

3. MAIN CHALLENGES ON WHOLESALE AND TRANSMISSION DEVELOPMENTS IN THE NORDICS, INCLUDING CROSS-ZONAL CAPACITIES, FOLLOWED BY Q&A

The Nordic TSOs

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AGENDA

0. Introduction and overview of activities

1. Transmission Capacities

1.1 Flowbased

1.2 70% rule

1.3 Countertrade needs driven by the 70%

1.4 ACER's proposal to extend the 70% rule to the IntraDay Market

1.5 Quarterly Capacity Report

1.6 SE3 restrictions, status and mitigations

2. Q&A



BUSY TIMES IN THE NORDIC MARKET DEVELOPMENT...

NBM – Nordic Balancing Model
Nordic Common Grid Model
Flowbased Capacity Calculation
Transparency (NUCS development)
15 min Market Time Unit
Intraday Auctions
More Nordic NEMOs

...today the
focus is on cross
zonal capacities

FLOWBASED STATUS:

- The flow-based implementation and the start of the External Parallel Run face some delays
- It is not possible, at this moment, to provide a specific timeline of the external parallel run, due to missing vital DC network components in the grid models, and the need to ensure data quality.

NEXT STEPS:

- Update on the general progress will be provided in December 2021
- It is the intention to share the first market report (focusing on the market impact and the comparison with the current NTC system) in the next weeks

STAKEHOLDERS:

- The internal parallel run is ongoing, and FB parameters can be found at the JAO website: <https://test-publicationtool.jao.eu/nordic/>
- Stakeholders stay tuned to the developments by means of monthly newsletters and stakeholder meetings, see also: <https://nordic-rsc.net/flow-based/>

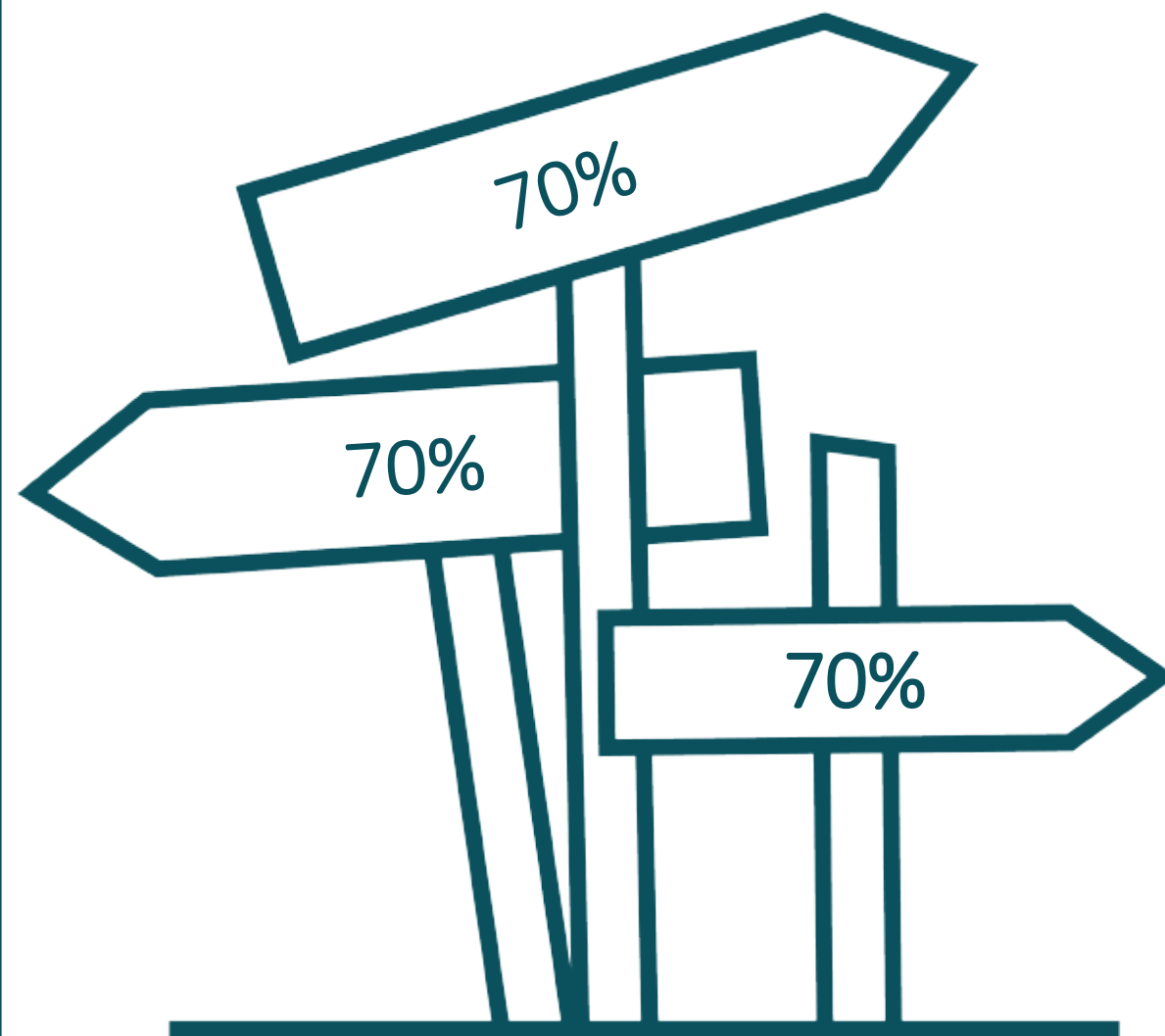
70% RULE

- As a result of the revised electricity market regulation art. 16(8), a minimum 70 % target for capacity available for cross-zonal trading was made applicable for all member states.
- The exact content of the 70% rule is uncertain – the text is not clear.
- The 70% requirement has mainly been expected to be fulfilled in the day-ahead market (TSO interpretation and ACER monitoring).

