



DA results from the external parallel run (EPR) of Nordic flow-based

SH bi-weekly meeting
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Biweekly stakeholder events

- The CCM project has initiated a biweekly meeting with a focus on elaborating EPR results
- Today's presentation will walk through the EPR flow-based results for week 26-32
- Going forward the presentation will deep dive into the latest two weeks of data
 - Next presentation will be on September 28 covering week 33-34
- Extra analysis on general topics can be presented in these meetings as well
 - We will be announced schedule for this in the newsletter and on the NRCC website

NOTE: The biweekly stakeholder event scheduled for 26 October will be canceled due to a general CCM FB hybrid meeting in Stockholm



Agenda

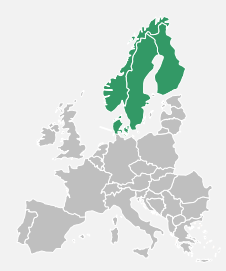
1. Introduction
2. Flow based impacts on
 - Socio-economic welfare (SEW)
 - Prices
 - Net position
 - Border flows
3. In-depth examination
 - Week 26: Negative SEW
 - Week 30-32: Consumer surplus gain



External parallel run (EPR)

- In EPR the capacities calculation process for both FB and NTC is performed in parallel.
- Market results are simulated with FB constraints by the NEMOs.
- A comparison between day-ahead market results for NTC is made against results simulated with FB.

This period is intended for the TSO and market participants to become familiar with FB capacity calculation and the impacts flow-based has on the allocation of electricity.



NOTE!

- The EPR market data comparison does not serve as forecasts of the future market results or a consequence access when introducing flow-based.
- The simulated market results for FB have been simulated with NTC orderbook. Consequently, the various effects FB would have on the water value in the Nordic region are not accounted in these simulations.
 - The effect of saved water in the South Nordic
 - The effect of higher use of water in the North Nordic



Social welfare change week 26-32

- Flow-based results in a higher SEW compared to NTC for both the Nordic region and the whole market coupling region.
 - Nordic SEW change 14M€
 - CI change on borders out of the Nordic region 17M€
 - Total SEW change in the SDAC region 31M€
- Flow-based provide a gain for the producers in the Nordic Region and a consumer gain in the continent.

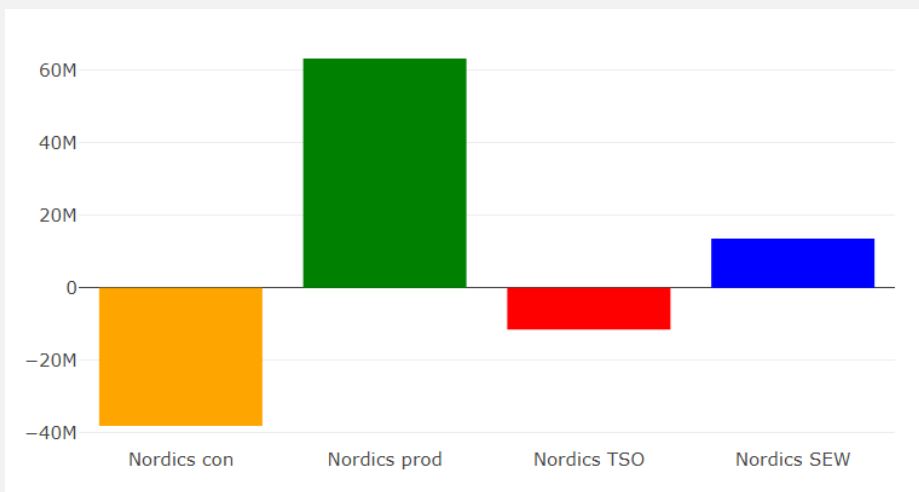


Figure: SEW change in CCR Nordic

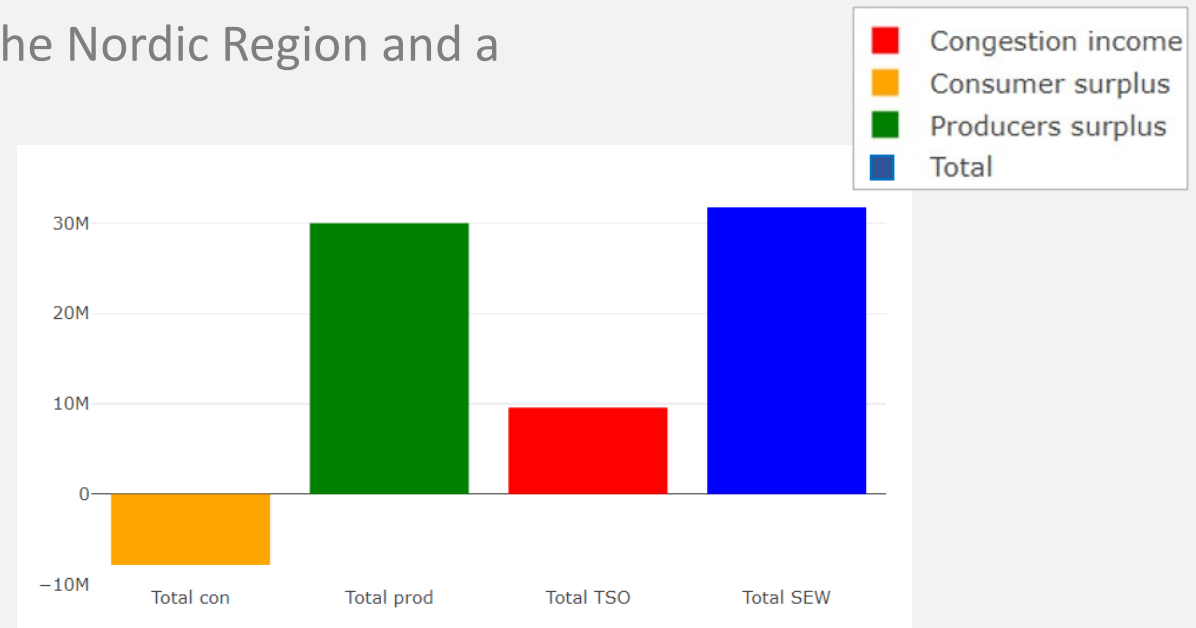


Figure: SEW change in the whole SDAC region



SEW Impact on country level week 26-32

- Flow-based results in a SEW gain for Sweden, while Denmark experiences a loss. The overall effects for Sweden and Finland are relatively minor.
- In Sweden has the largest distribution effect from consumers to producers.
- In Norway and Denmark there is a gain for the consumers, while in Sweden and Finland there is gain for the producers.

