

Nordic TSOs quarterly cross zonal capacity report

Quarter 3, 2019 - TSO version

Background and Purpose

Quarter 3, 2019

This quarterly report on cross-zonal transmission capacity is produced by the Nordic TSOs by the request of NordREG, an organization for the Nordic energy regulators.

The Nordic TSOs determine the capacity on each cross-zonal corridor every hour of the day. The purpose of this report is to provide the reader with information about

- the available cross-zonal capacity on corridors between the Nordic countries and between the Nordics and continental Europe, and
- the reasons why the cross-zonal capacity has been reduced in the cases where capacity has been reduced below a threshold of 75 % of max NTC as an average over the quarter

The report consists of

- an overview over all corridors,
- detailed information on each corridor with hourly values and
- description of reoccurring and/or significant capacity reductions

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Summary

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For all corridors (34 in total) the available capacity provided by the TSOs was 84% of max NTC as a weighted average, compared to the threshold of 75%.

For AC corridors (14 in total) the available capacity provided by the TSOs was 78% of max NTC as a weighted average, compared to the threshold of 75%.

For DC corridors (20 in total) the available capacity provided by the TSOs was 90% of max NTC as a weighted average, compared to the threshold of 75%.

The number of corridors under 75% was 14. The corridor(s) with the lowest average available capacity compared to Max NTC was NO4-SE2, with 50%.

Weekly day ahead capacities for all corridors – as a percentage of max NTC

Quarter 3, 2019

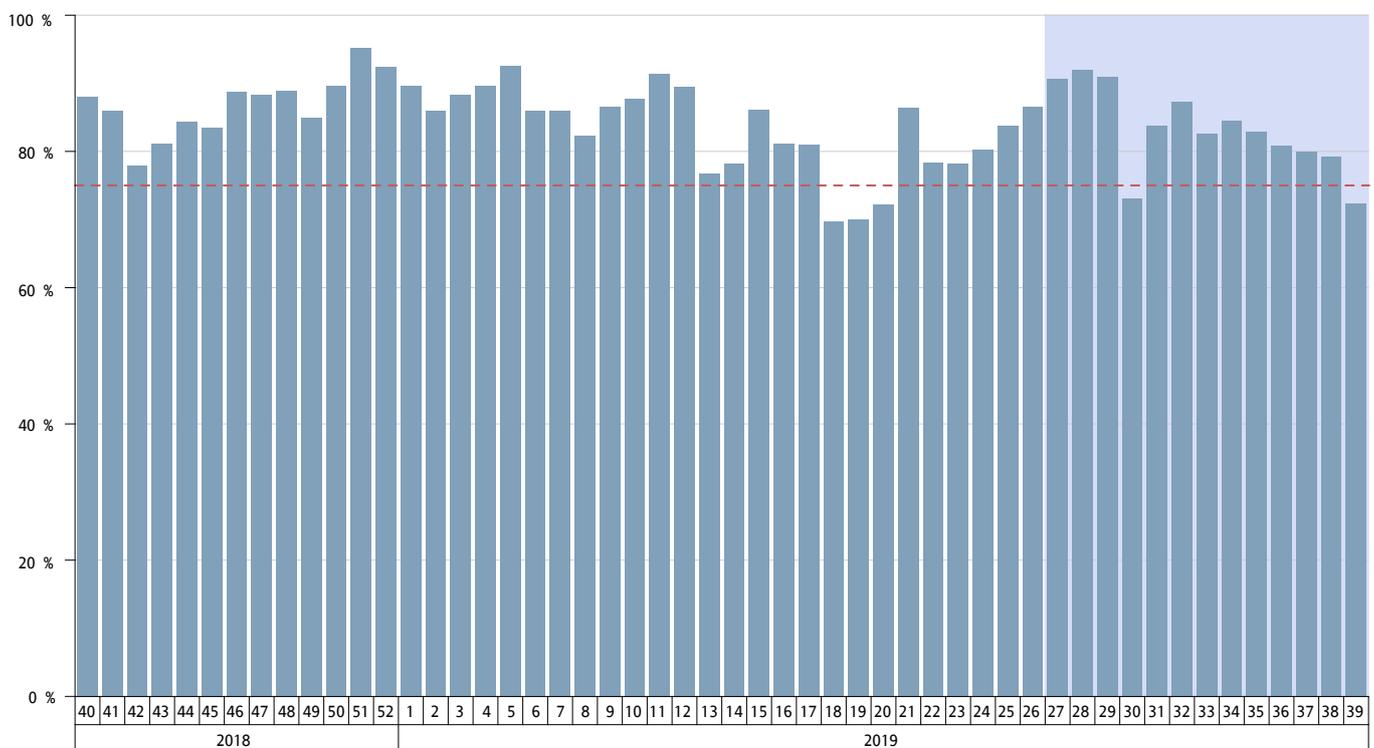


Figure 1: Cross-zonal day-ahead capacity result for all corridors, showing average weekly capacity given as a percentage of max NTC. The capacity is summed independent of direction.

Overall quarterly day ahead capacities and flows – percent of max NTC - AC Quarter 3, 2019

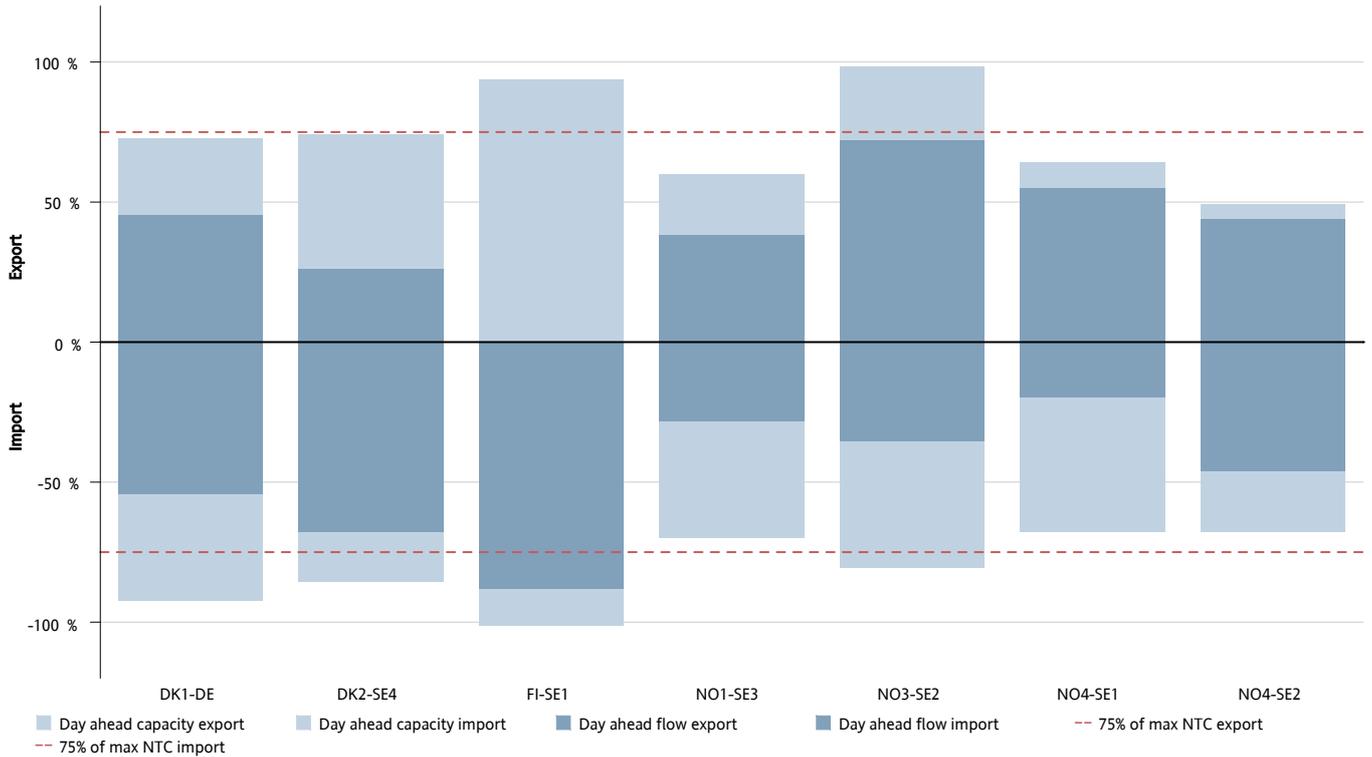


Figure 2: Cross-zonal day-ahead capacity result for AC corridors, showing average capacity given and flow as a percentage of max NTC. Available capacity is given for all hours, but the average flow is only given for hours with flow in that direction. For a corridor A-B, export means flow from A to B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

Overall quarterly day ahead capacities and flows – percent of max NTC - DC Quarter 3, 2019

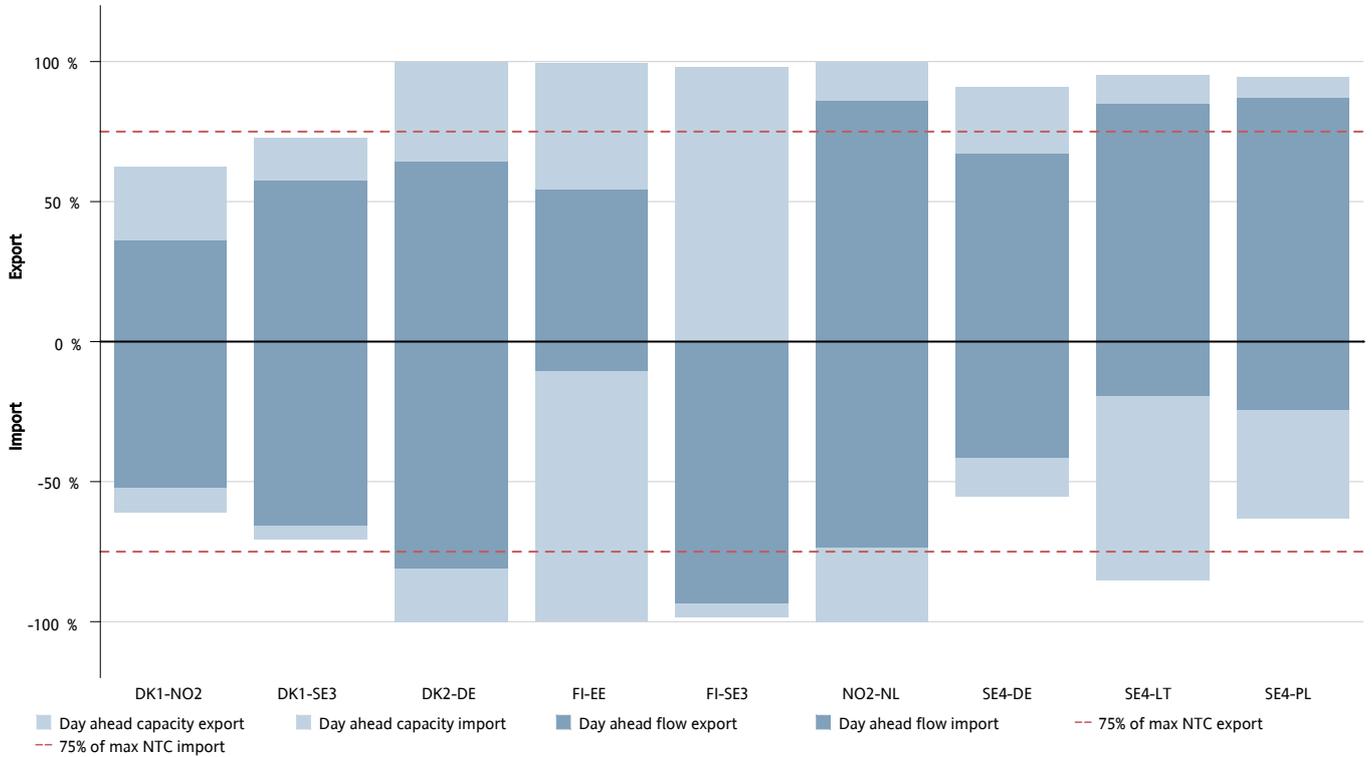


Figure 3: Cross-zonal day-ahead capacity result for DC corridors, showing average capacity given and flow as a percentage of max NTC. Available capacity is given for all hours, but the average flow is only given for hours with flow in that direction. For a corridor A-B, export means flow from A to B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

Overall quarterly day ahead capacities and flows - MW - AC

Quarter 3, 2019

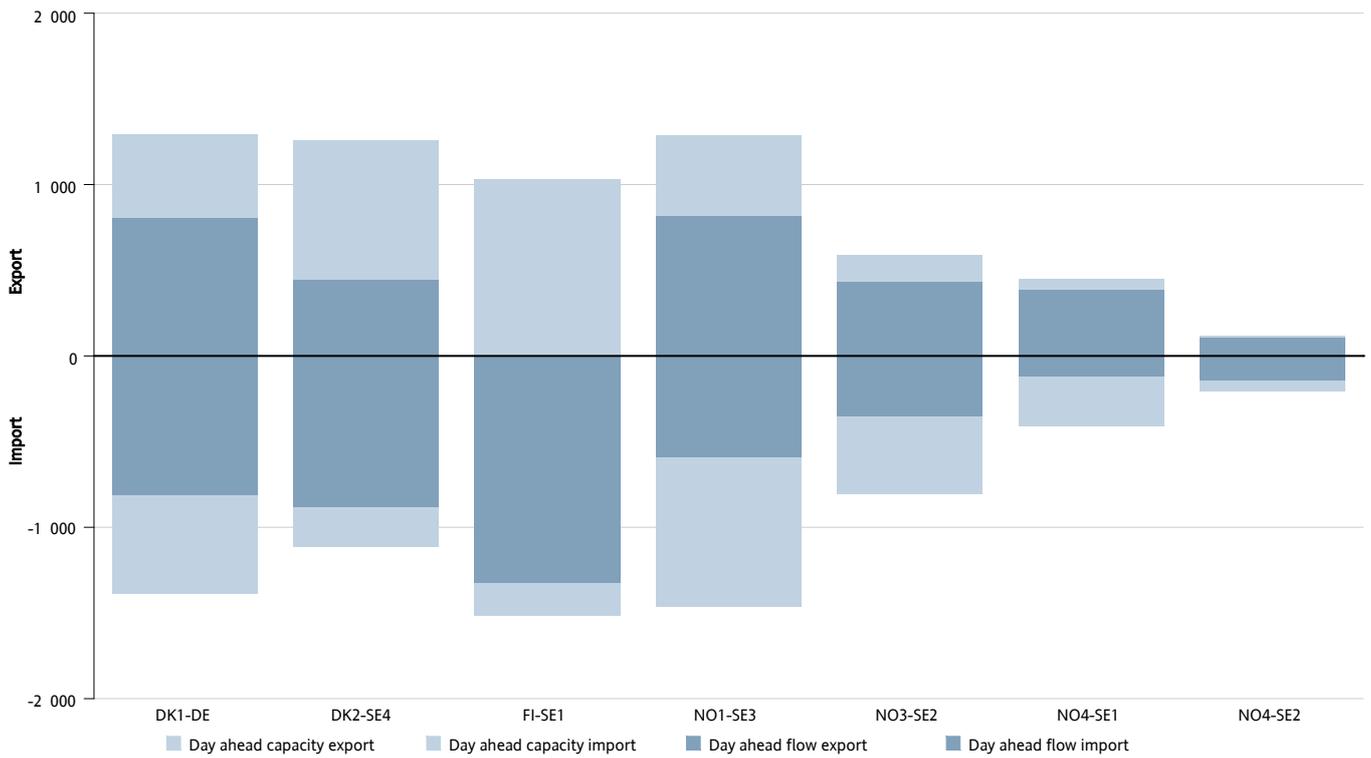


Figure 4: Cross-zonal day-ahead capacity result for AC corridors, showing average capacity given and flow in MW. Available capacity is given for all hours, but the average flow is only given for hours with flow in that direction. For a corridor A-B, export means flow from A to B and import means flow from B to A.

Overall quarterly day ahead capacities and flows - MW - DC

Quarter 3, 2019

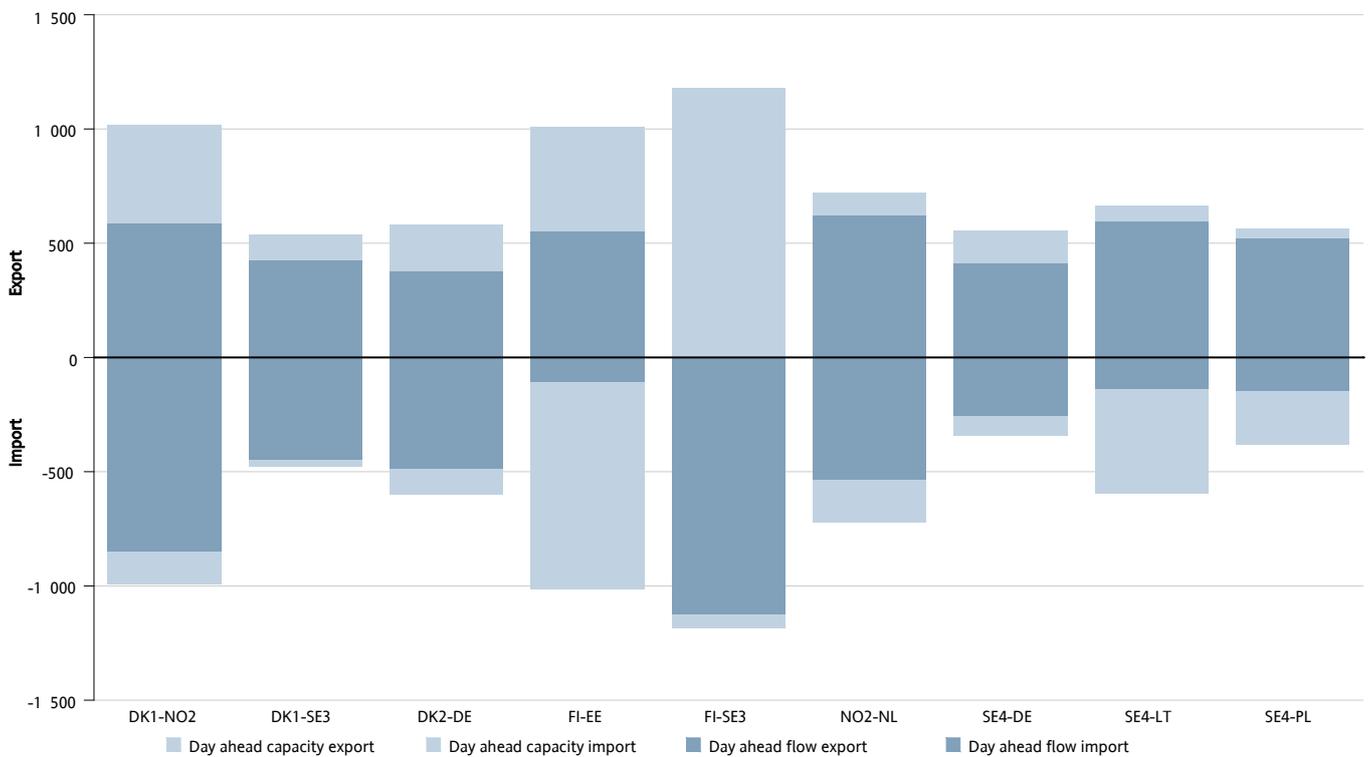


Figure 5: Cross-zonal day-ahead capacity result for DC corridors, showing average capacity given and flow in MW. Available capacity is given for all hours, but the average flow is only given for hours with flow in that direction. For a corridor A-B, export means flow from A to B and import means flow from B to A.

Percentage of time where capacity is larger than 75% of max NTC - AC

Quarter 3, 2019

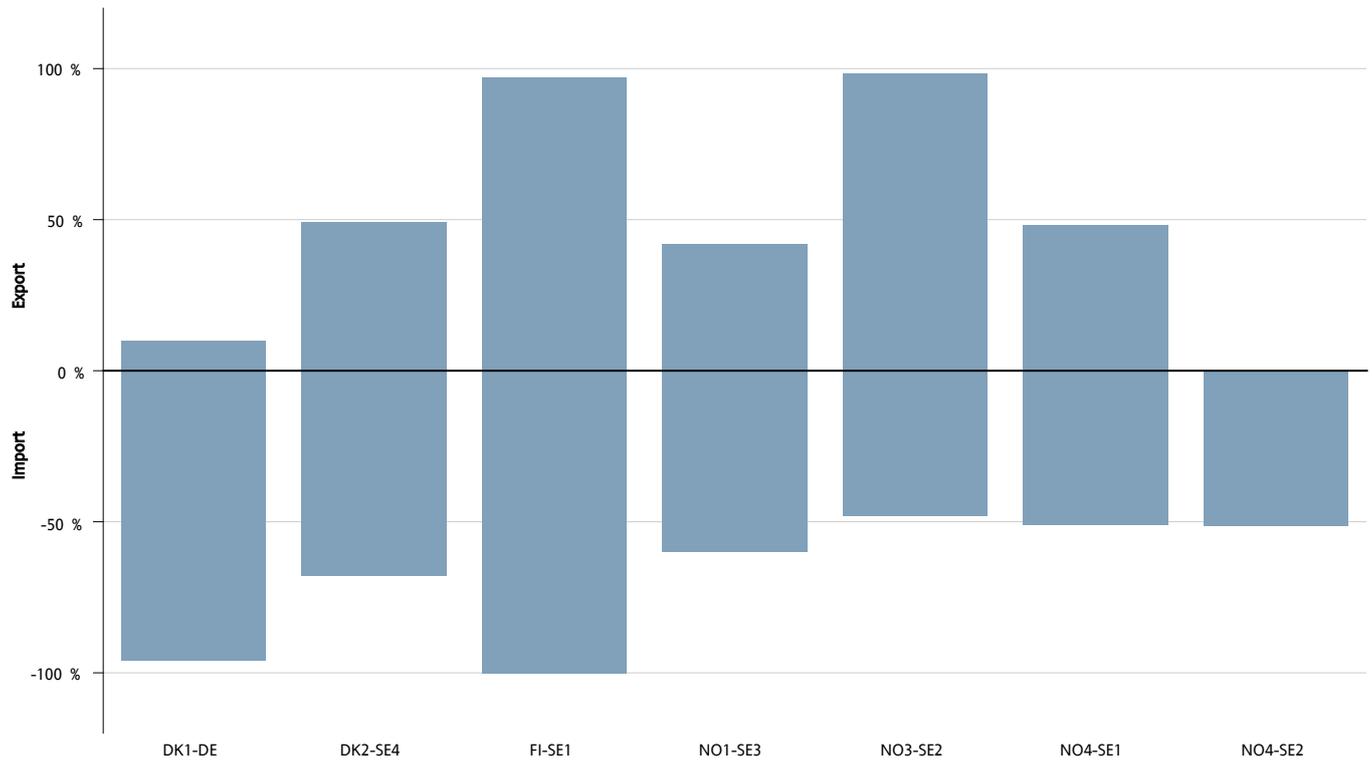


Figure 6: Shows the percentage of hours when the day-ahead capacity for AC corridors given to the energy market is above 75% of the max NTC. For a corridor A-B, export means flow from A to B and import means flow from B to A.

Percentage of time where capacity is larger than 75% of max NTC - DC

Quarter 3, 2019

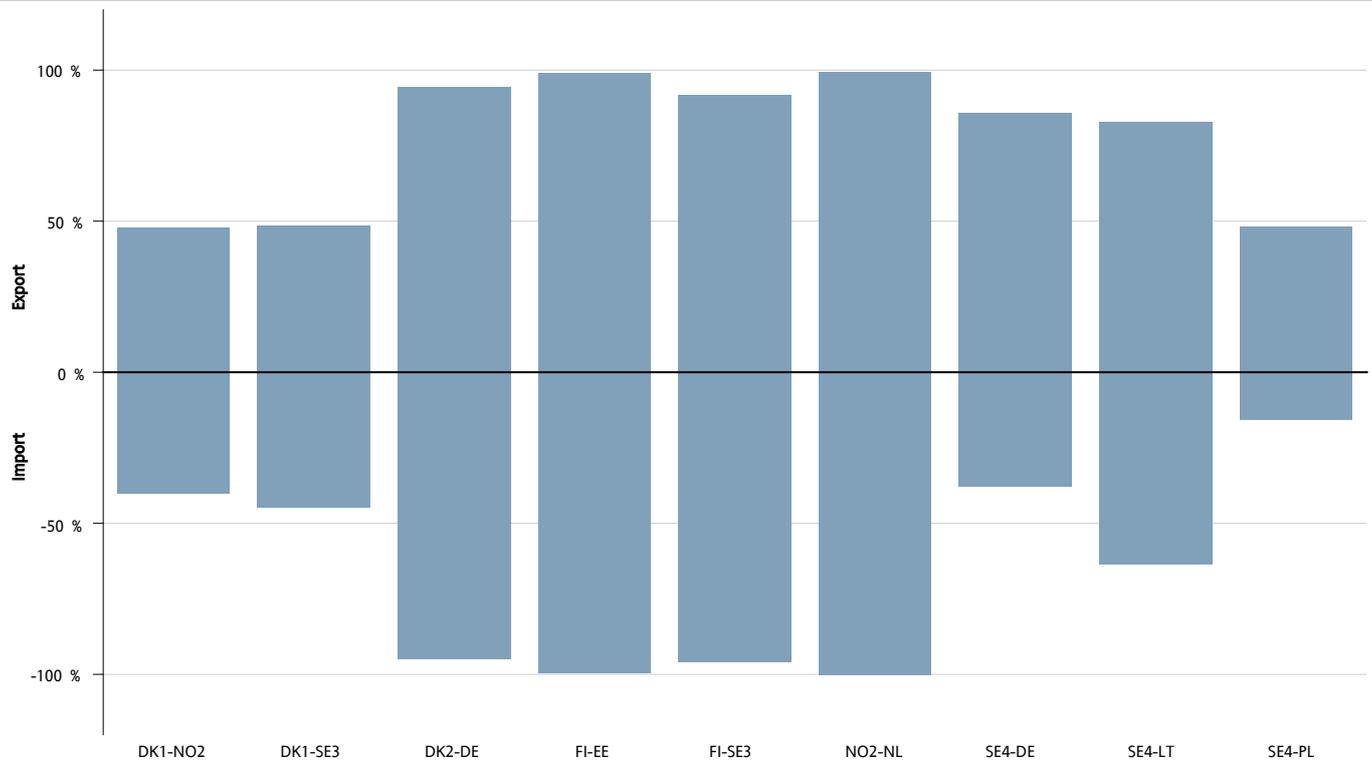


Figure 7: Shows the percentage of hours when the day-ahead capacity for DC corridors given to the energy market is above 75% of the max NTC. For a corridor A-B, export means flow from A to B and import means flow from B to A.

DK1-DE: weekly day ahead capacities and flows – percent of max NTC Quarter 3, 2019

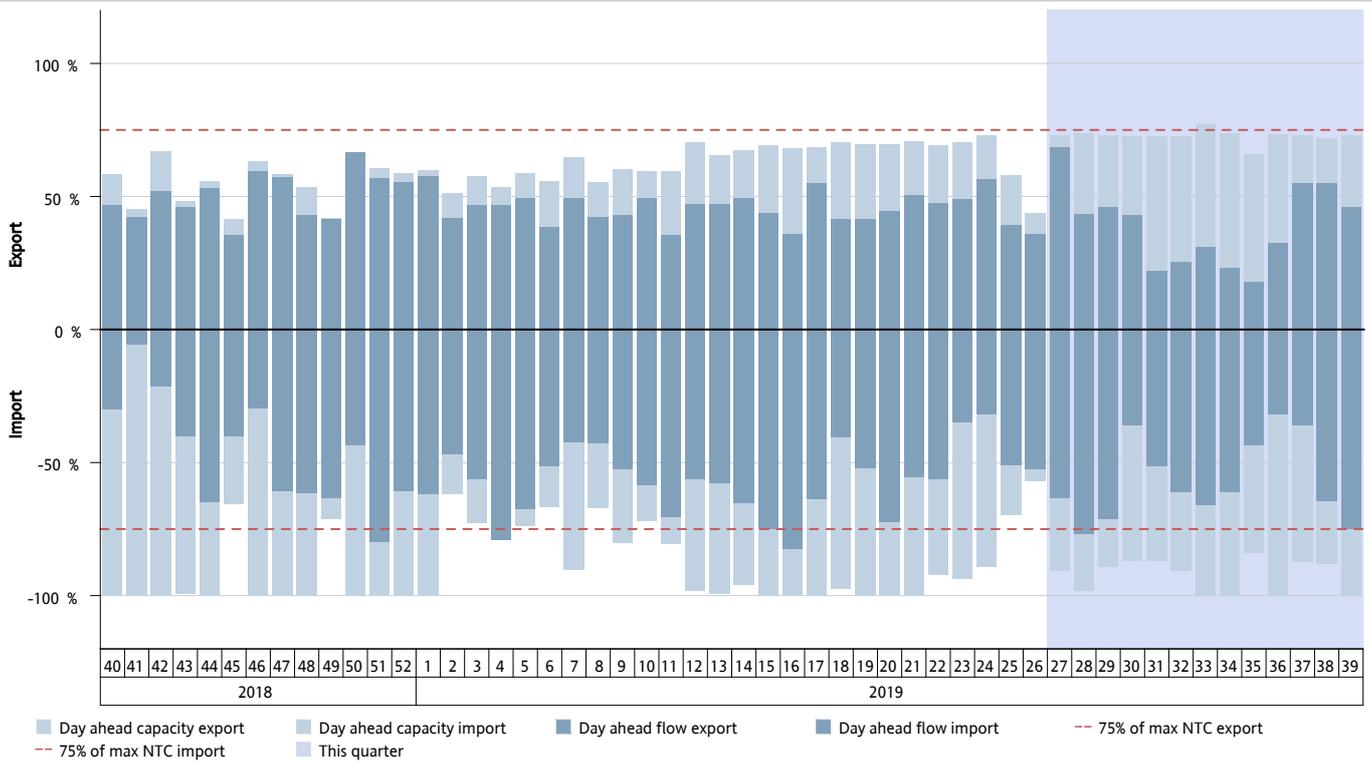


Figure 8: Shows cross-zonal day-ahead capacity result for the AC corridor DK1-DE, showing average weekly capacity given and flow as a percentage of max NTC. Available capacity is given for all hours, but the average flow is only given for hours with flow in that direction. Export indicates flow from DK1 to DE, while import indicates flow from DE to DK1.

DK1-DE: hourly mean day ahead capacities and flows – percent of max NTC Quarter 3, 2019

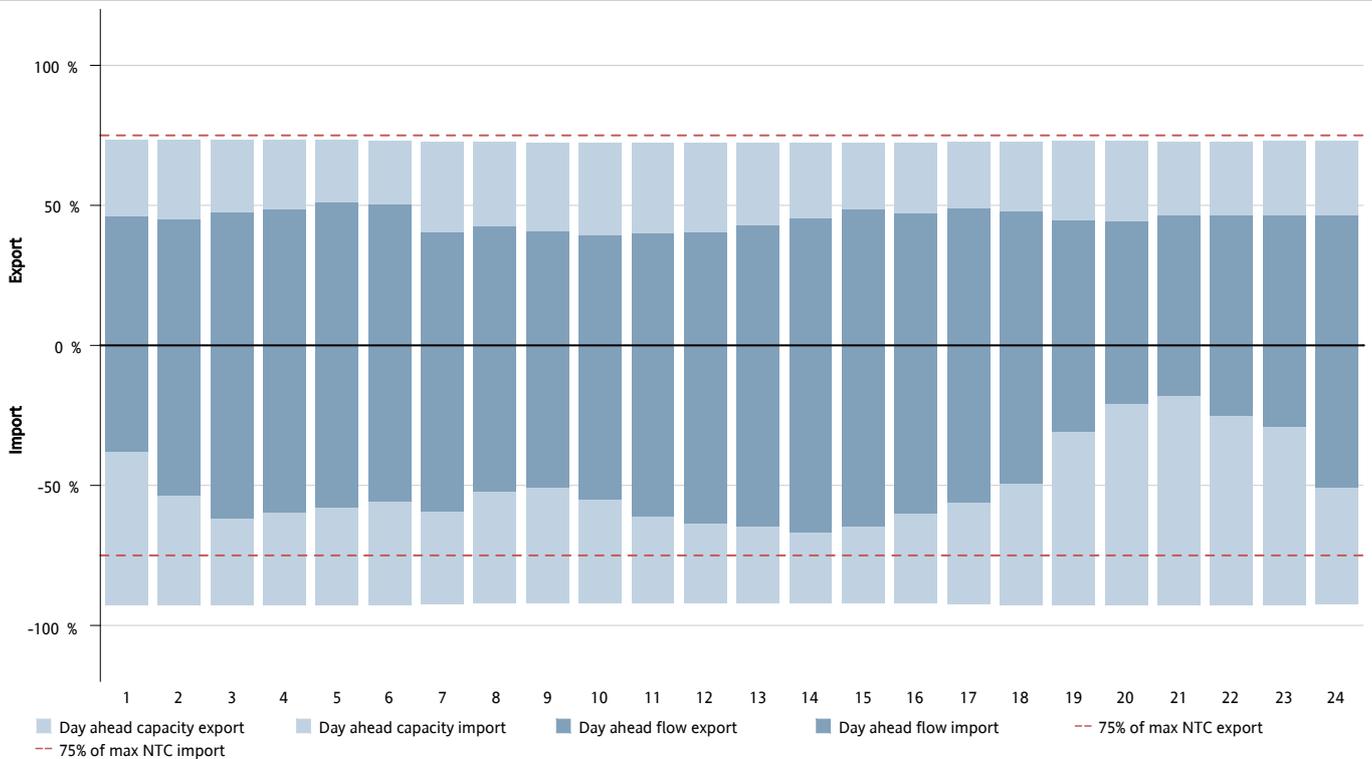


Figure 9: Shows cross-zonal day-ahead capacity result for the AC corridor DK1-DE, showing average per hour of the day (1-24) capacity given and flow as a percentage of max NTC. Available capacity is given for all hours, but the average flow is only given for hours with flow in that direction. Export indicates flow from DK1 to DE, while import indicates flow from DE to DK1.

