

Impact of Nordic Flow based on the Nordic System Price

Based on EPR results

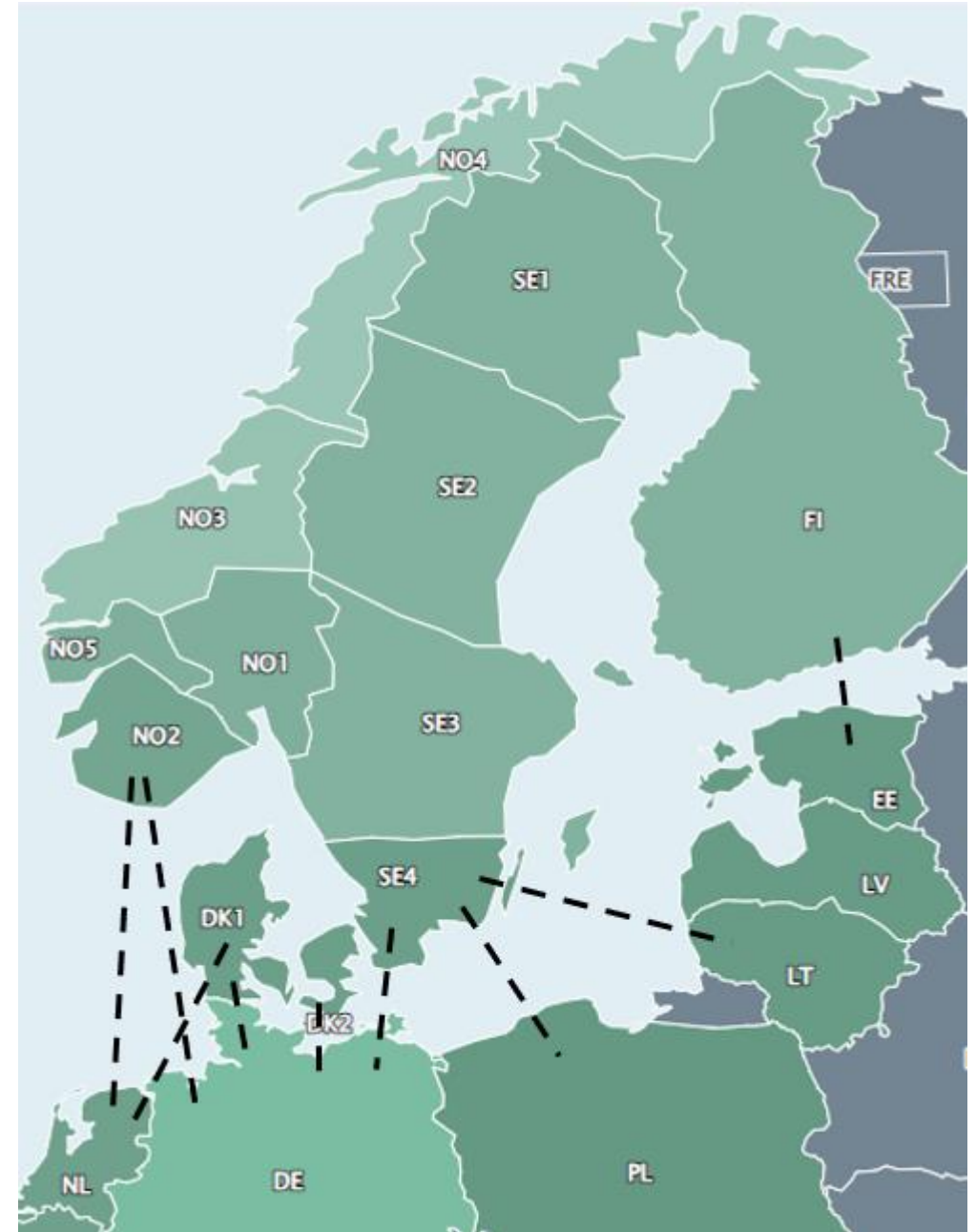
Arlanda 2023-10-26

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Will Nordic Flowbased impact System Price?

- The calculation methodology of Nordic System Price (the reference price for future contracts in the Nordic region) remains unchanged.
 - Unconstrained price calculation for Nordic areas taking into account flows on external borders from SDAC as price taking orders in the curves in adjacent Nordic areas (supply/demand depending on the direction of the flow)
- System Price is an unconstrained price calculation, so it doesn't matter (from methodology point of view) whether the network model in SDAC area price calculation is ATC or flow-based.
- However, flows on the 9 borders between the Nordic region and rest of SDAC (Core/Baltic) can change as a result of flow-based network model in the Nordic.
- Nord Pool has started to publish these results on a bi-weekly basis.