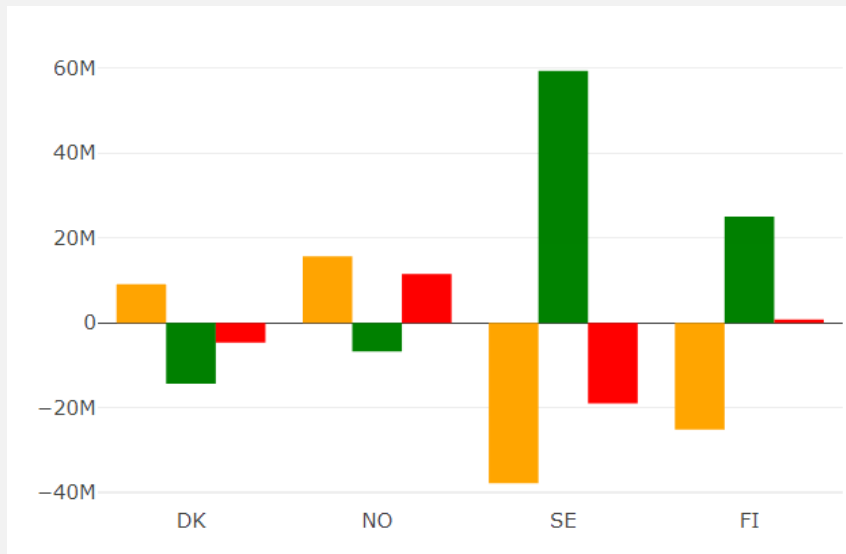


Figure: SEW change on stakeholder level in CCR Nordic per country

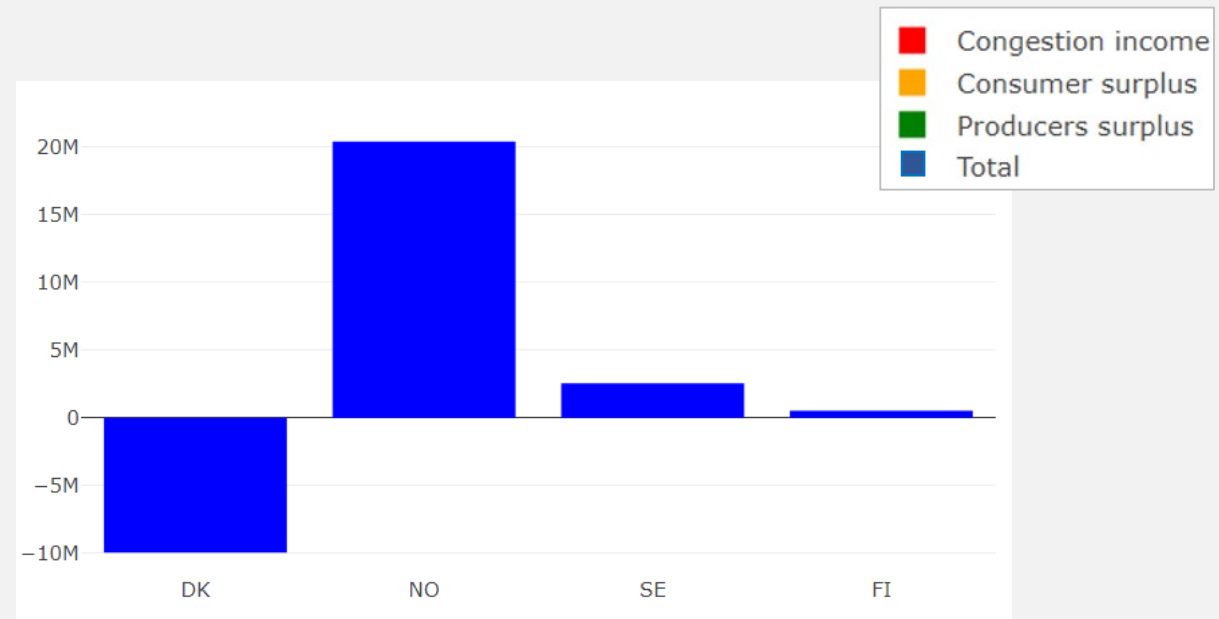


Figure: SEW change in CCR Nordic per country



Average prices in the Nordic region week 26-32

- In both NTC and FB there are significant price differences between the South Nordic areas (NO2, DK1 and DK2) and the rest of the Nordic area.
- FB increases the flow to the continent with 3%.
- However FB allows an increase of 26% over the constraining elements compared to NTC.
- This indicates that most of the extra electricity produced north of the constraint are used by producers in the South Nordic areas.

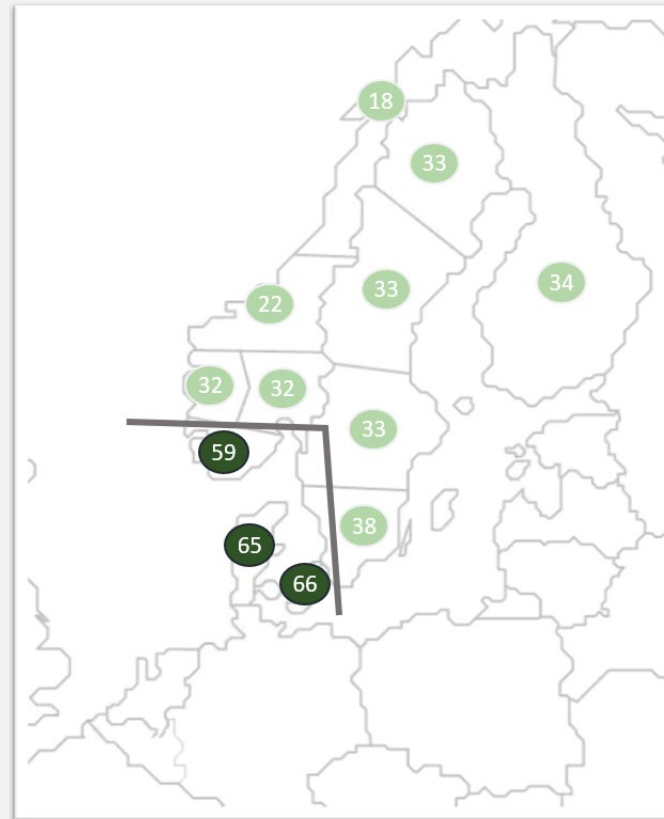


Figure: Average price per bidding zone with NTC

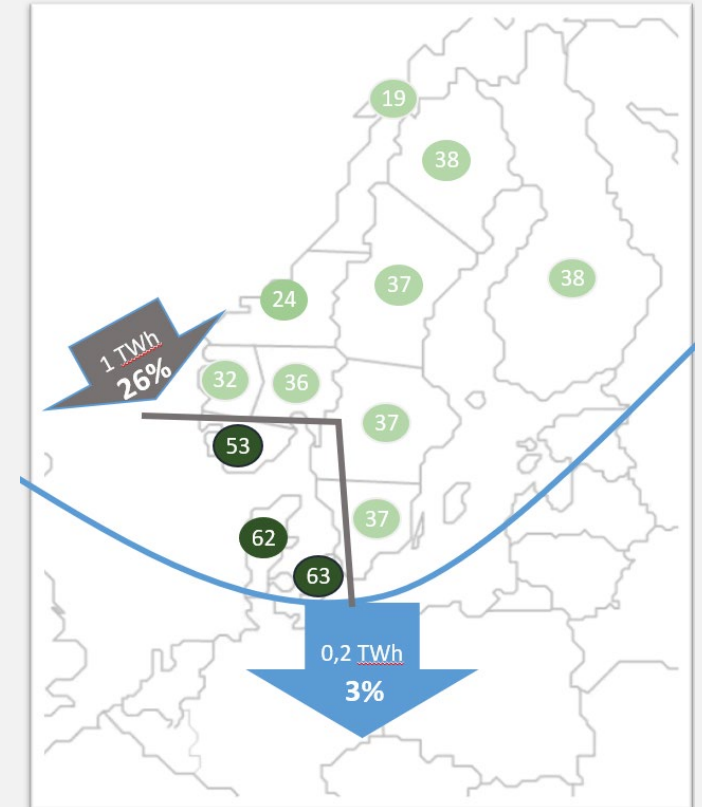


Figure: Average price per bidding zone with FB and the change in flow for FB compared to NTC