DK1-DE: hourly day ahead capacities and flows – MW

Quarter 3, 2019

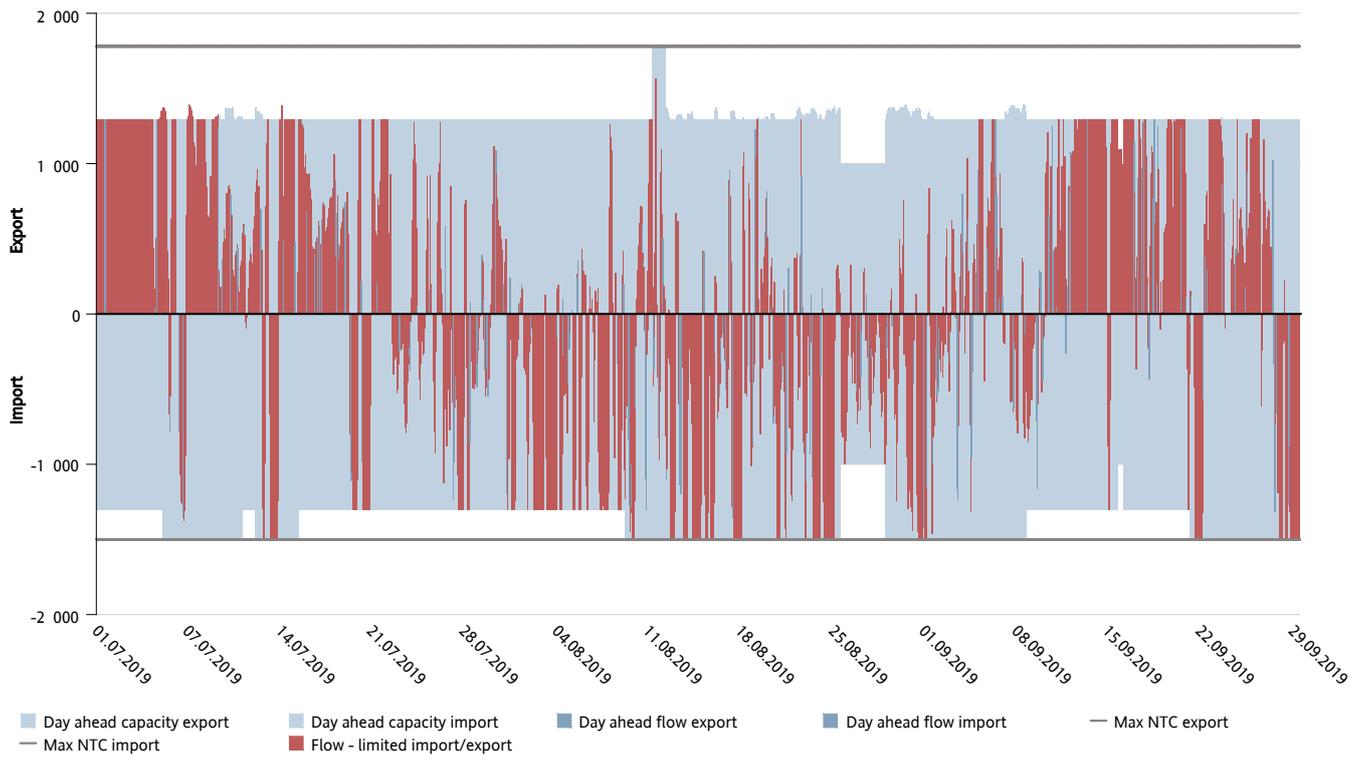


Figure 10: Shows cross-zonal day-ahead capacity result for the AC corridor DK1-DE, showing capacity given and flow (MW). Available capacity is given for all hours, but the average flow is only given for hours with flow in that direction. Export indicates flow from DK1 to DE, while import indicates flow from DE to DK1.

DK1-DE: price comparison in EUR

Quarter 3, 2019

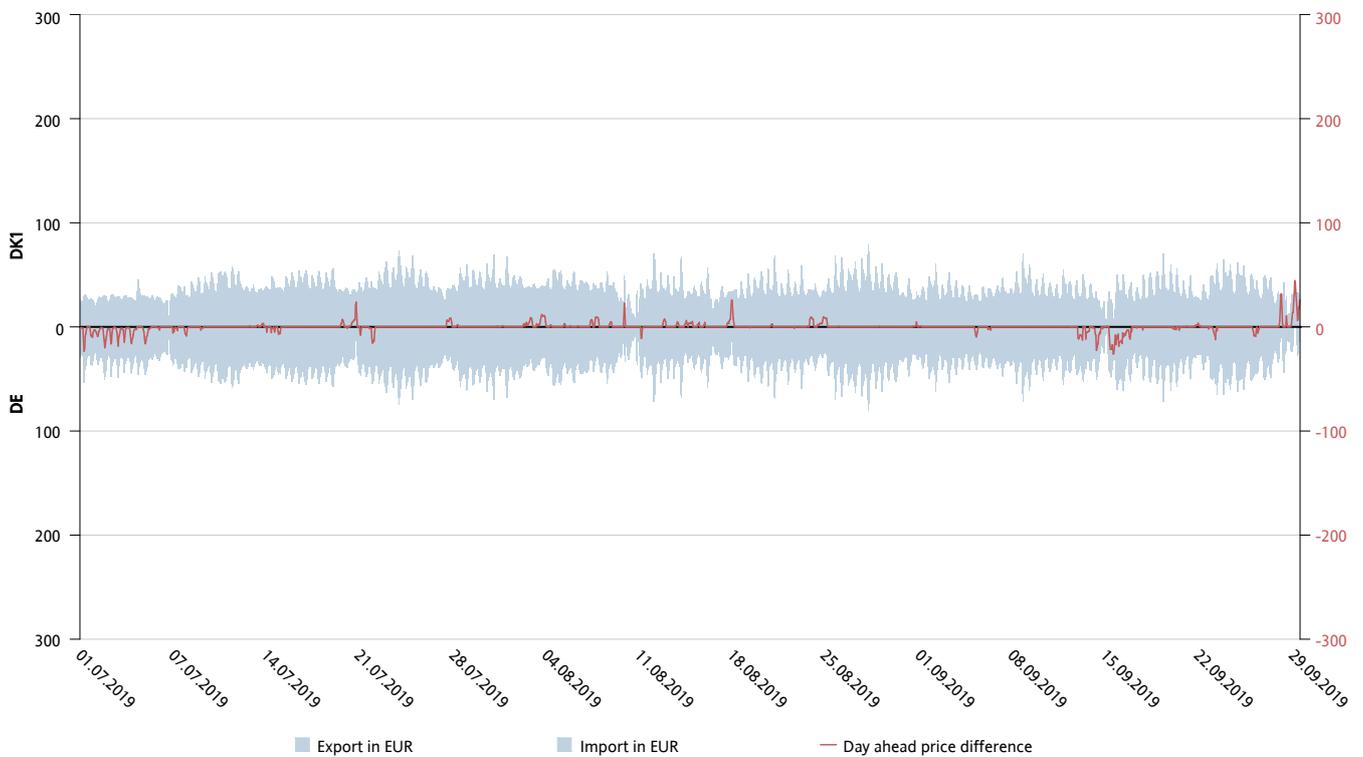


Figure 11: Shows day-ahead prices for the AC corridor DK1-DE, all prices are in EUR. The red line shows the price difference between the two areas.

DK1-NO2: weekly day ahead capacities and flows – percent of max NTC

Quarter 3, 2019

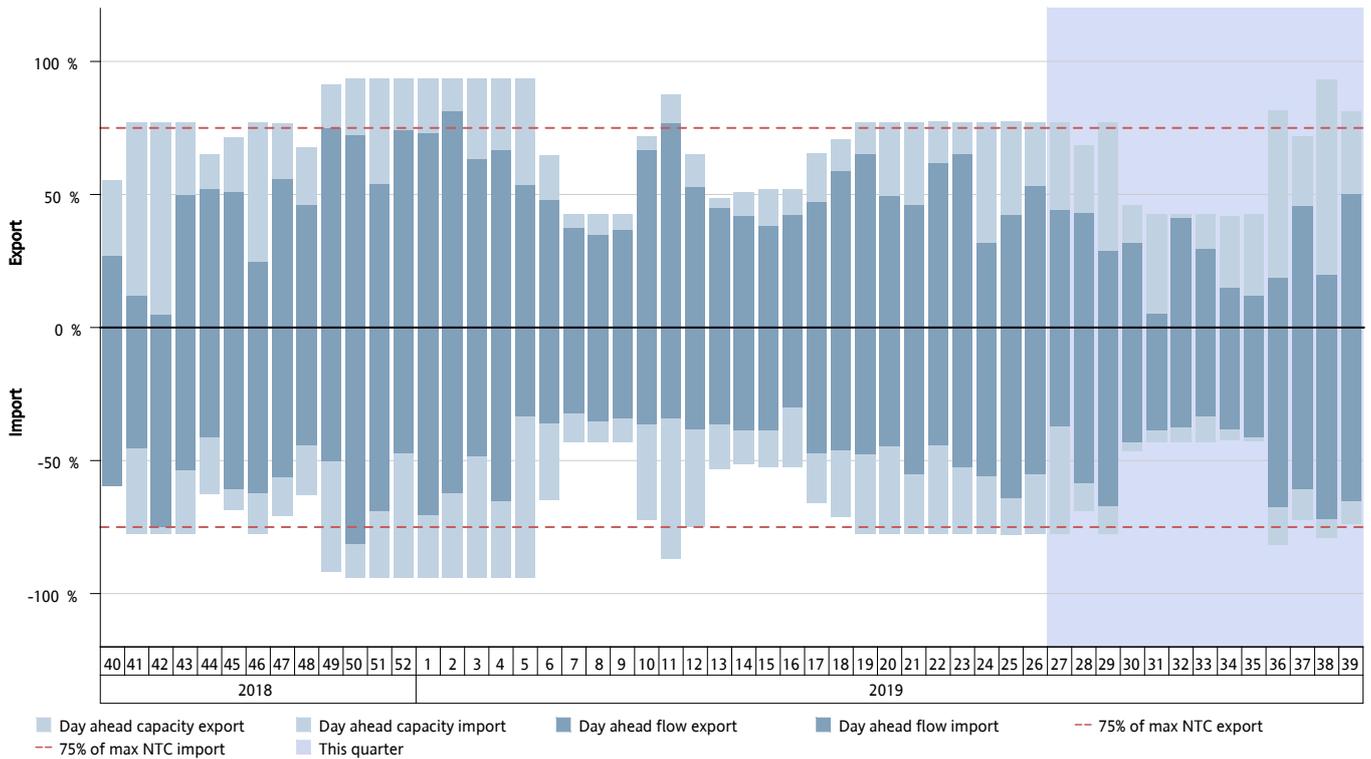


Figure 12: Shows cross-zonal day-ahead capacity result for the HVDC corridor DK1-NO2, showing average weekly capacity given and flow as a percentage of max NTC. Available capacity is given for all hours, but the average flow is only given for hours with flow in that direction. Export indicates flow from DK1 to NO2, while import indicates flow from NO2 to DK1.

DK1-NO2: hourly mean day ahead capacities and flows – percent of max NTC

Quarter 3, 2019

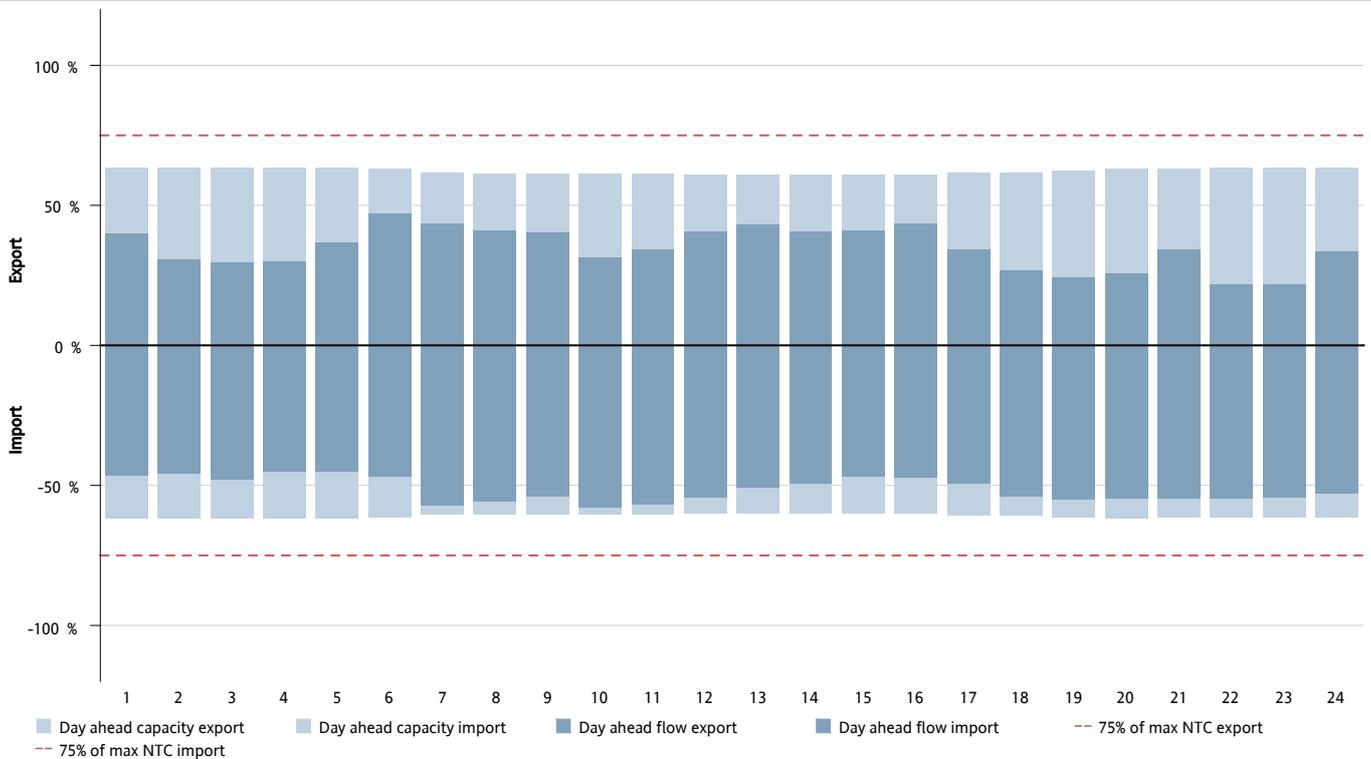


Figure 13: Shows cross-zonal day-ahead capacity result for the HVDC corridor DK1-NO2, showing average per hour of the day (1-24) capacity given and flow as a percentage of max NTC. Available capacity is given for all hours, but the average flow is only given for hours with flow in that direction. Export indicates flow from DK1 to NO2, while import indicates flow from NO2 to DK1.

DK1-NO2: hourly day ahead capacities and flows – MW

Quarter 3, 2019

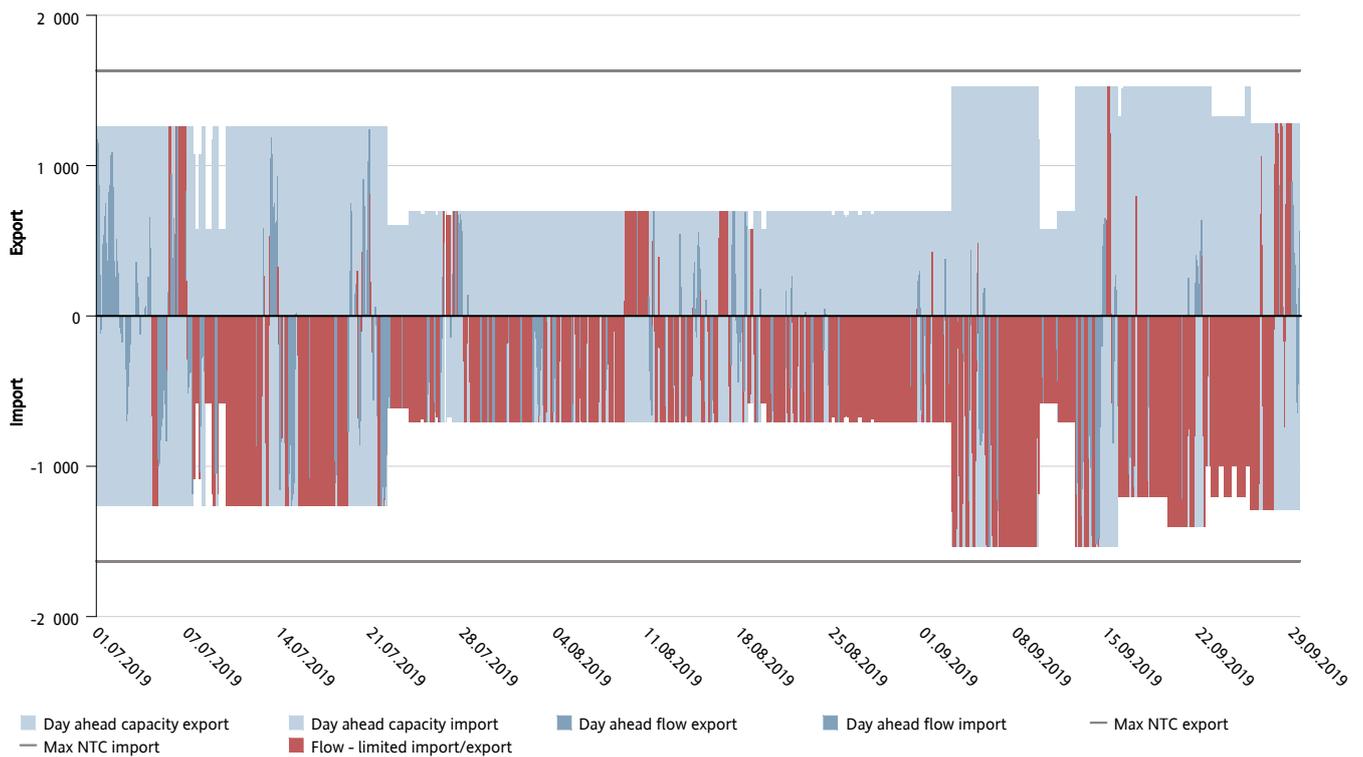


Figure 14: Shows cross-zonal day-ahead capacity result for the HVDC corridor DK1-NO2, showing capacity given and flow (MW). Available capacity is given for all hours, but the average flow is only given for hours with flow in that direction. Export indicates flow from DK1 to NO2, while import indicates flow from NO2 to DK1.

DK1-NO2: price comparison in EUR

Quarter 3, 2019

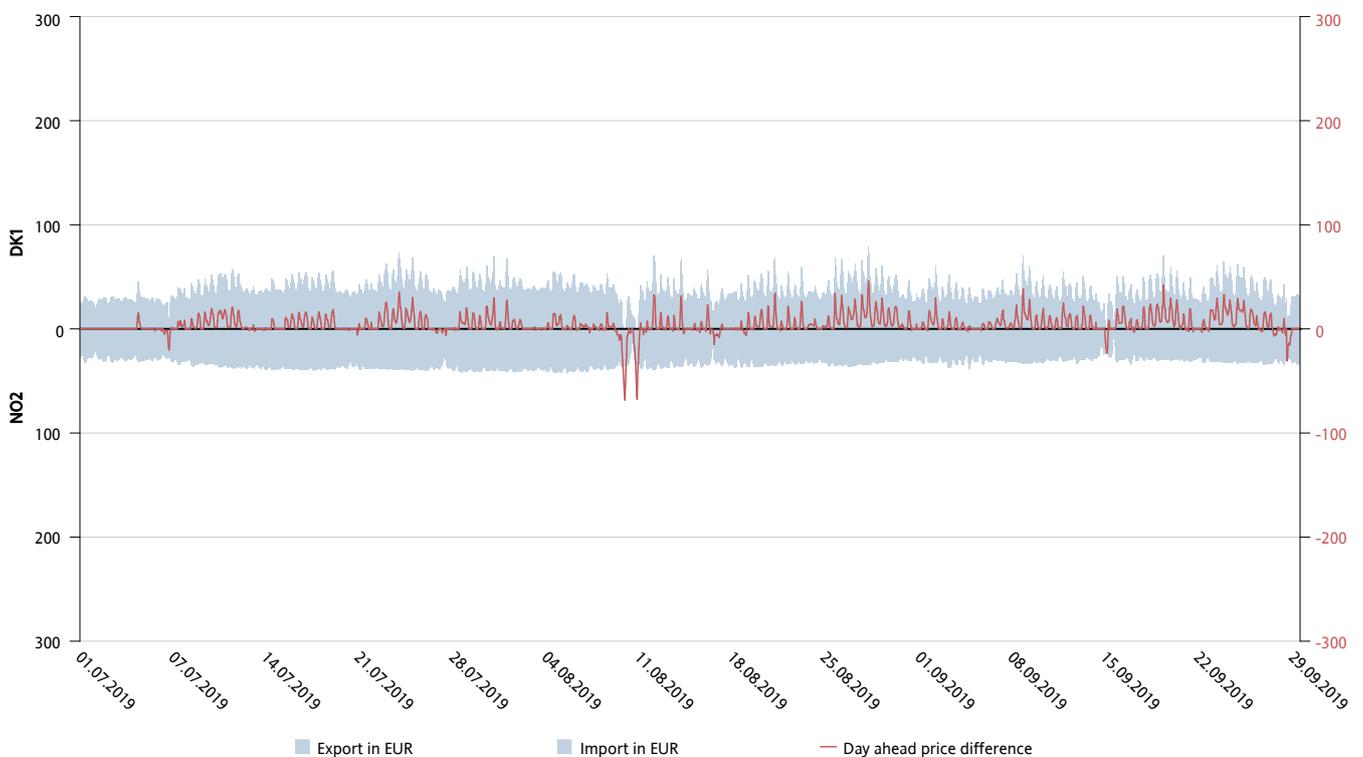


Figure 15: Shows day-ahead prices for the HVDC corridor DK1-NO2, all prices are in EUR. The red line shows the price difference between the two areas.

DK1-SE3: weekly day ahead capacities and flows – percent of max NTC

Quarter 3, 2019

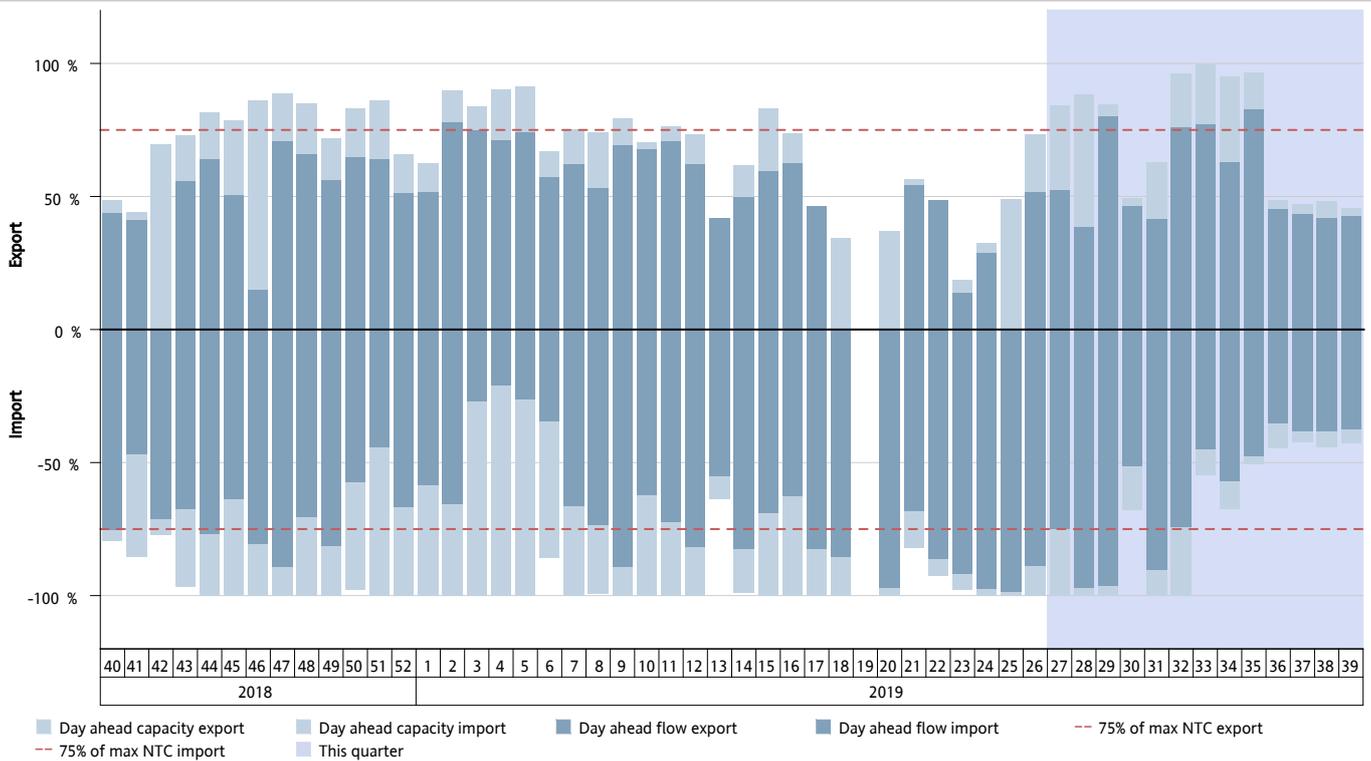


Figure 16: Shows cross-zonal day-ahead capacity result for the HVDC corridor DK1-SE3, showing average weekly capacity given and flow as a percentage of max NTC. Available capacity is given for all hours, but the average flow is only given for hours with flow in that direction. Export indicates flow from DK1 to SE3, while import indicates flow from SE3 to DK1.

DK1-SE3: hourly mean day ahead capacities and flows – percent of max NTC

Quarter 3, 2019

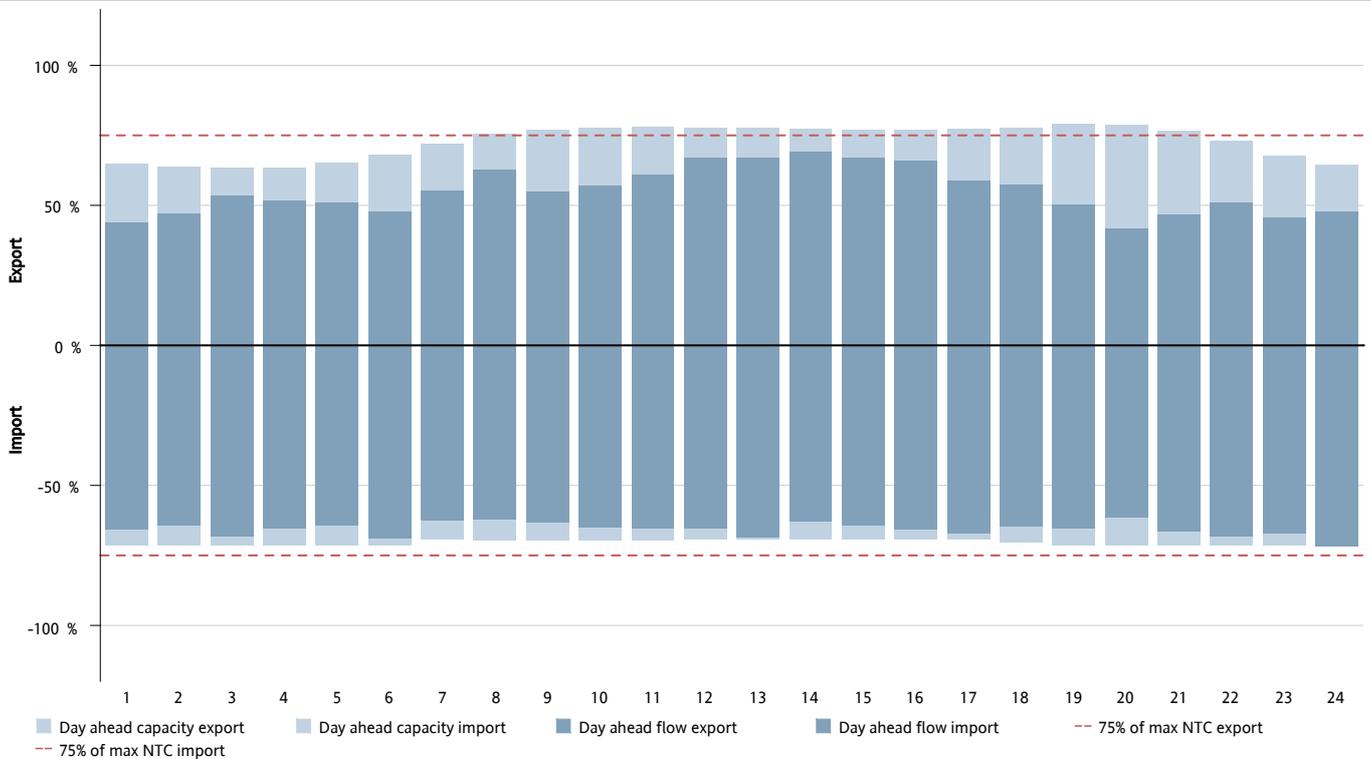


Figure 17: Shows cross-zonal day-ahead capacity result for the HVDC corridor DK1-SE3, showing average per hour of the day (1-24) capacity given and flow as a percentage of max NTC. Available capacity is given for all hours, but the average flow is only given for hours with flow in that direction. Export indicates flow from DK1 to SE3, while import indicates flow from SE3 to DK1.

DK1-SE3: hourly day ahead capacities and flows – MW

Quarter 3, 2019

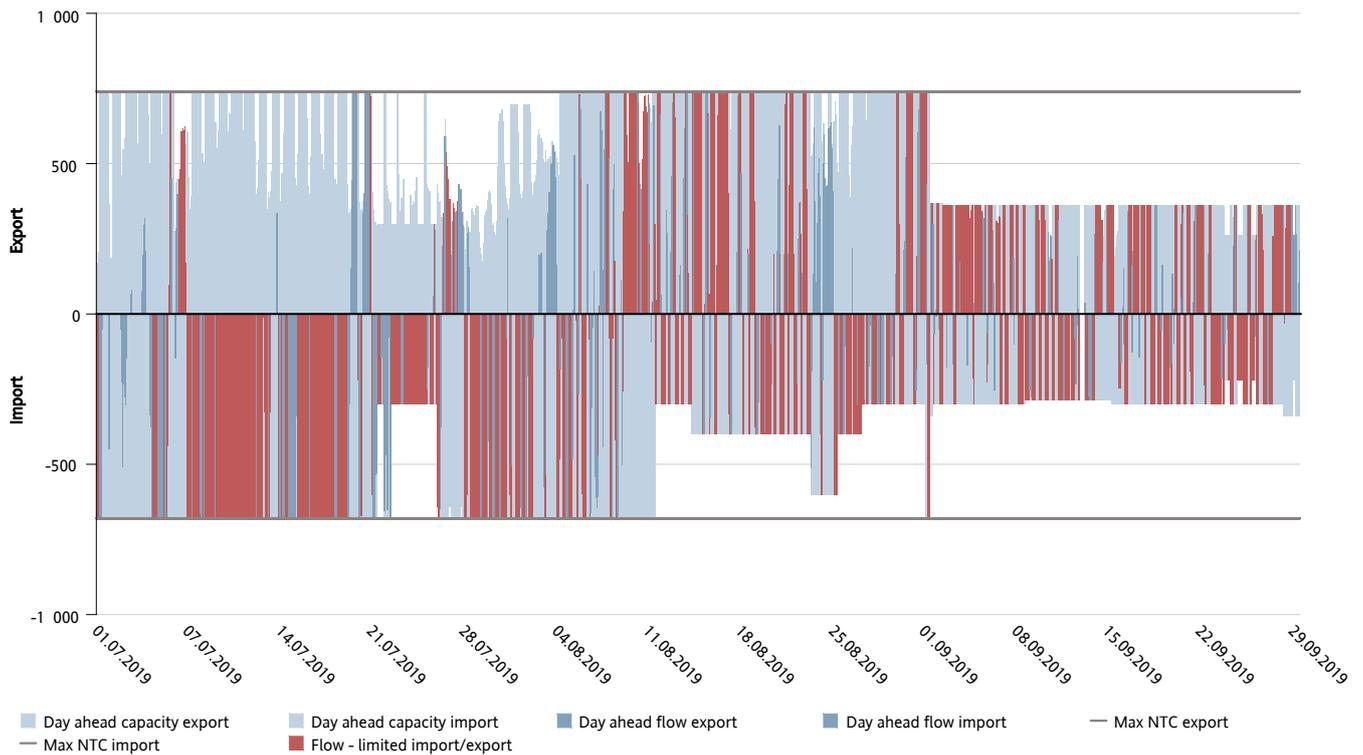


Figure 18: Shows cross-zonal day-ahead capacity result for the HVDC corridor DK1-SE3, showing capacity given and flow (MW). Available capacity is given for all hours, but the average flow is only given for hours with flow in that direction. Export indicates flow from DK1 to SE3, while import indicates flow from SE3 to DK1.