About the simulations

- Nord Pool's simulations of the System Price is based upon the official EPR results, all data disclaimers and potential issues existing in the CCM EPRs are also valid for these System Price simulations as can be found in the different market reports at: [Simulation Results - Nordic Regional Coordination Centre \(nordic-rcc.net\)](https://nordic-rcc.net)
- Nord Pool have found some issues with the input data as part of running these simulations, these have been reported back to the TSOs. Nord Pool don't have a full overview of all capacity input related issues as part of the EPRs.
- Capacity issues has not been corrected in Nord Pool's System Price simulations to keep simulated values comparable with other EPR results. In cases where TSOs have adjusted inputs and asked NEMOs for recalculations of EPRs this have been captured also in these system price simulations.
- The simulated System Price is based upon existing bids, this is same setups as for EPRs thus no future changes to bidding is captured as part of these simulations coming as a result from a FB implementation. This limitation in the EPR setup is important to keep in mind while looking at any results from the EPRs.
- The simulated System Price values in hourly format can be found and downloaded for Nord Pool webpage under a separated section to reduce any mix up with other prices. [Impact of Nordic Flow-Based on the Nordic System Price | Nord Pool \(nordpoolgroup.com\)](https://nordpoolgroup.com)
- Contact at Nord Pool for Questions around the simulations: nicolas.rivera@nordpoolgroup.com

Why System Price calculated based on EPR results is different from production System Price?

Change in Import/Export

- As a result of change in capacity calculation (flow-based) in the Nordic region, the flows (in EPR) on the following borders can be different from production results:
 - NorNed (NO2A-NL)
 - NordLink (NO2A-DE)
 - COBRACable (DK1-NL)
 - DK1-DE
 - Kontek (DK2-DE)
 - Baltic Cable (SE4-DE)
 - NordBalt (SE4-LT)
 - SwePol (SE4-PL)
 - Estlink (FI-EE)

Different capacity model on external borders (I)

- In EPR (and also after go-live of flow-based in the Nordic), the capacities for the external borders are given as FB input (PTDF matrix) to algorithm (not as ATCs).
- In these PTDF (border) constraints, the RAM of relevant CNE is representative of the corresponding ATC (in production).
- In case the RAMs are not equal to production ATCs, then the calculated System Price based on EPR results can be different from production.

Different capacity model on external borders (II): Timing of capacity publication/ Impact of late outages

- Another reason for difference in production ATCs and RAM of the corresponding PTDF constraint is due to the different deadlines for the NTC and FB process for the operators:
 - Examples:
 - FI-EL: 2022 11/12 difference on 348 MWh **Outage ended in 10.12 at 9.19, sooner than anticipated. At that time, allocation constraints cannot be fixed by IVAs.**
 - SE4_NB: 2023 8/1 difference on 700 MWh **This was mentioned in the market report. FB and NTC had different capacities as there were a late change on NordBalt in the NTC process, which was not captured in the FB-process.**

Example of differences in capacities on the external borders

Baltice Cable (2023.09.06)

- No capacity in EPR hours 1-7
- Capacity in NTC: 615 MW
- An average decrease of 0.15 Euro in calculated system price of these hours (EPR)

Baltice Cable (2023.09.15)

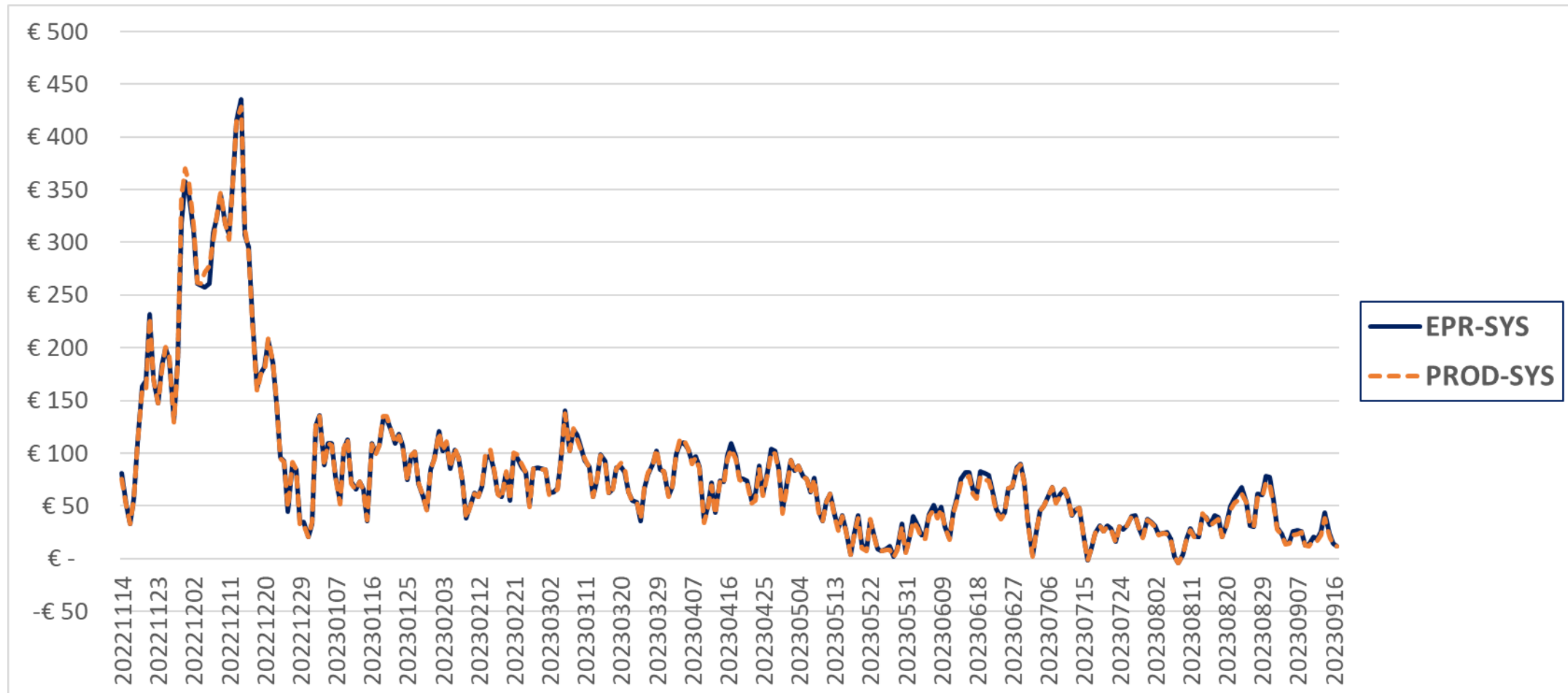
- No capacity in EPR hours 18-24
- Capacity in NTC: 615 MW
- An average increase of 2.3 Euro in calculated system price of these hours (EPR)

