fleksibilitet-i-det-nordiske-kraftsystemet/
(1) Integrated model

Possible to implement today! Only one BRP per balance resource owner.

At the moment the only model possible in Norway.
(2) Dual supply model

Enables portfolio of for example electrical vehicles, yet is dependant on technical solutions for measuring and settle partial volumes.

http://parker-project.com/
(3) Uncorrected model

Simple model, but only relevant for balancing products with a low energy volume (e.g. FCR). Dependent on flow of information between aggregator and balance responsible party.

DSR participation in Finland
status 18.1.2018

Applied in FCR-D in Finland since 2017 (Fingrid 2018)
(4) Reimbursement model

Balance responsible and aggregator both receive compensation, yet the model is complex and demand development of ICT systems, included measurement and verification.
Way forward aggregators

• Linked to BRP / BSP implementation

• Continued Nordic dialogue
  • Goal is harmonized Nordic solutions
  • No solution that fits all – multiple models possible (national/Nordic)

• Principles for roles and relations
  • Balance responsibility to all market actors
  • Compensation of costs

• ICT is an enabler
  • Settlement and financial flow
  • Information and data flow
The need for a pilot summer 2018

- Increase rotational mass
- Reduce size of dimensioning incident
- Acquire fast reserves (active power)

Fremtiden er elektrisk

Pilot: Fast Frequency Reserves

Why
• Are fast reserves available?
• Early communication with potential stakeholders
• Prepare for full scale solution to 2020

What
• 2 seconds response time if Nordic system frequency < 49.6 Hz
• 30 seconds duration

How
• ~ 100 MW (capacity and activation payment)
• Testing and prequalification
• Operation mid-July to mid-August (during the night 23:00-09:00)
Pilot: Fast Frequency Reserves (FFR)

Wide range in technology and mix new and existing BSPs
Morning 18th of July 07:57 📈

Proof of concept! Demand side response from a wide range of technologies can contribute to frequency stability!
Further development

'17 Q1-Q4
Nordic inertia study

'18 Q3
Evaluation pilot "CBA" FFR

'18 Q2
FFR pilot Norway

'19
Norwegian/Nordic FFR specification v1.0

'20 Q2
Norwegian/Nordic solution (op./market)

> '20 FFR v2.0

'20 Q2
NordLink
Summarized

• Nordic power system has a need for more flexibility, and demand side response can contribute!

• In order to release the flexibility potential and implement new regulatory framework, there is a need for change in roles and markets

• Small resources can contribute – but must be aggregated

• We are running pilots and cooperating on a Nordic level – incremental implementation of solutions