DK1-SE3: price comparison in EUR

Quarter 3, 2019

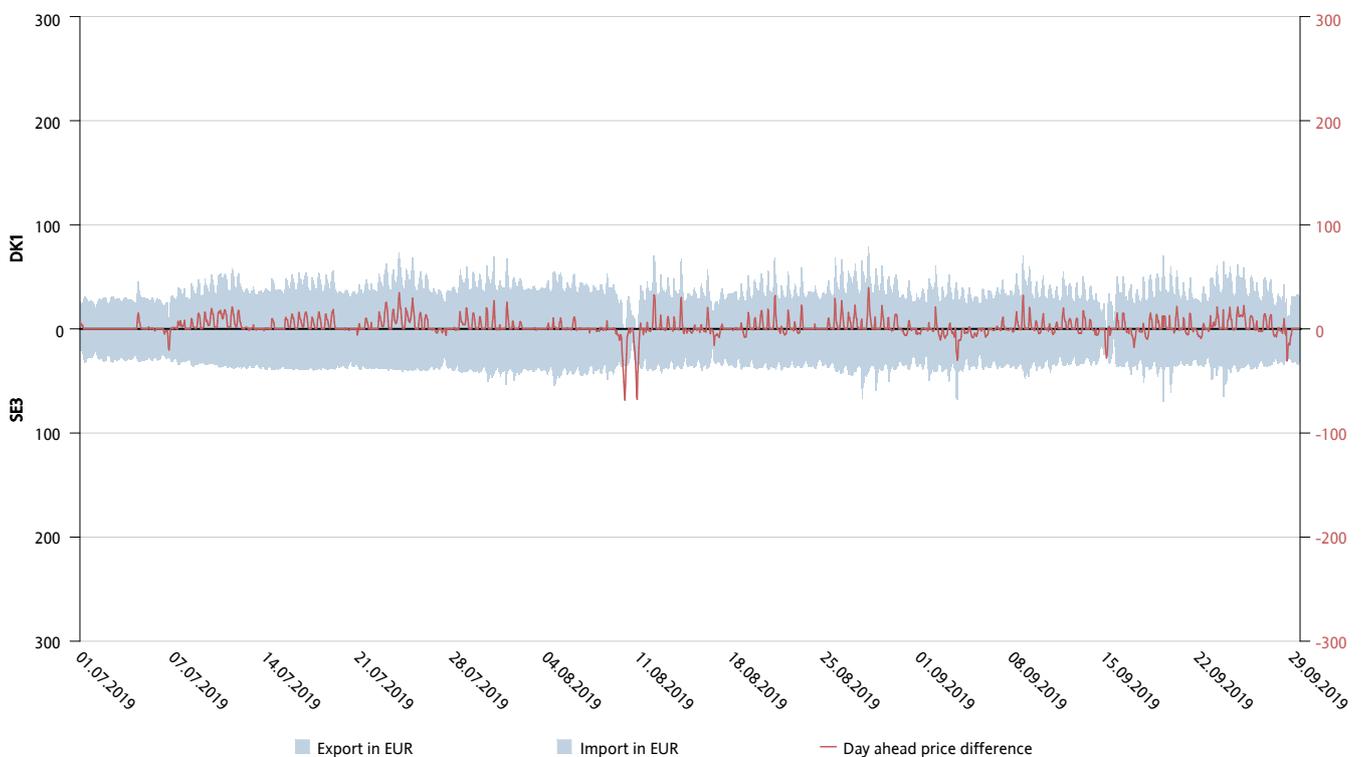


Figure 19: Shows day-ahead prices for the HVDC corridor DK1-SE3, all prices are in EUR. The red line shows the price difference between the two areas.

DK2-DE: weekly day ahead capacities and flows – percent of max NTC

Quarter 3, 2019

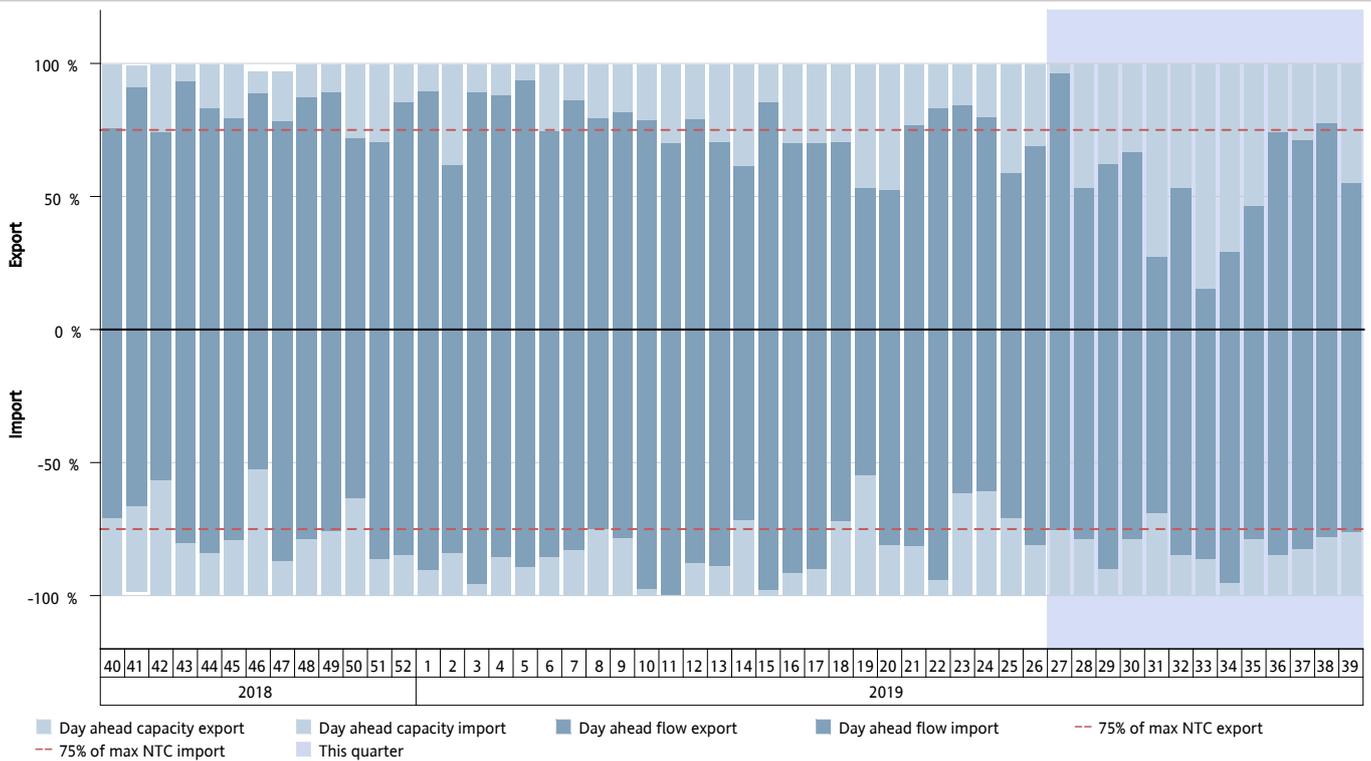


Figure 20: Shows cross-zonal day-ahead capacity result for the HVDC corridor DK2-DE, showing average weekly capacity given and flow as a percentage of max NTC. Available capacity is given for all hours, but the average flow is only given for hours with flow in that direction. Export indicates flow from DK2 to DE, while import indicates flow from DE to DK2.

DK2-DE: hourly mean day ahead capacities and flows – percent of max NTC

Quarter 3, 2019

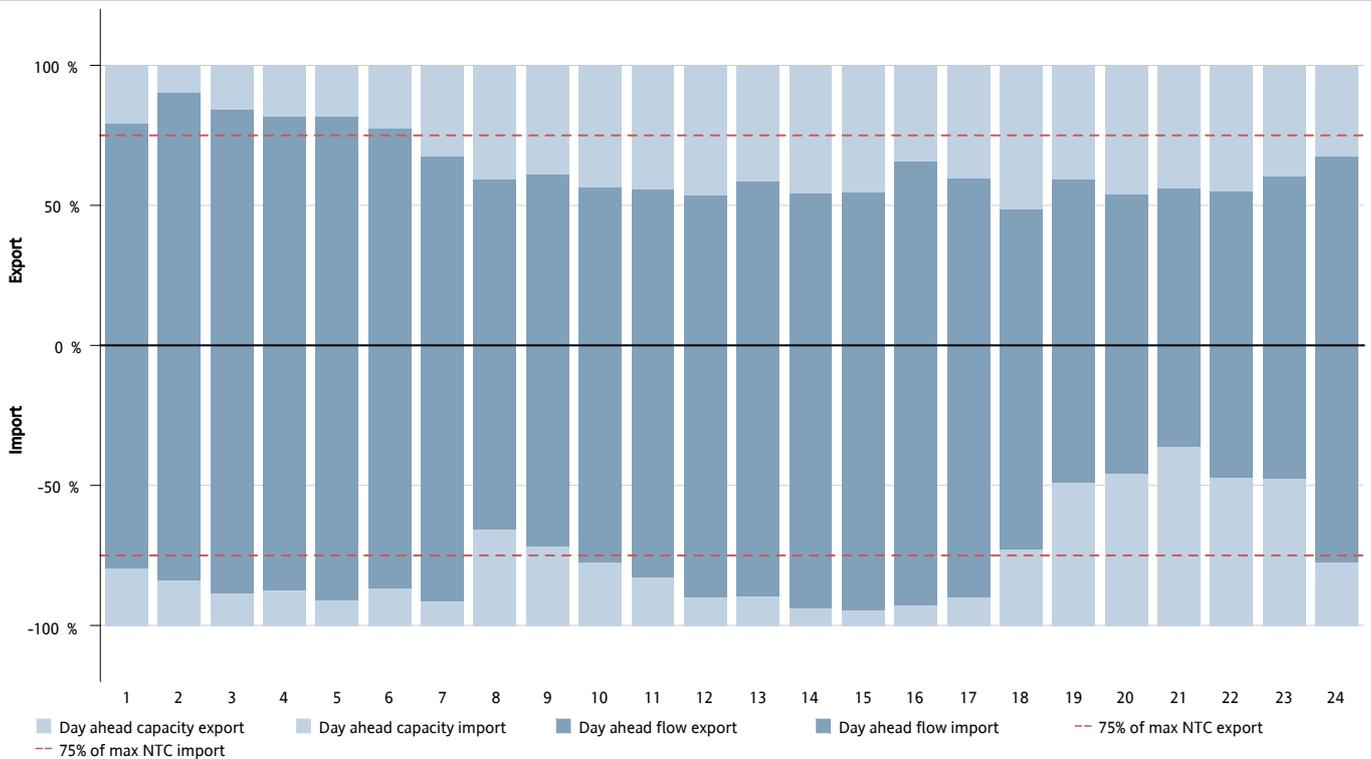


Figure 21: Shows cross-zonal day-ahead capacity result for the HVDC corridor DK2-DE, showing average per hour of the day (1-24) capacity given and flow as a percentage of max NTC. Available capacity is given for all hours, but the average flow is only given for hours with flow in that direction. Export indicates flow from DK2 to DE, while import indicates flow from DE to DK2.

DK2-DE: hourly day ahead capacities and flows – MW

Quarter 3, 2019

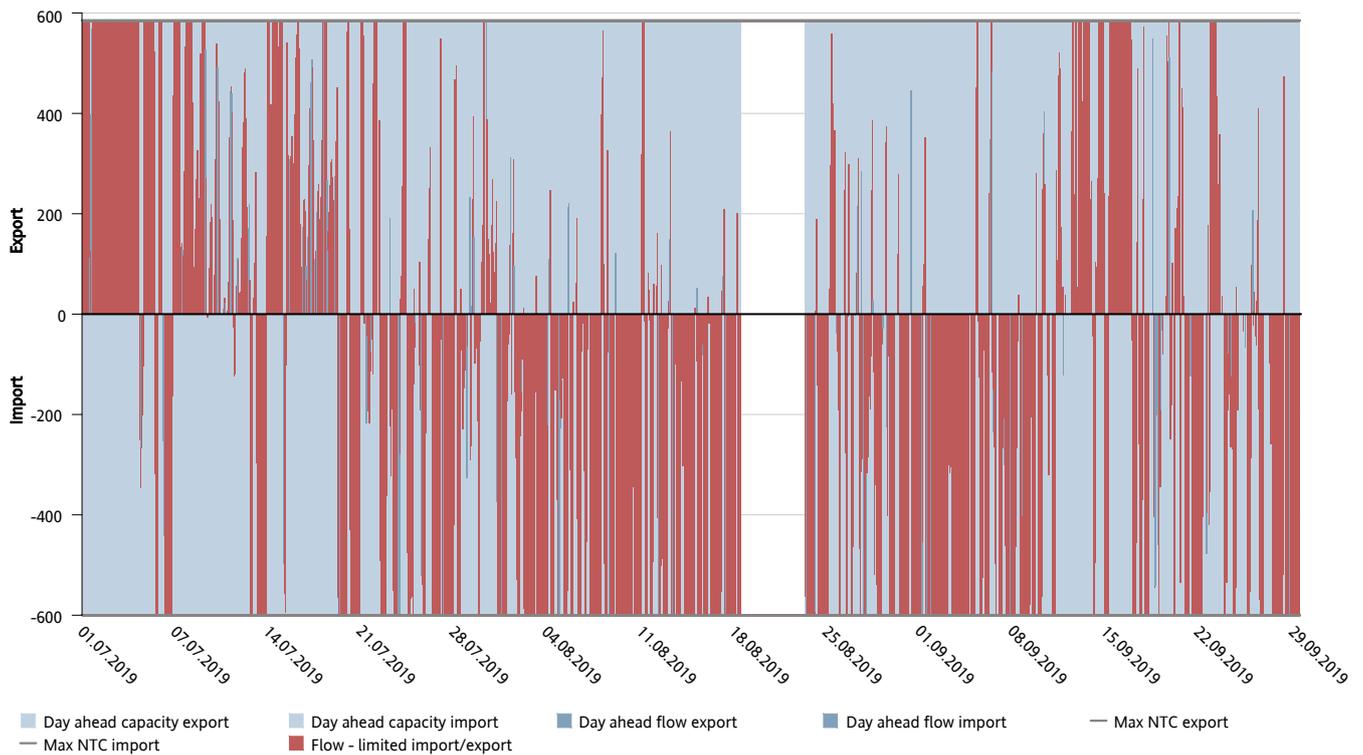


Figure 22: Shows cross-zonal day-ahead capacity result for the HVDC corridor DK2-DE, showing capacity given and flow (MW). Available capacity is given for all hours, but the average flow is only given for hours with flow in that direction. Export indicates flow from DK2 to DE, while import indicates flow from DE to DK2.

DK2-DE: price comparison in EUR

Quarter 3, 2019

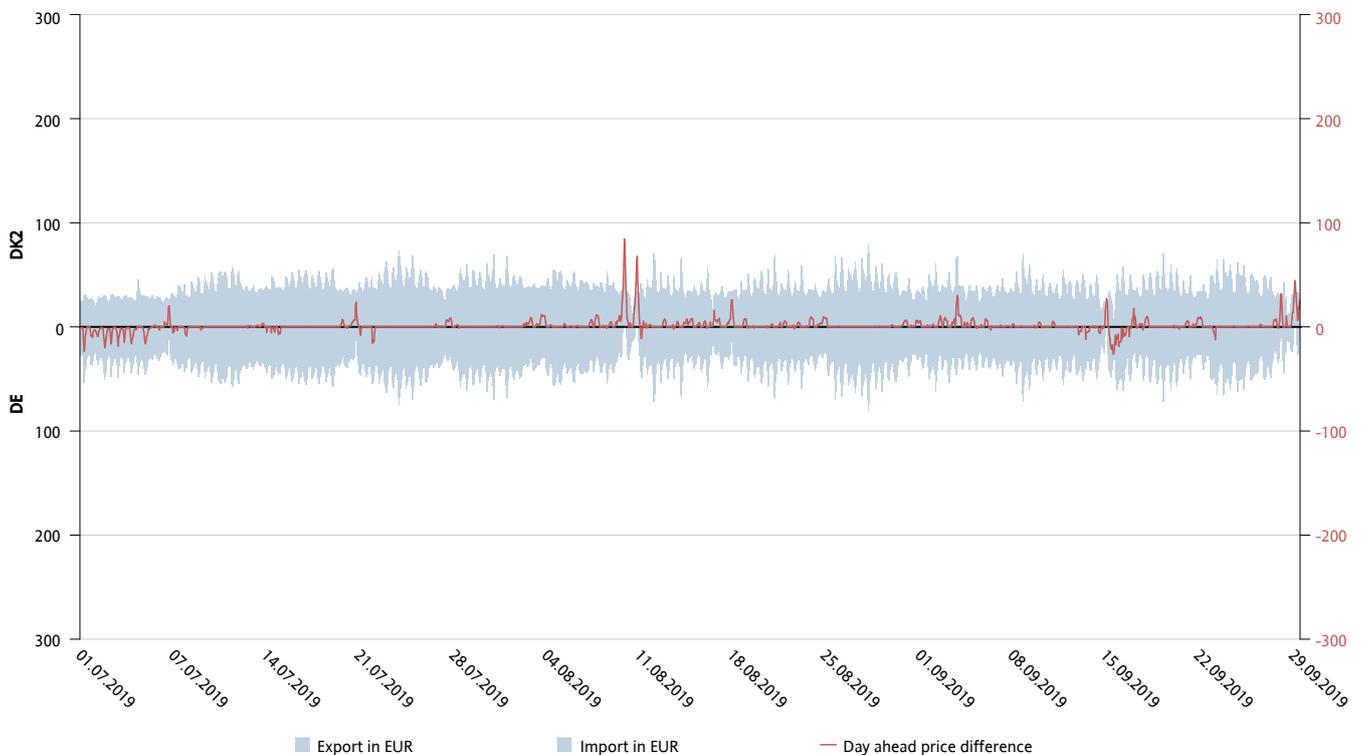


Figure 23: Shows day-ahead prices for the HVDC corridor DK2-DE, all prices are in EUR. The red line shows the price difference between the two areas.

DK2-SE4: weekly day ahead capacities and flows – percent of max NTC

Quarter 3, 2019

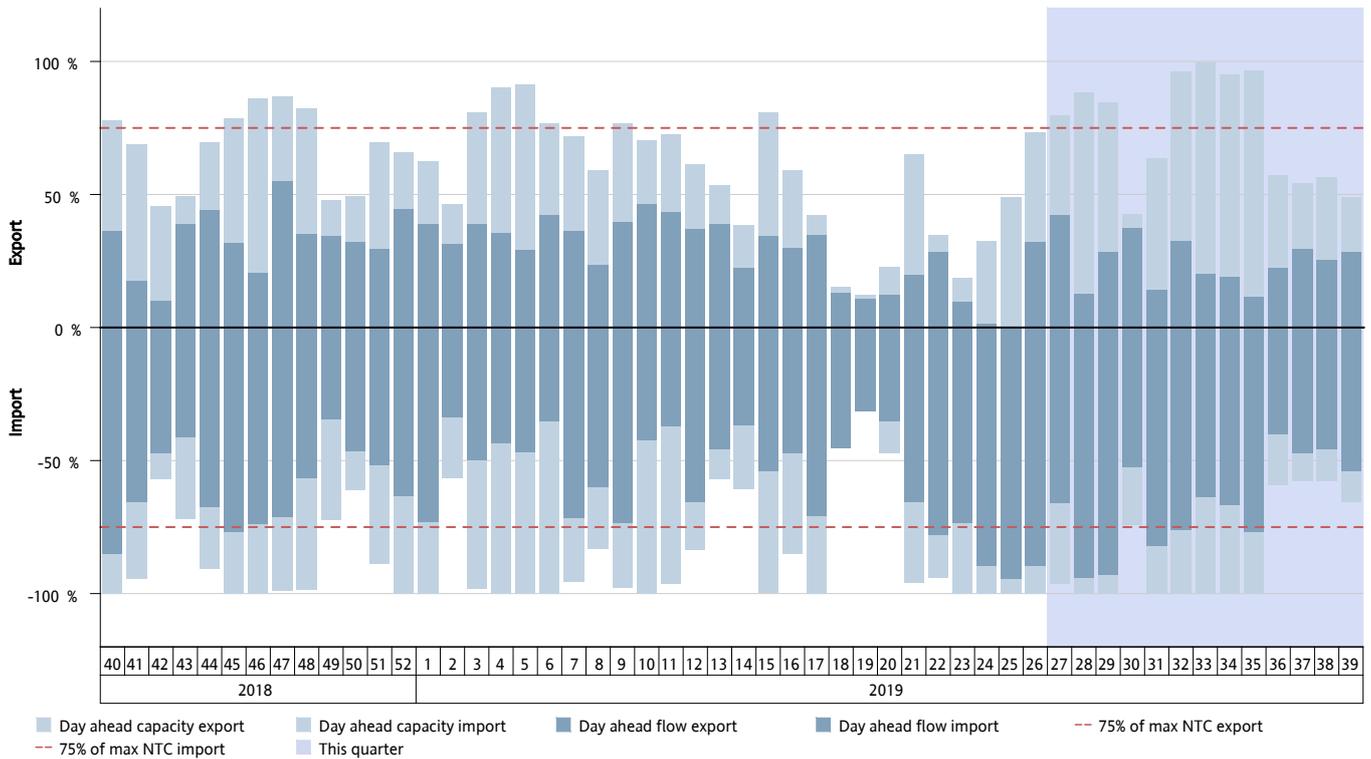


Figure 24: Shows cross-zonal day-ahead capacity result for the AC corridor DK2-SE4, showing average weekly capacity given and flow as a percentage of max NTC. Available capacity is given for all hours, but the average flow is only given for hours with flow in that direction. Export indicates flow from DK2 to SE4, while import indicates flow from SE4 to DK2.

DK2-SE4: hourly mean day ahead capacities and flows – percent of max NTC

Quarter 3, 2019

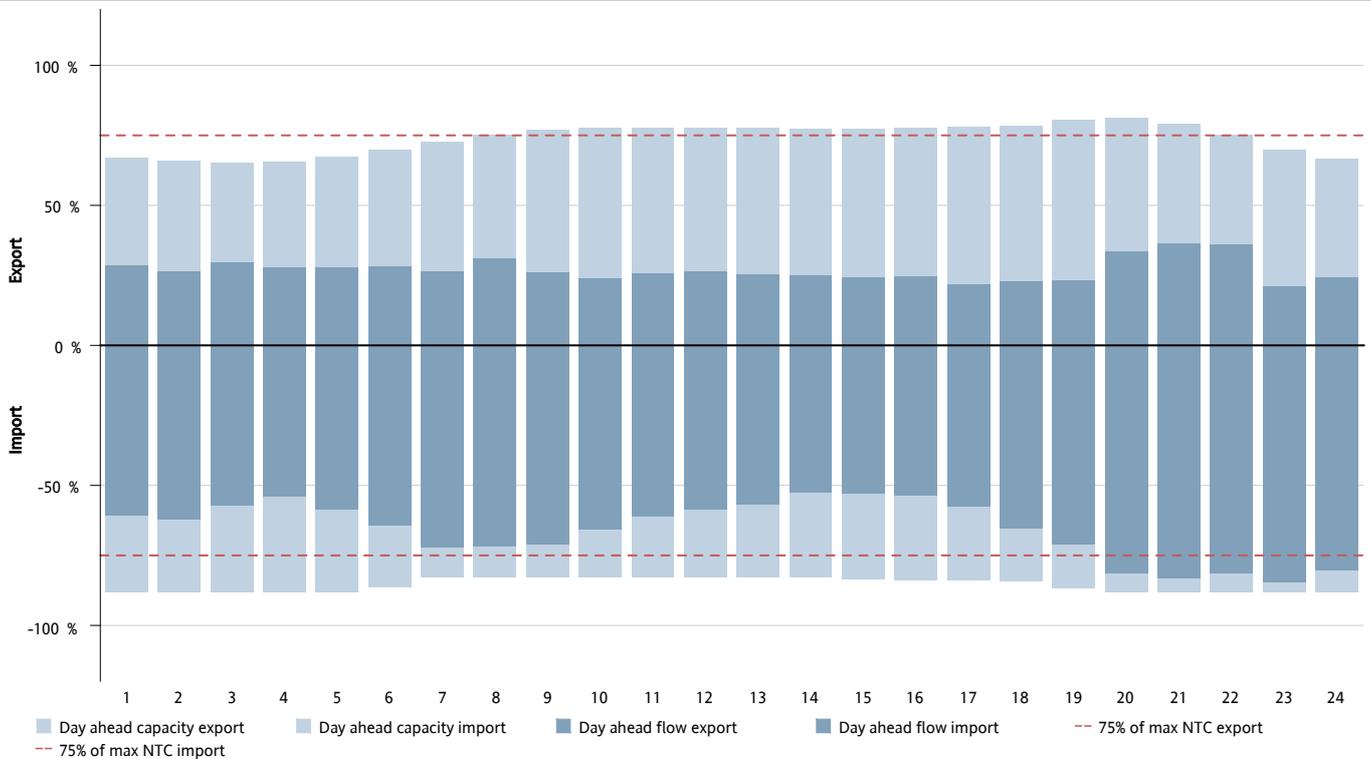


Figure 25: Shows cross-zonal day-ahead capacity result for the AC corridor DK2-SE4, showing average per hour of the day (1-24) capacity given and flow as a percentage of max NTC. Available capacity is given for all hours, but the average flow is only given for hours with flow in that direction. Export indicates flow from DK2 to SE4, while import indicates flow from SE4 to DK2.

DK2-SE4: hourly day ahead capacities and flows – MW

Quarter 3, 2019

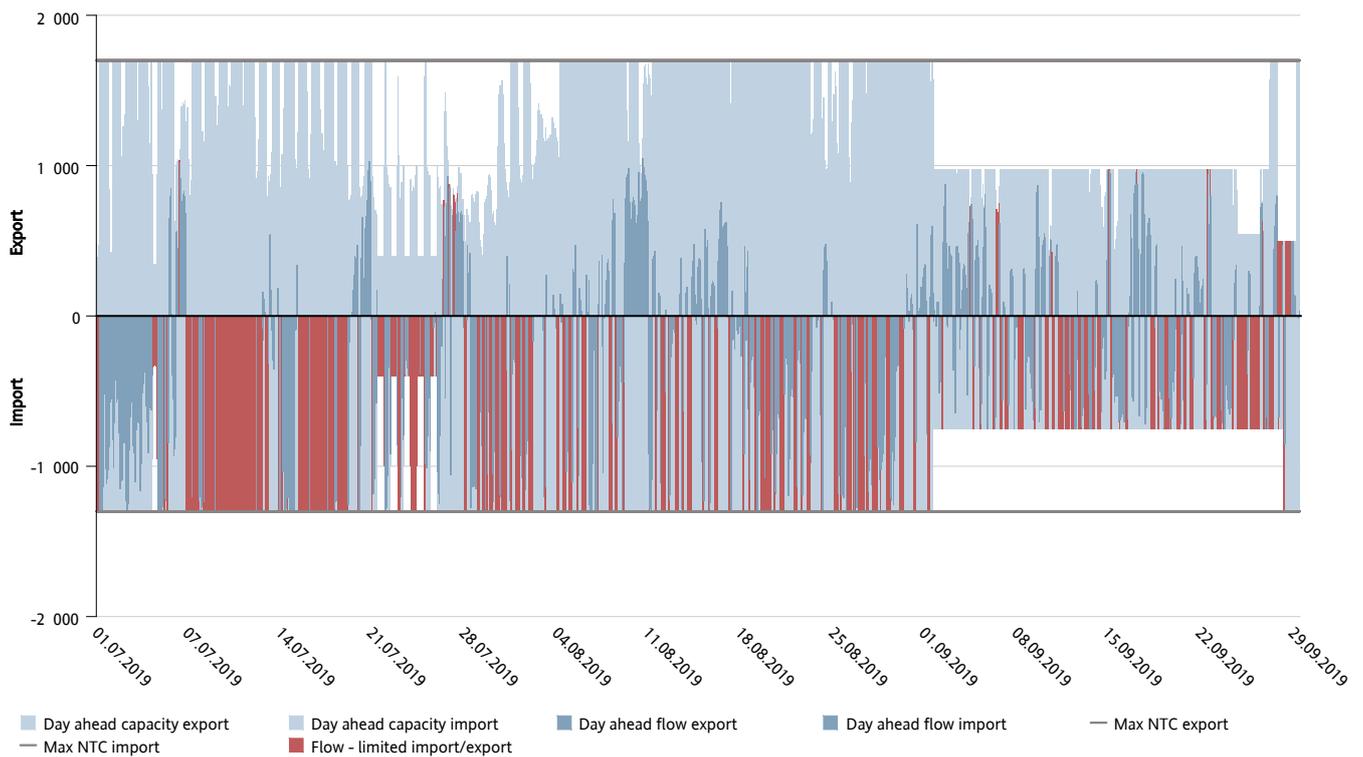


Figure 26: Shows cross-zonal day-ahead capacity result for the AC corridor DK2-SE4, showing capacity given and flow (MW). Available capacity is given for all hours, but the average flow is only given for hours with flow in that direction. Export indicates flow from DK2 to SE4, while import indicates flow from SE4 to DK2.

DK2-SE4: price comparison in EUR

Quarter 3, 2019

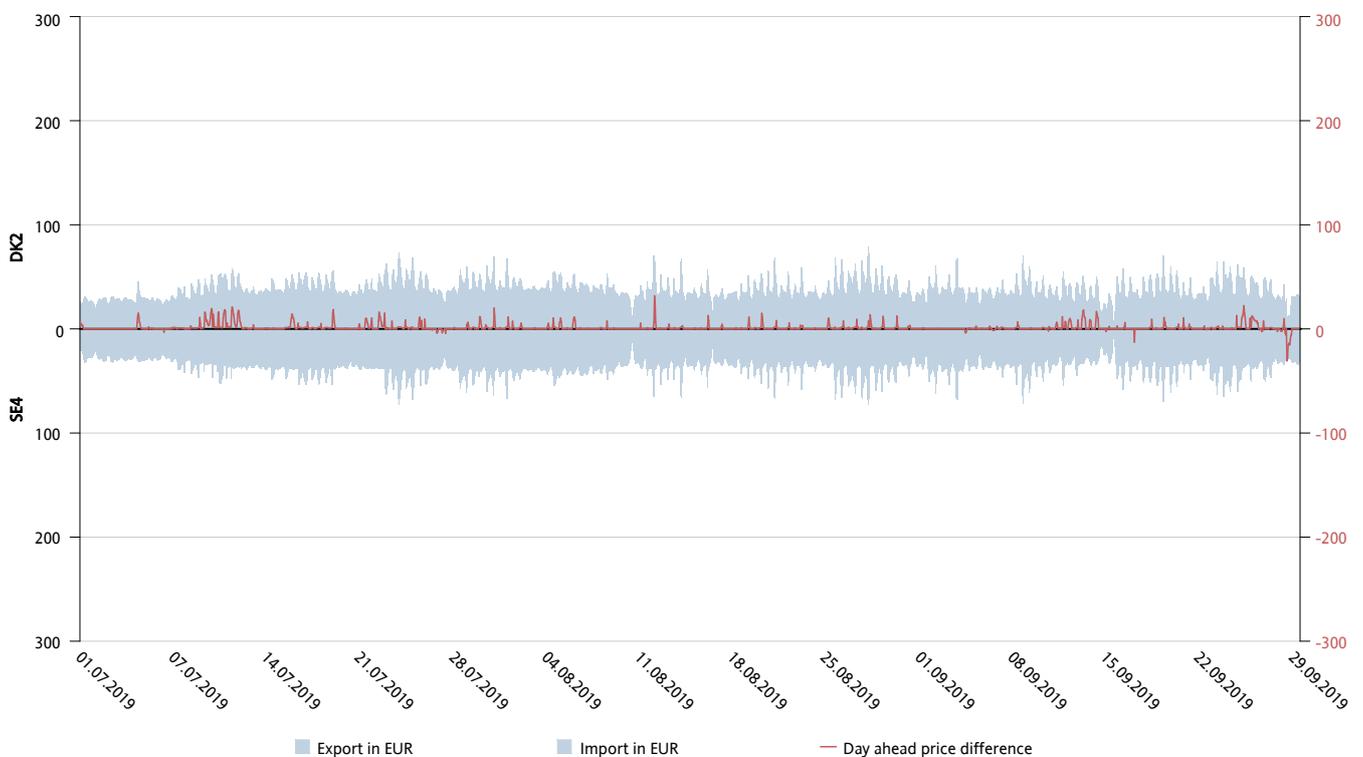


Figure 27: Shows day-ahead prices for the AC corridor DK2-SE4, all prices are in EUR. The red line shows the price difference between the two areas.