Daily Nordic System Price (EPR vs. NTC)

Period: 2022.11.14-2023.09.17

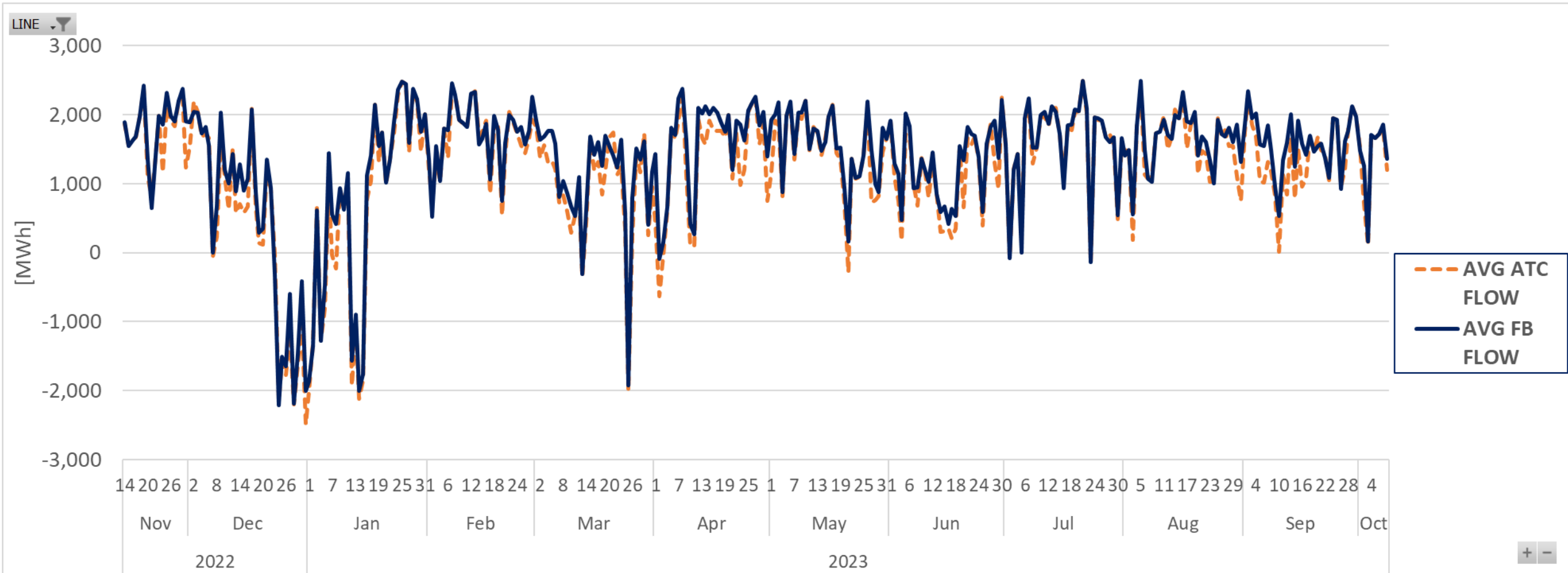
Average difference: 0.78 Euro (FB-NTC)

Max (daily) difference: 24.67 Euro (EPR-based system price less than NTC-based; 2022.11.29)