SEW Impact on bidding zone level week 26-32

- The distribution of the effect of FB are very different from BZ to BZ.
- Sweden has two BZ (SE1 and SE2) where the SEW increases and two BZ (SE3, SE4) where there is a loss.
- Flow-based results in a gain for the consumers in NO2, DK1 and DK2, while the consumers in SE3 and FI has the largest loss.

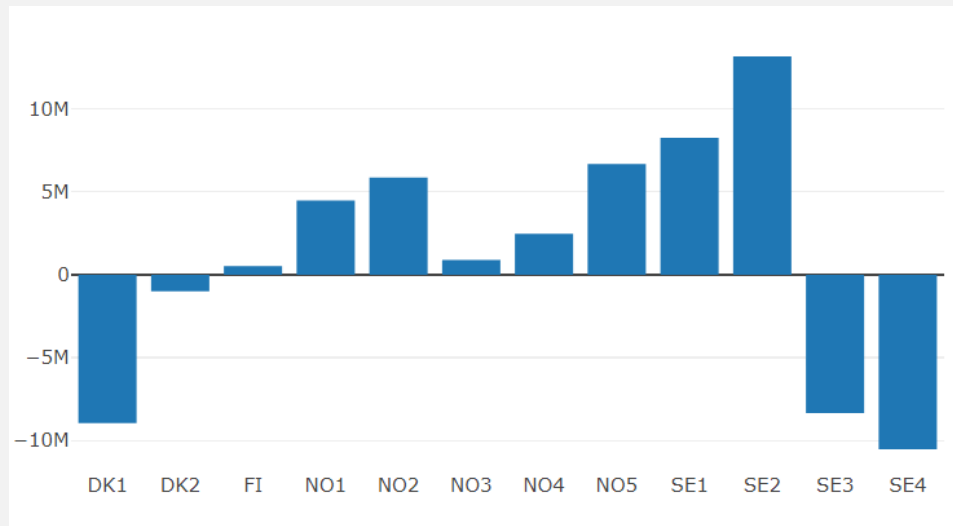


Figure: SEW change in CCR Nordic per BZ

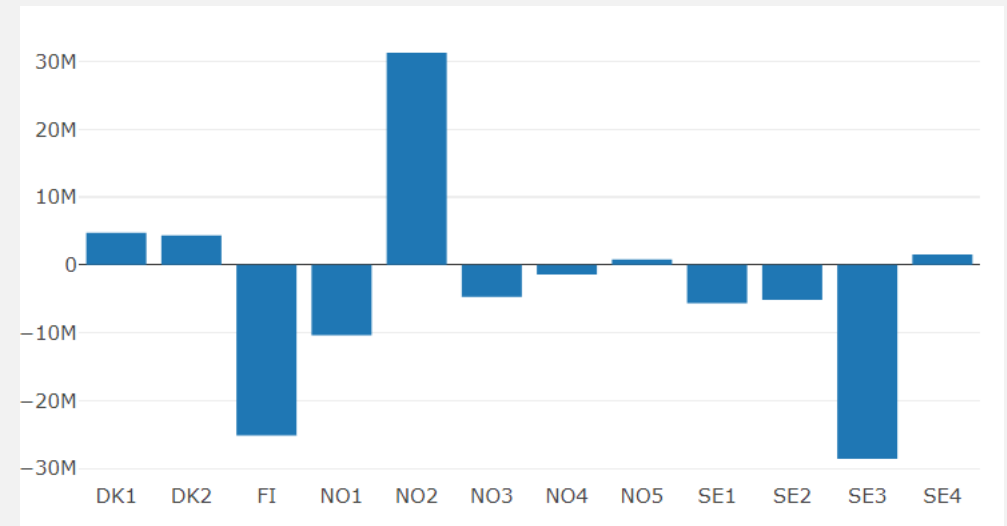


Figure: Consumer surplus change in CCR Nordic per BZ



Net position for Nordics week 26-32

Flow-based results in a general higher allocation of flow to the continent over the whole period.

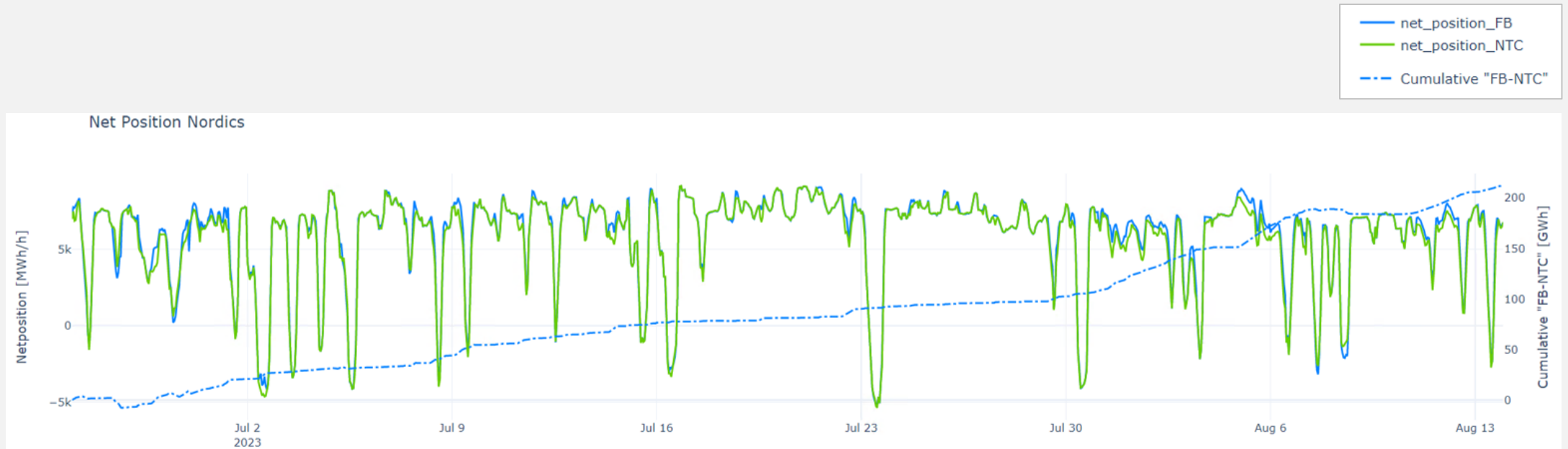


Figure: Net position on hourly level for the Nordic Region



Flow impact on Fenno-Skan

- Fenno-Skan is the interconnector between SE3 and FI.
- In NTC this border is limited from FI to SE3, but FB can better utilize the grid and therefore increase the flow.
- Due to maintained the opposite direction was constrained from 1 August as well. FB was also able to increase the flow allowed in this direction.