FI-EE: weekly day ahead capacities and flows – percent of max NTC

Quarter 3, 2019

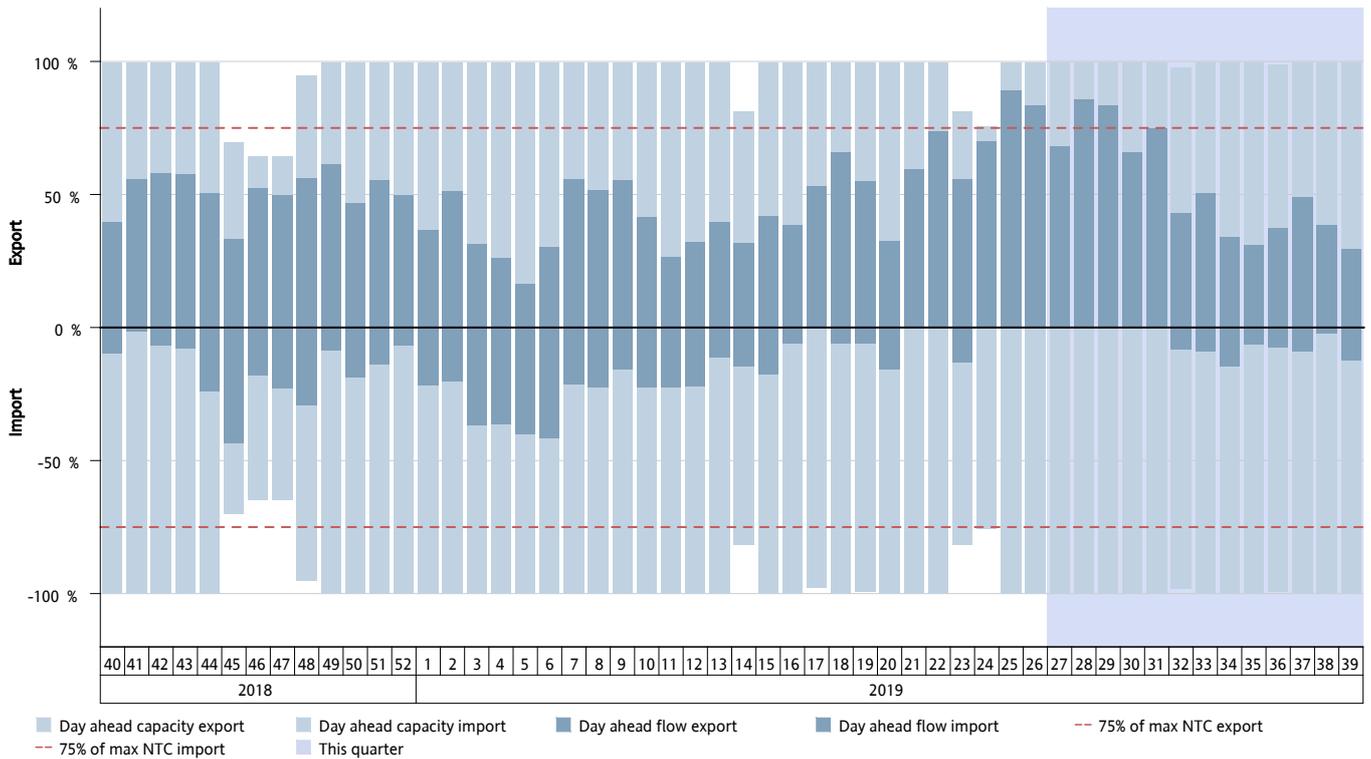


Figure 28: Shows cross-zonal day-ahead capacity result for the HVDC corridor FI-EE, showing average weekly capacity given and flow as a percentage of max NTC. Available capacity is given for all hours, but the average flow is only given for hours with flow in that direction. Export indicates flow from FI to EE, while import indicates flow from EE to FI.

FI-EE: hourly mean day ahead capacities and flows – percent of max NTC

Quarter 3, 2019

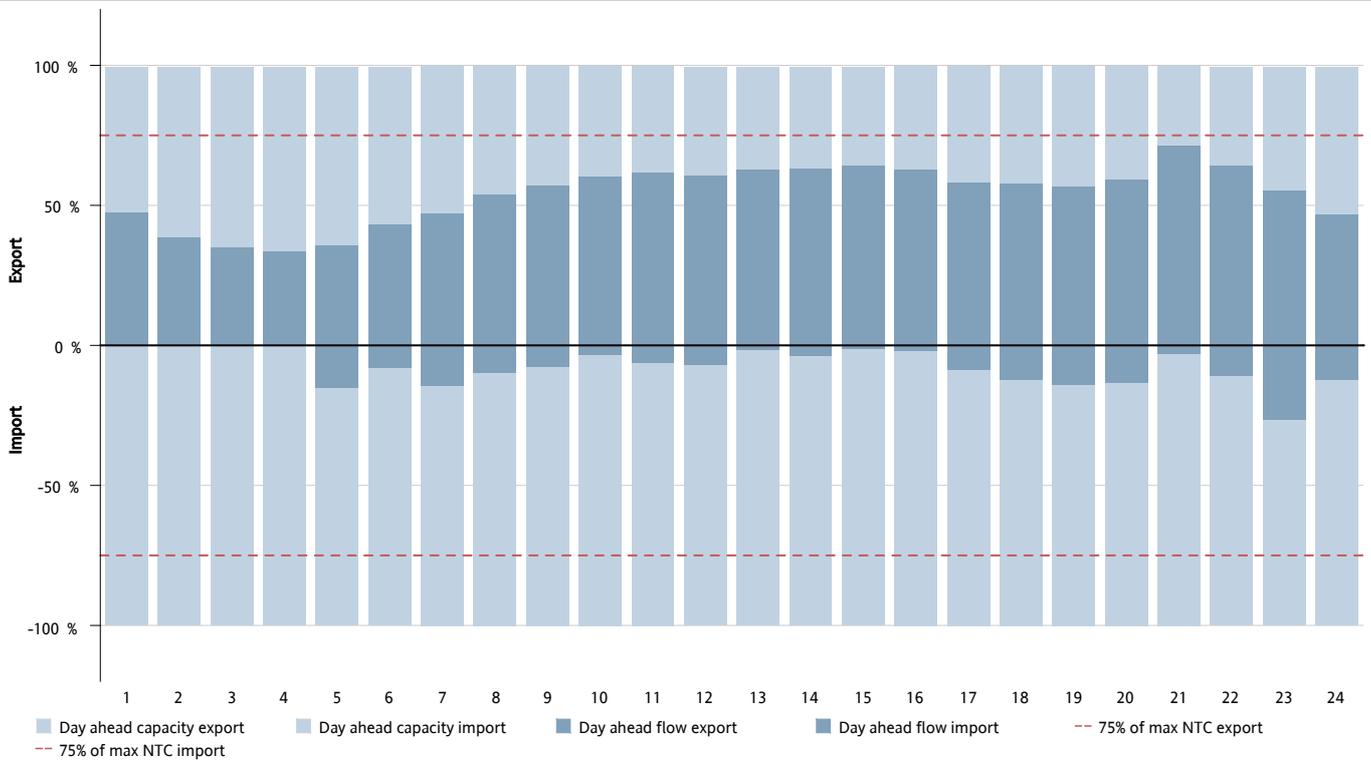


Figure 29: Shows cross-zonal day-ahead capacity result for the HVDC corridor FI-EE, showing average per hour of the day (1-24) capacity given and flow as a percentage of max NTC. Available capacity is given for all hours, but the average flow is only given for hours with flow in that direction. Export indicates flow from FI to EE, while import indicates flow from EE to FI.

FI-EE: hourly day ahead capacities and flows – MW

Quarter 3, 2019

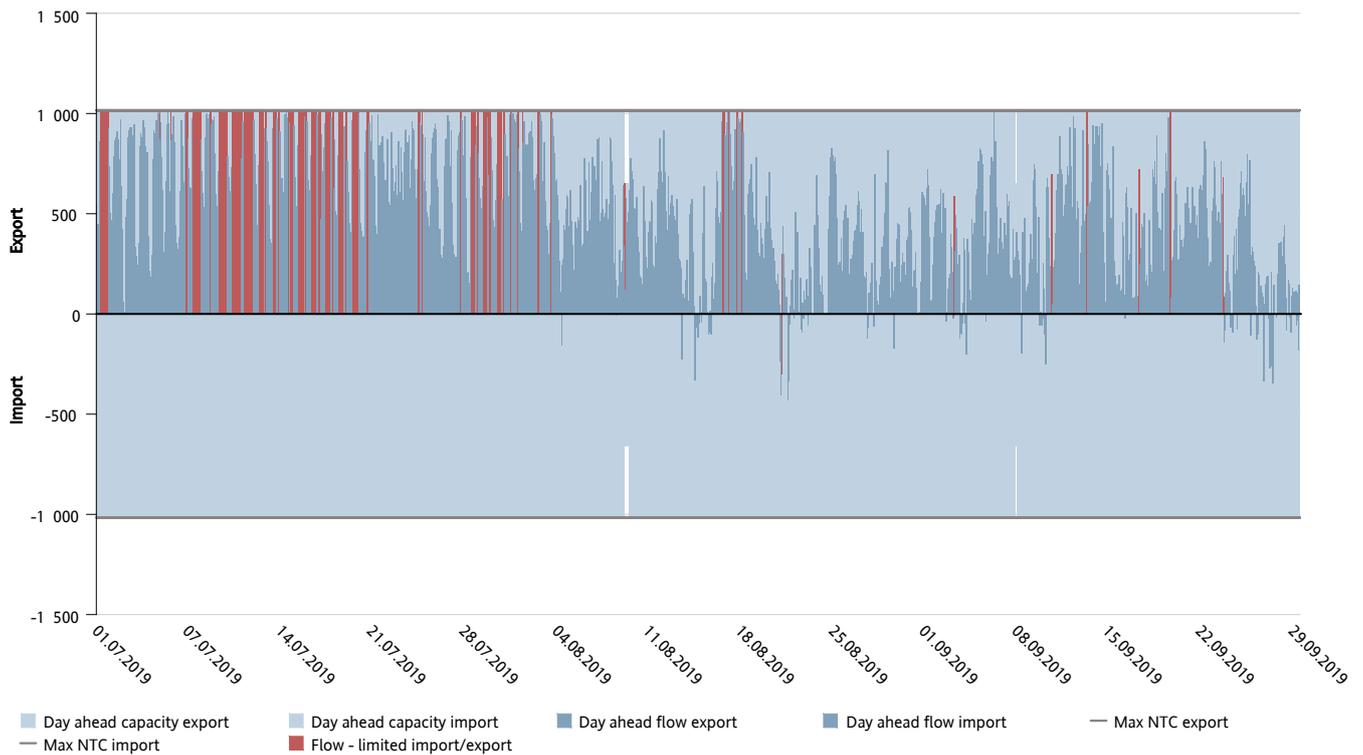


Figure 30: Shows cross-zonal day-ahead capacity result for the HVDC corridor FI-EE, showing capacity given and flow (MW). Available capacity is given for all hours, but the average flow is only given for hours with flow in that direction. Export indicates flow from FI to EE, while import indicates flow from EE to FI.

FI-EE: price comparison in EUR

Quarter 3, 2019

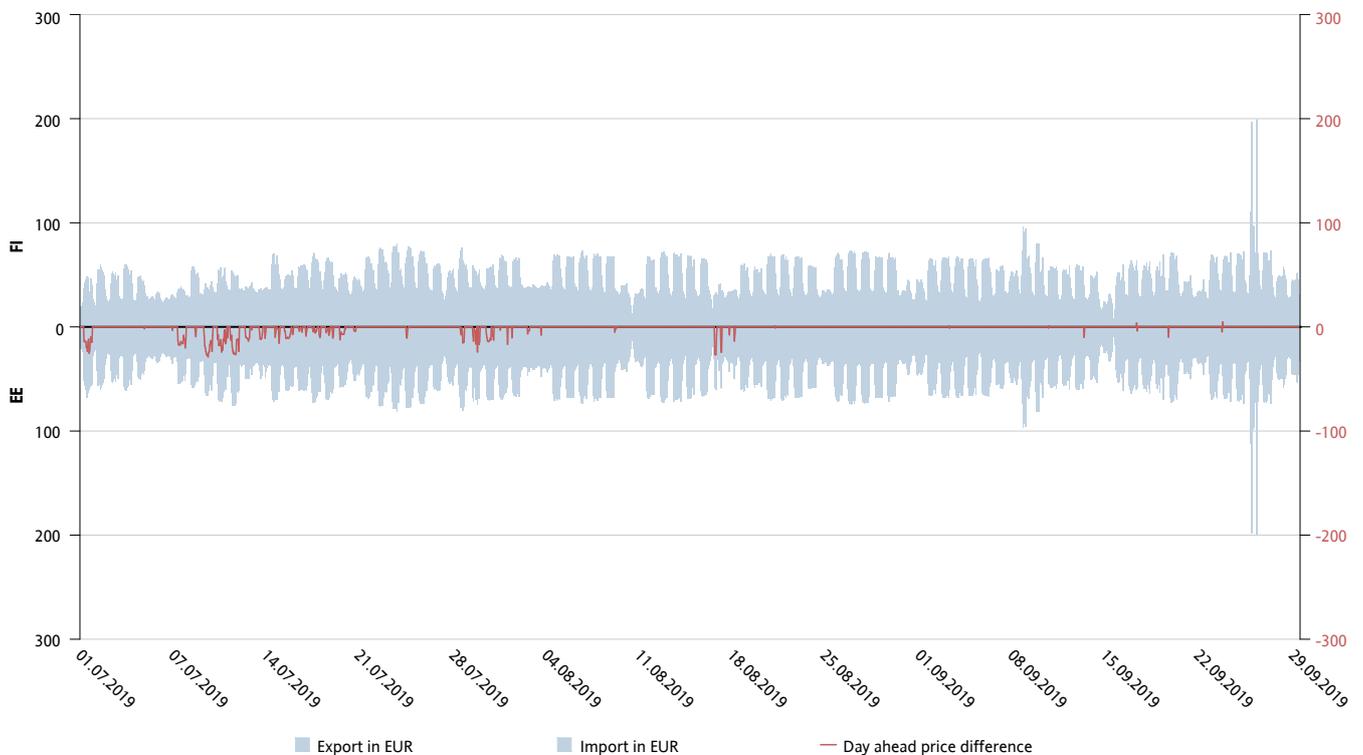


Figure 31: Shows day-ahead prices for the HVDC corridor FI-EE, all prices are in EUR. The red line shows the price difference between the two areas.

FI-SE1: weekly day ahead capacities and flows – percent of max NTC

Quarter 3, 2019

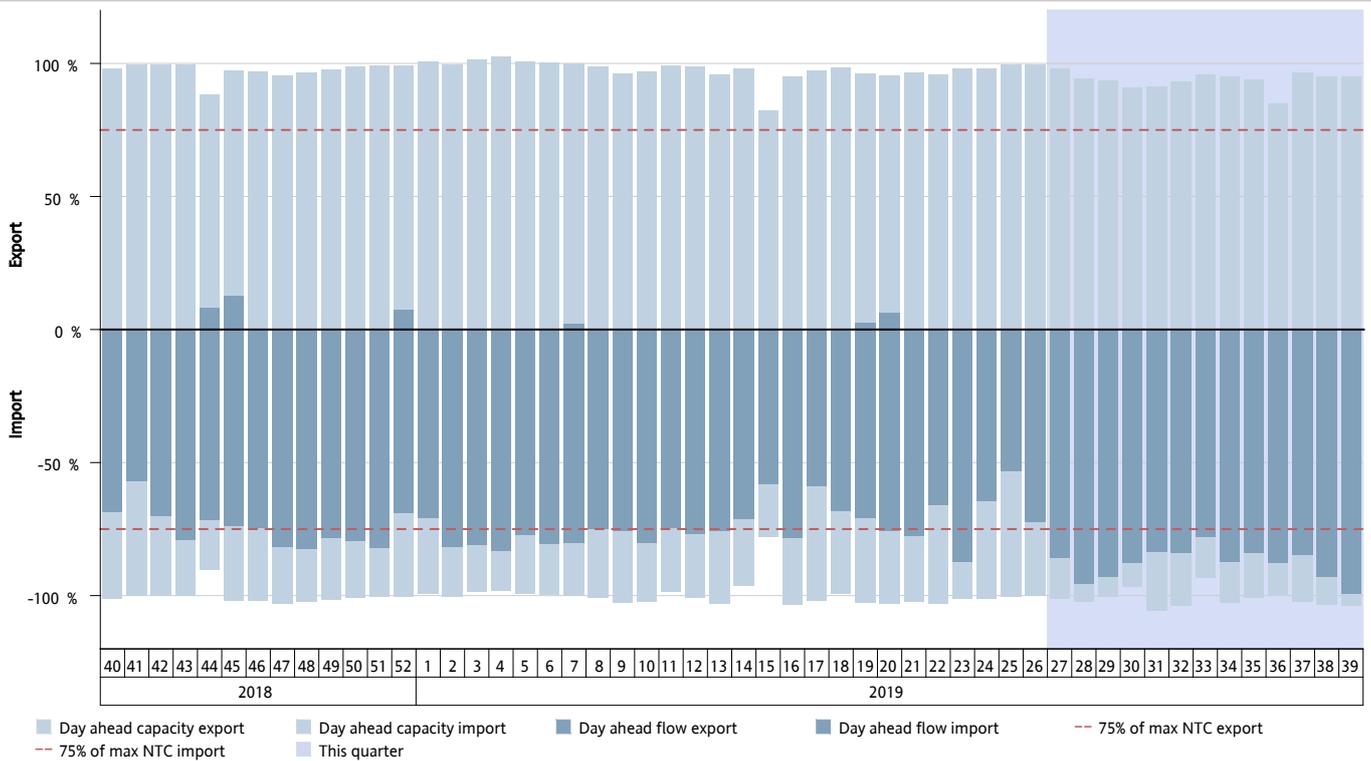


Figure 32: Shows cross-zonal day-ahead capacity result for the AC corridor FI-SE1, showing average weekly capacity given and flow as a percentage of max NTC. Available capacity is given for all hours, but the average flow is only given for hours with flow in that direction. Export indicates flow from FI to SE1, while import indicates flow from SE1 to FI.

FI-SE1: hourly mean day ahead capacities and flows – percent of max NTC

Quarter 3, 2019

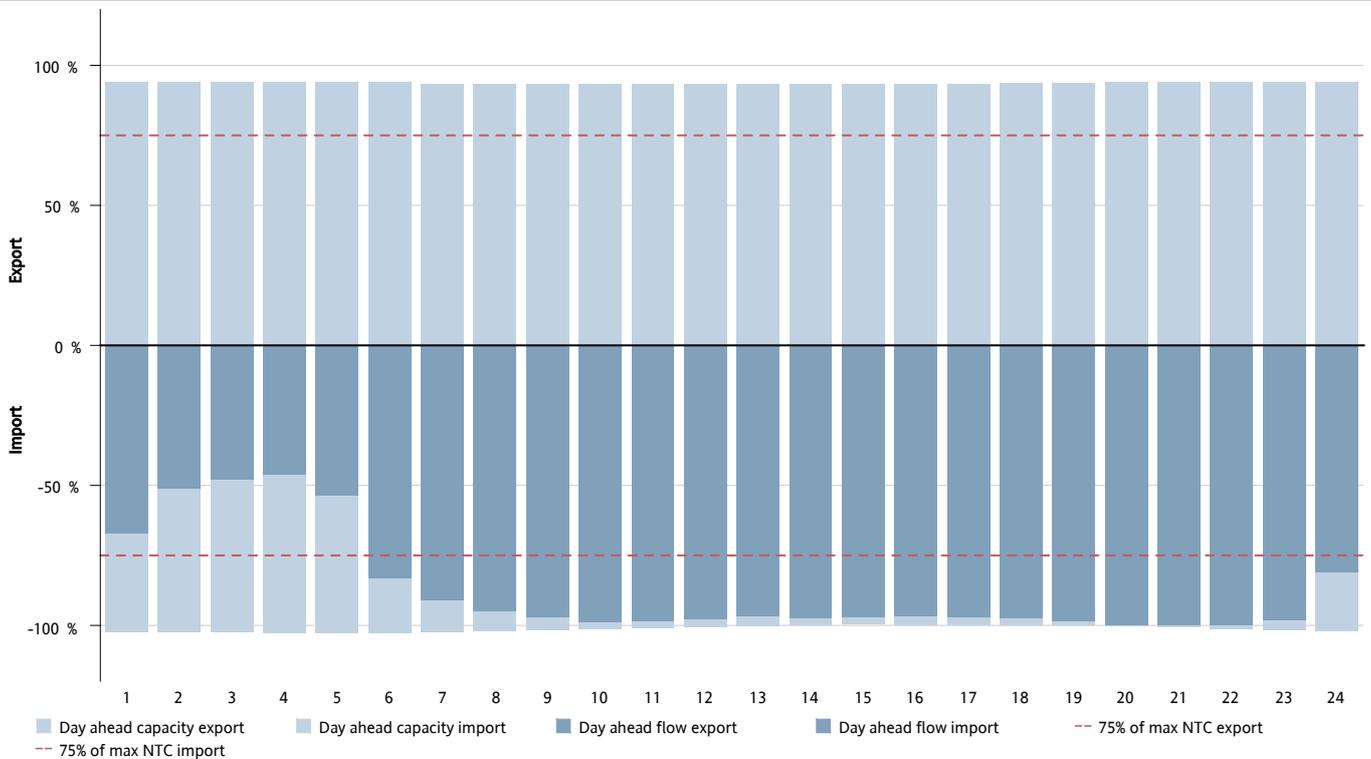


Figure 33: Shows cross-zonal day-ahead capacity result for the AC corridor FI-SE1, showing average per hour of the day (1-24) capacity given and flow as a percentage of max NTC. Available capacity is given for all hours, but the average flow is only given for hours with flow in that direction. Export indicates flow from FI to SE1, while import indicates flow from SE1 to FI.

FI-SE1: hourly day ahead capacities and flows – MW

Quarter 3, 2019

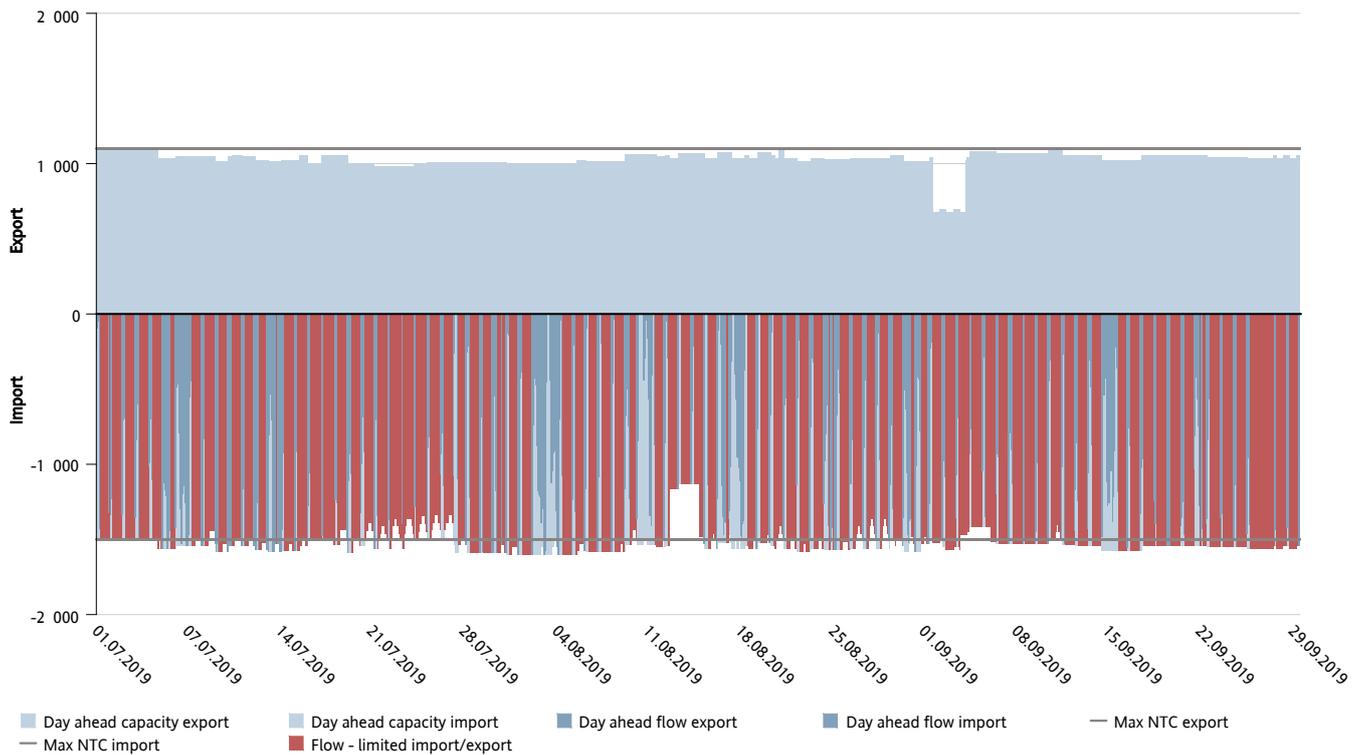


Figure 34: Shows cross-zonal day-ahead capacity result for the AC corridor FI-SE1, showing capacity given and flow (MW). Available capacity is given for all hours, but the average flow is only given for hours with flow in that direction. Export indicates flow from FI to SE1, while import indicates flow from SE1 to FI.

FI-SE1: price comparison in EUR

Quarter 3, 2019

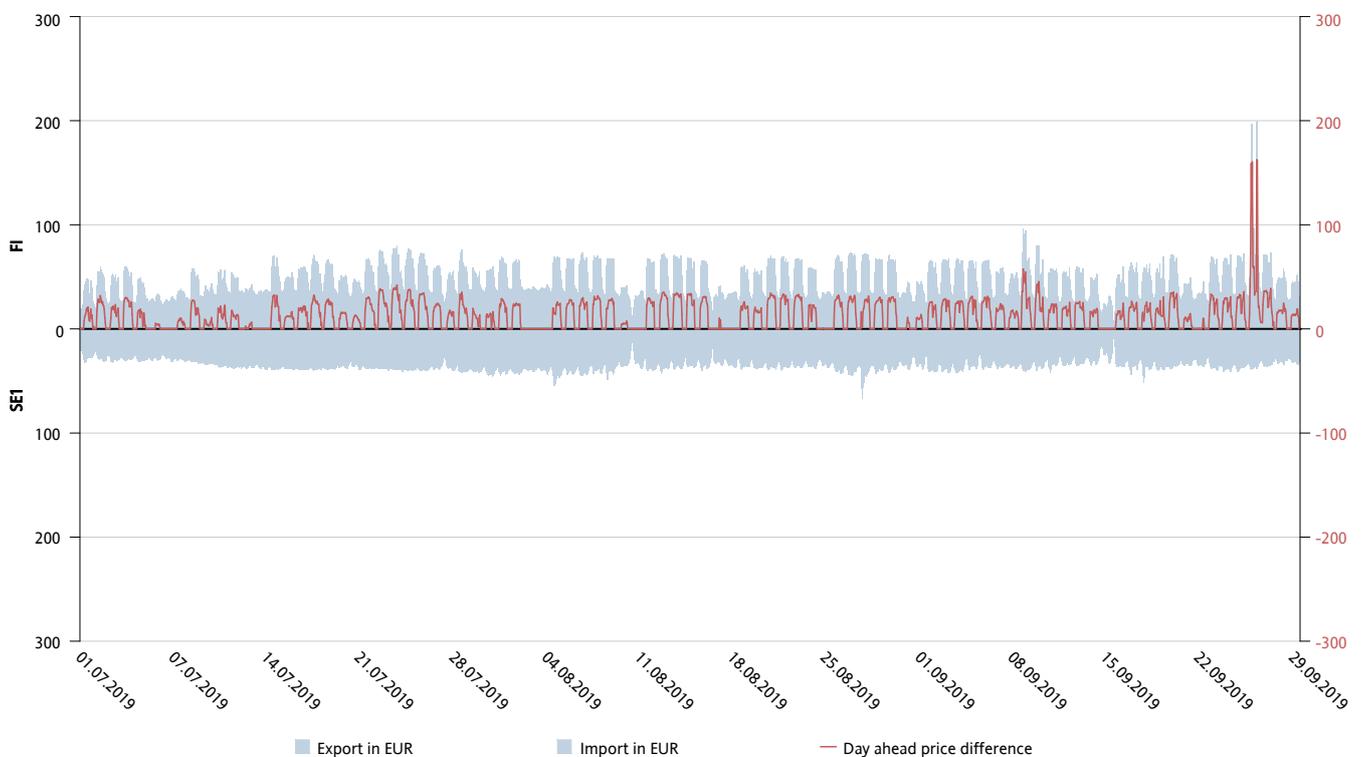


Figure 35: Shows day-ahead prices for the AC corridor FI-SE1, all prices are in EUR. The red line shows the price difference between the two areas.

FI-SE3: weekly day ahead capacities and flows – percent of max NTC

Quarter 3, 2019

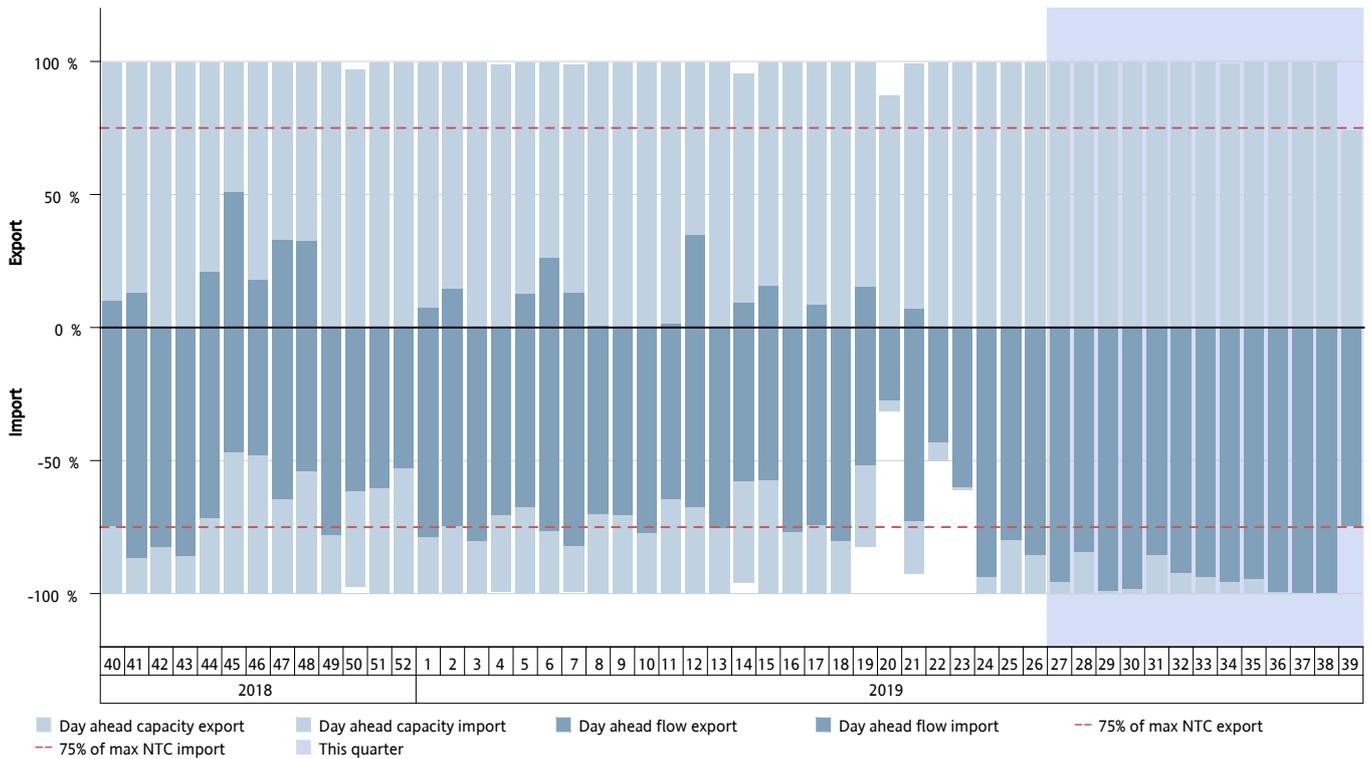


Figure 36: Shows cross-zonal day-ahead capacity result for the HVDC corridor FI-SE3, showing average weekly capacity given and flow as a percentage of max NTC. Available capacity is given for all hours, but the average flow is only given for hours with flow in that direction. Export indicates flow from FI to SE3, while import indicates flow from SE3 to FI.