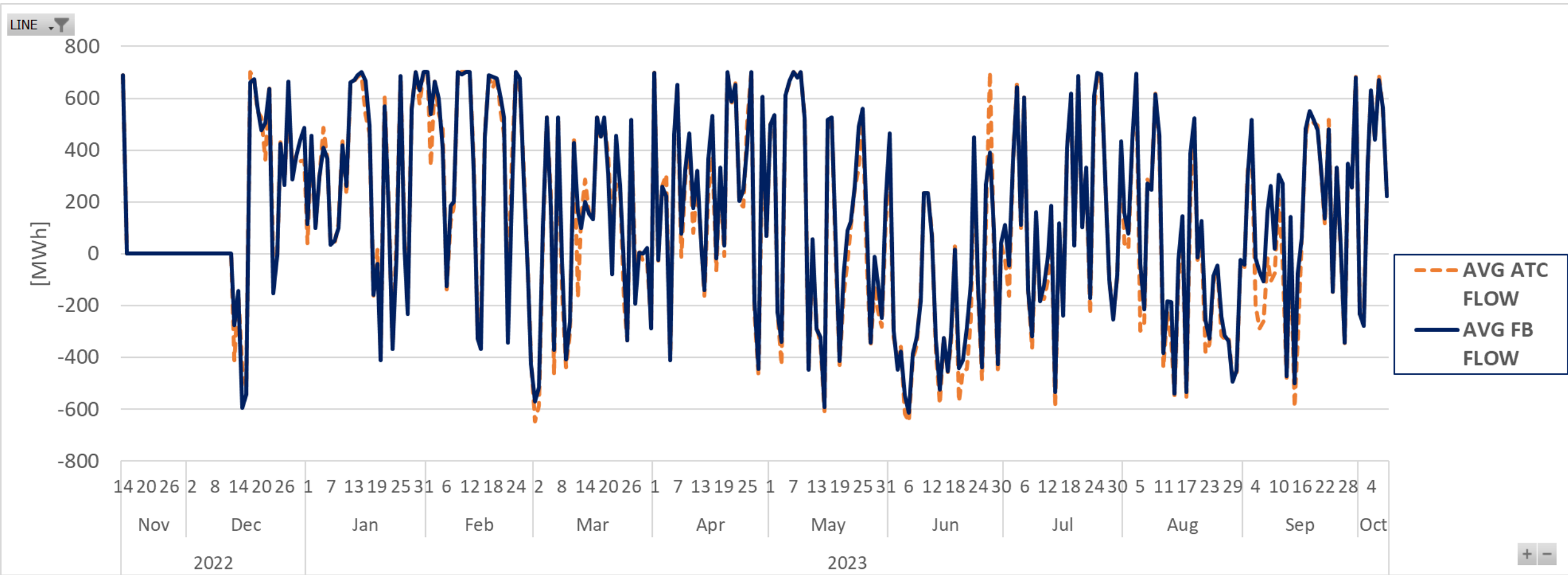
Daily average flow on DK1-DE/LU

Average difference in daily scheduled exchanges (FB – NTC) = 150 MWh



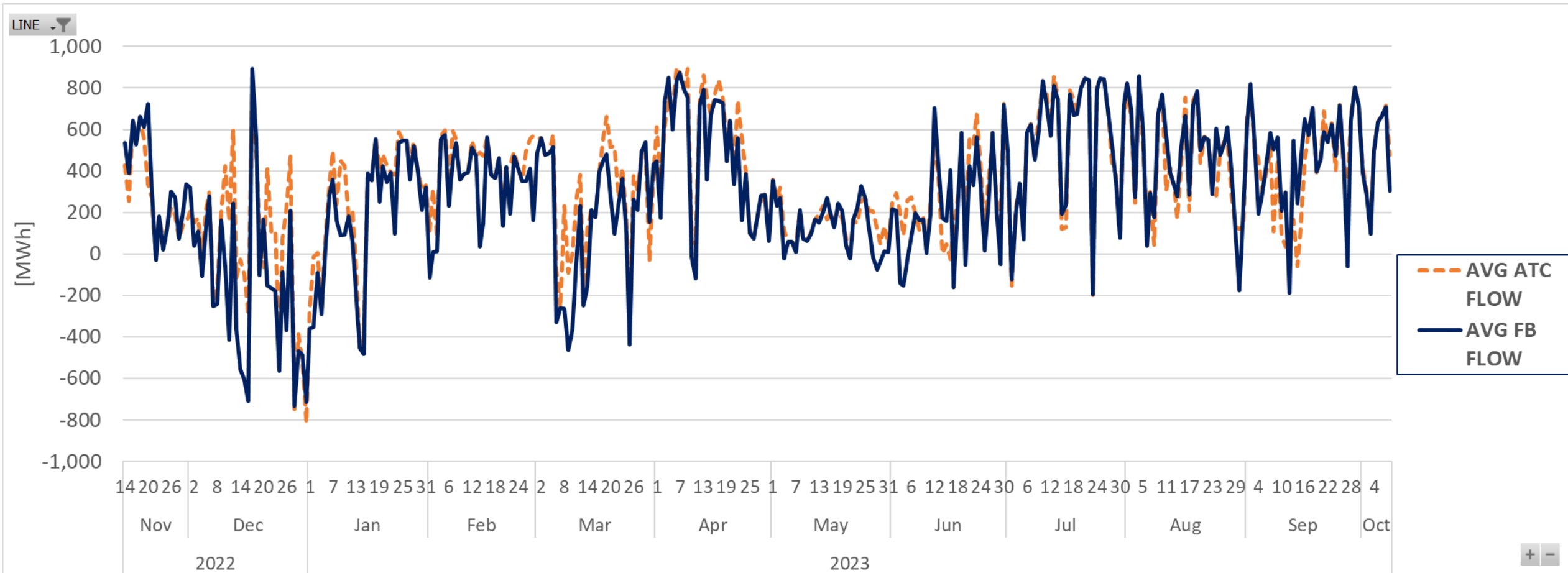
Daily average flow on DK1-NL

Average difference in daily scheduled exchanges (FB – NTC) = 24 MWh



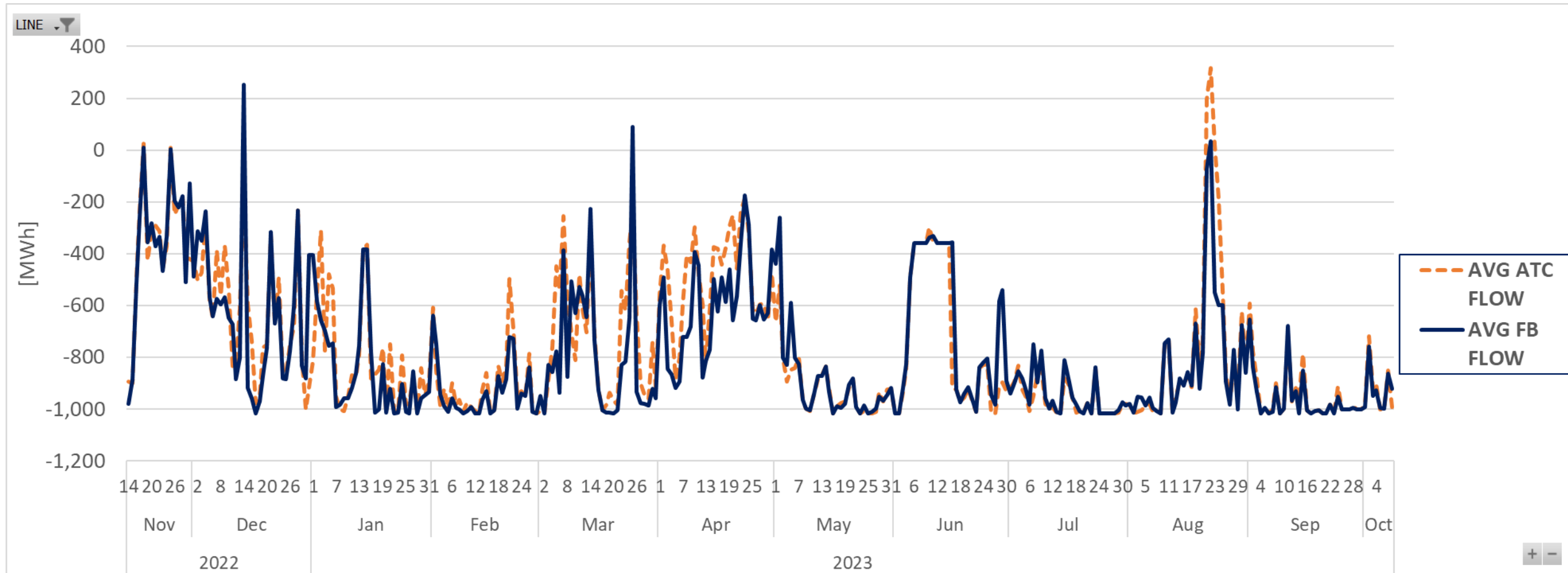
Daily average flow on DK2-DE/LU

Average difference in daily scheduled exchanges (FB – NTC) = -49 MWh



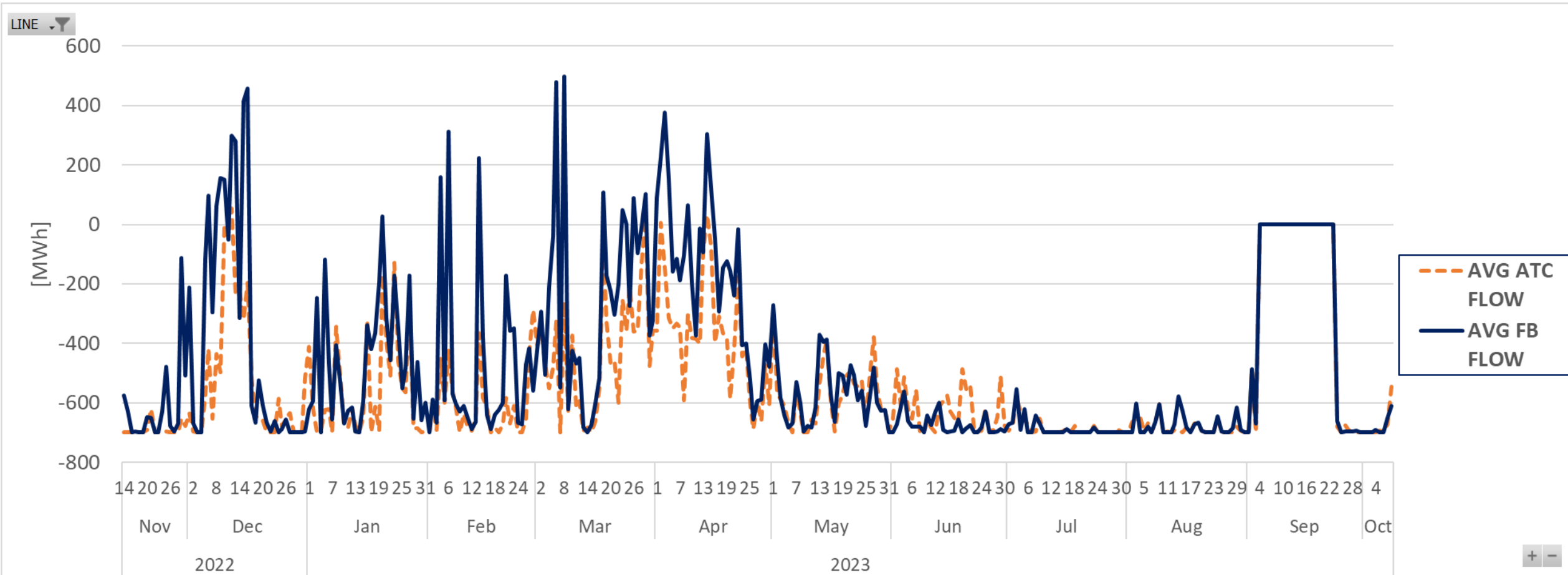
Daily average flow on EE-FI

Average difference in daily scheduled exchanges (FB – NTC) = -20 MWh



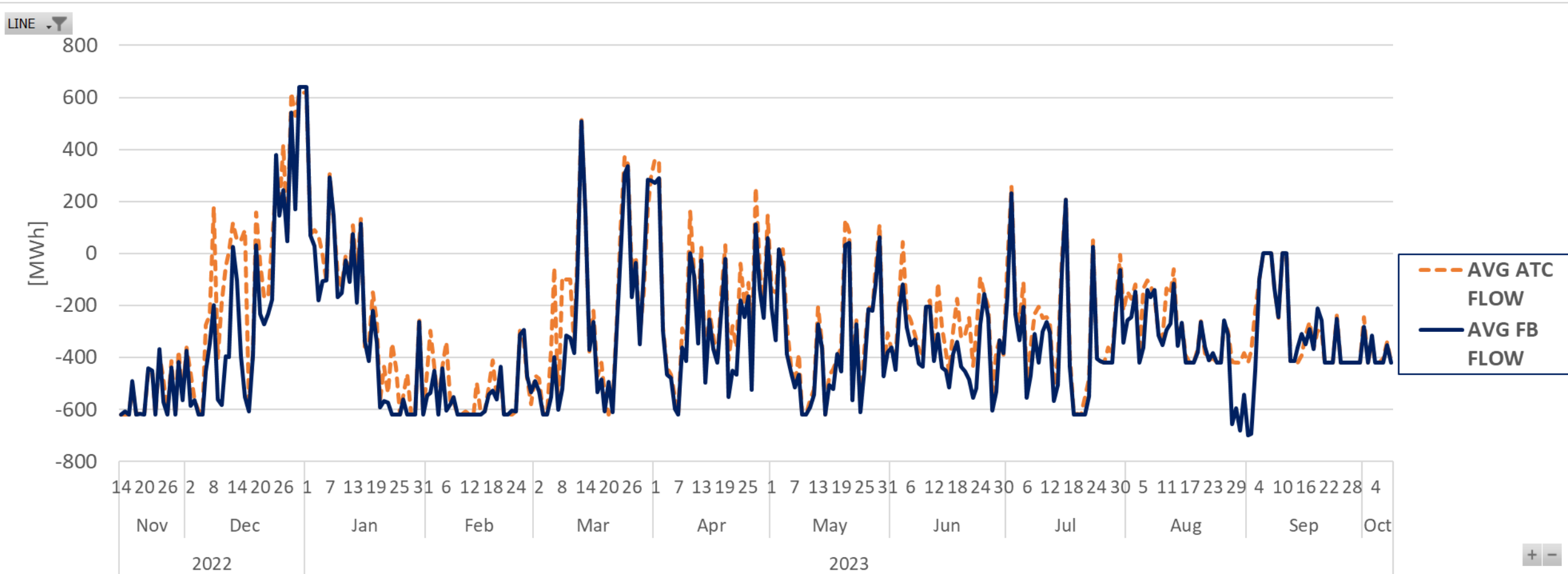
Daily average flow on LT-SE4