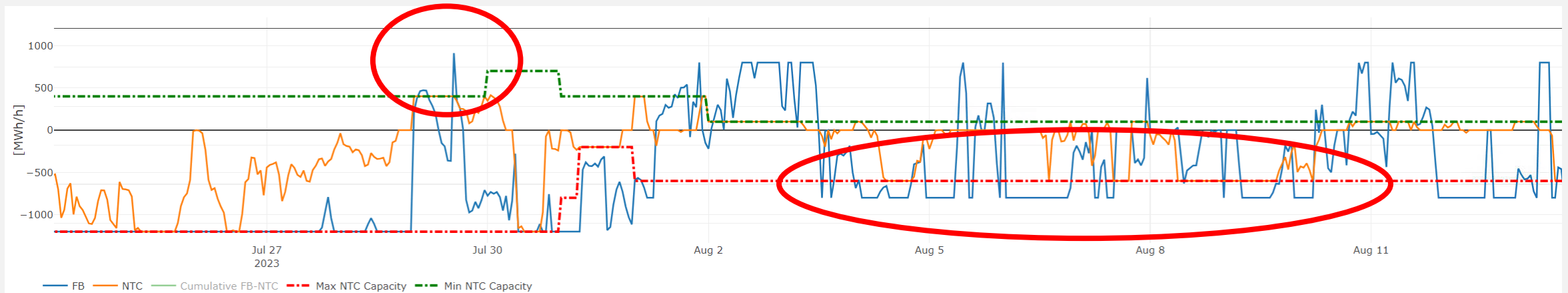


Figure: NTC and FB flow together with the NTC capacities provided in market coupling on Fenno-Skan.



Social welfare impact on daily level

In the following section there will be a closer, in-depth examination of the following:

- SEW loss in week 26
- Overall consumer welfare gain in week 30, 31 and 32

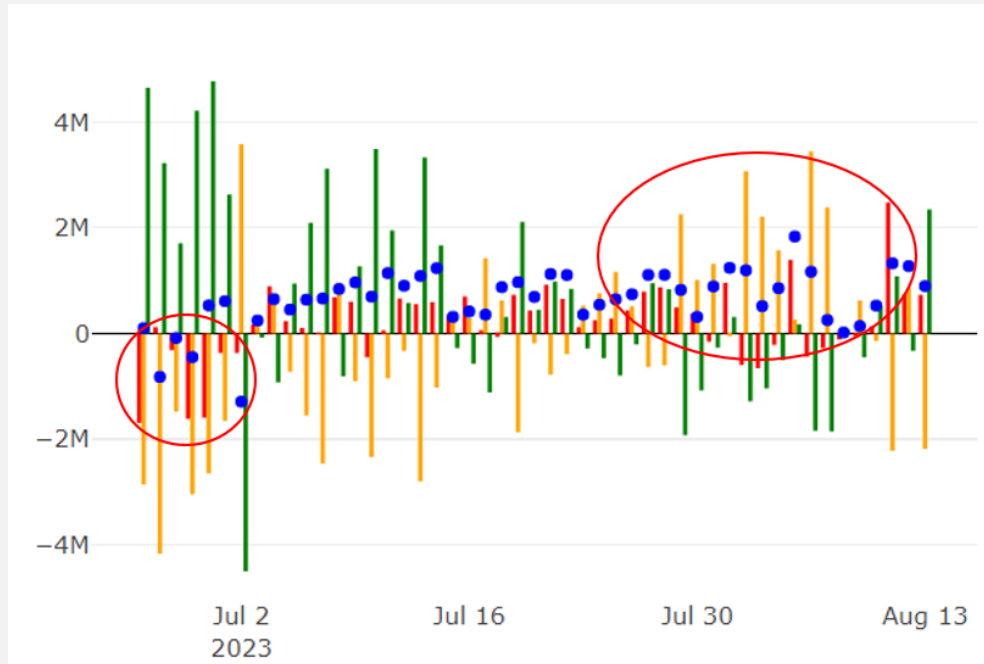


Figure: SEW change in the whole SDAC region on daily level

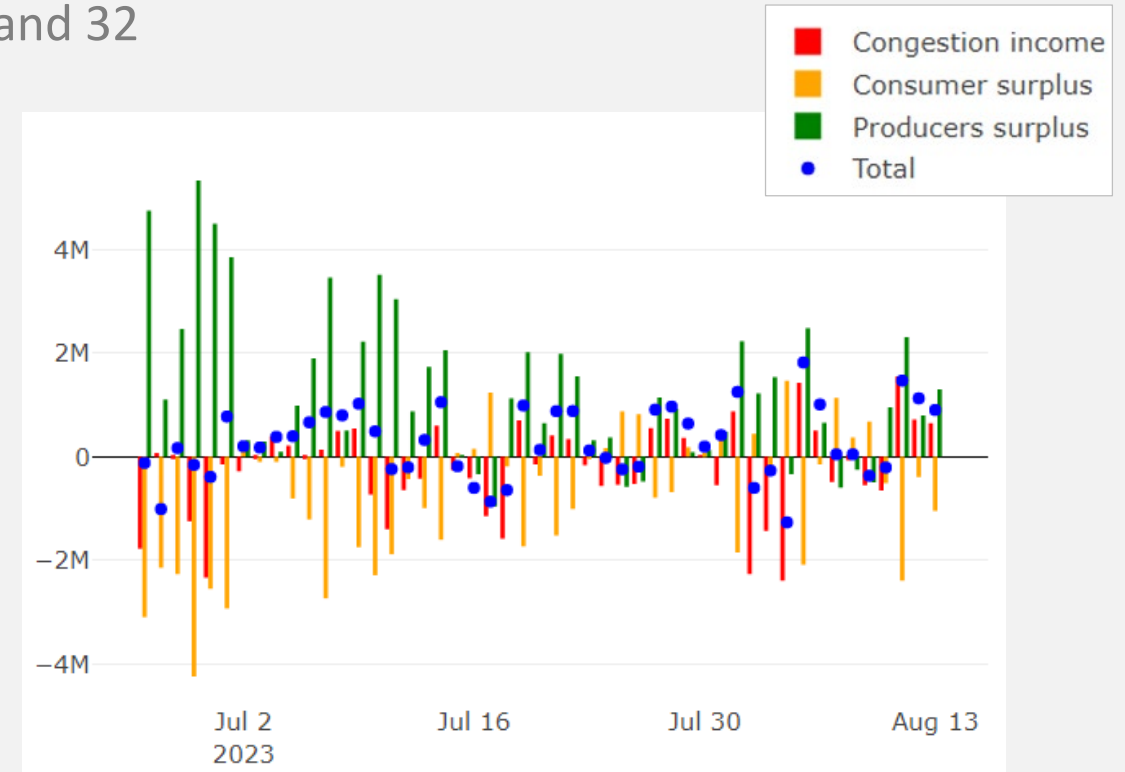
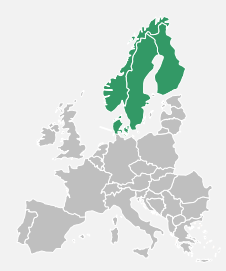