FI-SE3: hourly mean day ahead capacities and flows – percent of max NTC

Quarter 3, 2019

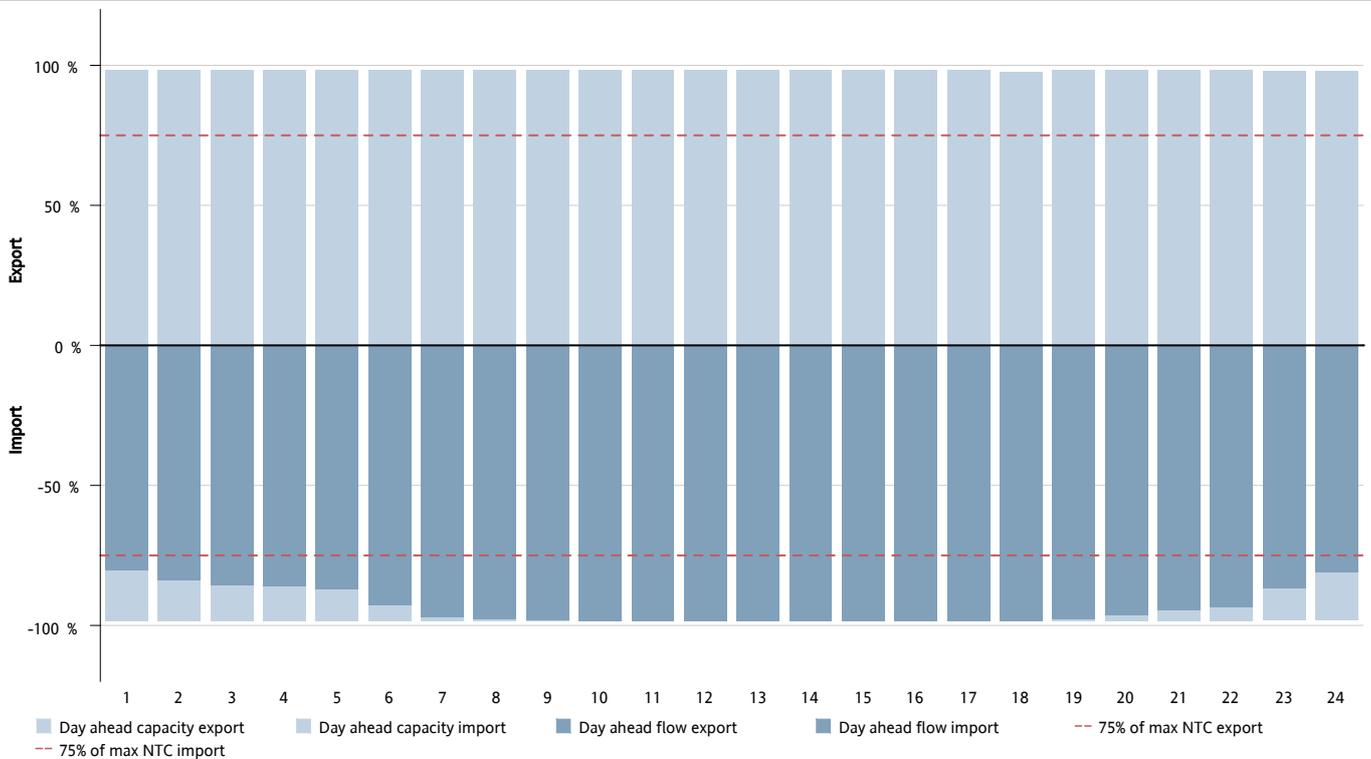


Figure 37: Shows cross-zonal day-ahead capacity result for the HVDC corridor FI-SE3, showing average per hour of the day (1-24) capacity given and flow as a percentage of max NTC. Available capacity is given for all hours, but the average flow is only given for hours with flow in that direction. Export indicates flow from FI to SE3, while import indicates flow from SE3 to FI.

FI-SE3: hourly day ahead capacities and flows – MW

Quarter 3, 2019

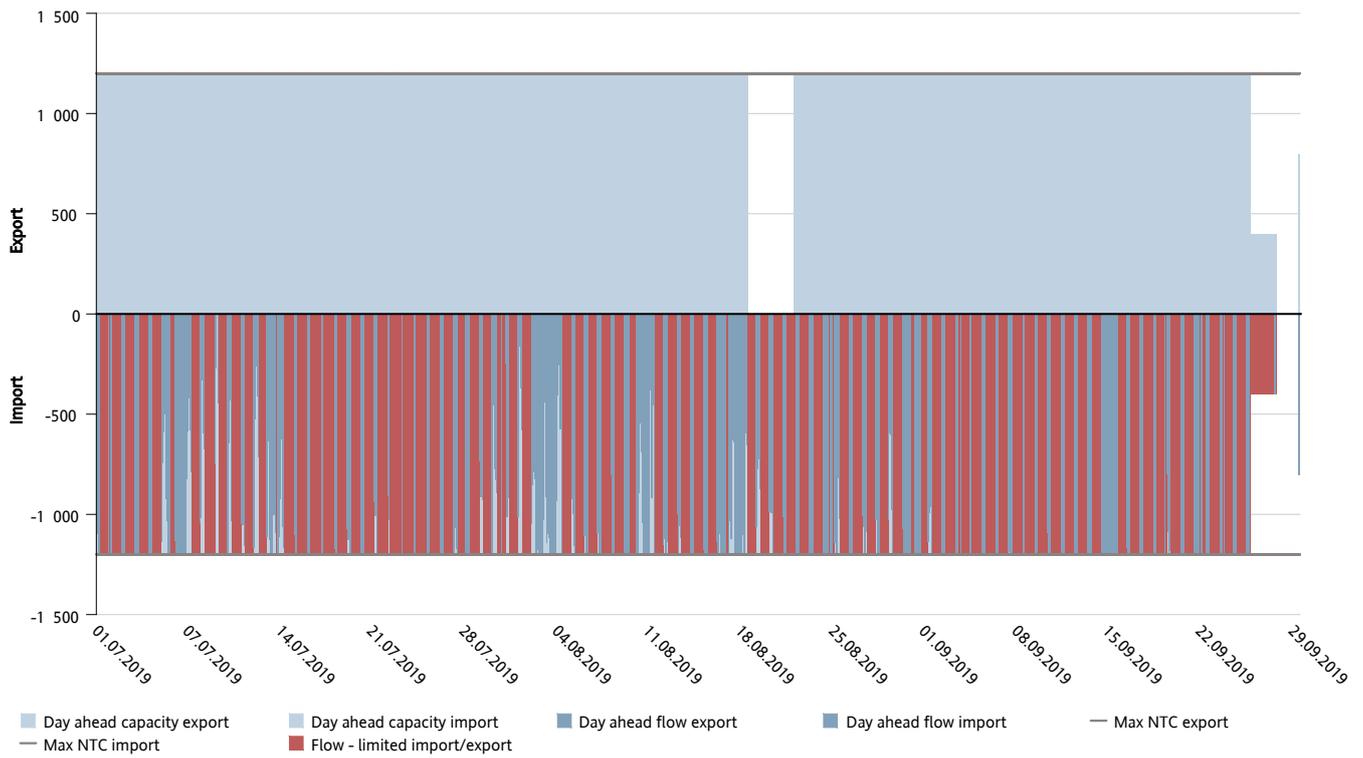


Figure 38: Shows cross-zonal day-ahead capacity result for the HVDC corridor FI-SE3, showing capacity given and flow (MW). Available capacity is given for all hours, but the average flow is only given for hours with flow in that direction. Export indicates flow from FI to SE3, while import indicates flow from SE3 to FI.

FI-SE3: price comparison in EUR

Quarter 3, 2019

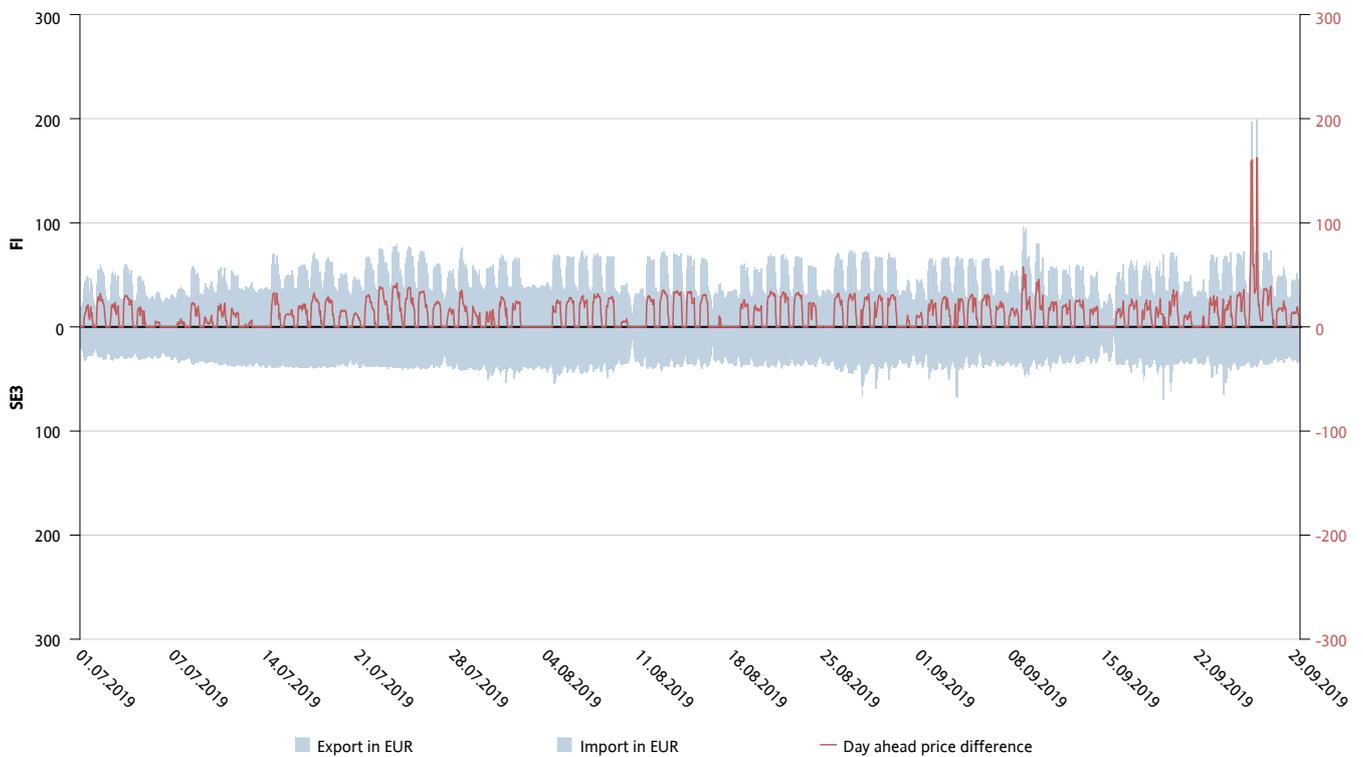


Figure 39: Shows day-ahead prices for the HVDC corridor FI-SE3, all prices are in EUR. The red line shows the price difference between the two areas.

NO1-SE3: weekly day ahead capacities and flows – percent of max NTC

Quarter 3, 2019

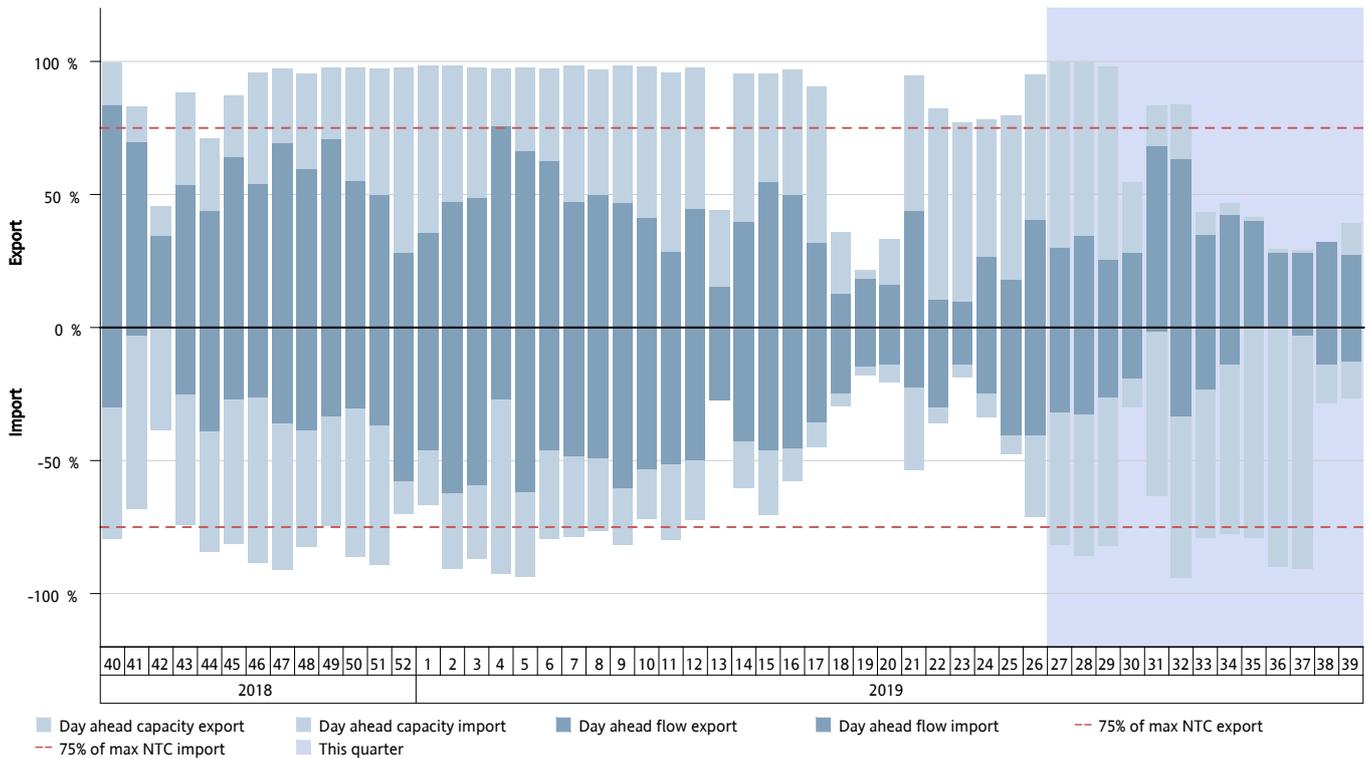


Figure 40: Shows cross-zonal day-ahead capacity result for the AC corridor NO1-SE3, showing average weekly capacity given and flow as a percentage of max NTC. Available capacity is given for all hours, but the average flow is only given for hours with flow in that direction. Export indicates flow from NO1 to SE3, while import indicates flow from SE3 to NO1.

NO1-SE3: hourly mean day ahead capacities and flows – percent of max NTC

Quarter 3, 2019

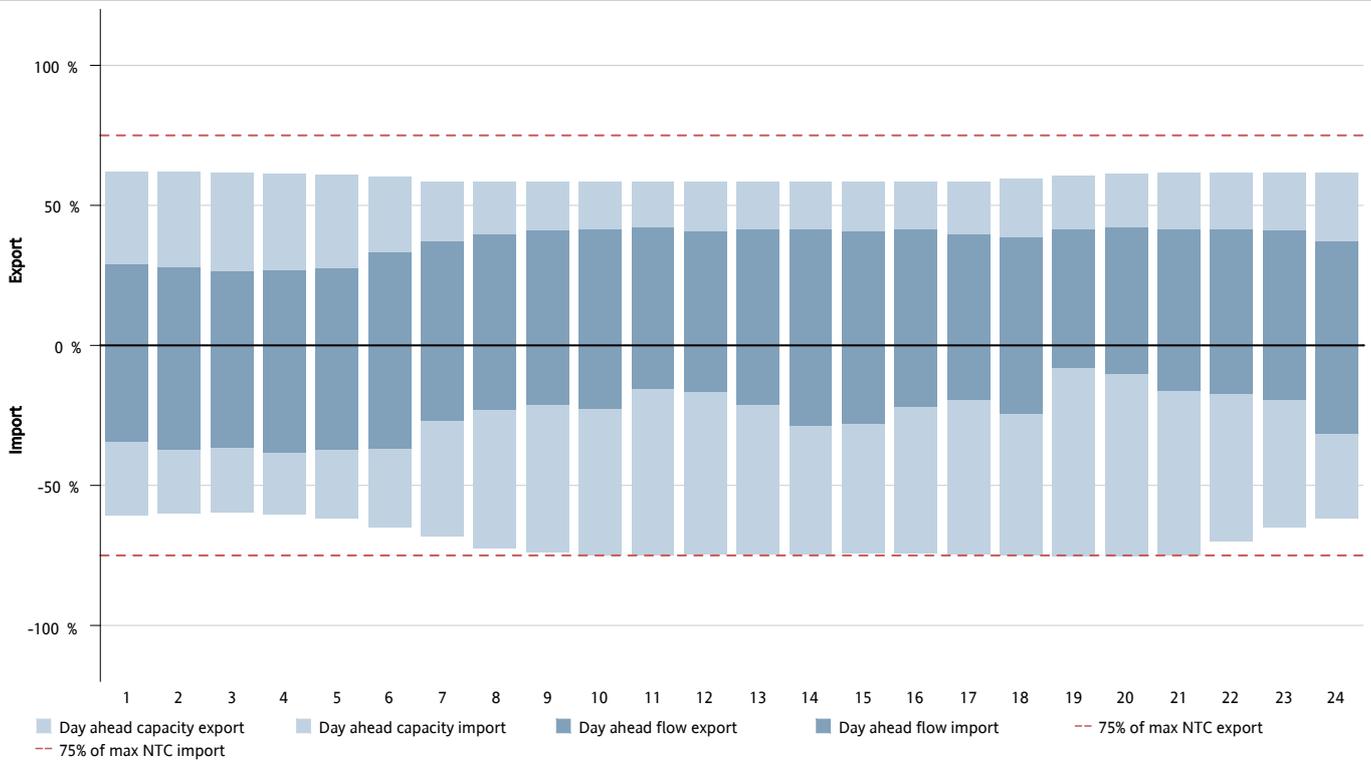


Figure 41: Shows cross-zonal day-ahead capacity result for the AC corridor NO1-SE3, showing average per hour of the day (1-24) capacity given and flow as a percentage of max NTC. Available capacity is given for all hours, but the average flow is only given for hours with flow in that direction. Export indicates flow from NO1 to SE3, while import indicates flow from SE3 to NO1.

NO1-SE3: hourly day ahead capacities and flows – MW

Quarter 3, 2019

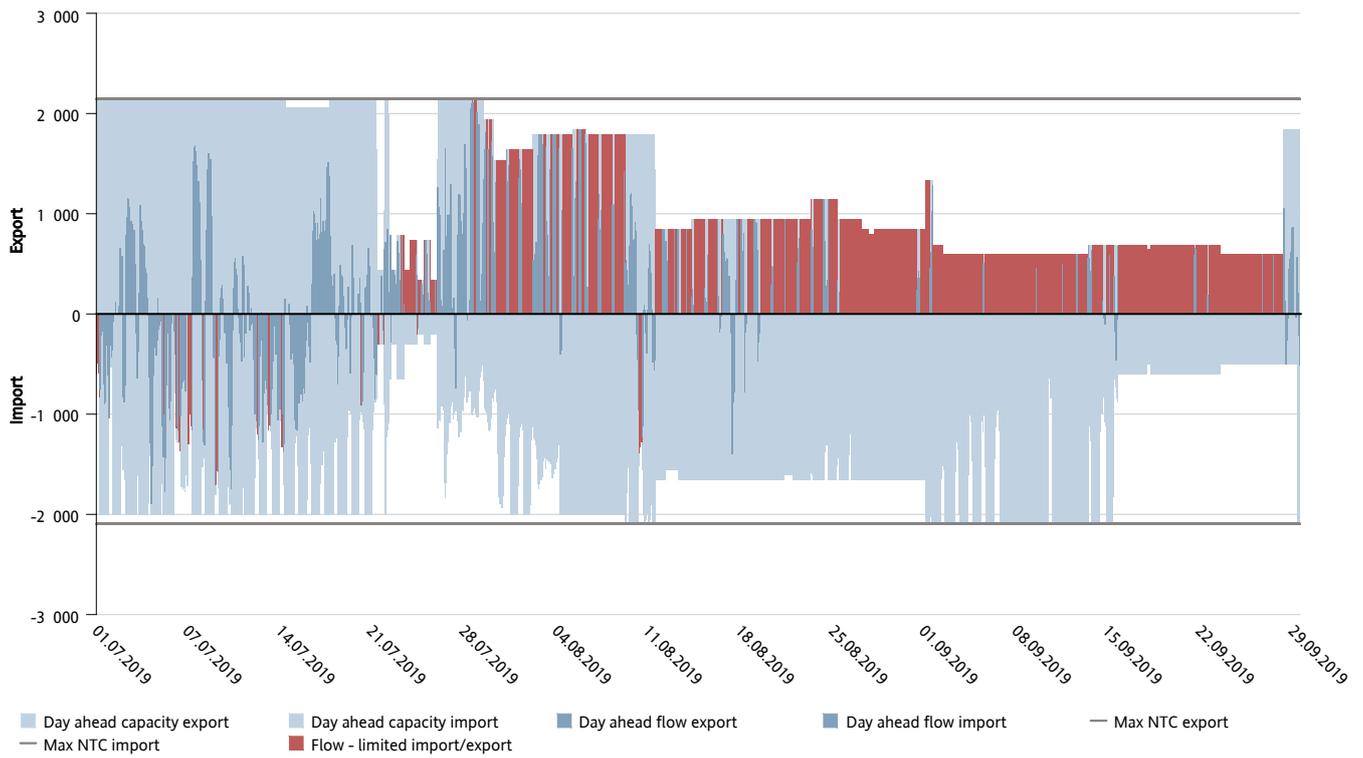


Figure 42: Shows cross-zonal day-ahead capacity result for the AC corridor NO1-SE3, showing capacity given and flow (MW). Available capacity is given for all hours, but the average flow is only given for hours with flow in that direction. Export indicates flow from NO1 to SE3, while import indicates flow from SE3 to NO1.

NO1-SE3: price comparison in EUR

Quarter 3, 2019

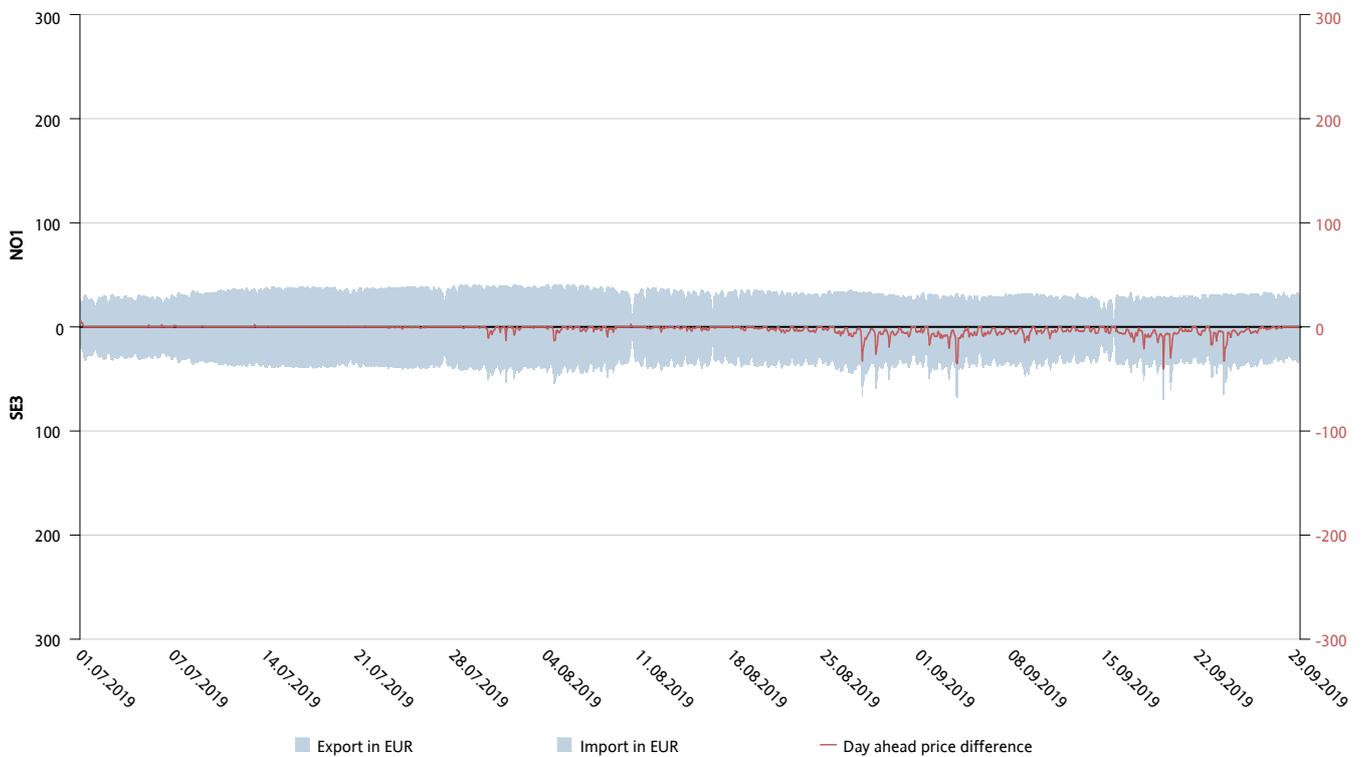


Figure 43: Shows day-ahead prices for the AC corridor NO1-SE3, all prices are in EUR. The red line shows the price difference between the two areas.

NO2-NL: weekly day ahead capacities and flows – percent of max NTC

Quarter 3, 2019

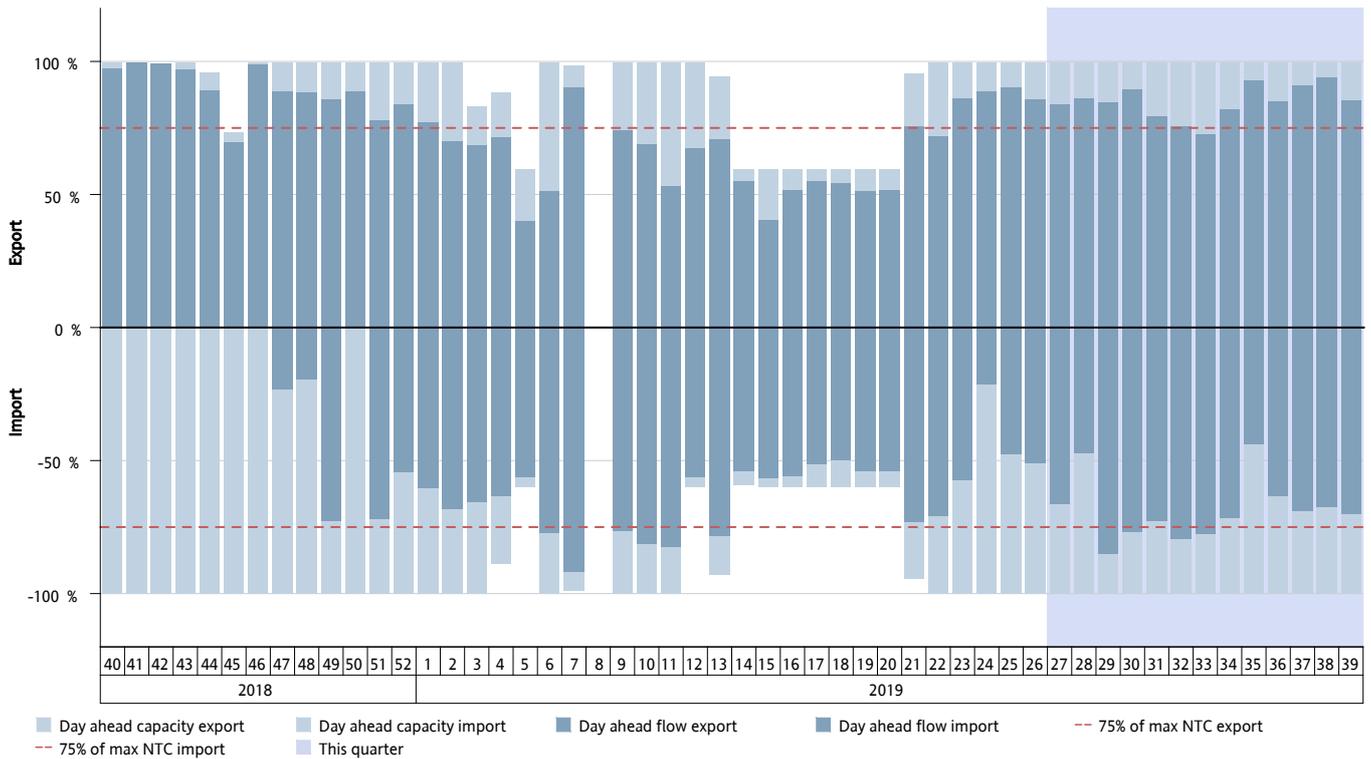


Figure 44: Shows cross-zonal day-ahead capacity result for the HVDC corridor NO2-NL, showing average weekly capacity given and flow as a percentage of max NTC. Available capacity is given for all hours, but the average flow is only given for hours with flow in that direction. Export indicates flow from NO2 to NL, while import indicates flow from NL to NO2.

NO2-NL: hourly mean day ahead capacities and flows – percent of max NTC

Quarter 3, 2019

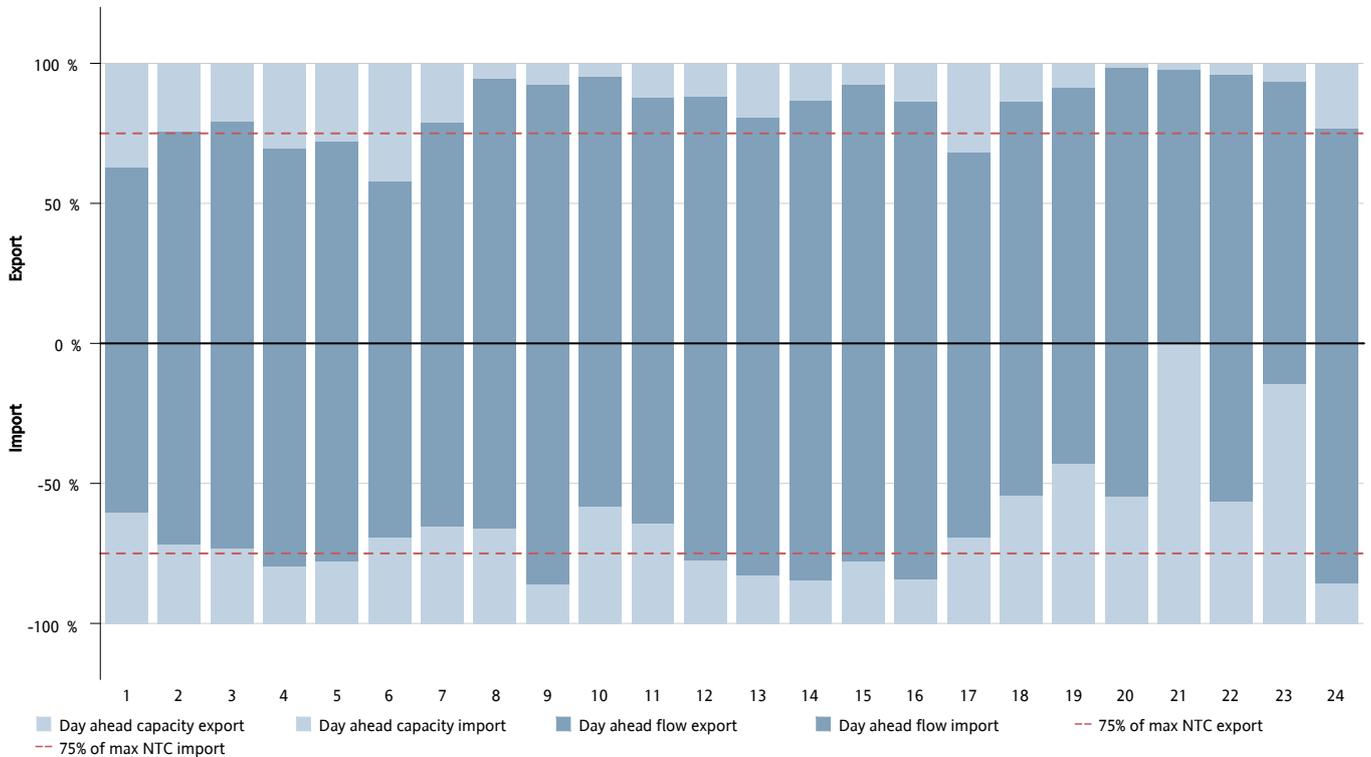


Figure 45: Shows cross-zonal day-ahead capacity result for the HVDC corridor NO2-NL, showing average per hour of the day (1-24) capacity given and flow as a percentage of max NTC. Available capacity is given for all hours, but the average flow is only given for hours with flow in that direction. Export indicates flow from NO2 to NL, while import indicates flow from NL to NO2.