...the true implications of the 70% rule has not materialized across Europe as many Member States through Action Plans and derogations have not in practice have had to live up to the requirements.

COUNTERTRADE NEEDS DRIVEN BY THE 70% RULE

- Today the TSOs in many cases meets the 70 % rule by offering "virtual capacity" in the day-ahead market.
- If virtual capacity is offered this need to be reversed afterwards in another market or through costly remedial actions.
- Increased wind and solar and reduced dispatchable generation creates growing need for structural countertrade. This will happen across Europe.



IN THE CACM 2.0
DRAFT ACER
PROPOSES THAT
THE 70% RULE ALSO
SHALL BE
APPLICABLE IN THE
INTRADAY
TIMEFRAME

ACERs proposal creates critical issues for the operational security

- Structural countertrade known well in advance of the operational hour will have to be handled close to the operational hour in the balancing market, if the 70 % rule also applies in ID.
- To handle this in balancing is not sustainable.
- ACER proposal creates conflicting requirements in terms of SOGL, where TSOs are obligated to maintain operational security.

1.4 Quaterly capacity report Q3 2021

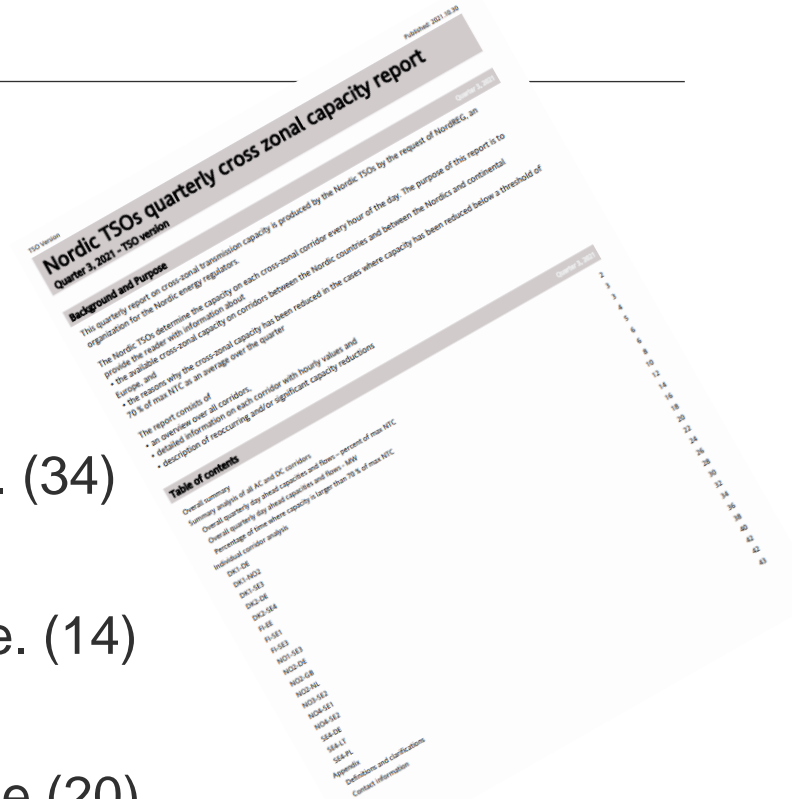
Some highlights



Summery

- > For all corridors, 76% of max NTC as a weighted average. (34)
- > For AC corridors, 75% of max NTC as a weighted average. (14)
- > For DC corridors, 76% of max NTC as a weighted average (20)
- > Corridors under 70%, (17).

The corridor(s) with the lowest average available capacity compared to Max NTC was FI-SE3, with 13%.