Figure: SEW change in CCR Nordic on daily level



In-depth examination week 26

- First (and only) week of negative SEW for both Nordic and SDAC since the start of EPR
 - A total loss for the whole SDAC region of 106 k€ for the entire week.
 - 4 days with overall negative welfare change with FB
- NTC allowed more load on elements that were constraining in FB. Causing the NTC solution to be outside the FB domain.
 - CNECs in DK were too limited in FB.
 - Flow between NO5->NO1 in NTC too high.

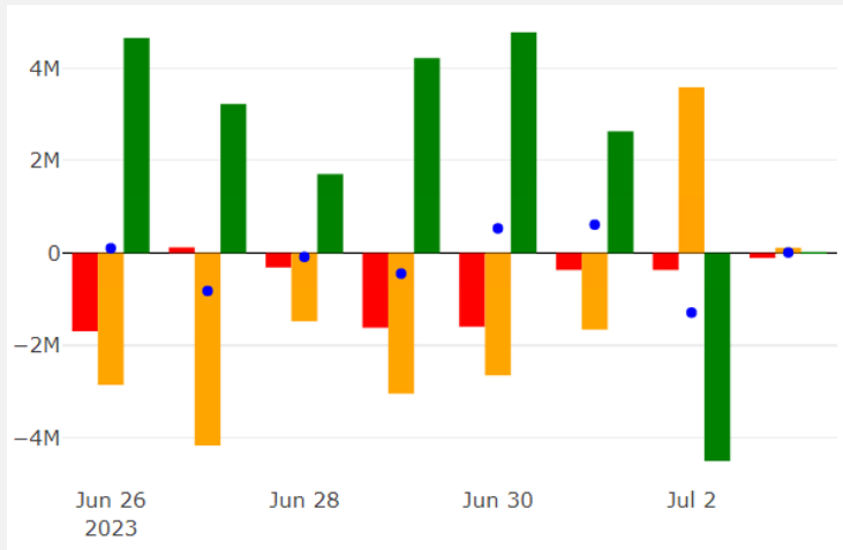


Figure: SEW change in the whole SDAC region on daily level

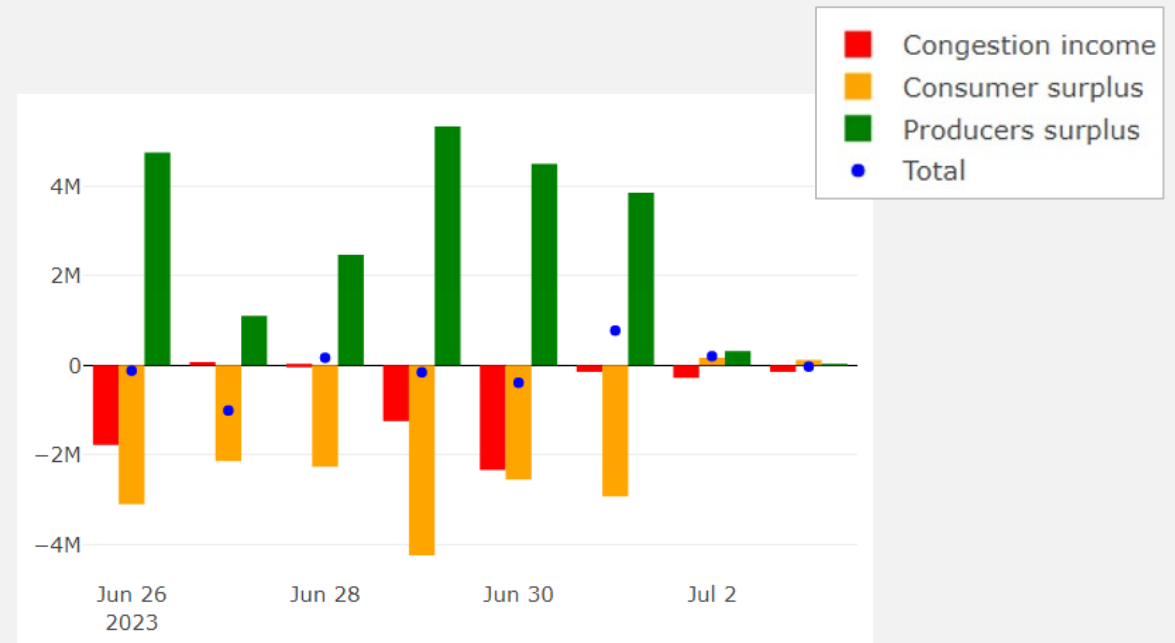


Figure: SEW change in CCR Nordic on daily level



NTC flow NO5->NO1 too high, week 26

- In NTC the capacity provided allow a flow between NO5->NO1 that is higher that the grid can handle.
- TSO had too countertrade to handle these situations in operation.
- FB handled the constrains in the system and provided a more secure solution.

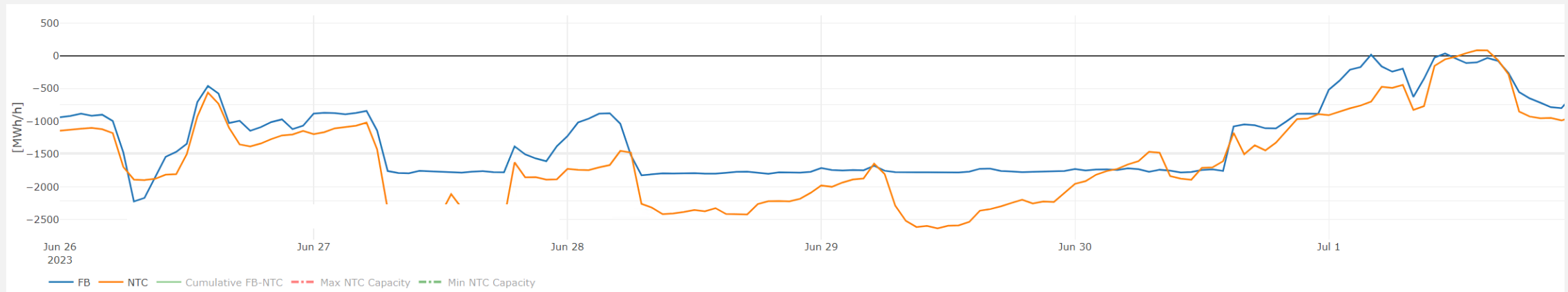


Figure: AAF-flow for both NTC and FB on the border between NO1->NO5.