Average difference in daily scheduled exchanges (FB – NTC) = 72 MWh



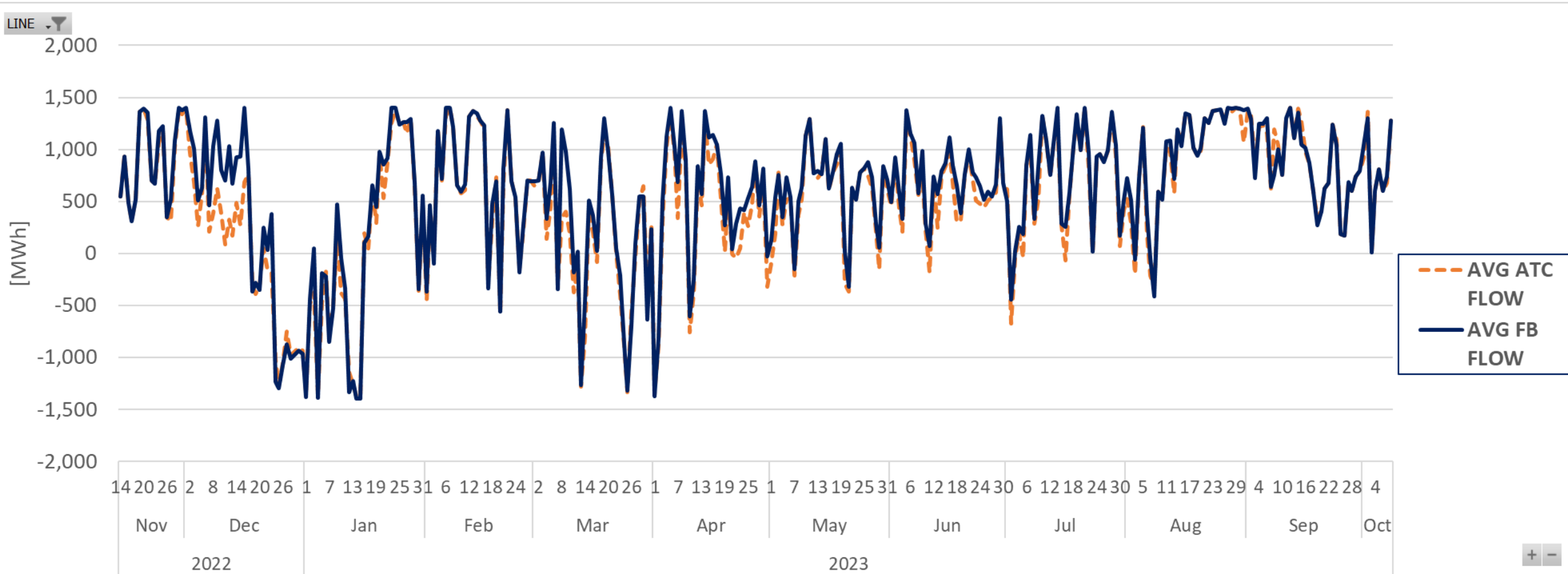
Daily average flow on NL-NO2

Average difference in daily scheduled exchanges (FB – NTC) = -59 MWh



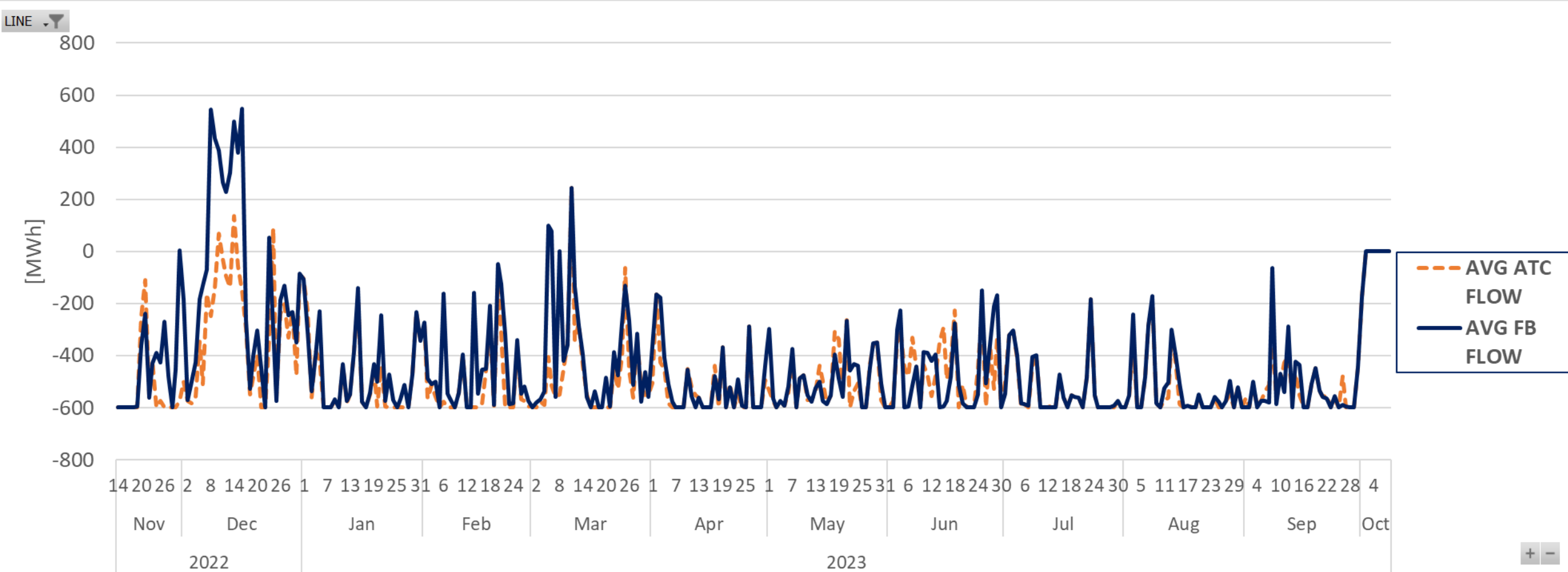
Daily average flow on NO2-DE/LU

Average difference in daily scheduled exchanges (FB – NTC) = 81 MWh



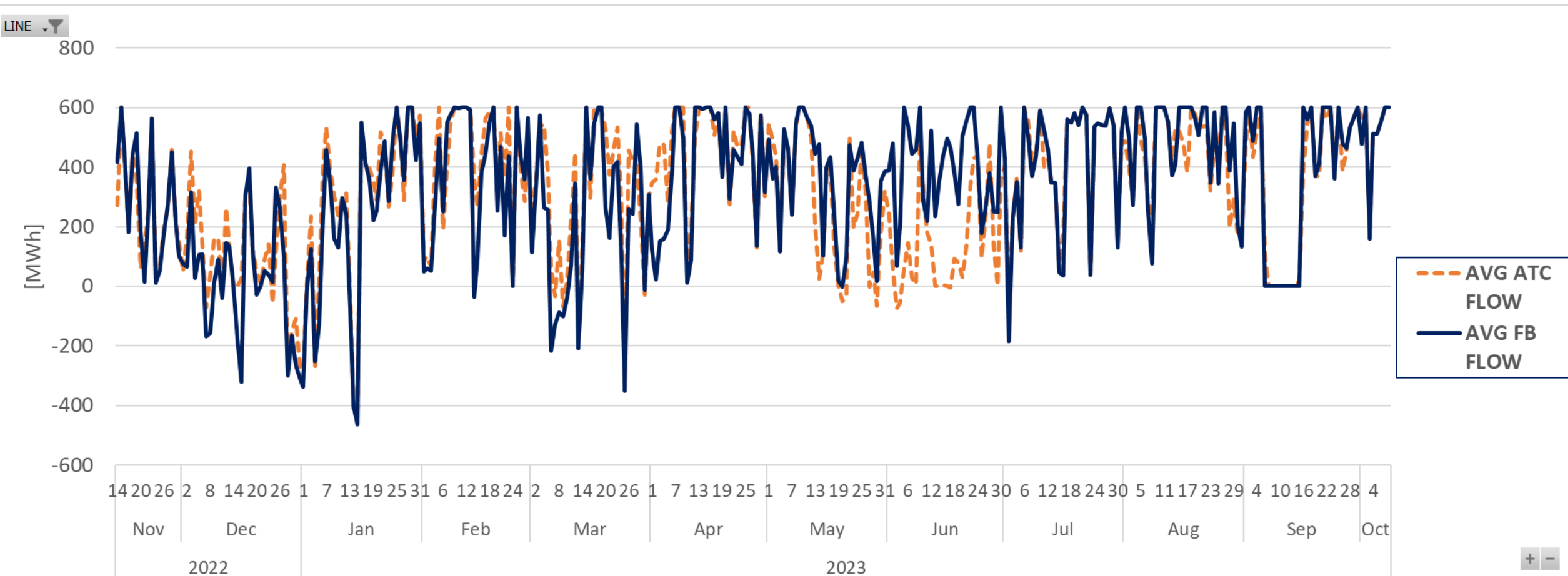
Daily average flow on PL-SE4

Average difference in daily scheduled exchanges (FB – NTC) = 43 MWh



Daily average flow on SE4-DE/LU

Average difference in daily scheduled exchanges (FB – NTC) = 7 MWh



Example (2022.11.29, period: 18-19)