XB capacities in %, Q2-Q3 typical outage period

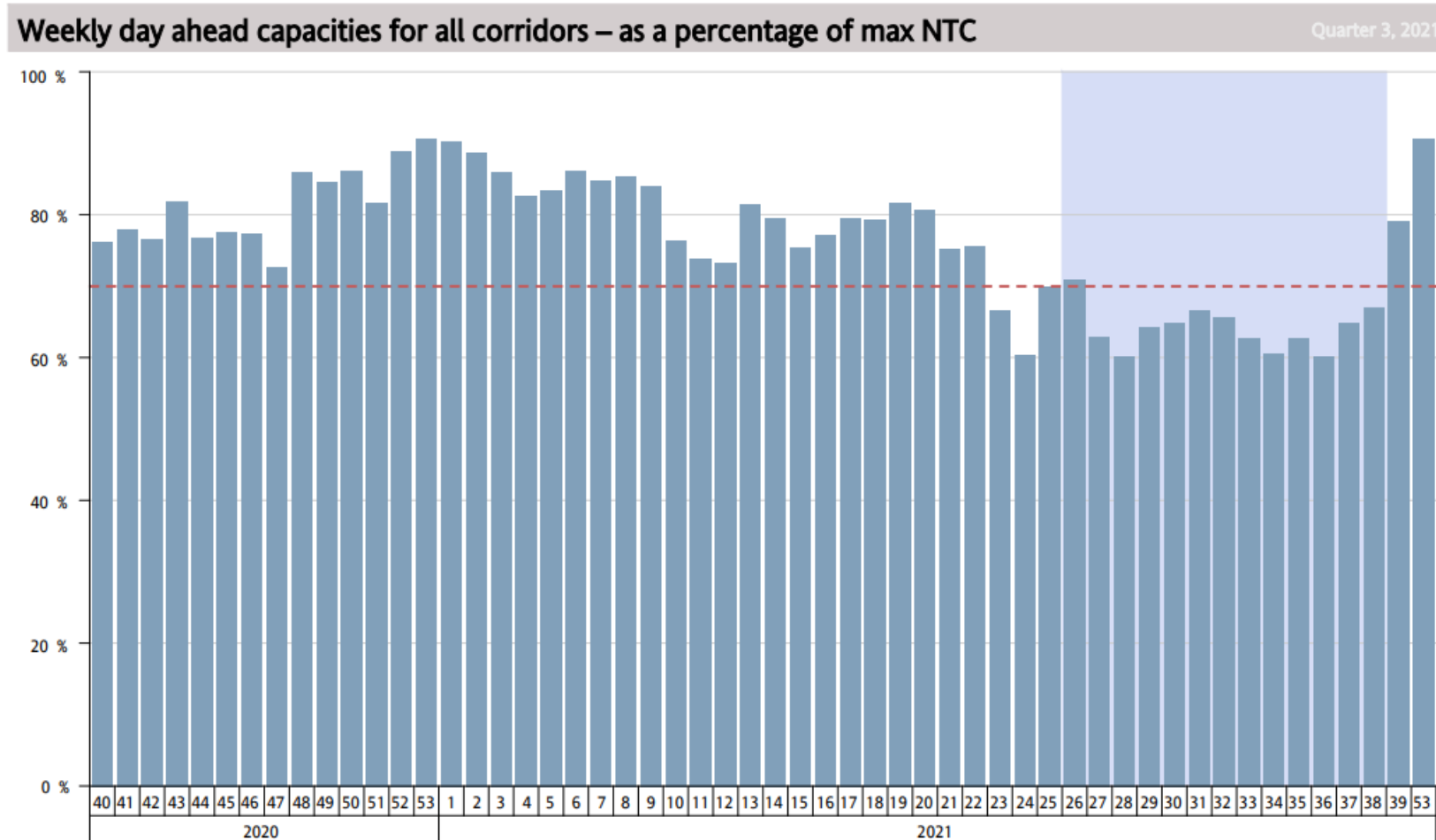


Figure 1: Cross-zonal day-ahead capacity result for all corridors, showing average weekly capacity given as a percentage of max NTC. The capacity is summed independent of direction.

Overall quarterly day ahead capacities and flows – percent of max NTC - AC

Quarter 3, 2021

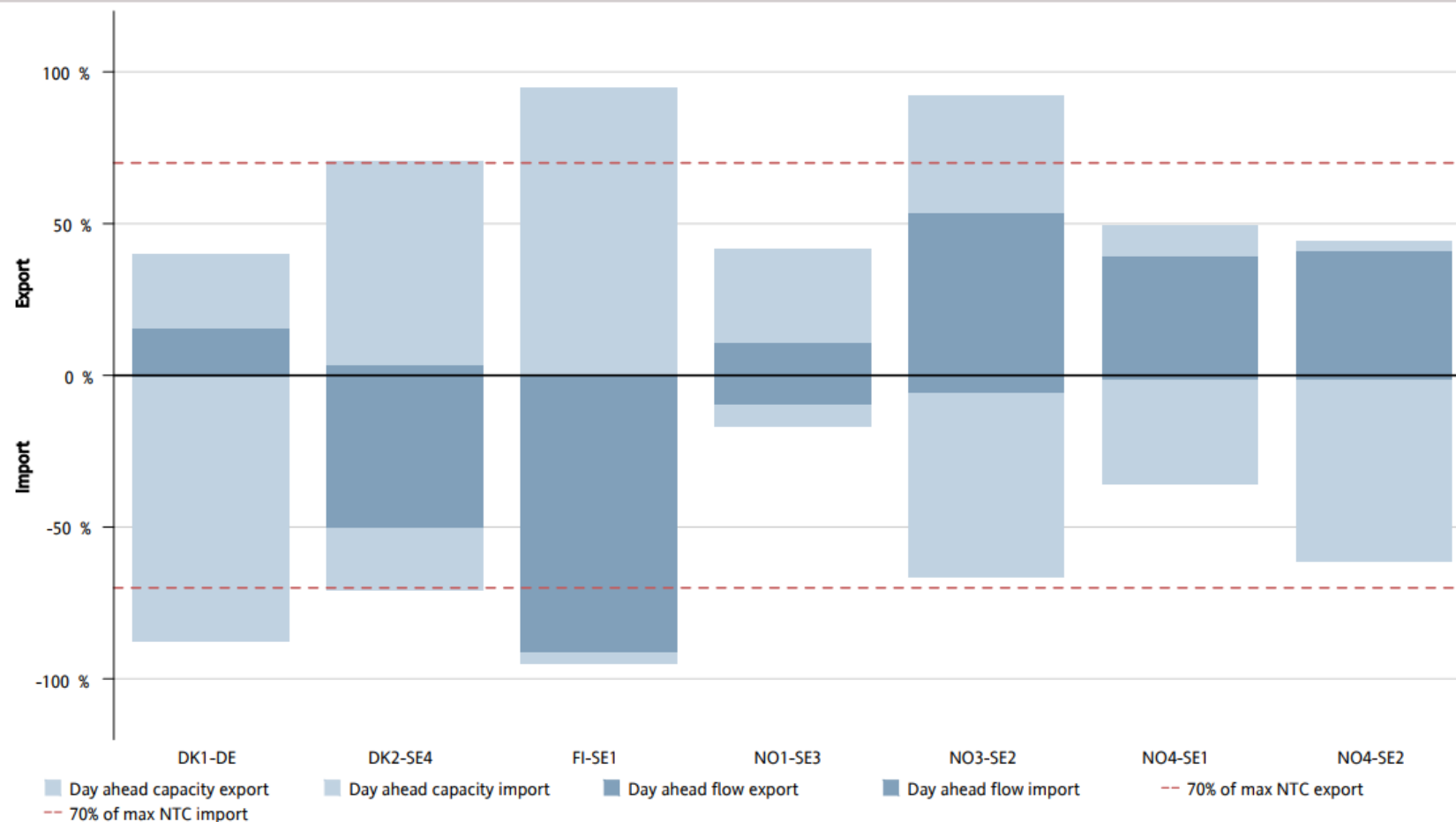


Figure 2: Cross-zonal day-ahead capacity result for AC corridors, showing average capacity given and flow as a percentage of max NTC. Available capacity is given for all hours, but the average flow is only given for hours with flow in that direction. For a corridor A-B, export means flow from A to B and import means flow from B to A.