DK constraints week 26

- Multiple 150kW lines out for maintenance in both DK1 and DK2.
- High wind production
- Both Skagerrak and DK1-DE limited.
- 2 CNECs were constraining and the net position to a level below the NTC level.
 - E_KAE_LYK3 1 N Terminal : N
 - ENDK DK2 E_KAM_SPA 1 F Terminal : F.
- The FB was constraining too much and Energinet are examining if a case like this can be avoided in the future.

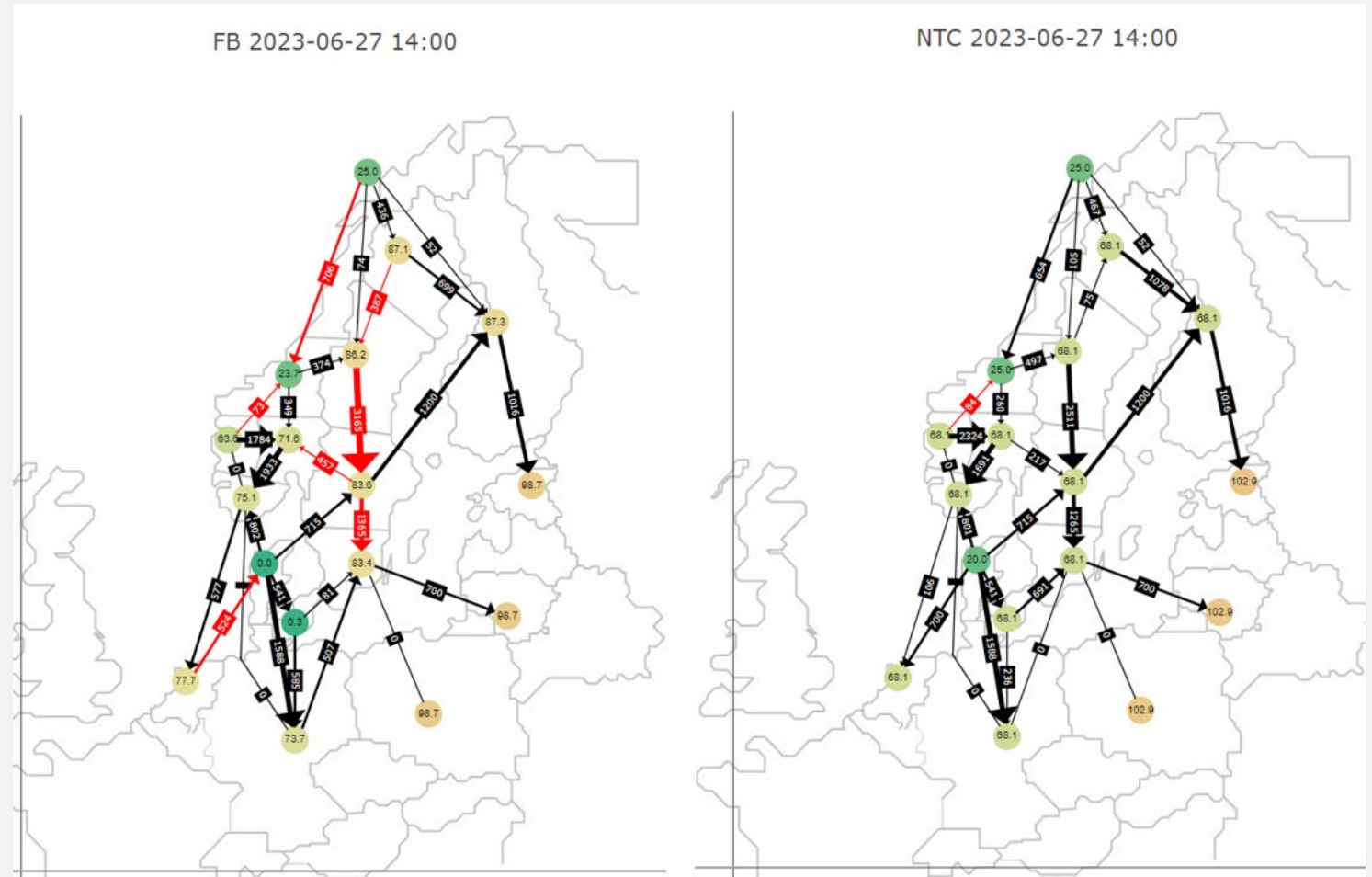


Figure: AAF-flow and prices for both NTC and FB for June 27 hour 14-15.



In-depth examination week 30-32

- The prices in NO5 and NO1 was lower in both FB and NTC than we have seen for a long time.
- Flow-based increased the export to the South Nordic area (DK1, DK2, NO2) and to the continent causing the prices to decrease in these areas.
- The consumer gain for this period lies mostly in NO2, but also in DK1 and DK2 from the Nordic Area together with the continent.

