NordLink

NordREG/TSOs stakeholder meeting on capacities

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NordLink trial operation

- New, and large, HVDC connection changes system operation
- Go live for NordLink trial operation is currently set to start of market operation 8th December with delivery for the 9th.
- For system security reasons TenneT will have a maximum transmission capacity on NordLink of 700 MW offered to the markets for a maximum duration of up to four weeks from start of trial operation.

Statnett capacity calculation

- The **Western corridor** project is upgrading the network from 300 to 420 kV and will be finished in October 2021. Planned outages will affect the capacities on the HVDC connections February – October 2021.

- In addition, a new 420 kV line **Lyse-Fagrafjell** will remove the need for capacity reduction when the network is intact, and reduce the capacity reductions during outages. This line will be in operation in 2023/24 and is the last planned reinforcement in the 420 kV network in NO2.

Capacity constraints in NO2

- **During high export** it will be most efficient to reduce the flow on NordLink and NorNed to handle grid constraints in NO2.
- **During high imports**, it will be most efficient to reduce the flow on Skagerak from DK1
- Average NordLink capacity in 2021:
  - Average export: **1140 / 917 MW**[1]
  - Average import: **1377 / 1363 MW**[2]

1) Assuming high vs low generation in NO2
2) Assuming high vs low load in NO2

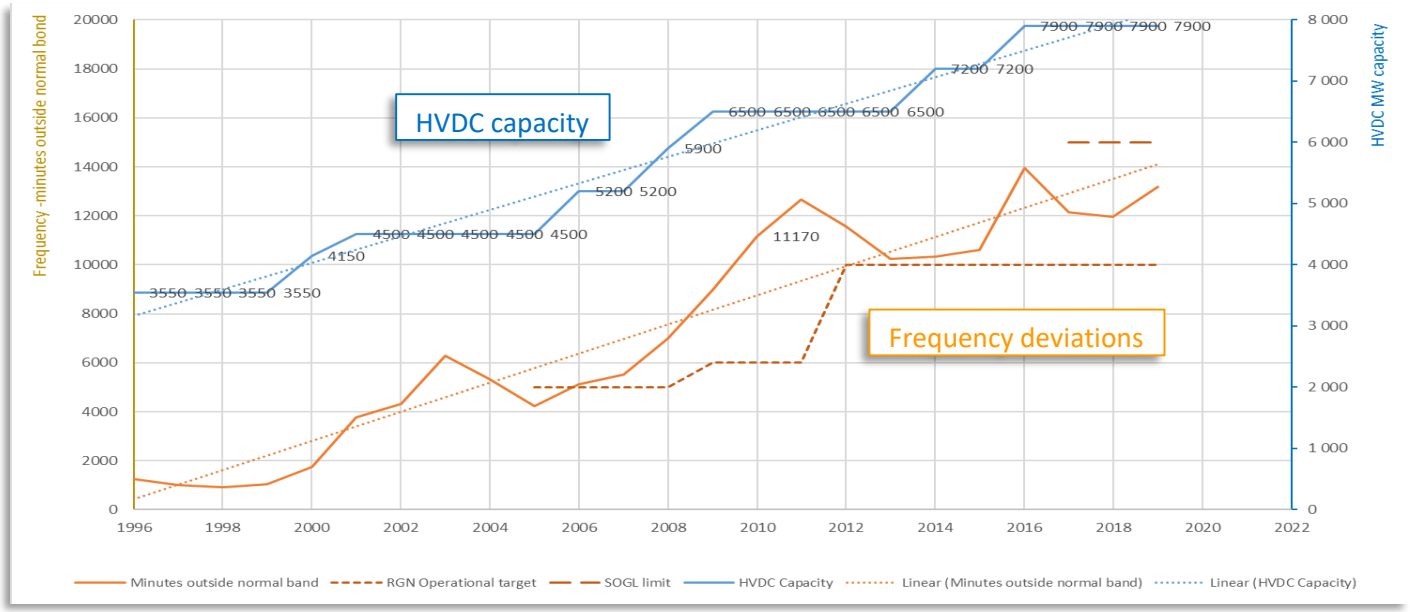
Capacity Calculation Methodology

- The capacity reductions on each HVDC connection is based on socio-economic analyses, taking into account both **the effect of the reductions** on actual network constraints and **the expected price differences** between NO2 and NL, DE and DK1.
- Calculations taking into account
  - "Spring" and "Autumn" cases for local generation and demand
  - Year-ahead outage plans for all relevant projects and grid elements
  - Installed Emergency Power Control (EPC) functionality
- Initially, a net capacity into and out of NO2 is calculated.
- Distribution between individual HVDC connections based on effect on actual constraints and expected price differences.
- Capacity calculations will be updated closer to the start of the outage, or when new outage plans are submitted.

Ramping challenge in the Nordic SA

The Nordic TSOs have agreed a ramping limit of **600 MW/hour** on individual HVDC interconnectors. Each new IC has implemented the same limit, while frequency quality has deteriorated.

Fast and big changes in flow challenges the congestion management



Ramping rules for NordLink

- *Our ambition is to increase ramping to 600 MW/h during Trial Operation, provided that given quality criteria are not violated*
- In addition to frequency deviations, a main challenge is to handle the large changes in flow around hour shifts due to HVDC ramping. It is necessary to gradually build experience with the new interconnectors.
- *NordLink will therefore have a ramping limit of **300 MW/h** in Day-Ahead and Intraday from start of Trial Operation*.
- Based on a set of quality criteria, Statnett will evaluate how fast ramping can increase during Trial Operation.
  - Number and duration of frequency deviations
  - Number and duration of flow limit violations
- A more enduring solution is to implement a sum restriction for ramping in NO2 in the market coupling in combination with less restrictive individual restrictions, but this will not be available for NordLink go-live