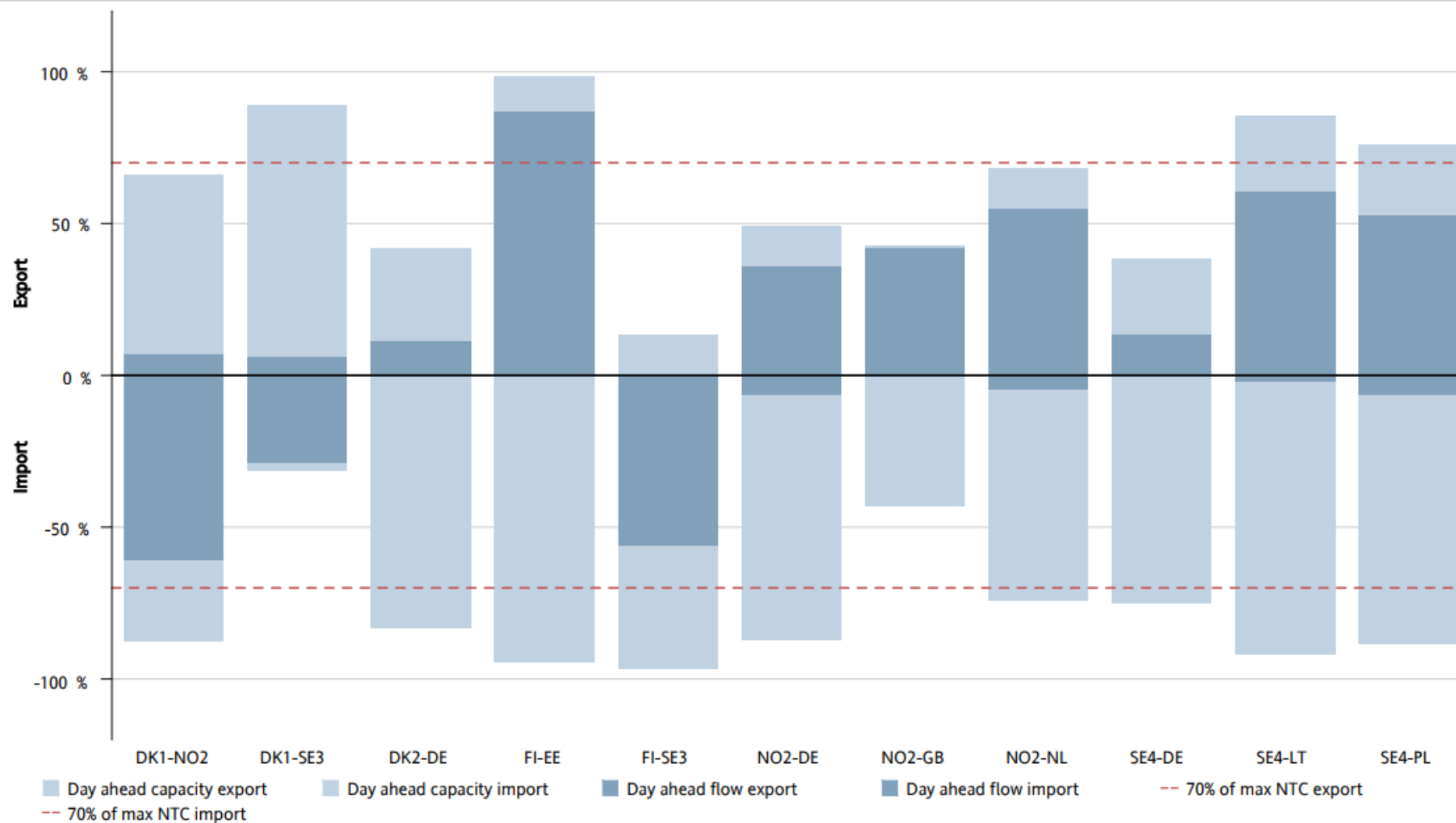



Figure 3: Cross-zonal day-ahead capacity result for DC corridors, showing average capacity given and flow as a percentage of max NTC. Available capacity is given for all hours, but the average flow is only given for hours with flow in that direction. For a corridor A-B, export means flow from A to B and import means flow from B to A.