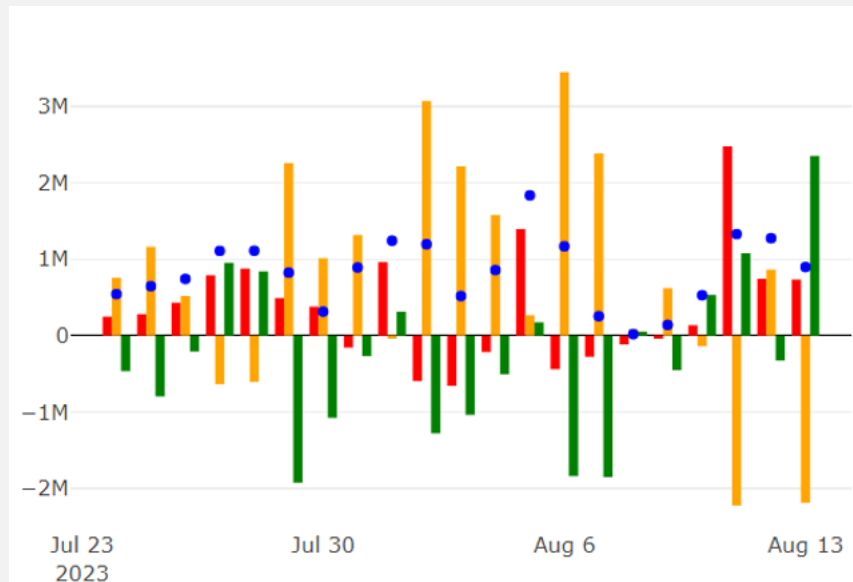


Figure: SEW change in the whole SDAC region on daily level

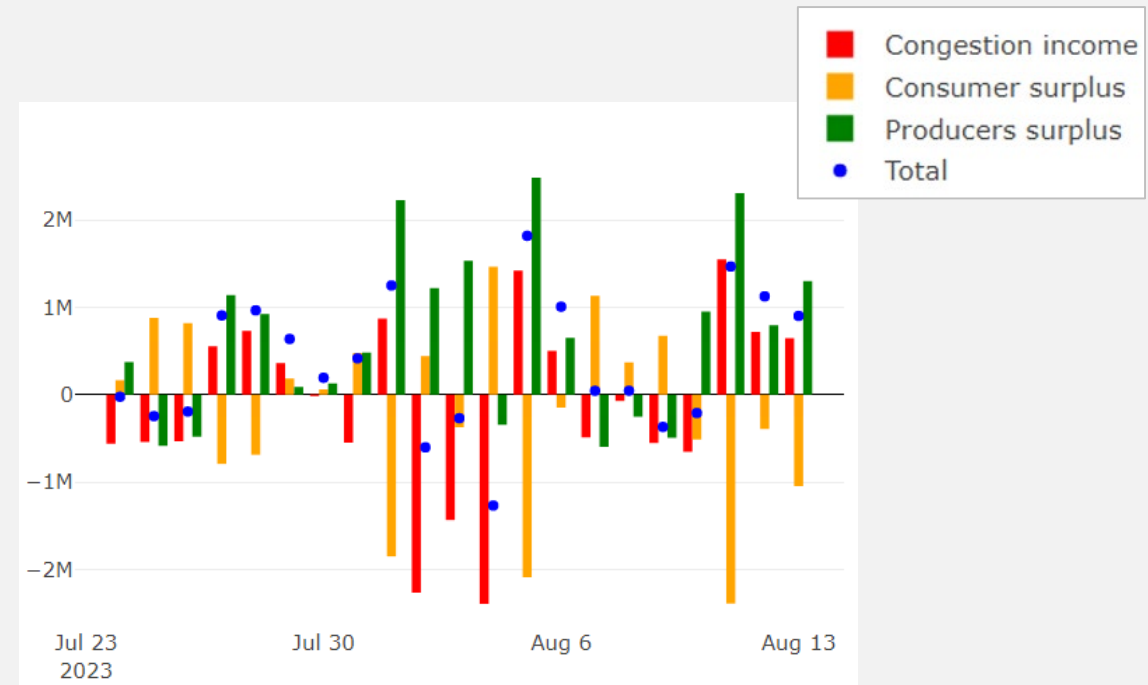


Figure: SEW change in CCR Nordic on daily level



NO1 and NO5 price decrease

- From middle of July the hydro level increased in NO1 and NO5 causing the change in the price level for these areas.
- These BZ went from having high prices compared to the areas north and east for them to being at the same price level.
- This shows that external factors effect the distribution effects of flow-based.

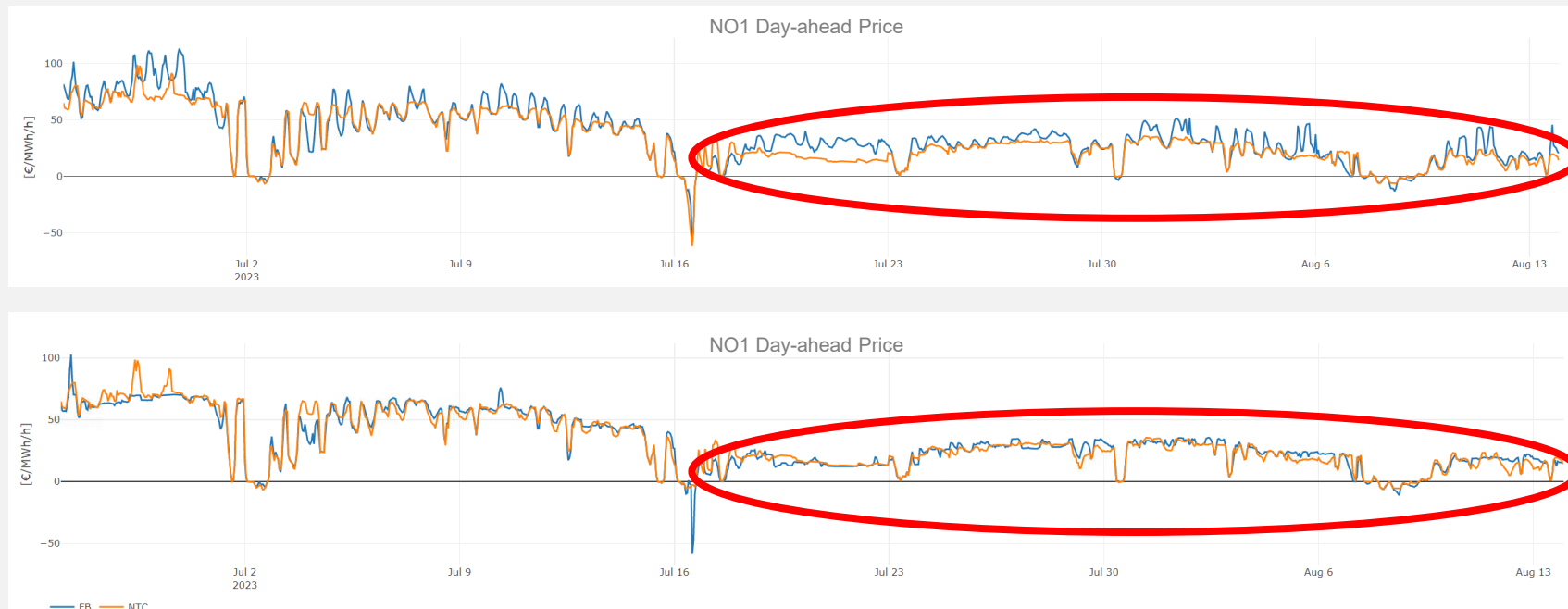


Figure: Price in NTC and FB on hourly level for both NO1 and No5



Consumer gain in the continent due to increased flow

- Increased import to NO2, DK1, DK2 and SE4
- Higher export out of the Nordics
- Consumer gain:
 - Continent
 - NO2, DK1, DK2 and SE4

