Nordic and Baltic Sea Winter Power Balance Forecast 2020 – 2021

RG BS

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Methodology description

The assessment depicts a deterministic worst-case (extreme) scenario of adequacy situation in the region:

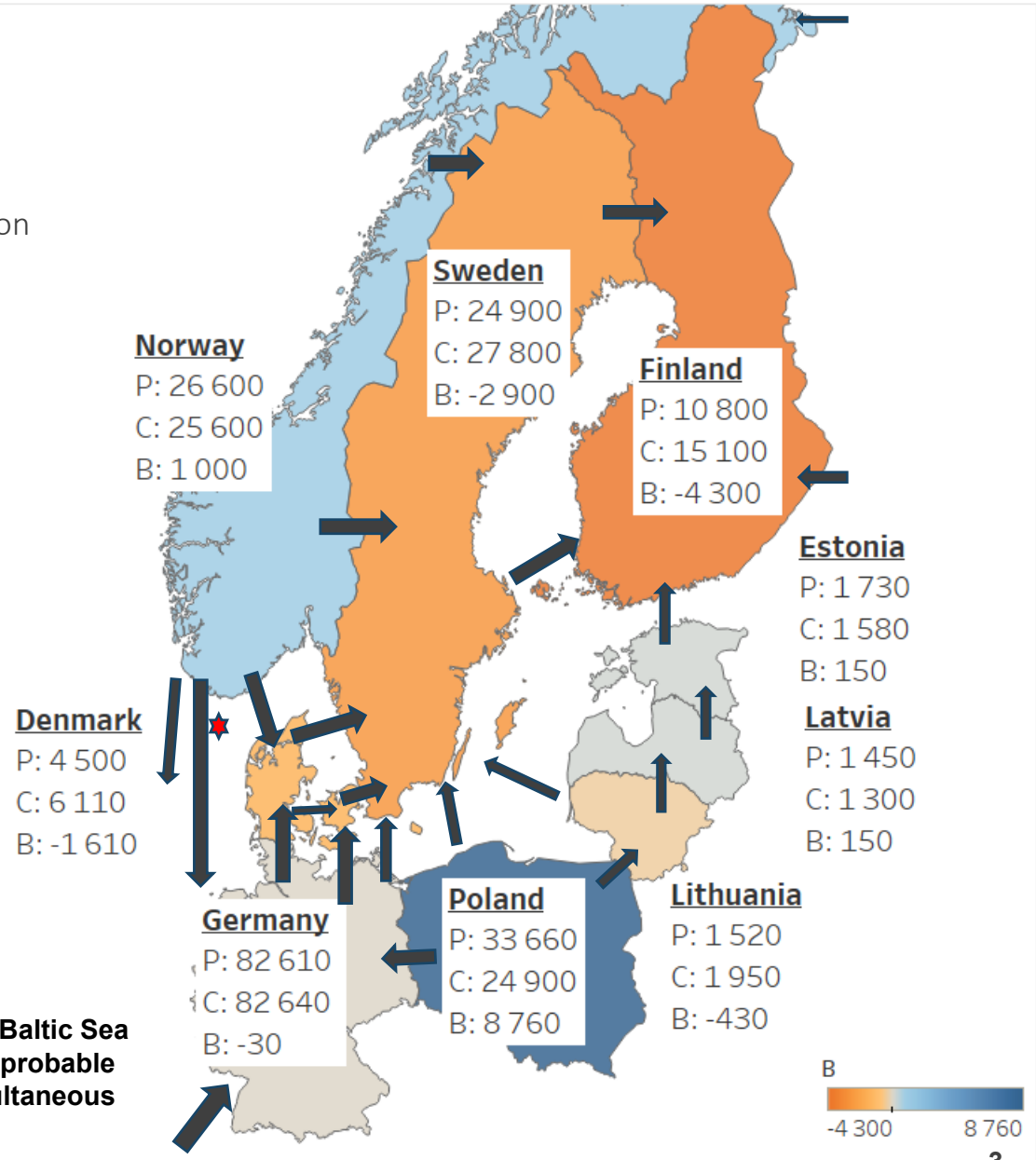
- with simultaneous peak demands with a likelihood of once in 10 years
- low wind production and low demand-side response.

TSOs' contracted reserves are excluded from this representation. Exception: Strategic reserves/adequacy reserves are included for Sweden, Germany.