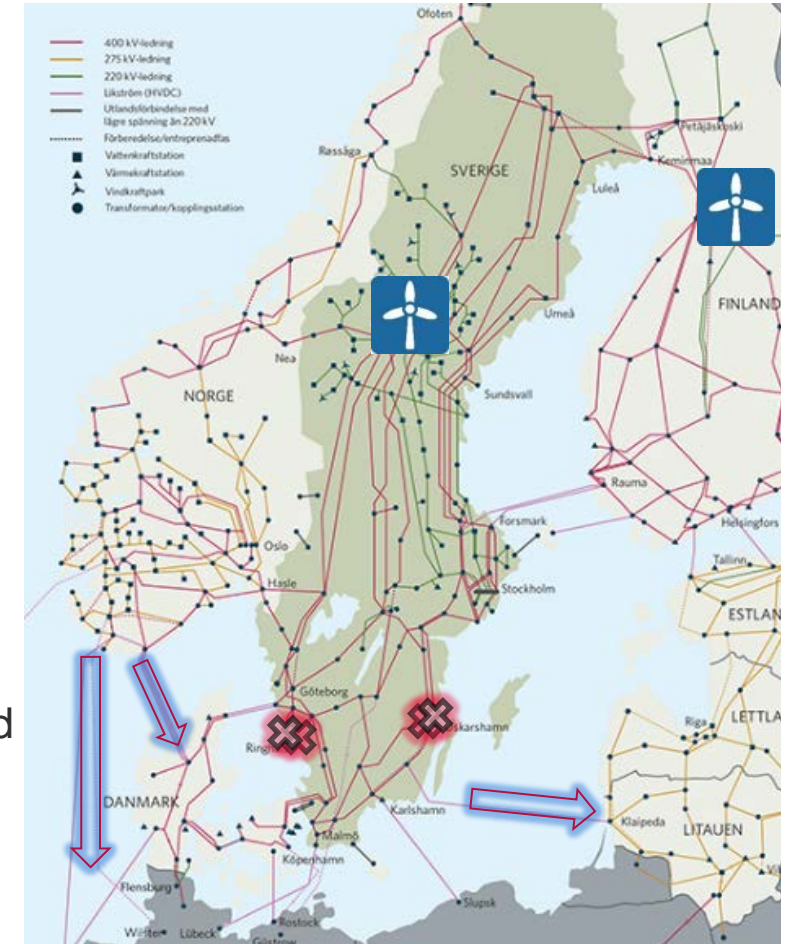
1.5 New flows in SE3, transit flow east-west, status and mitigations



**SVENSKA
KRAFTNÄT**

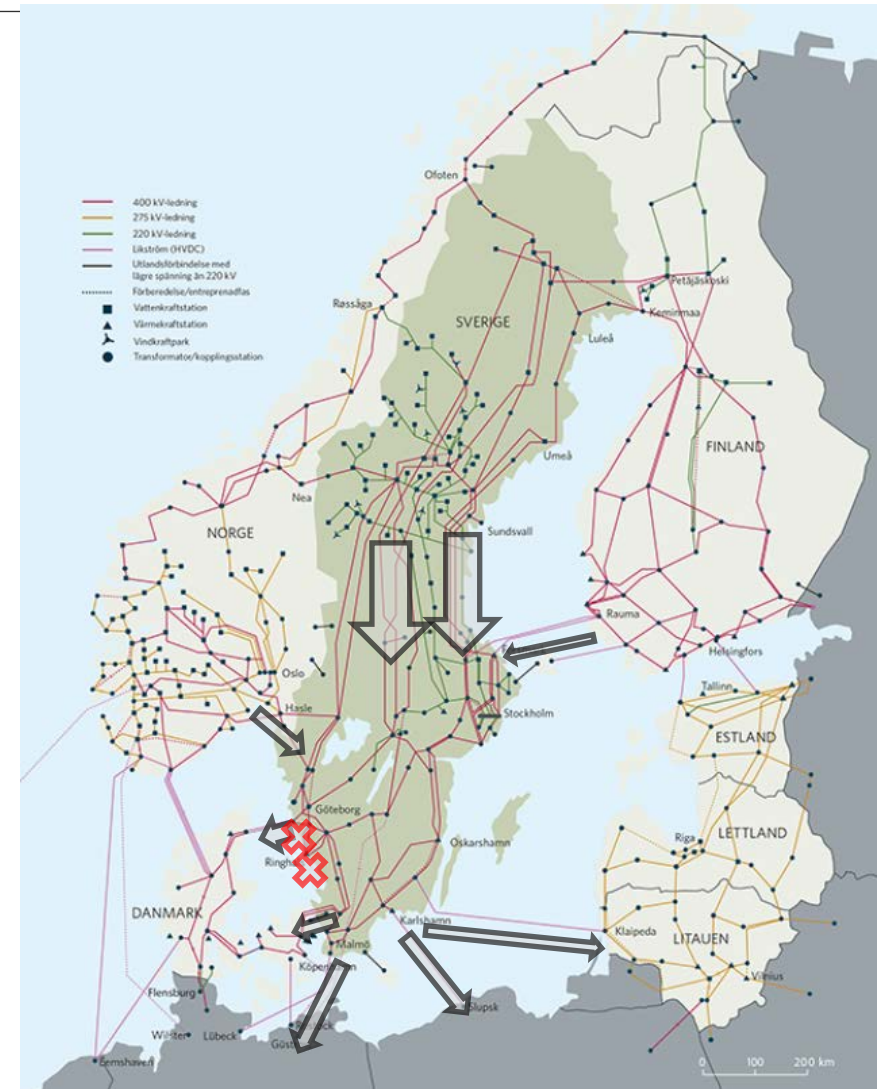
Changes in the transmission system

- > The power system is undergoing major changes:
 - > Changes in the production mix
 - > New trade relations (Norway and Denmark)
- > Network, designed for transmission north to south requires updating
 - > Changes are planned and investments are ongoing
 - > It takes longer time to build lines than the change in production
 - > Some network investments are done, some close to be done and some as long term to find the right end solution