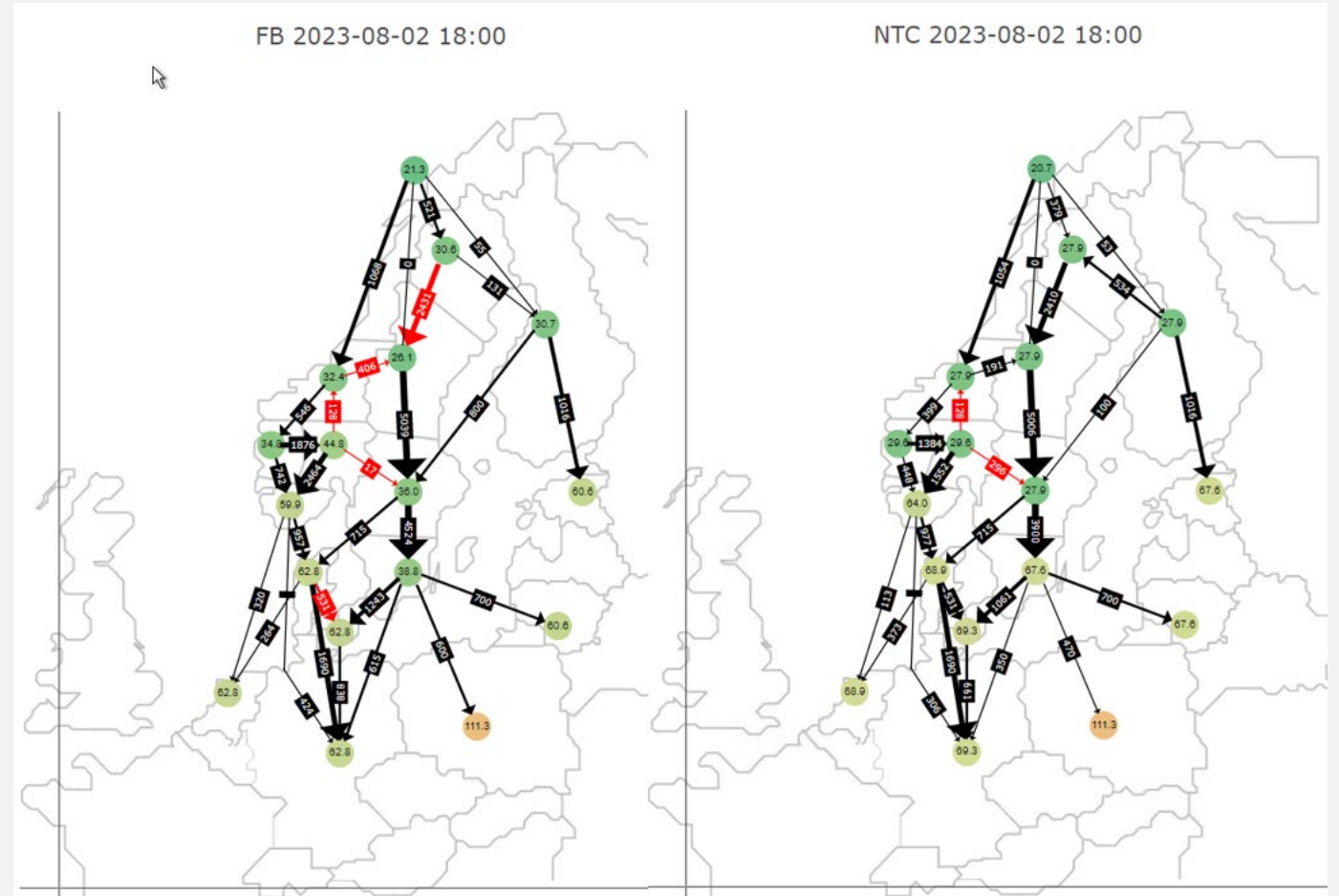


Figure: AAF-flow and prices for both NTC and FB for 2 August hour 18-19.



Consumer gain in the Nordics with similar export

- Increased import to NO2, DK1 and DK2
- Limited change in flow on the external borders as the capacity was fully utilized in NTC.
- Consumer gain:
 - NO2, DK1, DK2

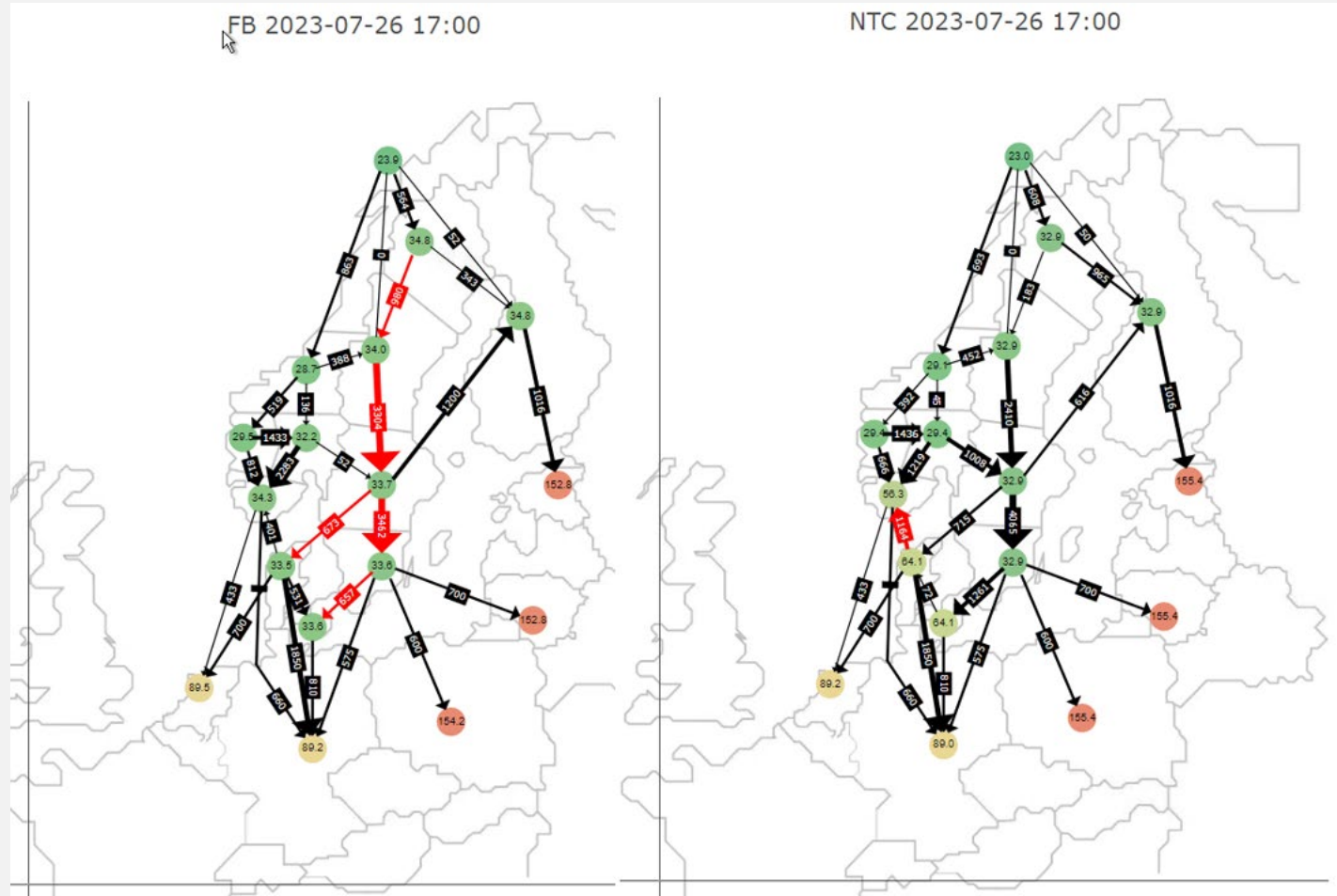


Figure: AAF-flow and prices for both NTC and FB for July 26 hour 17-18.



Summary

- Flow-based has a better utilization of the grid causing the flow through the Nordic area to increase from North to South.
- Flow-based decreases the price in the BZ with the highest prices.
 - This being DK1, DK2 and NO2.
- External parameters have an effect on the distribution effects of flow-based.

Questions?