NO2-NL: hourly day ahead capacities and flows – MW

Quarter 3, 2019

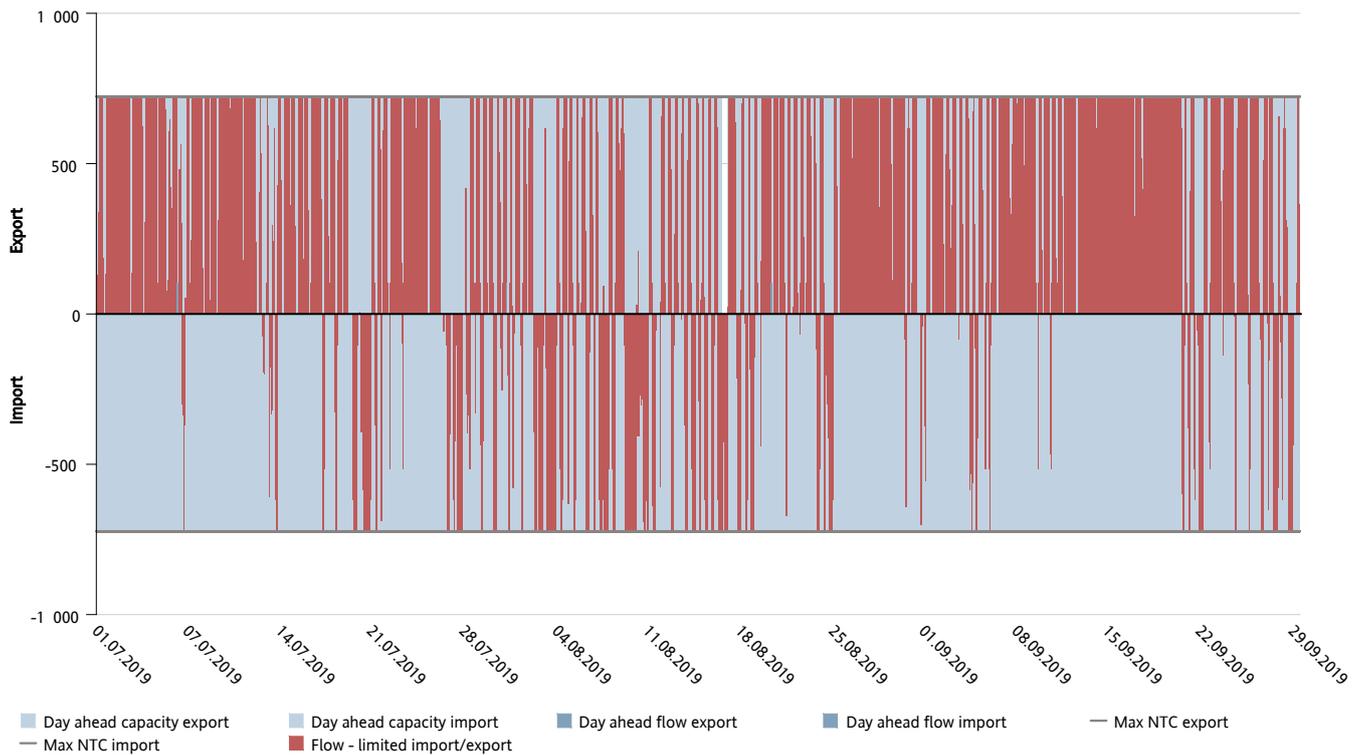


Figure 46: Shows cross-zonal day-ahead capacity result for the HVDC corridor NO2-NL, showing capacity given and flow (MW). Available capacity is given for all hours, but the average flow is only given for hours with flow in that direction. Export indicates flow from NO2 to NL, while import indicates flow from NL to NO2.

NO2-NL: price comparison in EUR

Quarter 3, 2019

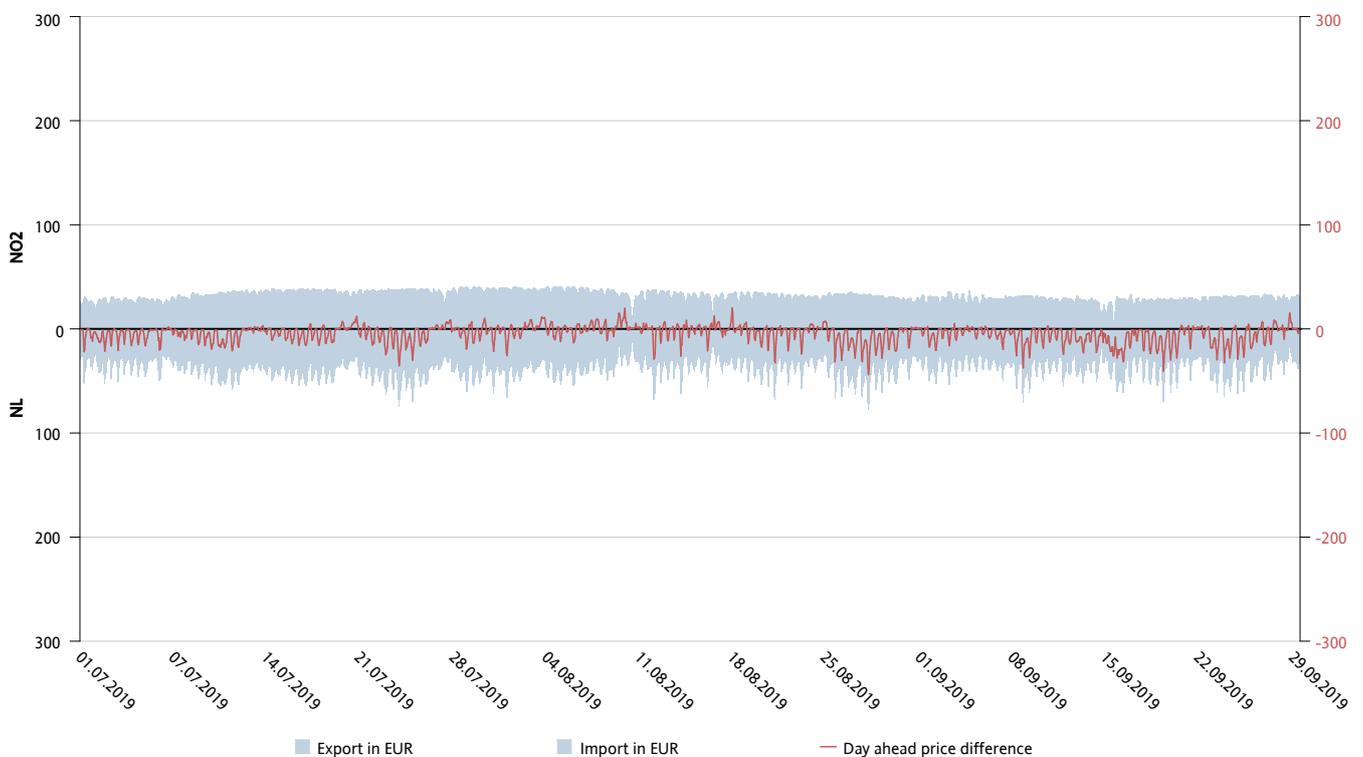


Figure 47: Shows day-ahead prices for the HVDC corridor NO2-NL, all prices are in EUR. The red line shows the price difference between the two areas.

NO3-SE2: weekly day ahead capacities and flows – percent of max NTC

Quarter 3, 2019

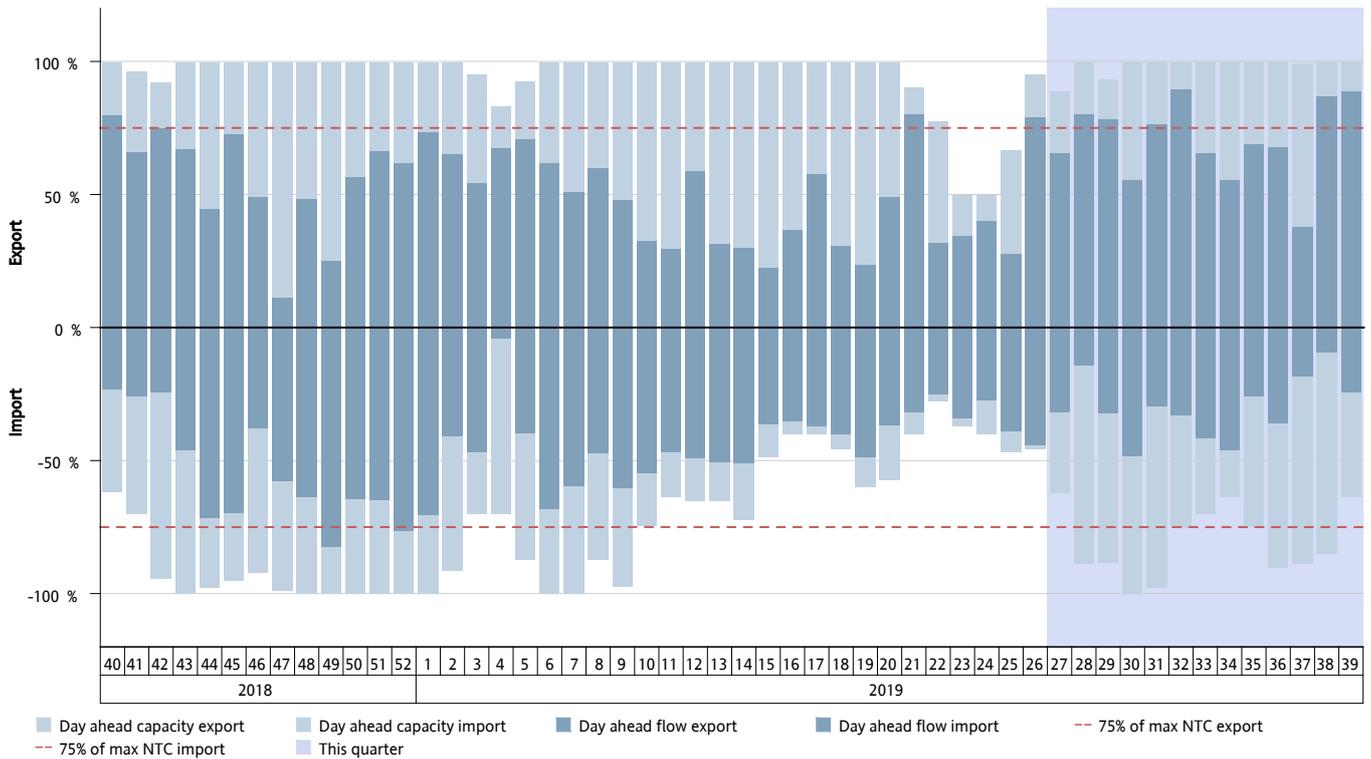


Figure 48: Shows cross-zonal day-ahead capacity result for the AC corridor NO3-SE2, showing average weekly capacity given and flow as a percentage of max NTC. Available capacity is given for all hours, but the average flow is only given for hours with flow in that direction. Export indicates flow from NO3 to SE2, while import indicates flow from SE2 to NO3.

NO3-SE2: hourly mean day ahead capacities and flows – percent of max NTC

Quarter 3, 2019

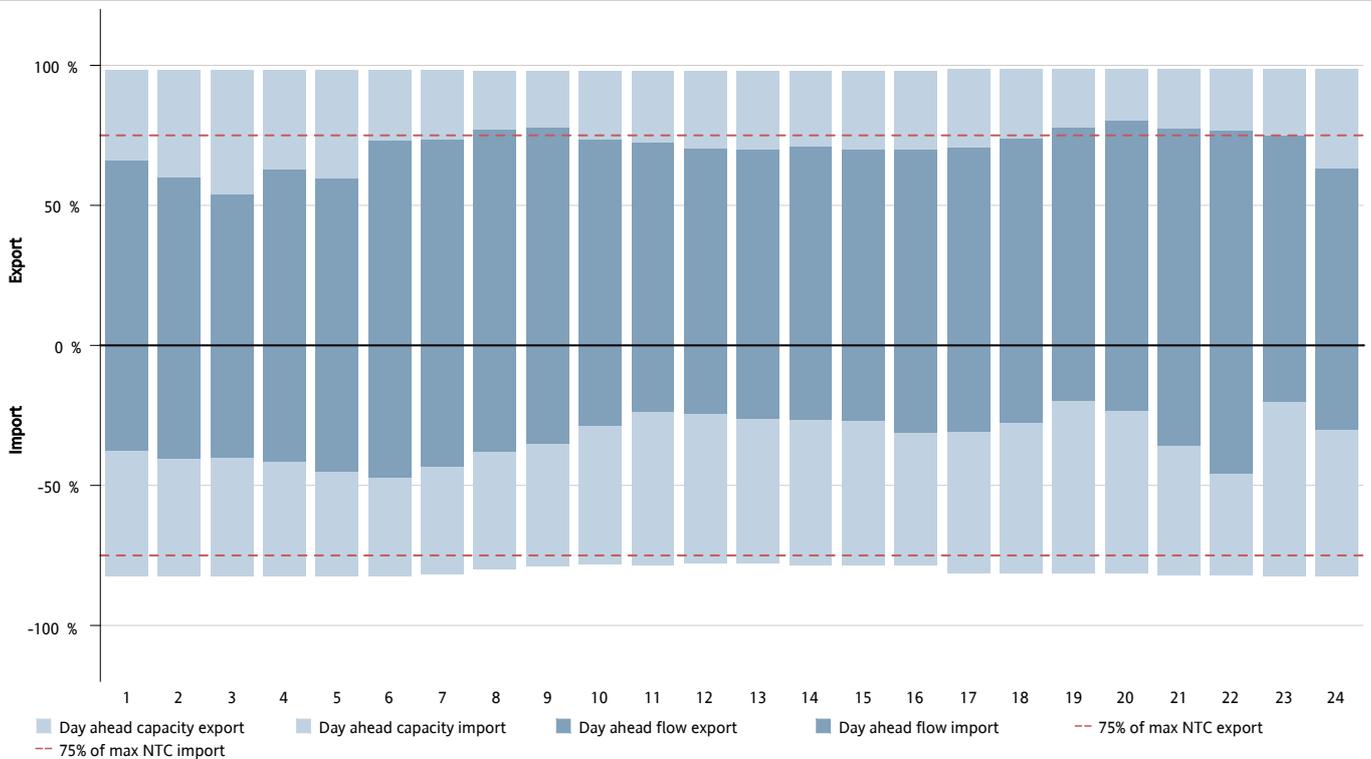


Figure 49: Shows cross-zonal day-ahead capacity result for the AC corridor NO3-SE2, showing average per hour of the day (1-24) capacity given and flow as a percentage of max NTC. Available capacity is given for all hours, but the average flow is only given for hours with flow in that direction. Export indicates flow from NO3 to SE2, while import indicates flow from SE2 to NO3.

NO3-SE2: hourly day ahead capacities and flows – MW

Quarter 3, 2019

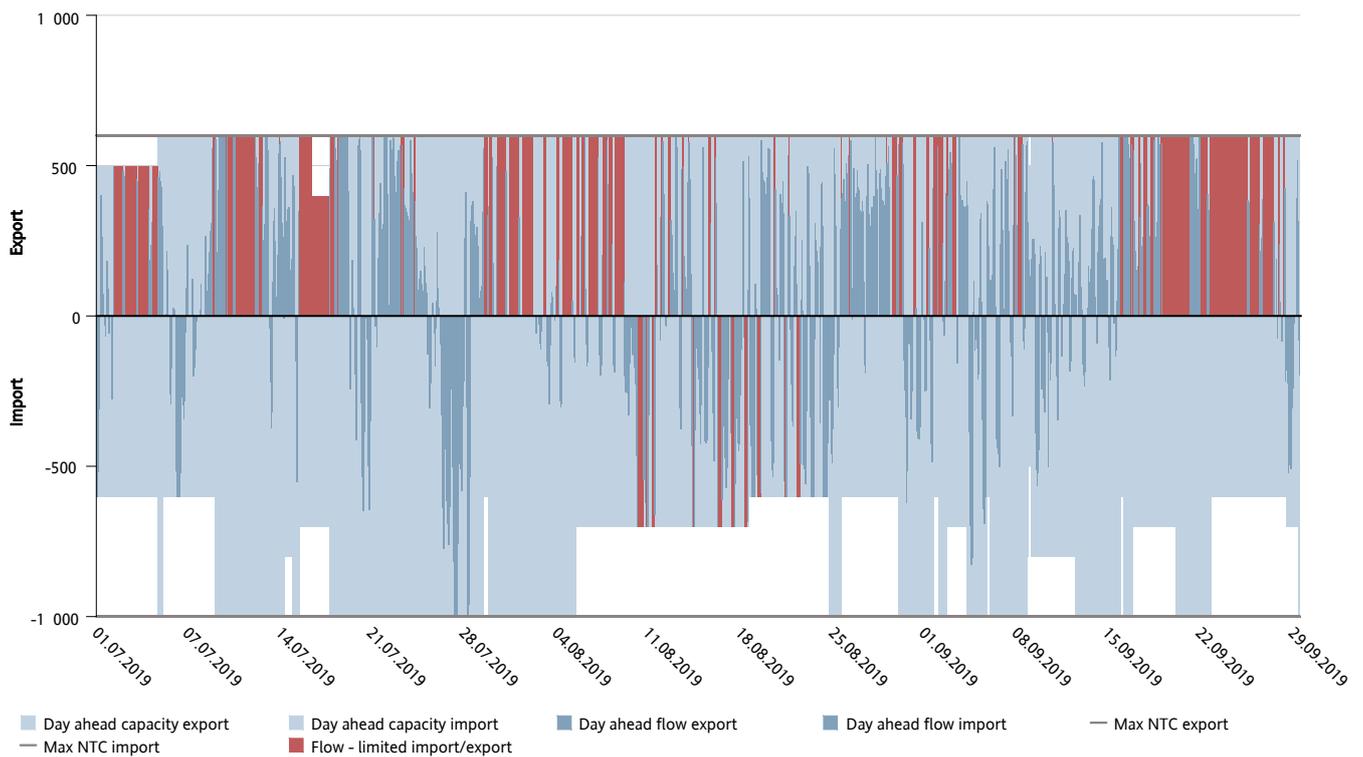


Figure 50: Shows cross-zonal day-ahead capacity result for the AC corridor NO3-SE2, showing capacity given and flow (MW). Available capacity is given for all hours, but the average flow is only given for hours with flow in that direction. Export indicates flow from NO3 to SE2, while import indicates flow from SE2 to NO3.

NO3-SE2: price comparison in EUR

Quarter 3, 2019

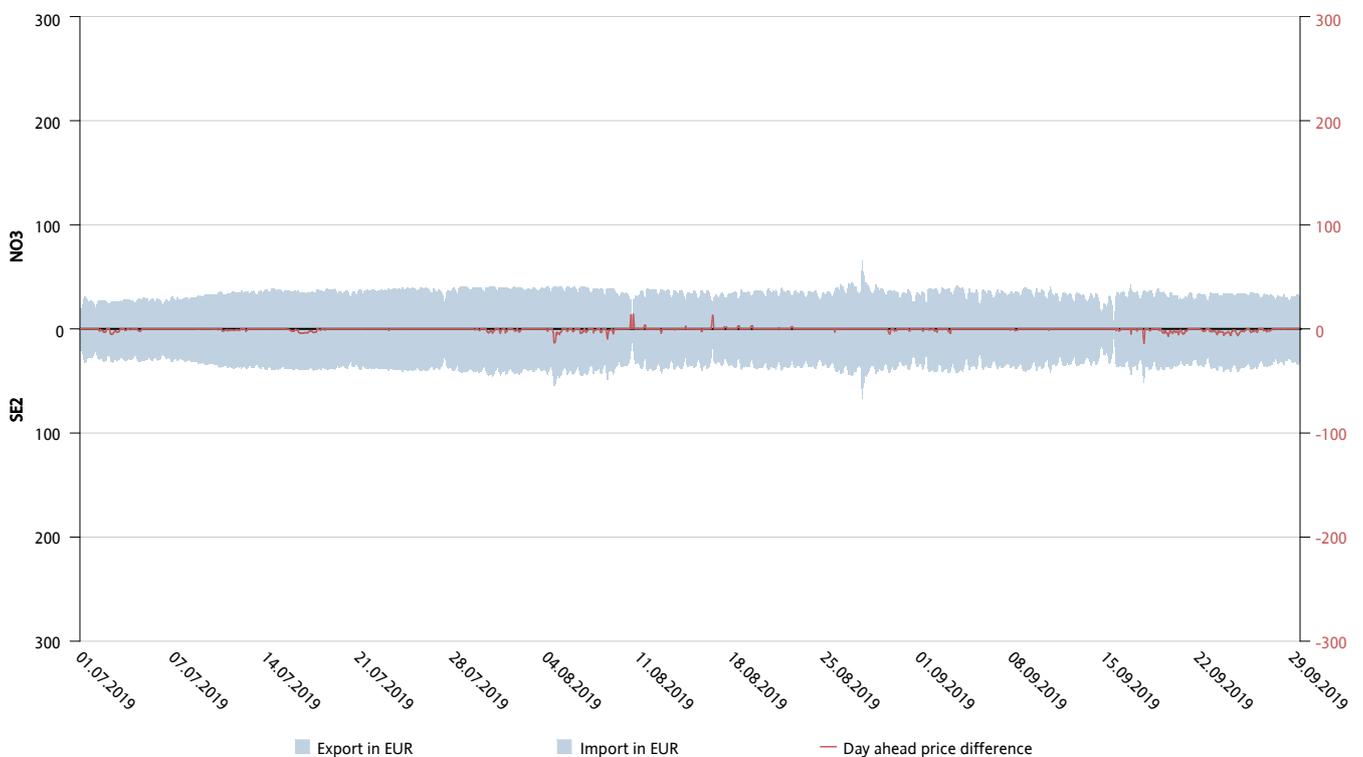


Figure 51: Shows day-ahead prices for the AC corridor NO3-SE2, all prices are in EUR. The red line shows the price difference between the two areas.

NO4-SE1: weekly day ahead capacities and flows – percent of max NTC

Quarter 3, 2019

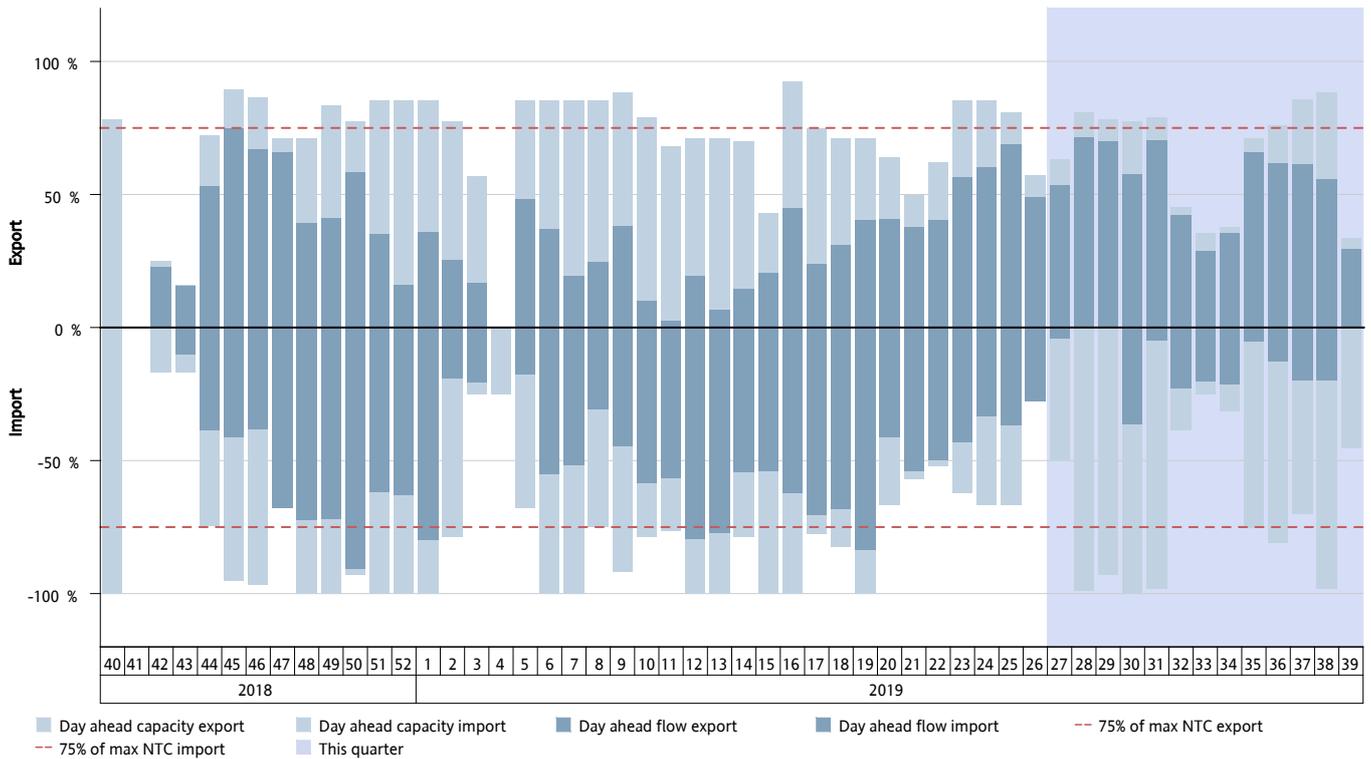


Figure 52: Shows cross-zonal day-ahead capacity result for the AC corridor NO4-SE1, showing average weekly capacity given and flow as a percentage of max NTC. Available capacity is given for all hours, but the average flow is only given for hours with flow in that direction. Export indicates flow from NO4 to SE1, while import indicates flow from SE1 to NO4.

NO4-SE1: hourly mean day ahead capacities and flows – percent of max NTC

Quarter 3, 2019

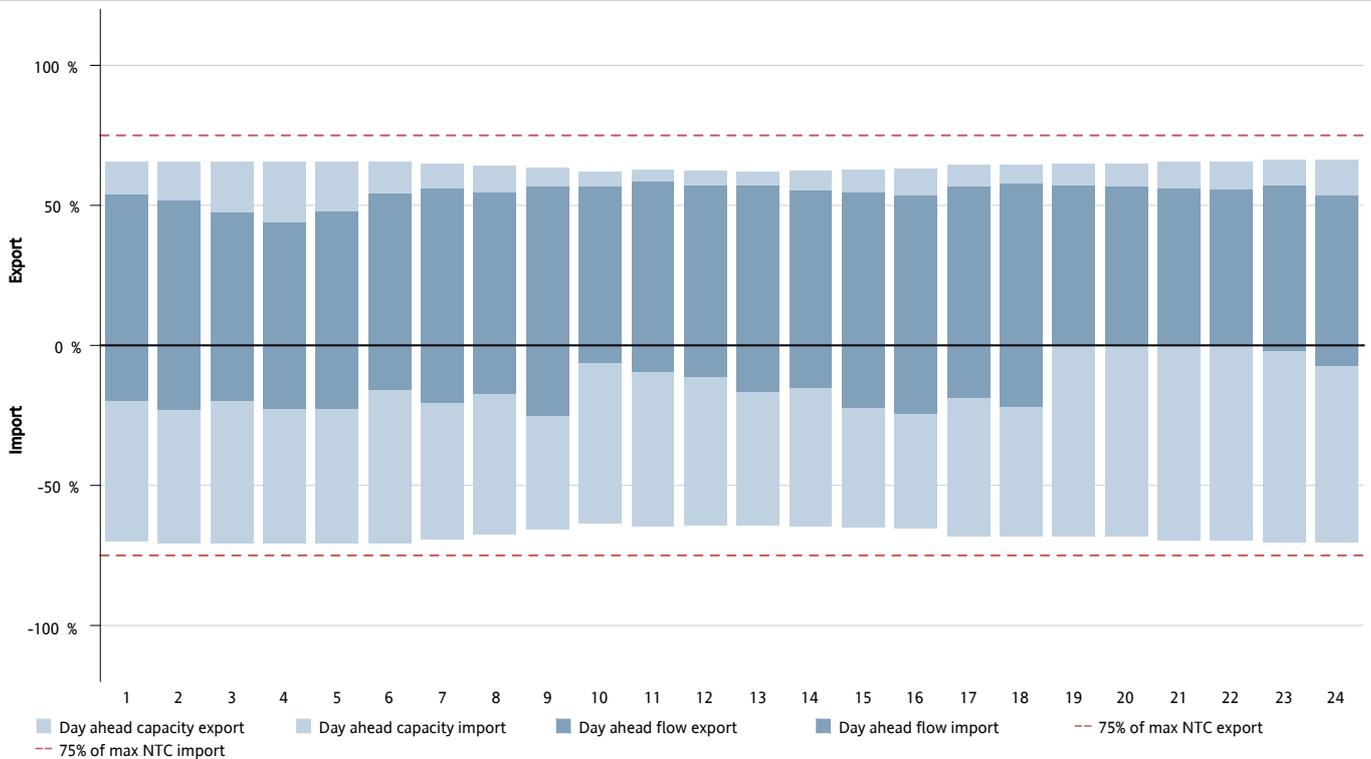


Figure 53: Shows cross-zonal day-ahead capacity result for the AC corridor NO4-SE1, showing average per hour of the day (1-24) capacity given and flow as a percentage of max NTC. Available capacity is given for all hours, but the average flow is only given for hours with flow in that direction. Export indicates flow from NO4 to SE1, while import indicates flow from SE1 to NO4.

NO4-SE1: hourly day ahead capacities and flows – MW

Quarter 3, 2019

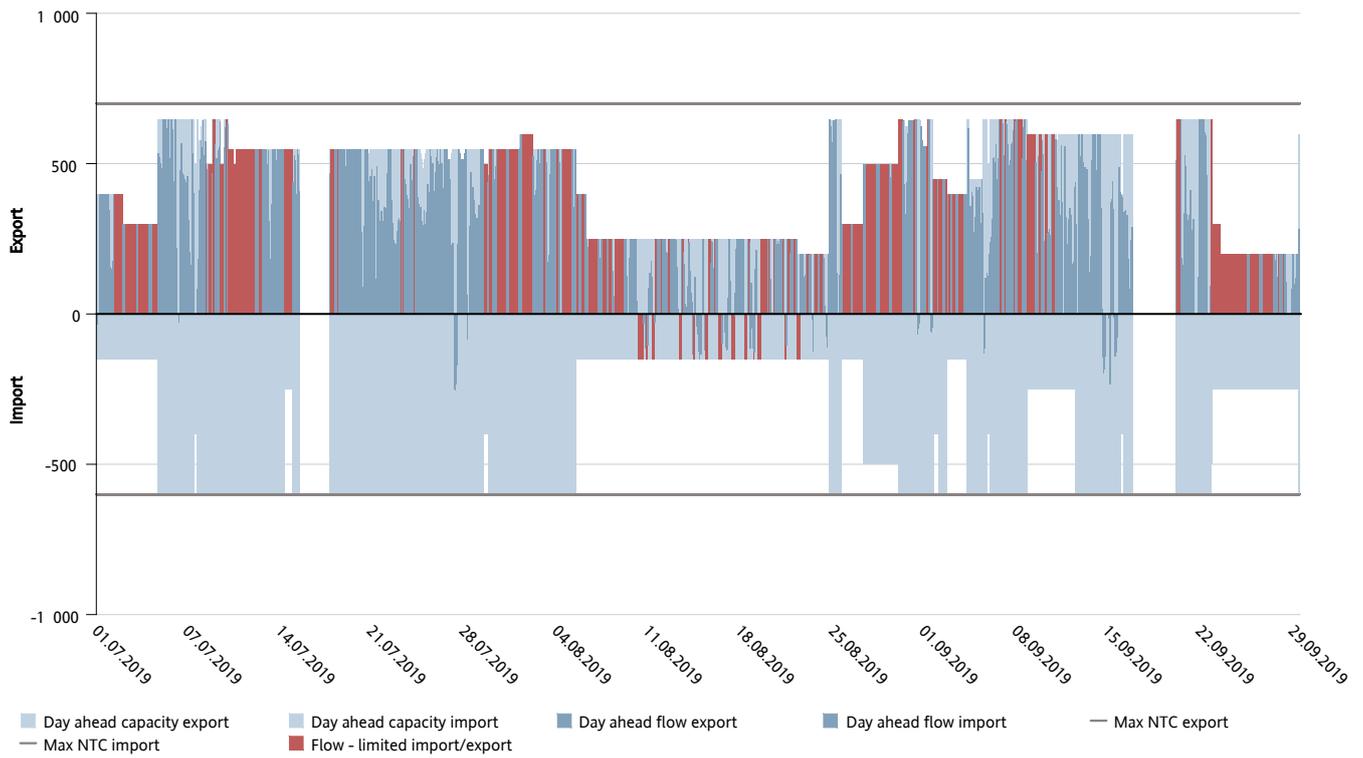


Figure 54: Shows cross-zonal day-ahead capacity result for the AC corridor NO4-SE1, showing capacity given and flow (MW). Available capacity is given for all hours, but the average flow is only given for hours with flow in that direction. Export indicates flow from NO4 to SE1, while import indicates flow from SE1 to NO4.

NO4-SE1: price comparison in EUR

Quarter 3, 2019

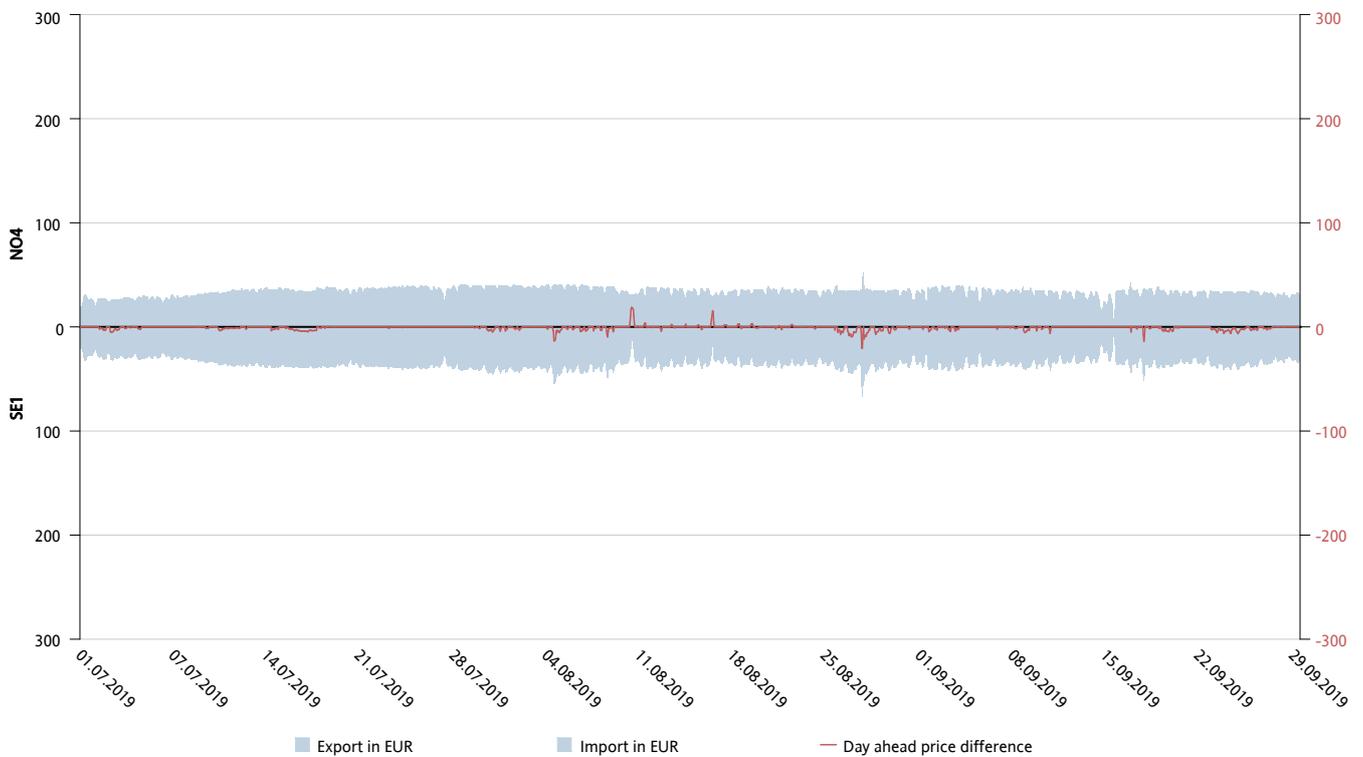


Figure 55: Shows day-ahead prices for the AC corridor NO4-SE1, all prices are in EUR. The red line shows the price difference between the two areas.