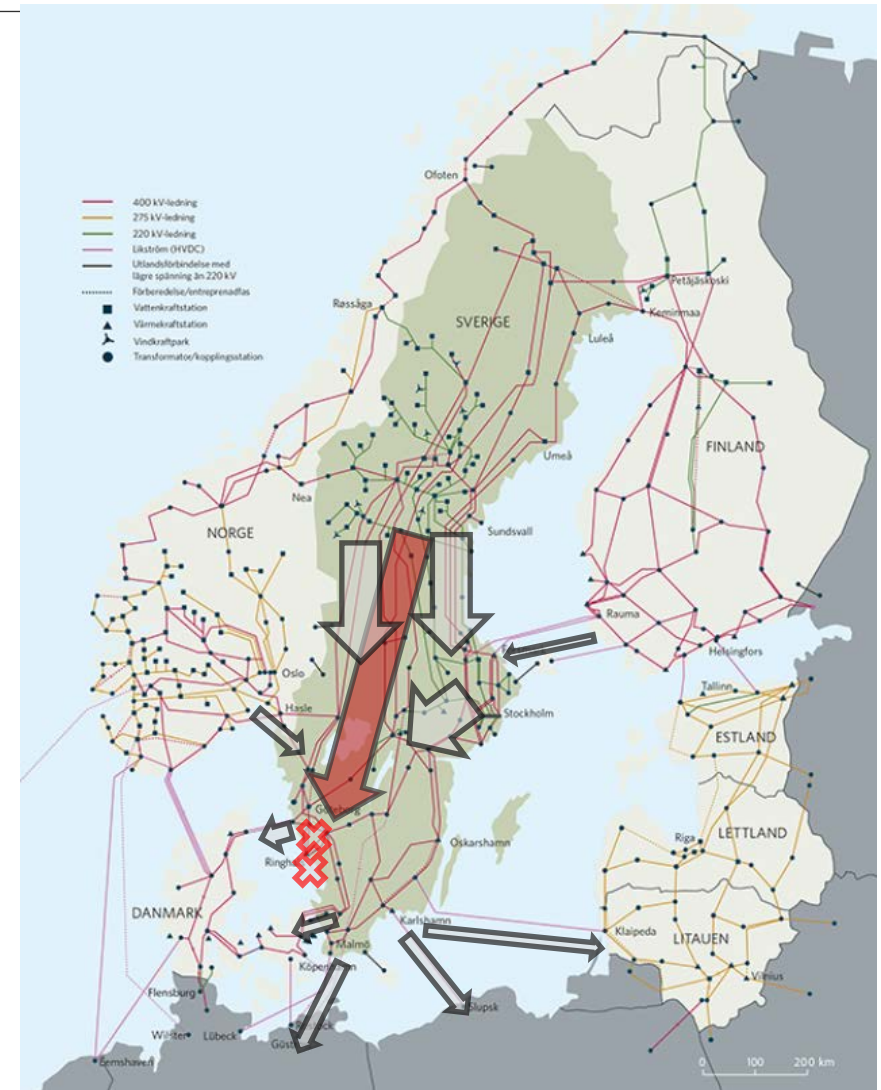
How do the flows change and why?

- > **Production changes → increased net demand SE3&4**



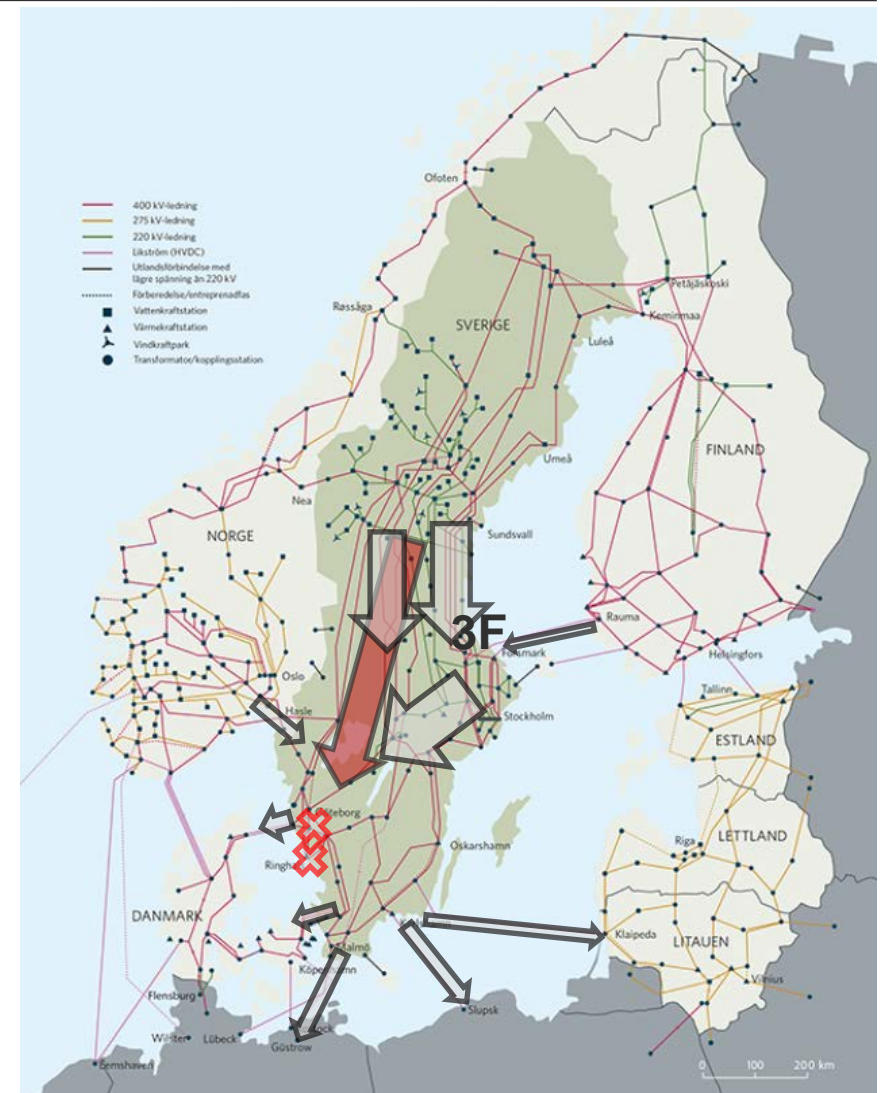
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- > The distribution on the flows shifts and causes higher flows in the southwest