POWER BALANCE 2020-2021

With estimated power exchange [MW]
Cold winter day in <u>1 of 10 winters</u>

P: Estimated available production capacity during peak consumption in 1 of 10 winters
C: Estimated peak consumption in 1 of 10 winters
B: Balance



Arrows between and to/from the Baltic Sea area countries indicate the most probable power flow direction during simultaneous peak hour situation

Remarks :
***) Assumed availability in percentage**
<u>Nuclear power</u>: 100 % in Finland, 90 % in Sweden
<u>Wind power:</u> 6 % in Finland, 9 % in Sweden,
15 % in Norway and 3% Lithuania,
0% Estonia and Poland, 1% in Germany
<u>Hydro power</u>: 50% in Lithuania, 80% Germany,
85% Norway
<u>ROR</u>: 28% Germany
<u>Other RES:</u> 50% Germany

Trial operation between December 2020 and March 2021

Country Comments

Finland

- Finland is strongly dependent of electricity import during peak hours. Compared to the previous winter, there have been decrease in generating capacity and expected demand. Some highlights: There has been changes in the amount of strategic reserves including mothballing or decommissioning of some power plants that were previously in the reserve. In demand side Kaipola paper mill will be closing mid December and industrial demand has decreased 10% since April 2020. The 4 300 MW deficit is expected to be met with import from neighboring areas. However, in case of a major power plant or interconnection failure in cold period, there is a risk for power shortage. The import capacity on interconnections, 5 100 MW, is sufficient to meet the deficit.
- During the winter period of 2020/2021, there is 611 MW strategic reserve available, in addition to the figures presented on the previous slide.

Norway

- The power balance in Norway is expected to be positive during peak hours, with export to Denmark, Sweden, and the Netherlands. The exchange between Southern Norway and Sweden is expected to be around zero on a cold winter day.
- NordLink, the new cable between Norway and Germany, is expected to be put into operation in December 2020. Exchange in peak hours will depend on wind power generation in Germany. If this is low, Norway may export to Germany as well

Sweden

- During peak hours at severe conditions, the power balance in Sweden is expected to be negative and import is expected to play a role in maintaining adequacy.
- The Swedish power balance is approximately 900 MW weaker during severe conditions than previous winter, mainly due to shutdown of Ringhals 1 (880 MW).

Denmark

- Energinet expects a stable winter. The power situation seems fine and expected power plant outages are at a minimum. The same is true for the restriction on the connections to Germany and Sweden/Norway. The connection to the Netherlands is currently out of operation due to a cable failure.
- The COVID-19 pandemic does not affect the power situation and does not give any restriction on power plants. The staff in the control centre are at a minimum, but still running the system securely.

Country Comments

Estonia

- We don’t expect to get any support from renewable sources like solar and wind for covering the peak demand. Most likely the peak demand will occur at the end of January and during the evening peak, while the solar power output is negligible. Due to the small geographical area where wind farms are located in Estonia we also find that giving the wind power a fixed generation capacity of X%, as it is done in neighboring countries would not be realistic.
- In the available capacity, there are 3 power plants, with a total capacity of 420 MW, that are currently mothballed but are still expected to be turned on during an extreme event. In a colder than usual winter these plants would be able to compete in the market. We do not expect to be in power deficit in the upcoming winter and more likely will export to Finland during peak hours.

Latvia

- No expectations of load reduction during coming winter season because the available capacity should be enough to cover peak load.

Lithuania

- During the winter peak period, in case of low RES generation, local generating capacity could be insufficient to ensure the adequacy. Lithuania will be dependent on import. However, the available interconnection capacity can ensure the import of deficient capacity, if generation capacity is sufficient behind the interconnectors.

Germany

- In cases of high excess generation, specific laws and regulations allow the German TSOs to reduce the RES feed–in in order to mitigate any negative effects on the network. Therefore, no critical situations are expected
    - In situations of high RES feed–in in the north and high demand in the south of Germany, the necessity of remedial actions to maintain (n–1)–security on internal lines and on interconnectors is expected
    - The interconnectors are expected to play an important role for the export of excess generation during demand minimum periods.
- In cases of generation scarcity the 'strategic reserve' for Germany can be activated. It contains lignite units in stand–by (2.4 GW), Grid reserve (6,6 GW), Out of the market Demand Side Response (1,5 GW) and Capacity reserve (1,1 GW).

Poland

- In this analysis the FOR and the maintenance profile were not taken into account. Despite such a high surplus of generation over the demand, in extreme situations (e.g. lack of wind, failures of thermal generating units) there may be a problem in covering the demand.

Overall assessment

The Baltic Sea area especially Nordic power balance is highly dependent on the availability of transfer capacity between the countries, import from other synchronous areas and high availability of nuclear power plants.

Available capacity on interconnectors into the Baltic Sea area system cannot simply be added to the power balance, due to internal congestions in the Nordic AC grid and the power balance in the Continental power system.

TSO-s have operational reserves that can be procured to try to avoid load curtailment. In the case of the need for load curtailment, the energy not served will be limited to hour(s) of high demand during the cold day(s).

Comments and assumptions

The estimated peak demand for each country is momentary and the likelihood of demand peaks falling on the same hour is extremely small

Assumed wind power production will be very low compared to installed capacity, but naturally the uncertainty is high during a peak load situation.

During high-price periods, the price elasticity of consumption might reduce the peak demand compared to the presented values. This will improve the power balance.

Additional Comments and Future Development

- The next publication (Winter Power Balance of 2021/2022) will have an additional figure of an average winter peak demand included in this report to get a broader view of the Baltic Sea winter power balance.
  - ➢ Methodology for assessing an average winter is being developed.

- For probabilistic analysis please see: Winter Outlook 2020-2021 by ENTSOE