NO4-SE2: weekly day ahead capacities and flows – percent of max NTC

Quarter 3, 2019

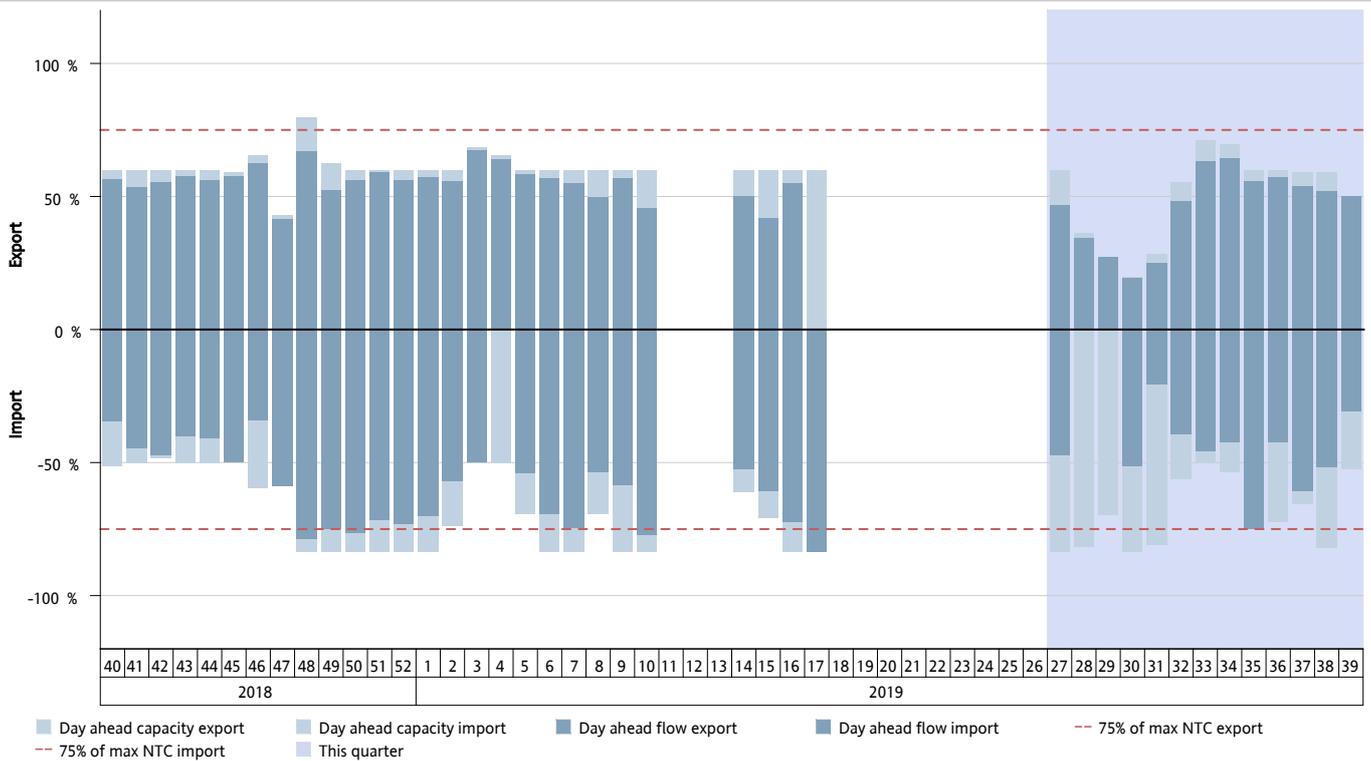


Figure 56: Shows cross-zonal day-ahead capacity result for the AC corridor NO4-SE2, showing average weekly capacity given and flow as a percentage of max NTC. Available capacity is given for all hours, but the average flow is only given for hours with flow in that direction. Export indicates flow from NO4 to SE2, while import indicates flow from SE2 to NO4.

NO4-SE2: hourly mean day ahead capacities and flows – percent of max NTC

Quarter 3, 2019

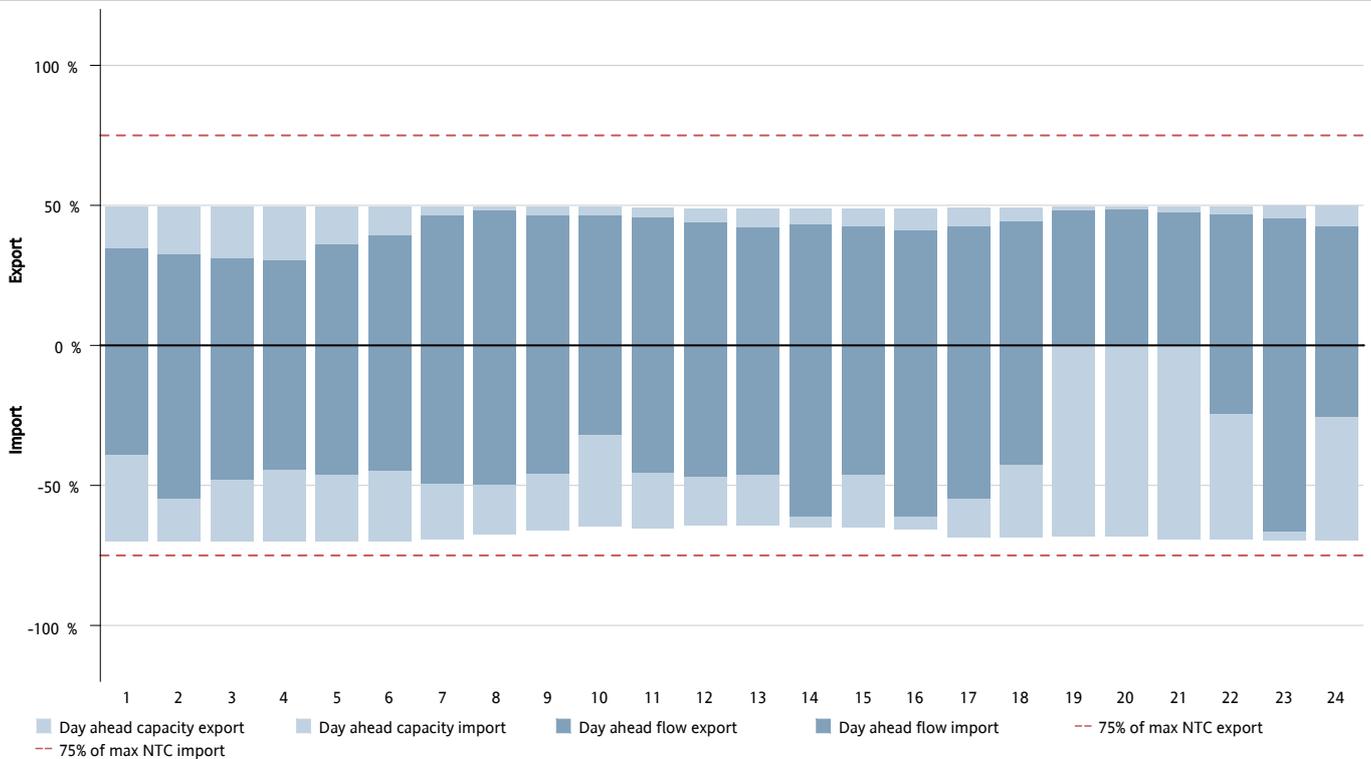


Figure 57: Shows cross-zonal day-ahead capacity result for the AC corridor NO4-SE2, showing average per hour of the day (1-24) capacity given and flow as a percentage of max NTC. Available capacity is given for all hours, but the average flow is only given for hours with flow in that direction. Export indicates flow from NO4 to SE2, while import indicates flow from SE2 to NO4.

NO4-SE2: hourly day ahead capacities and flows – MW

Quarter 3, 2019

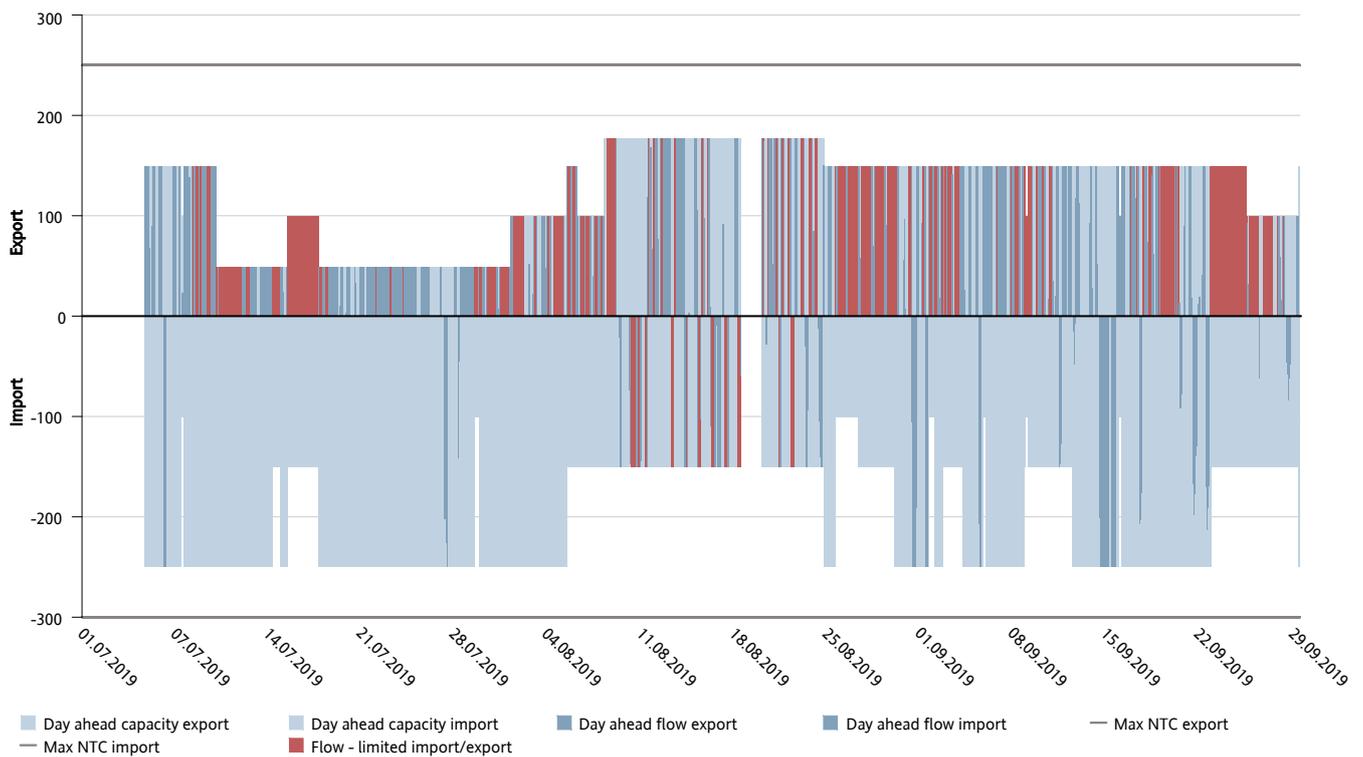


Figure 58: Shows cross-zonal day-ahead capacity result for the AC corridor NO4-SE2, showing capacity given and flow (MW). Available capacity is given for all hours, but the average flow is only given for hours with flow in that direction. Export indicates flow from NO4 to SE2, while import indicates flow from SE2 to NO4.

NO4-SE2: price comparison in EUR

Quarter 3, 2019

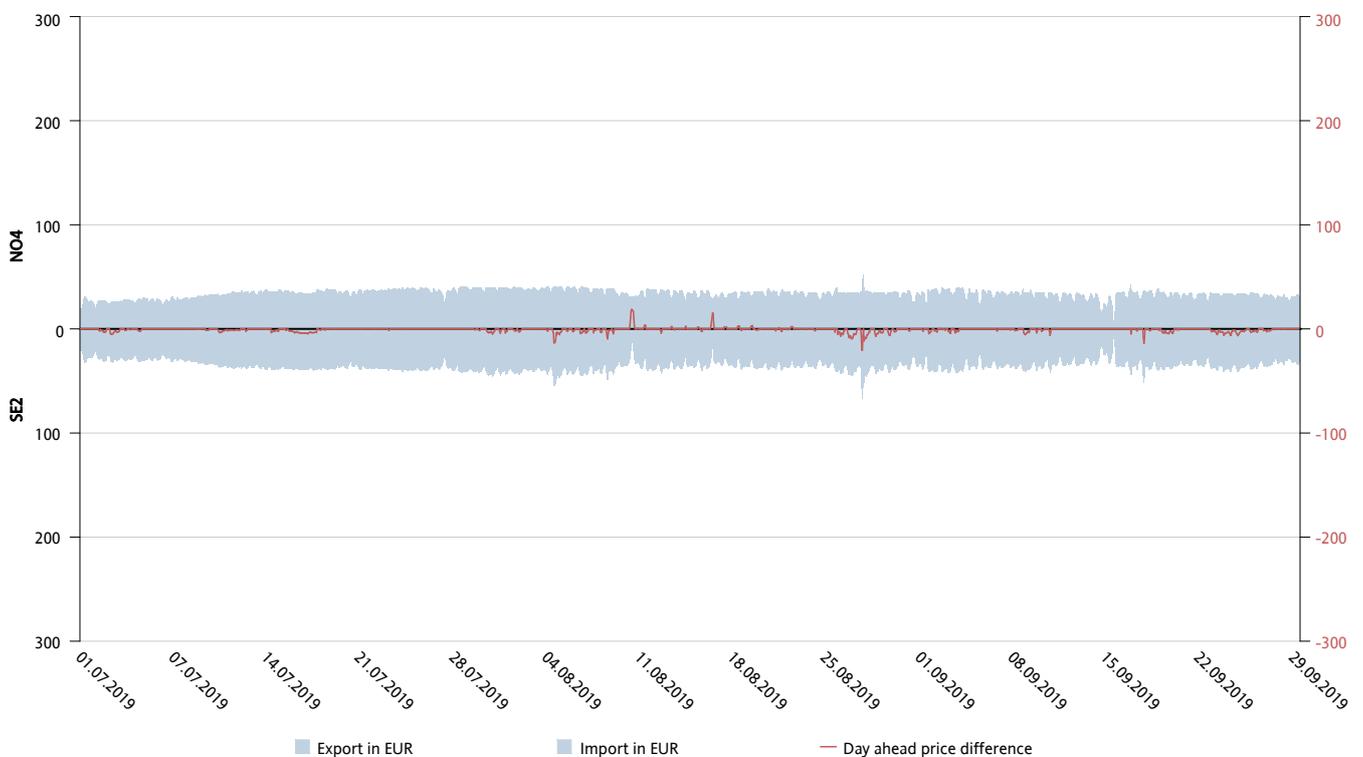


Figure 59: Shows day-ahead prices for the AC corridor NO4-SE2, all prices are in EUR. The red line shows the price difference between the two areas.

SE4-DE: weekly day ahead capacities and flows – percent of max NTC

Quarter 3, 2019

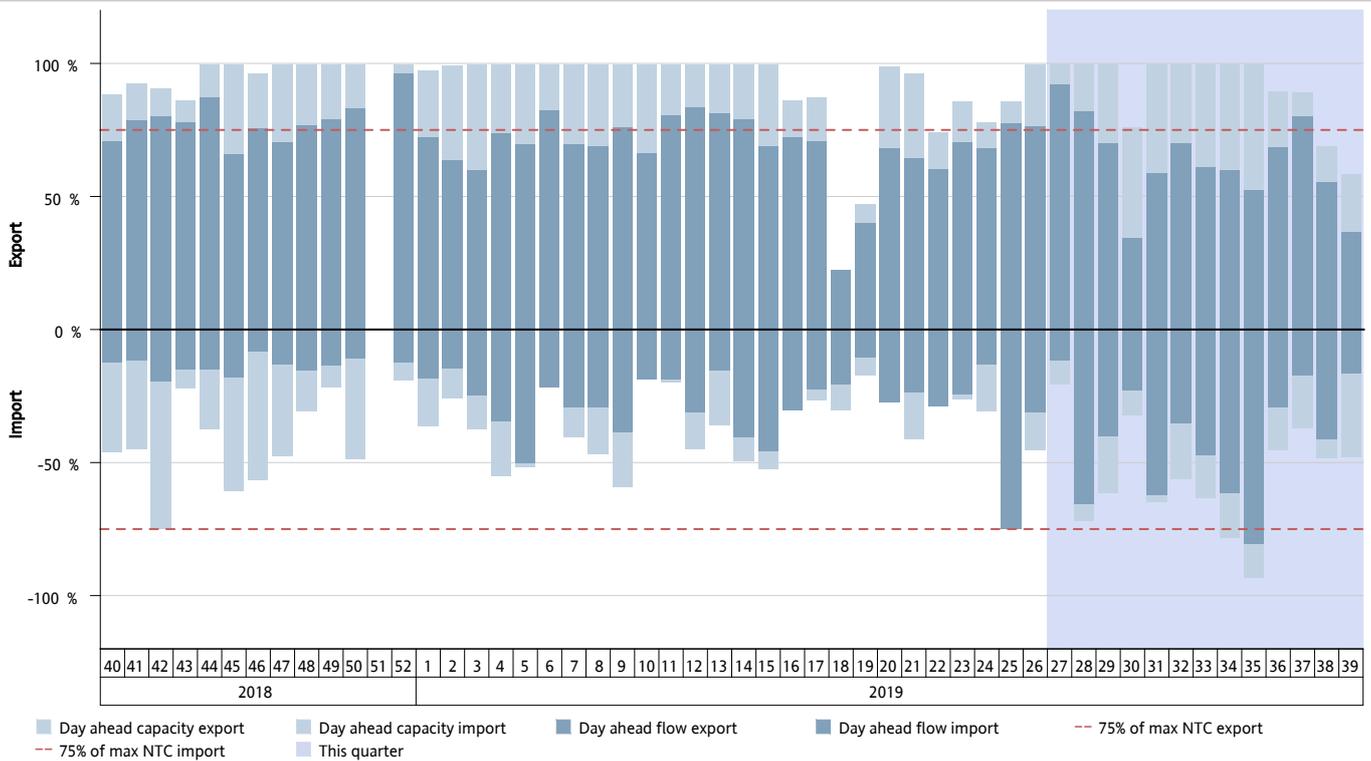


Figure 60: Shows cross-zonal day-ahead capacity result for the HVDC corridor SE4-DE, showing average weekly capacity given and flow as a percentage of max NTC. Available capacity is given for all hours, but the average flow is only given for hours with flow in that direction. Export indicates flow from SE4 to DE, while import indicates flow from DE to SE4.

SE4-DE: hourly mean day ahead capacities and flows – percent of max NTC

Quarter 3, 2019

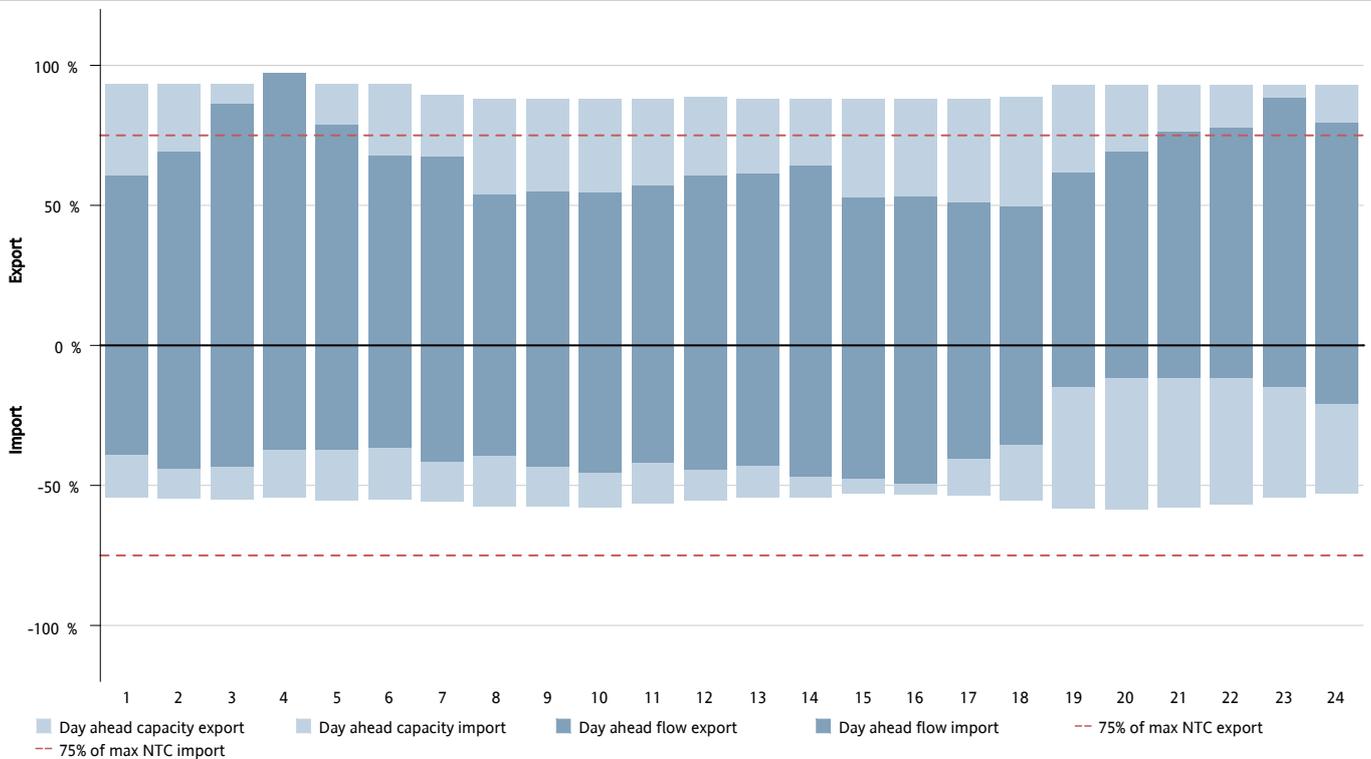


Figure 61: Shows cross-zonal day-ahead capacity result for the HVDC corridor SE4-DE, showing average per hour of the day (1-24) capacity given and flow as a percentage of max NTC. Available capacity is given for all hours, but the average flow is only given for hours with flow in that direction. Export indicates flow from SE4 to DE, while import indicates flow from DE to SE4.

SE4-DE: hourly day ahead capacities and flows – MW

Quarter 3, 2019

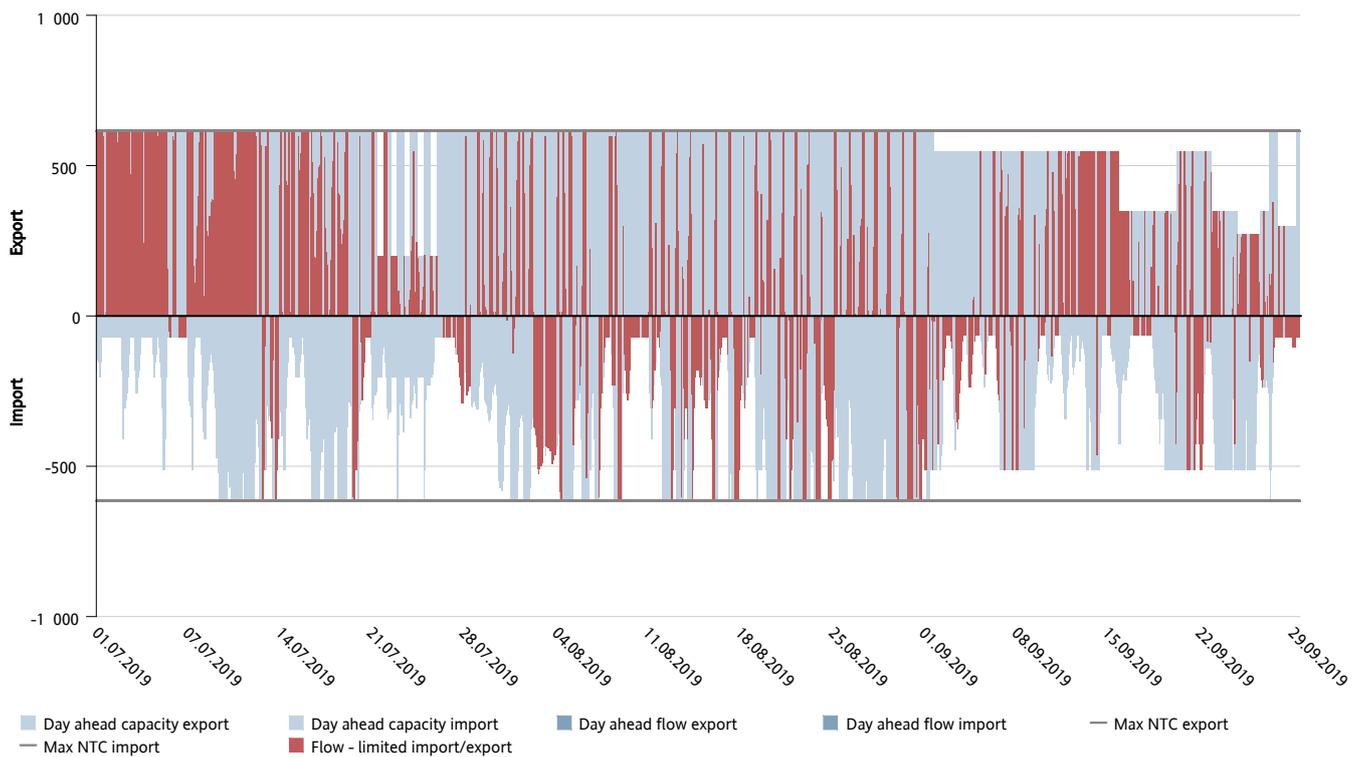


Figure 62: Shows cross-zonal day-ahead capacity result for the HVDC corridor SE4-DE, showing capacity given and flow (MW). Available capacity is given for all hours, but the average flow is only given for hours with flow in that direction. Export indicates flow from SE4 to DE, while import indicates flow from DE to SE4.

SE4-DE: price comparison in EUR

Quarter 3, 2019

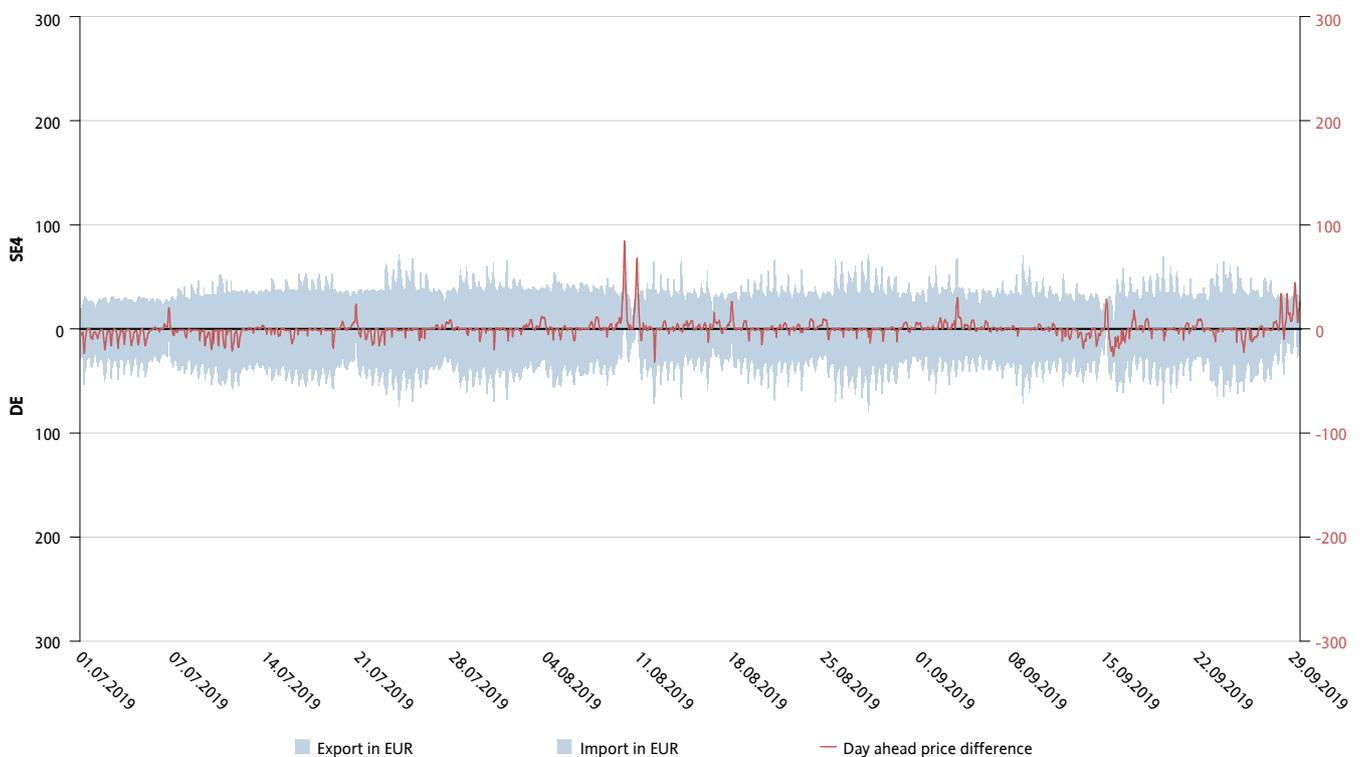


Figure 63: Shows day-ahead prices for the HVDC corridor SE4-DE, all prices are in EUR. The red line shows the price difference between the two areas.

SE4-LT: weekly day ahead capacities and flows – percent of max NTC

Quarter 3, 2019

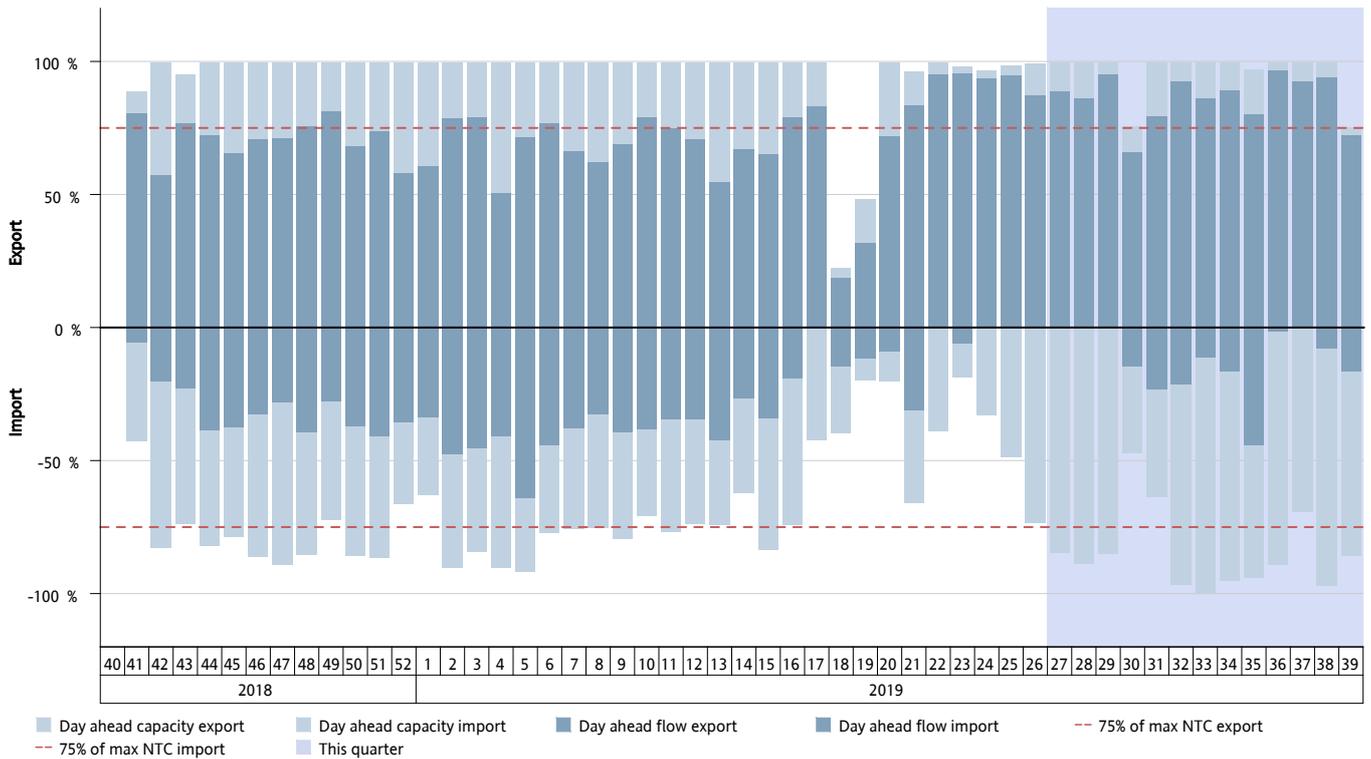


Figure 64: Shows cross-zonal day-ahead capacity result for the HVDC corridor SE4-LT, showing average weekly capacity given and flow as a percentage of max NTC. Available capacity is given for all hours, but the average flow is only given for hours with flow in that direction. Export indicates flow from SE4 to LT, while import indicates flow from LT to SE4.