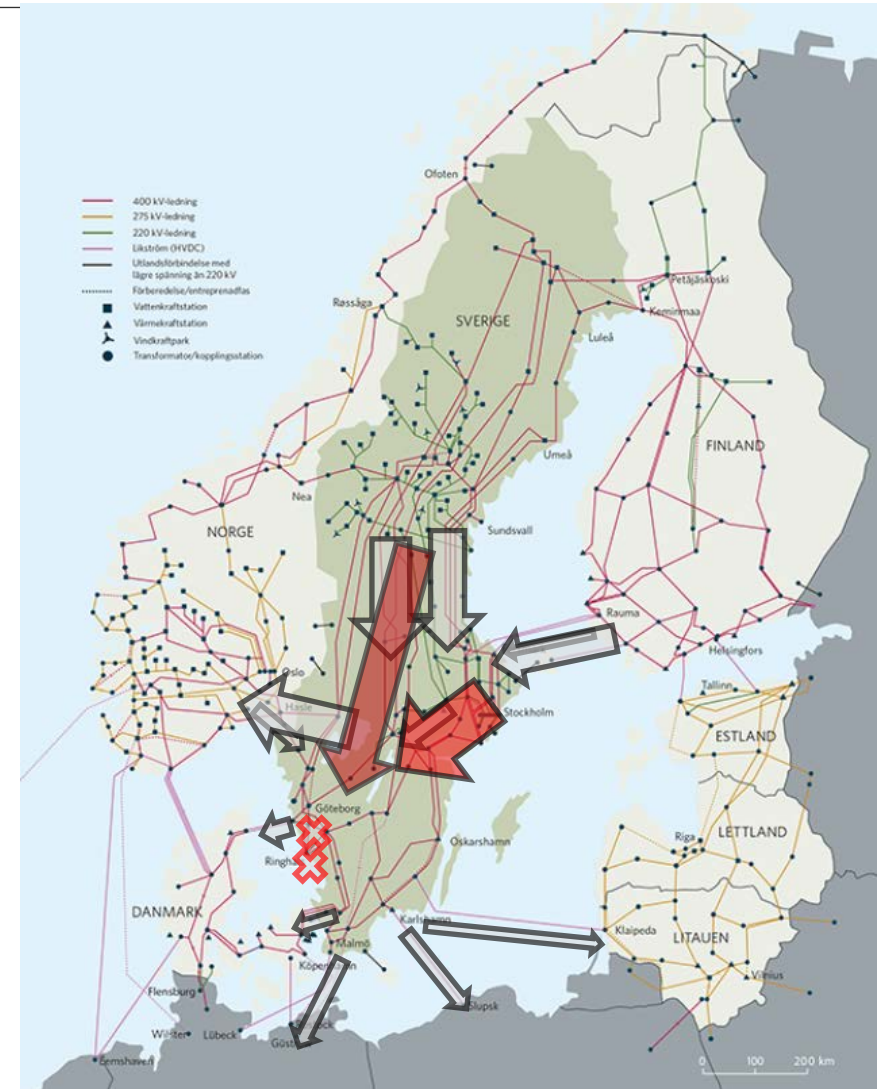
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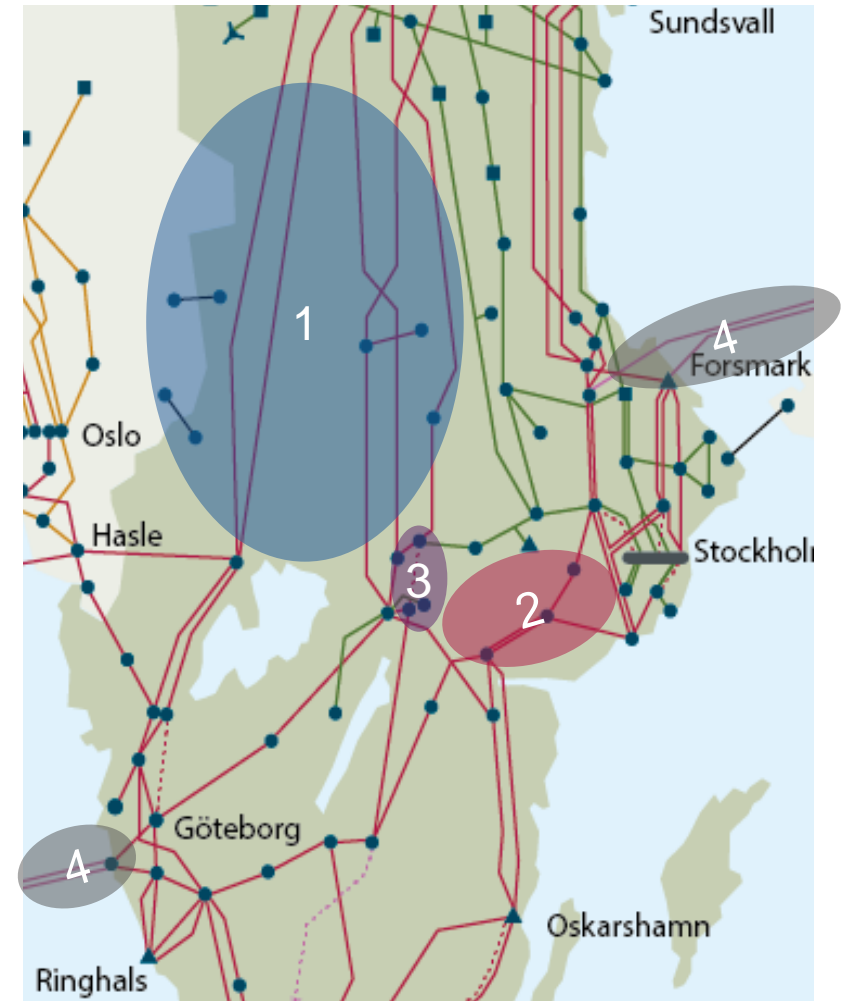
- > **Production changes → increased net demand SE3&4**
- > The distribution on the flows shifts and causes higher flows in the southwest
- > Change in import / export flows
- > The outcome of all trade combinations are not possible any more.



