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

Bi-weekly stakeholder meeting on EPR results 28 September 2023

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### **Upcoming events**

- Hybrid meeting 26 October
  - The bi-weekly EPR result elaboration will be part of the agenda.
     (It has previously been communicated that the EPR elaboration would be cancelled.)
  - Place: Radisson Blu Terminal Hotel, Stockholm Arlanda Airport, Sweden.
  - Please register for onsite participation on the RCC website.
  - No registration necessary if you participate by Teams.
- Next bi-weekly EPR elaboration 12 October 9-11
  - Team link are available in the Nordic CCM news update.











## Agenda

- 1. Introduction
- 2. Updates since last meeting
- **3. Flow based results** Socio-economic welfare (SEW)

Prices

Net position

Constraining CNECs

4. NTC vs. FB example











### Introduction

- Bi-weekly meetings during the EPR
- Meetings are arranged by the Nordic CCM project in order to present the latest results from the External Parallel Run
- Goal: understanding the differences of the methods and communicating these to the stakeholders
- Today: Week 33 and 34 2023
- Time for questions at the end of the presentation











# **External parallel run (EPR)**

- In EPR, the capacity calculation process for both FB and NTC is performed in parallel
- Market results are simulated with FB constraints by NEMOs
- Same market coupling algorithm, same order books, different capacity calculation method
- The NTC results are the actual DA market coupling results, while FB is simulated
- The simulated FB-results are compared with the results from the DA market, where the Nordics currently still use NTC

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 market outcome.











#### **Important to note!**

The EPR market data comparison **does not** serve as:

- A complete forecast of the future market results, or
- a consequence assessment of the introduction of flow-based.

Please remember that the EPR market results for FB are simulated using NTC order books. These simulations **does not** consider the diverse effects FB could potentially have on water values in the Nordic region.

To summarize, the EPR market data **does not consider** the following:

• The effect of unused water resources (which could have been used in the NTC world) in the southern part of the Nordic region

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• The effect of increased water utilization in the northern part of the Nordic region







# **Updates since last SH meeting**

Unanswered questions from the last bi-weekly meeting:

- The "Avg. price spread for non-intuitive flows" for the non-intuitive flows are not correct. They contain the total price spread of the border. This will be updated in the next release.
- The TSOs will come back to the topic Remedial actions in relation to FB during a future SH event.

Other changes since last meeting:

The F\_AAC values for NTC are incorrect in the Market Result file. Previously
has the calculation been correct, but in the latest update these numbers
were updated historically. This will be update with in the coming weeks –
also historical.











#### Social welfare change week 33-34

- Flow-based results in a higher SEW compared to NTC for both the Nordic region and the whole market coupling region.
  - Total Nordic SEW change 19 M€
  - CI change on borders out of the Nordic region 0,19M€
  - Total SEW change in the SDAC region 20 M€
- Flow-based provide a gain for the producers in the Nordic Region and a consumer gain in the continent.



Figure: SEW change in Nordic



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Figure: SEW change in the whole SDAC region

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# SEW Impact on bidding zone level week 33-34

The distribution of the effect of FB is very different from BZ to BZ.

Sweden has two BZs (SE1 and SE2) where the SEW increases and two BZs (SE3, SE4) where there is a loss.

Flow-based results in a gain for the consumers in FI, NO2 and NO5 while the consumers in SE2, SE3 and NO1 have the largest loss.



Figure: Total SEW change in CCR Nordic per BZ



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Figure: Consumer surplus change in CCR Nordic per BZ

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#### Average prices in the Nordic region week 33-34

- High prices seen in NO2, DK1, DK2 and FI in both FB and NTC
- Lower FB prices in high price area and NO5. Higher prices for remaining BZ.
- FB increases the flow to the continent with 5 %
- FB allows for 42 % increased flow to NO2
- High export increase from SE3-FI during week 34
- This indicate that most of the e xtra electricity produced in the northern Nordics are used by consumers in the southern Nordic areas.



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## **Net position impacts**

- FB allows for more export to the continent, clear trend seen since beginning of April
- Generally net position increases in northern areas
- Total net position decrease for high price bidding zones and NO5 is 384 GWh
- This also indicate that most of the extra electricity produced in the northern Nordics are used by consumers in the southern Nordic areas.

#### **Top 5 largest changes in NP**

BZs	Net position change FB-NTC (GWh)
SE1	183
SE2	115
NO2	-192
NO4	150
NO5	-184

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## **Constraining CNECs in FB**

#### Sum of shadow prices on the 10 most constraining CNECs for week 33-34

Name of the CNEC (Swedish CNECs are anonymized)	Sum of shadow price	Internal CNEC	From area	To area
13792_325 300 Mauranger-Blåfalli	47309	No	NO5	NO2
AC_minimum_SE3_KS	43187	No	SE3	DK1
DK2_SV_IMP	18162	No	DK2	SE4
Swedish CNEC 1	15031	No	SE2	SE3
Swedish CNEC 2	14190	No	SE4	LT
FI_PTC_RAC_SE1-FI	14503	No	SE1	FI
Swedish CNEC 3	14190	No	SE4	PL
AC_Minimum_DK1_KS	14058	No	DK1	SE3
AC_Minimum_SE4_BC	13974	No	SE4	DE
AC_Minimum_NO2_NK	11648	No	NO2	NL
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# Flow impacts on Fenno-Skan NTC vs. Flow-based examples



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# NTC method at Svenska kraftnät

Capacity calculations consider the following operational parameters:

- Grid configuration (topology)
- Contingencies (N-1 criterion)
- Production pattern (production level and its geographical distribution)
- Load pattern (load level and its geographical distribution)
- Weather conditions (e.g. precipitation, temperature and wind which affects thermal capacity of conductors, wind power output, etc.)
- Electrical characteristics (of lines, transformers, production and consumption units, HVDC, etc.)

<u>Click this link for a presentation with more detailed descriptions of NTC</u> <u>method, East West flows and 70% rule (on the Svenska kraftnät website)</u>

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#### **Different flow scenarios**







Southbound-flows

East-west flows

Future flows?

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# The NTC-process: East-West example

- 1. Chose a probable operational flow scenario
- 2. Identify limiting components/bottlenecks
- 3. Identify contributing corridor flows
  - SE2 > SE3
  - FI > SE3
  - SE3 > NO1
  - SE3 > DK1
  - SE3 > SE4



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### **The NTC-process – East-West example**

- 4. Distribute available capacities to contributing corridor flows according to operational security
- 5. Allocate DA-capacities













### **The NTC-process – East-West example**

- 6. Evaluate DA-turnout
  - SE3 > FI would shift the line flow distribution
- 7. Adjust capacities on the intraday market
  - Possible to increase capacities on other contributing corridors



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#### Case East – West SE3 2023-08-16 01:00 to 02:00



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#### **Case Fennoskan + outage in SE3**

- 1. Chose a probable operational flow scenario
  - Outage: <u>Hjälta-Ängsberg (18.08.2023 24.08.2023 )</u>
- 2. Identify limiting components/bottlenecks
- 3. Identify (main) contributing corridor flows
  - SE2 > SE3 (Limit 5400 5600 MW)
  - SE3 > FI (Limit 600-800 MW)
  - SE2>NO3 (limit (0-100 MW)



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#### Case Fenno-Skan + outage in SE3 2023-08-23 15:00 to 16:00



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#### **Flow impacts**

#### FB allows more import and export depending on different flows



FI > SE3 Physical Flow











#### Thank you!

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