SE4-LT: hourly mean day ahead capacities and flows – percent of max NTC

Quarter 3, 2019

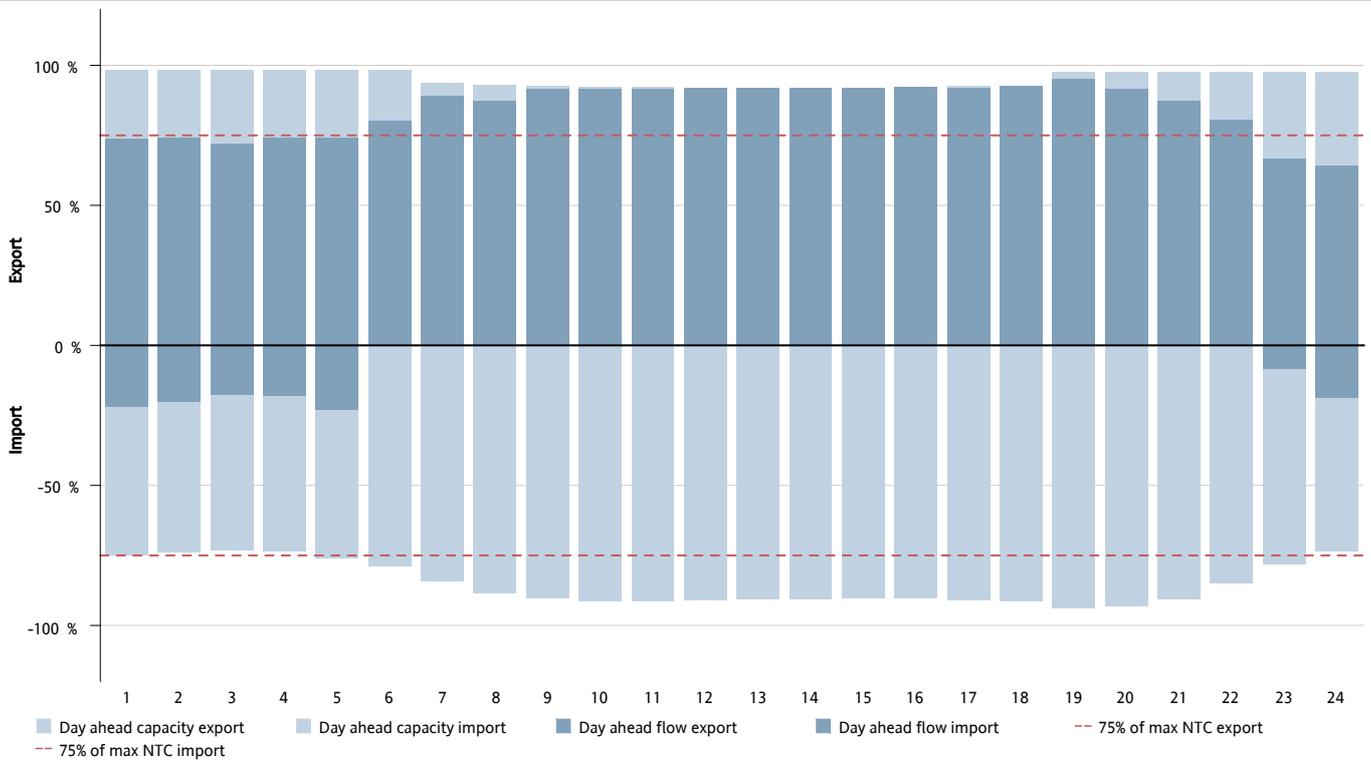


Figure 65: Shows cross-zonal day-ahead capacity result for the HVDC corridor SE4-LT, showing average per hour of the day (1-24) capacity given and flow as a percentage of max NTC. Available capacity is given for all hours, but the average flow is only given for hours with flow in that direction. Export indicates flow from SE4 to LT, while import indicates flow from LT to SE4.

SE4-LT: hourly day ahead capacities and flows – MW

Quarter 3, 2019

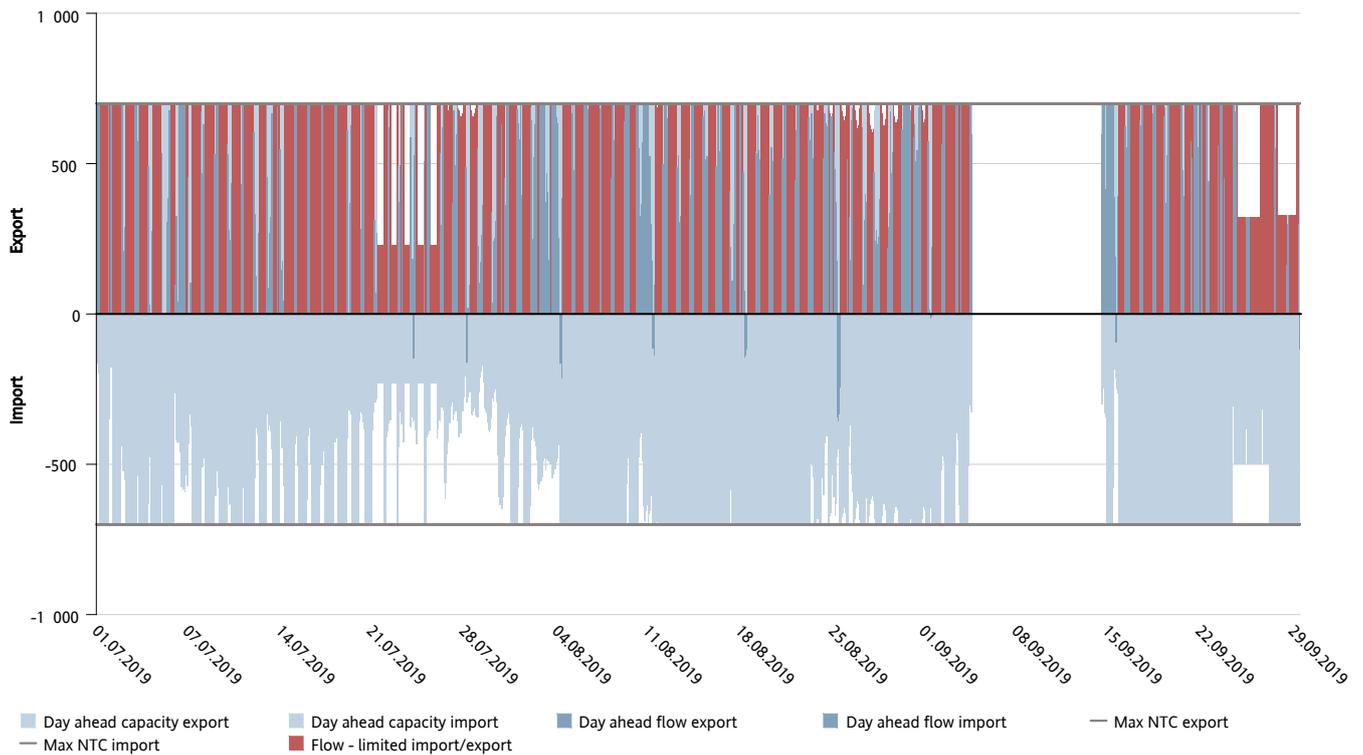


Figure 66: Shows cross-zonal day-ahead capacity result for the HVDC corridor SE4-LT, showing capacity given and flow (MW). Available capacity is given for all hours, but the average flow is only given for hours with flow in that direction. Export indicates flow from SE4 to LT, while import indicates flow from LT to SE4.

SE4-LT: price comparison in EUR

Quarter 3, 2019

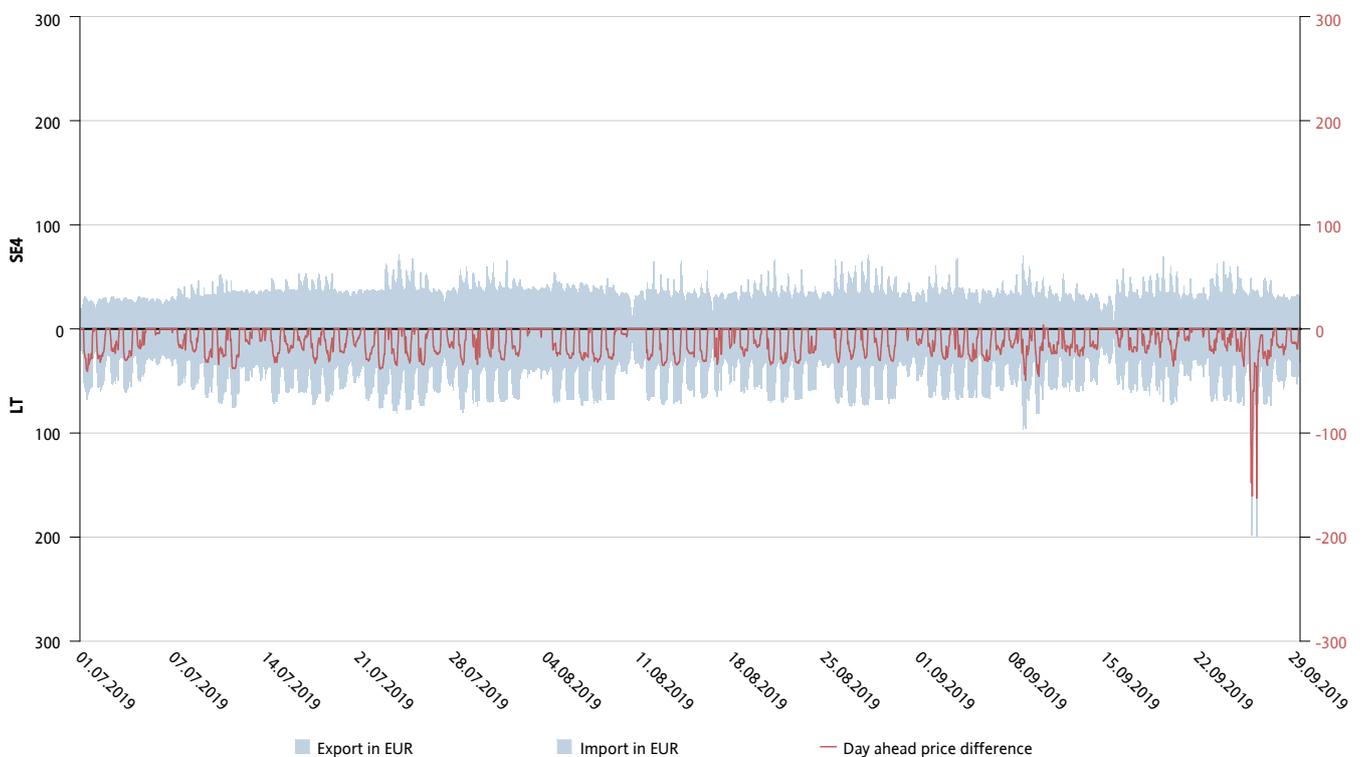


Figure 67: Shows day-ahead prices for the HVDC corridor SE4-LT, all prices are in EUR. The red line shows the price difference between the two areas.

SE4-PL: weekly day ahead capacities and flows – percent of max NTC

Quarter 3, 2019

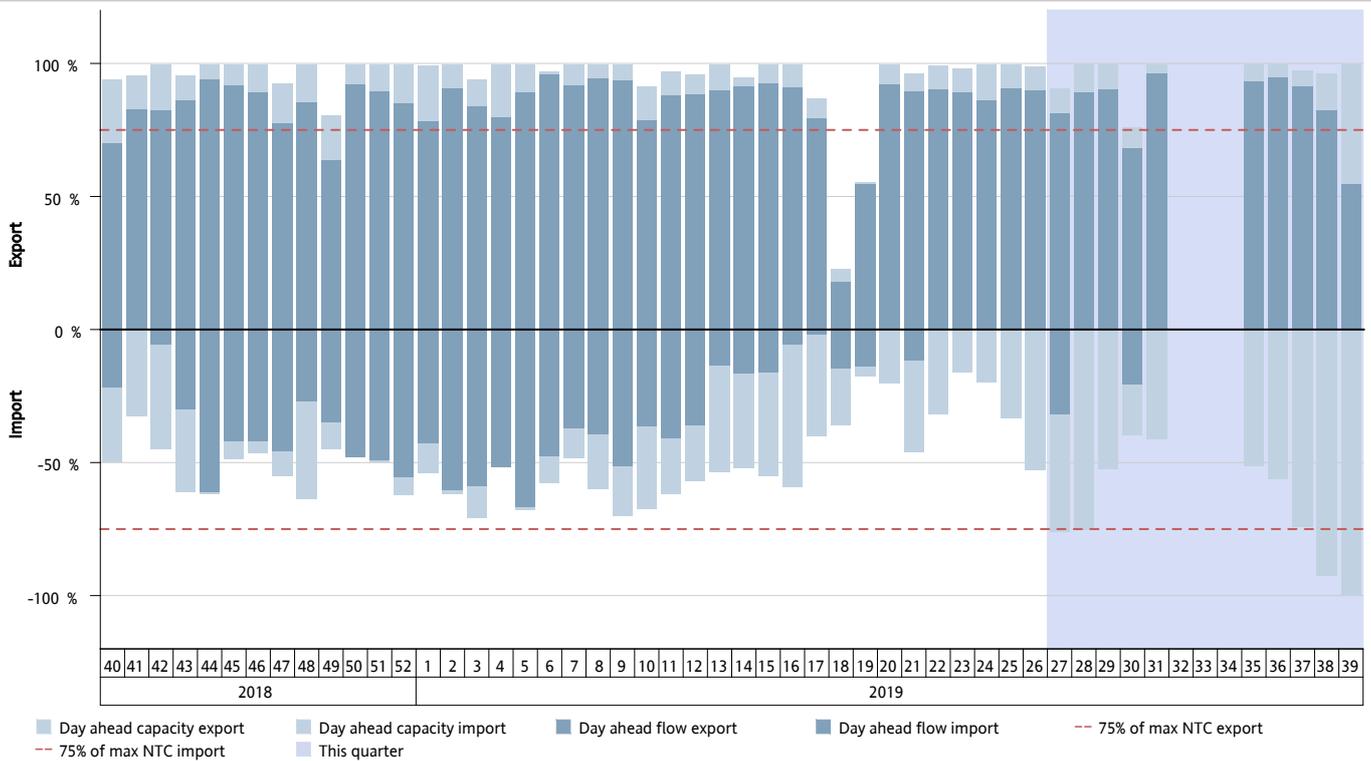


Figure 68: Shows cross-zonal day-ahead capacity result for the HVDC corridor SE4-PL, showing average weekly capacity given and flow as a percentage of max NTC. Available capacity is given for all hours, but the average flow is only given for hours with flow in that direction. Export indicates flow from SE4 to PL, while import indicates flow from PL to SE4.

SE4-PL: hourly mean day ahead capacities and flows – percent of max NTC

Quarter 3, 2019

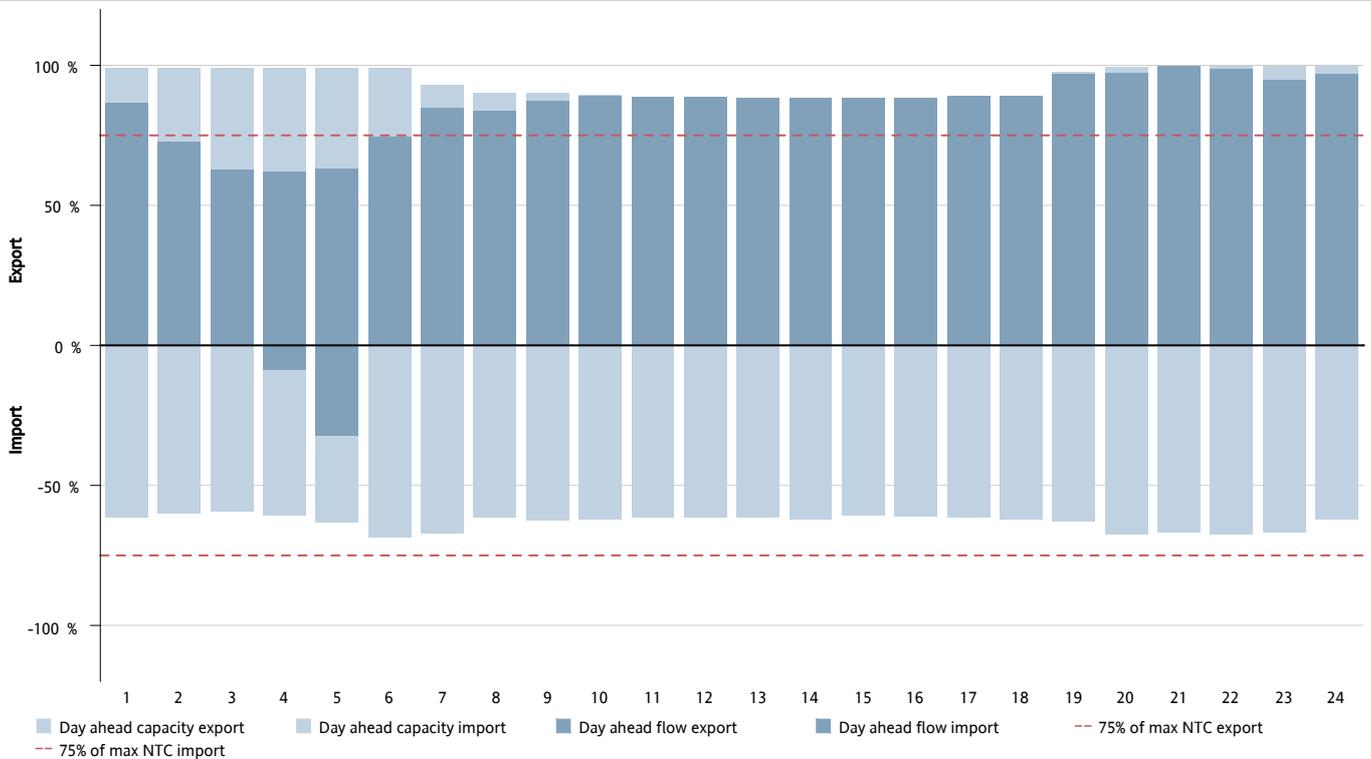


Figure 69: Shows cross-zonal day-ahead capacity result for the HVDC corridor SE4-PL, showing average per hour of the day (1-24) capacity given and flow as a percentage of max NTC. Available capacity is given for all hours, but the average flow is only given for hours with flow in that direction. Export indicates flow from SE4 to PL, while import indicates flow from PL to SE4.

SE4-PL: hourly day ahead capacities and flows – MW

Quarter 3, 2019

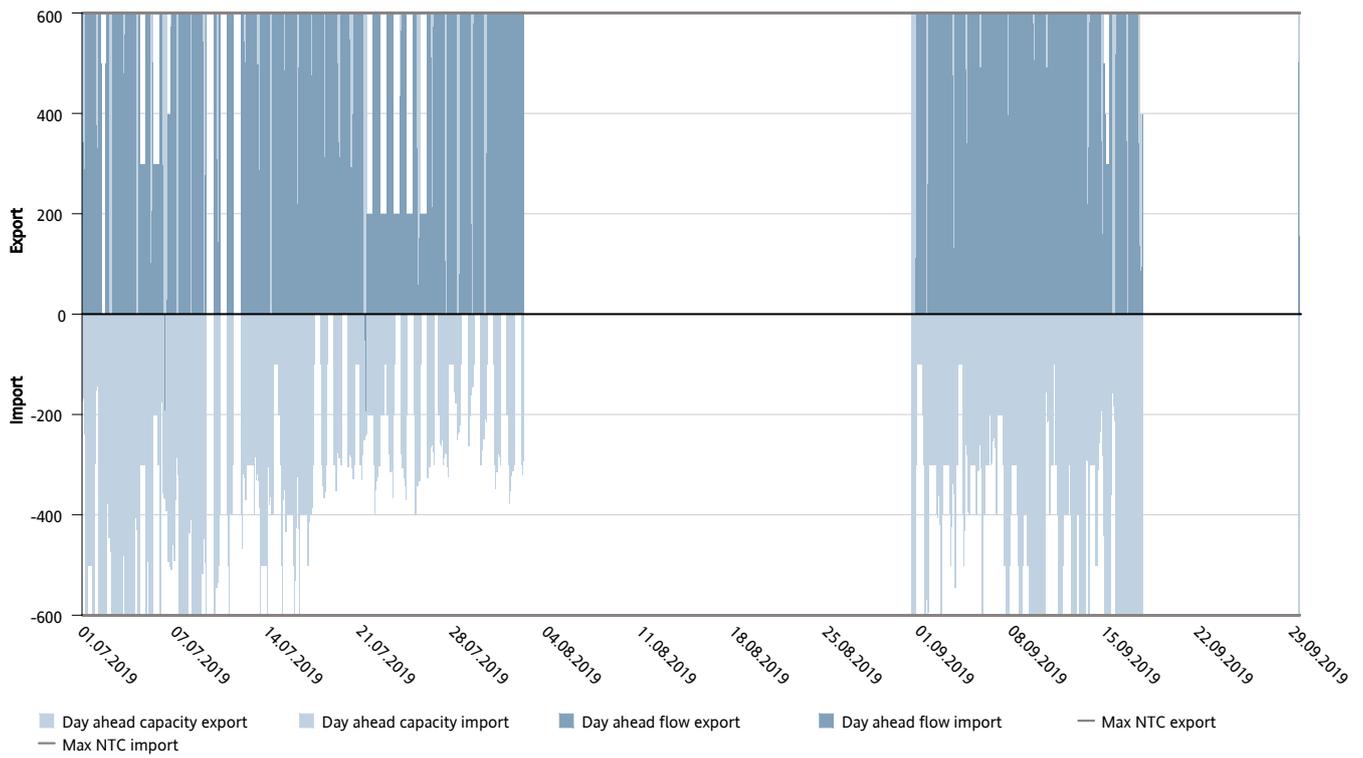


Figure 70: Shows cross-zonal day-ahead capacity result for the HVDC corridor SE4-PL, showing capacity given and flow (MW). Available capacity is given for all hours, but the average flow is only given for hours with flow in that direction. Export indicates flow from SE4 to PL, while import indicates flow from PL to SE4.

SE4-PL: price comparison in EUR

Quarter 3, 2019

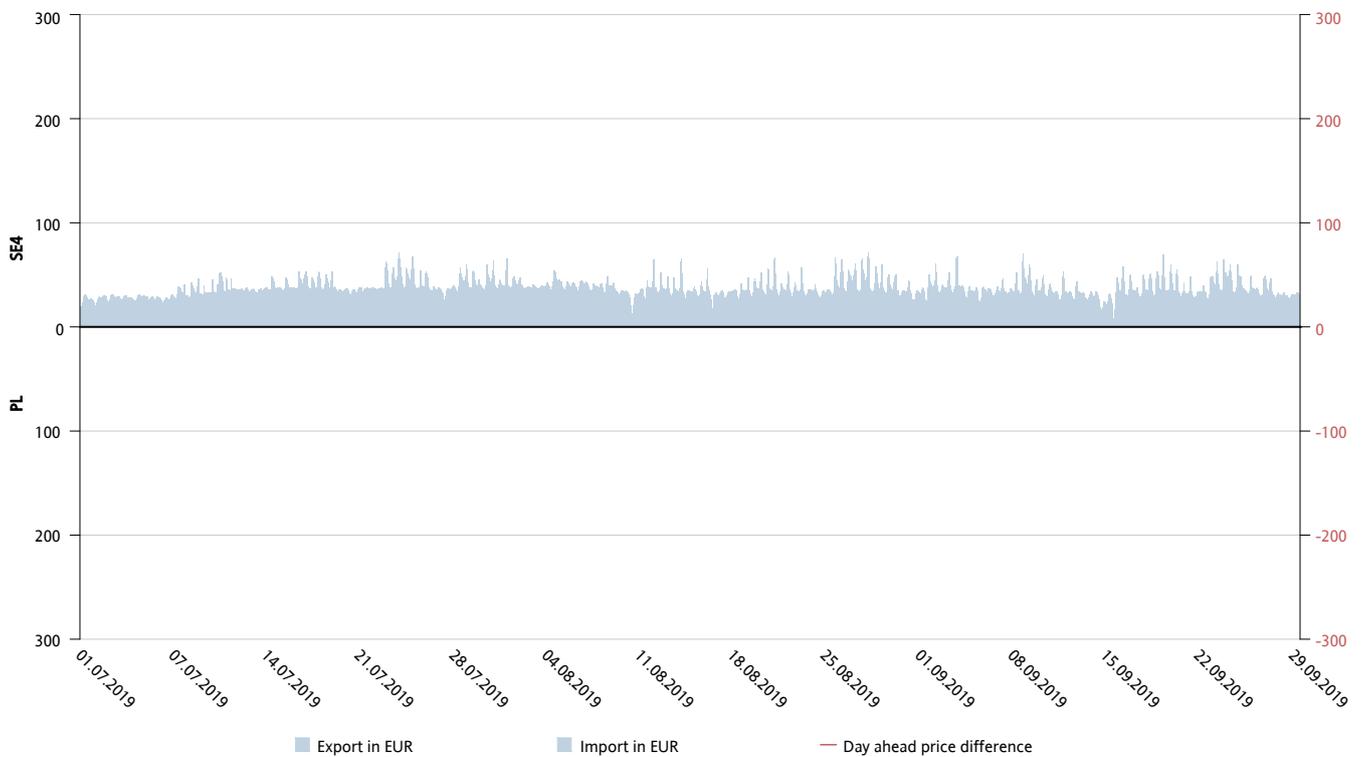


Figure 71: Shows day-ahead prices for the HVDC corridor SE4-PL, all prices are in EUR. The red line shows the price difference between the two areas.

DEFINITIONS AND CLARIFICATIONS

The table below defines the terms used in this report and provides clarifying text to assist the reader.

TERM	DEFINITION or CLARIFICATION
Net Transfer Capacity	<ul style="list-style-type: none"> •The Net Transfer Capacity (NTC, $NTC = TTC - TRM$) is the maximum exchange program between two areas compatible with security standards applicable in both areas and taking into account the technical uncertainties on future network conditions.
The Total Transfer Capacity	<ul style="list-style-type: none"> •The Total Transfer Capacity (TTC) is the maximum exchange program between two areas compatible with operational security standards applicable at each system if future network conditions, generation and load patterns were perfectly known in advance.
The Transmission Reliability Margin	<ul style="list-style-type: none"> •The Transmission Reliability Margin (TRM) is a security margin that copes with uncertainties on the computed TTC values arising from: <ol style="list-style-type: none"> a) Unintended deviations of physical flow during operation due to the physical functioning of load-frequency regulation b) Emergency exchanges between TSOs to cope with unexpected unbalanced situations in real time c) Inaccuracies, e. g. in data collection and measurements

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Description of capacity reductions below 75% of NTC in Q3 2019

Statnett

NO1>SE3: The capacity has mainly been reduced by outages in Sweden.

SE3>NO1: The capacity has mainly been reduced by outages in Sweden.

NO4>SE1: Several planned outages in the Norwegian grid between Nedre Røssåga and Ofoten has caused reduced capacity. Planned outage of the main line between NO4 and SE1, 420 kV Ofoten-Ritsem, has also impacted the capacity.

SE1>NO4: Several planned outages in the Norwegian grid between Nedre Røssåga and Ofoten has caused reduced capacity. Planned outage of the main line between NO4 and SE1, 420 kV Ofoten-Ritsem, has also impacted the capacity.

NO4>SE2: Several planned outages in the Norwegian grid between Nedre Røssåga and Ofoten has caused reduced capacity. Planned outage of the main line between NO4 and SE2, 220 kV Nedre Røssåga-Ajaure, has also impacted the capacity.

SE2>NO4: Several planned outages in the Norwegian grid between Nedre Røssåga and Ofoten has caused reduced capacity. Planned outage of the main line between NO4 and SE2, 220 kV Nedre Røssåga-Ajaure, has also impacted the capacity.

NO2>DK1: Main reason for reduction has been a fault on the HVDC cable Skagerak 4 ,approximately 6 weeks. Additionally, the capacity has been reduced due to planned outages on Skagerrak1, Skagerrak 2 and busbars in Kristiansand.

DK1>NO2: Main reason for reduction has been a fault on the HVDC cable Skagerak 4 ,approximately 6 weeks. Additionally, the capacity has been reduced due to planned outages on Skagerrak1, Skagerrak 2 and busbars in Kristiansand.

Fingrid

FI-EE, Finland-Estonia

The capacity was reduced on the interconnector between FI and EE for week 32 due to planned maintenance work in Estonian Harkü substation.

FI-SE1, Finland-Sweden North

The capacity was reduced on the AC interconnectors between FI and SE1 due to high temperature and planned outages affected to the interconnectors.

FI-SE3, Finland-Sweden Middle

The capacity was reduced on the interconnectors between FI and SE3 due to annual maintenance of both Fenno-Skan HVDC-links.

Energinet:

DK1 –DE

Main portion of the limitation has been caused by expansion work in the northern part of the German grid. Project work has been ongoing on the Danish side of the interconnector in Q3 as well. However, ENDK limitations only amounts to approximately 2 % of the max NTC volume in Q3 2019. ENDK has had limitations in two instances, namely 26.08.2019 06:00 – 29.08.2019 16:00 and 16.09.2019 06-16. In both cases careful planning with TenneT Germany has been done in order to minimize market impact.

NO2 – DK1

The main reason for limitations on this interconnector in Q3 2019 has been repeated faults on the SK4 cable. Intense work is undergoing in order to ascertain the underlying cause and clarify mitigating measures. Every care is taken in order to facilitate the availability of SK4 to the market while still considering personnel safety and system security.

DK1 – NO2

The main reason for limitations on this interconnector in Q3 2019 has been repeated faults on the SK4 cable. Intense work is undergoing in order to ascertain the underlying cause and clarify mitigating measures. Every care is taken in order to facilitate the availability of SK4 to the market while still considering personnel safety and system security.

DK2 – SE4

Main reason for the limitation has been maintenance work and congestions on the Swedish side of the interconnector. However maintenance work has been planned on the Danish side of the interconnector as well. ENDK has had limitation on the connection in the period 16.09.2019 08:00 – 24.09.2019 16:00 replacing electrical equipment in the 132 kV part of the connection. This piece of work has been coordinated with SvK in order to minimize market impact.

DK1 – SE3

The main reason for limitations has been replacement of the control system for KS2. Planning has enabled other pieces of limiting maintenance work in the Danish grid to be undertaken in the same period.

SE3 – DK1

The main reason for limitations has been replacement of the control system for KS2. Planning has enabled other pieces of limiting maintenance work in the Danish grid to be undertaken in the same period.

Svenska Kraftnät

SE2-NO4

Svenska kraftnät has reduced the capacity on the interconnector between SE2 and NO4, because of maintenance on the interconnector and because of thermal limitation on the interconnector.

SE3-DK1

Svenska kraftnät has reduced the capacity on the interconnector between SE3 and DK1, because of congestion in the West Coast Corridor, planned maintenance on and close to the interconnector.

SE3-NO1

Svenska kraftnät has reduced the capacity on the interconnector between SE3 and NO1, because of congestion in the West Coast Corridor, and maintenance on and close to the interconnector.

SE4-DK2

Svenska kraftnät has reduced the capacity on the interconnector between SE4 and DK2, because of congestion in the West Coast Corridor, and maintenance on and close to the interconnector.

SE4-DE

Svenska kraftnät has reduced the capacity on the interconnector between SE4 and DE, because of congestion in the West Coast Corridor, planned outage on and close to the interconnector.

SE4-PL

Svenska kraftnät has reduced the capacity on the interconnector between SE4 and PL, because of congestion in the West Coast Corridor, maintenance on and close to the interconnector, and disturbance on the interconnector.

Reoccurring capacity reductions in Q3 2019

Svenska Kraftnät

The West Coast corridor is a section in the Swedish national grid, close to Gothenburg in SE3, which might be congested in normal operation. This typically occurs during night and weekends with a large northbound transfer of power over the West Coast Corridor. The congestion leads to reduction of SE3 to NO1, DK1 to SE3, DK2 to SE4, DE to SE4, PL to SE4, and LT to SE4. For more information see:

<https://www.nordpoolgroup.com/message-center-container/newsroom/tso-news/2016/q4/no.-332016---updated-routine-for-congestion-management-for-the-west-coast-corridor-in-sweden/>