Measures to mitigate the impact on capacities from East-West flows – Short term

1. Serial capacitors - upgrade and redistribution to manage East-West flows
2. Voltage control – installation of static and dynamic equipment
Disconnectors and breakers – upgrade, sept 2021
3. New 400 kV line, stepwise 2022-
4. EPC – develop and establish 2022

Predicted capacity increase of 800 MW when all measures are in place



Measures to mitigate the impact on capacities from East-West flows – Mid term

Establish new market capacity algorithm (FlowBased)



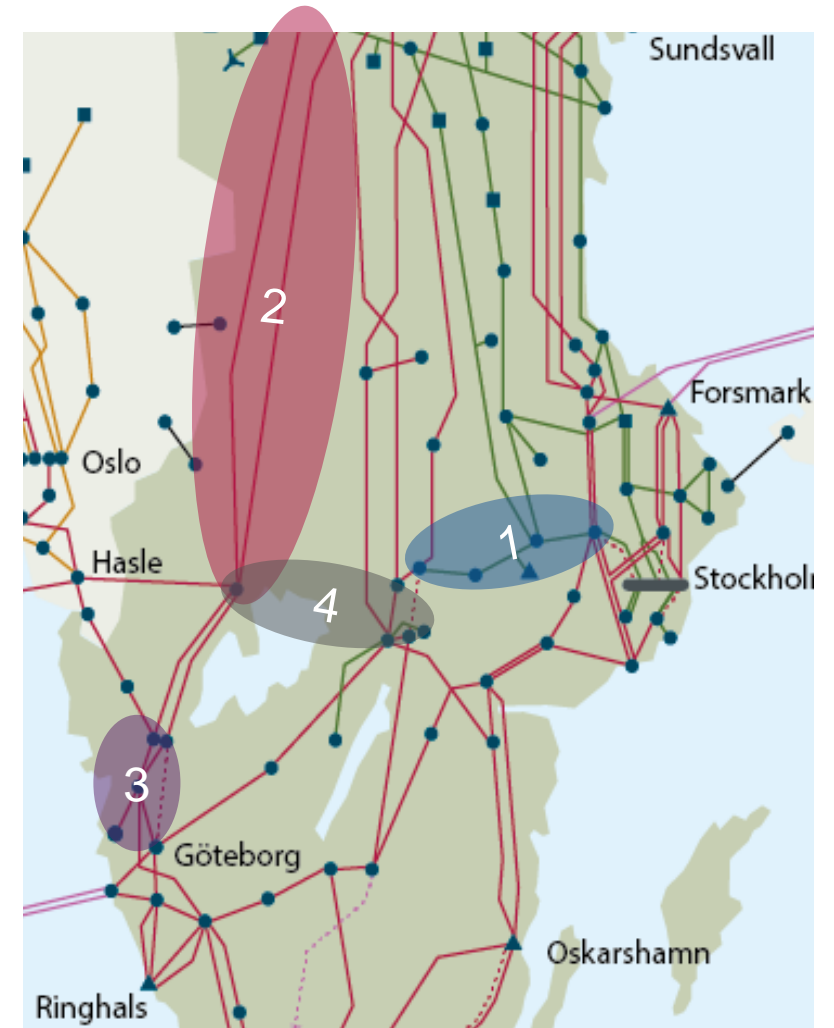
Measures to mitigate the impact on capacities from East-West flows – Long term

Investment projects included in Svk long term plan:

1. 220 kV → 400 kV voltage upgrade, constructions and commissioning in steps 2024-2028
2. Capacity upgrade, 450 km 400 kV line (refurbished 2020) upgrade and refurbishment and upgrade of substations, commissioning planned 2035
3. New 400 kV line and new substation, planned commissioning in 2025

Investigation started:

4. New 400 kV line



Status on associated topics: Unavailability Messages - NUCS

2021

Reason	Duration / Version / RSS Reference ID
Foreseen Maintenance	3 months, 1 day, 7 hours, 59 minutes
The following NTC varies on Day-Ahead and/or XBID as follows: SE2>SE3: 5500-7000* MW; SE3>SE4: 4500-6000* MW, SE3>NO1: 750-1500, SE3>DK1: 360-715 MW, FI>SE3: 400-1000 MW. The capacities depend on the availability of remedial actions, ambient temperatures and expected load flow conditions. *Can be lower in order to ensure sufficient reserves in bidding zones.	1 fmQ7Px_VTVaOVkgULwfDow_001

2022

Remarks
To maintain operational security, NTC for FI>SE3, SE3>NO1 and SE3>DK1 will vary depending on operational conditions and availability of reserves with respect to variations in load, production and grid status. During high east-west flows the NTC's will be in the following intervals (but it can at times be lower): FI>SE3: 600-1200 MW, SE3>NO1: 1000-2095 MW, SE3>DK1: 360-715 MW. This capacity forecast will be updated when new information is available. Svenska kraftnät cannot exclude that future reductions will be required until additional grid investments is complete upwards 2030. Capacities on SE2>SE3 and SE3>SE4 will vary according to this UMM: https://www.nucs.net/outage-domain/unavailability-messages/show?ummid=da8323c342a64ecdb2ed7ab8bfb3832b%7C10X1001A1001A418

More information about allocation of capacity during the webinar 26 November. See homepage. Welcome!