Date	Period	EPR NFB SYS	PROD SYS	dif
2022.11.29	18-19	399.93	474.33	-74.4

- Capacities on external borders in EPR are equivalent to the ones in NTC.
- Change in the direction of the flow on NordBalt which is inserted in the curve of Nordic region explains the impact on the calculated system price.

- When the flow is from the Nordic region (in NTC), then its volume is added to the demand curve of the Nordic region which is often steeper than the supply curve.
- When the flow is to the Nordic region (in NTC), then its volume is added to the supply curve which is less steep and has more flexibility (price steps).
- Therefore, the impact on the (system) price can be bigger.

LINE	dif	FB_FLOW	NTC_FLOW
LT-SE4	1000.3	559.8	-440.5
DK1-DE/LU	29.1	2322.9	2293.8
NL-NO2	52.4	-325.5	-377.9
EE-FI	-449.2	-648	-198.8
DK1-DE/LU	415.9	-74	-489.9

Example (2022.12.16, period: 9-10)

Date	Period	EPR NFB SYS	PROD SYS	dif
2022.12.16	9-10	420.01	349.99	70.02

- Capacities on external borders in EPR are equivalent to the ones in NTC.
- Change in the flow on NordBalt, NordNed, NordLink, and BalticCable explains the difference in system price.

NordBalt (LT-SE4)

- Zero flow in NTC
- 700 MW in EPR (LT->SE4), in system price calculation this flow is added to the Supply curve.

Baltice Cable (SE4-DE/LU)

- Zero flow in NTC
- 600 MW in EPR (DE/LU->SE4), in system price calculation this flow is added to the Supply curve.

NorNed (NL-NO2)

- Zero flow in NTC
- 619.5 in EPR (NO2->NL), in system price calculation this flow is added to the Demand curve.

NordLink (NO2-DE)

- Zero flow in NTC
- 1399.2 MW in EPR (NO2->DE/LU), in system price calculation this flow is added to the Demand curve.

LINE	dif	FB_FLOW	NTC_FLOW
EE-FI	-345.3	-654.9	-309.6
SE4-DE/LU	-600	-600	0
LT-SE4	700	700	0
NL-NO2	-619.5	-619.5	0
PL-SE4	461.1	600	138.9
NO2-DE/LU	1399.2	1399.2	0



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