

Challenges of FB domain forecasting from producer perspective

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Agenda

- Hypothesis of challenges before go-live
- Observations since go-live
- What do actors need?
- Wish list
- Conclusion



Old news, but still relevant

- Optimal hydro-scheduling relies (partly) on network capacity forecasting.
- TSO information and UMM facilitated NTC forecasting.
- Since FBMC go-live, actors need to forecast the FB domain.
- Forecasting FB domain is challenging due to lack of public data usable for forecasting.
- Information from TSO, such as UMM, is no longer be helpful.
- Actors don't have enough information to forecast changes in the domain due to changes in availability of network elements and power plants.
- Losing ability to forecast and resulting in **less optimal use of water resources**.

And losing ability to forecast **affects in a much broader perspective** than we were first focusing on...!

Hypothesis of challenges before go- live

DA

Lack of data
= Difficult to forecast
= Decreased flexibility in Nordics



ID

Reduced ID capacity
= Reduced ID trades
= Reduced flexibility
= Increased balancing needs

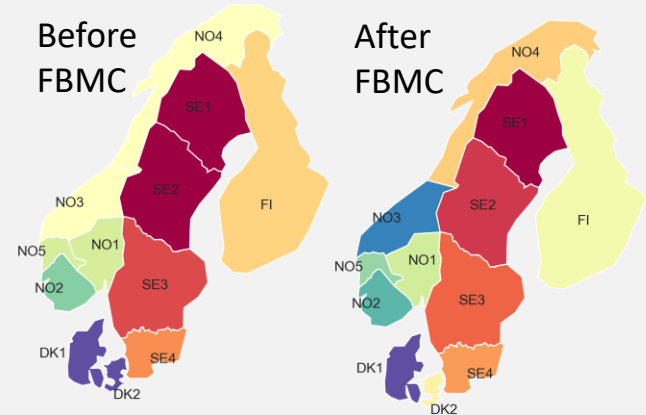


Challenges of FB domain forecasting

Observations since go-live

- Even more important now to have correct forecasts and bid curves per area. Before, it was often enough to have good forecasts and bid curves on an aggregated level (areas with same price with NTC).
- With FBMC, despite potentially converging prices, there is more decoupling between areas (as expected, but nevertheless, challenging).
- We have noticed that it is more difficult to do forecasts on price area level.

From 9 areas in practice to 12 areas after go-live



What do actors need?

Understand outcome

Reliable price forecasts on short-,
mid- and long-term horizon

Why are actors struggling?

Challenges we experience

Nothing has changed since go-live; we still have the same **challenges, questions and uncertainty.**

- Anonymous CNE/CNEC in Sweden.
- No official network data, network model would then be based on assumptions.
- Generation shift keys, limited information on these, which means we can only try to do an educated guess.
- Translating NTC UMM into FB UMM, requires understanding how each UMM affects the FB domain.
- State of serial capacitors, how to model these? They have a big impact!
- Demand and production forecasts we use may differ from TSO forecasts, another error source (net position distribution would then be different).
- Up to this date we still see quite some errors in the domain description (for example substation to/from vs name definition), adds a layer of complexity when processing information.
- No existing list of all CNEC, meaning that from time to time we see new CNECs being added to the domain, which we haven't "processed".
- Forecasting of Fmax without network model and TSO assumptions is too complex.
- ... and the list goes on!

→ We need to simulate what TSO do, without all the TSO data. **Practically an impossible task!**

Challenges of FB domain forecasting

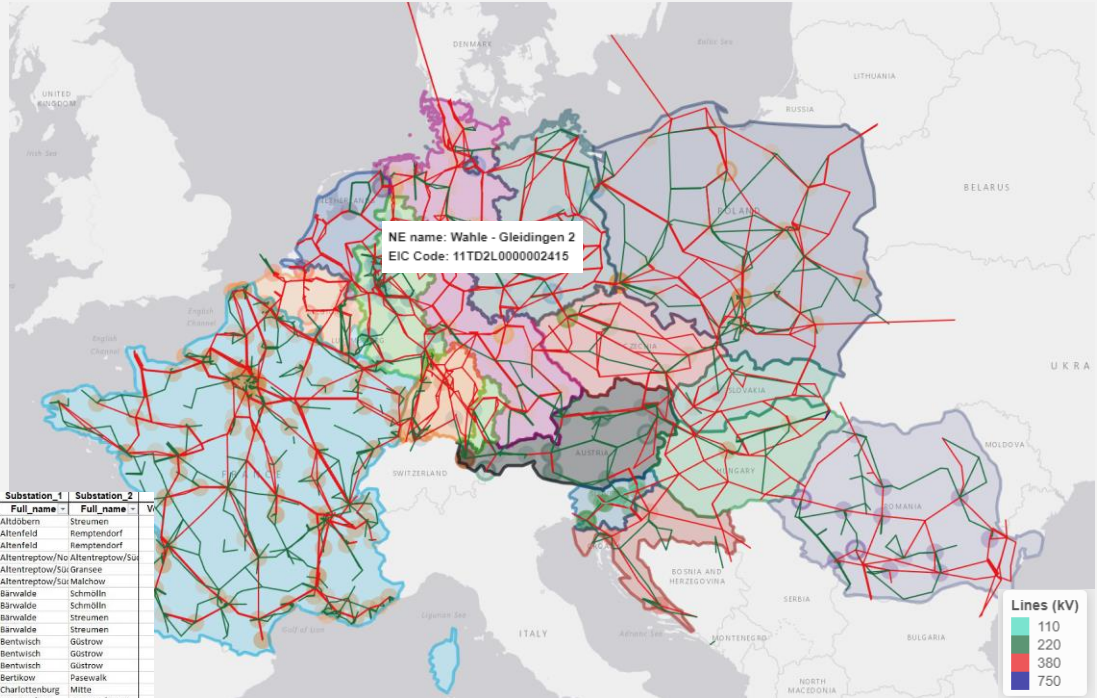
Wish list

We should have same kind of data as Core:

- Static grid model

→ Connect UMMs to elements in grid model

	NE_name	EIC_Code	TSO	Substation_1	Substation_2
1					
2					
3	Altdöbern - Streumen 563	11T0-0000-5949-E	SOHERTZ	Altdöbern	Streumen
4	Altenfeld - Remptendorf 463	11T0L463-----C	SOHERTZ	Altenfeld	Remptendorf
5	Altenfeld - Remptendorf 464	11T0L464-----4	SOHERTZ	Altenfeld	Remptendorf
6	Altentrop/Süd - Altentrop/Süd 477	11T0-0000-0008-4	SOHERTZ	Altentrop/Süd	Altentrop/Süd
7	Altentrop/Süd - Granssee 479	11T0-0000-0009-1	SOHERTZ	Altentrop/Süd	Granssee
8	Altentrop/Süd - Malkow 538	11T0-0000-0010-C	SOHERTZ	Altentrop/Süd	Malkow
9	Bärwalde - Schmölln 551	11T0L551-----R	SOHERTZ	Bärwalde	Schmölln
10	Bärwalde - Schmölln 552	11T0L552-----J	SOHERTZ	Bärwalde	Schmölln
11	Bärwalde - Streumen 557	11T0L557-----G	SOHERTZ	Bärwalde	Streumen
12	Bärwalde - Streumen 558	11T0L558-----B	SOHERTZ	Bärwalde	Streumen
13	Bentwisch - Güstrow 275	11T0L275-----7	SOHERTZ	Bentwisch	Güstrow
14	Bentwisch - Güstrow 543	11T0L543-----K	SOHERTZ	Bentwisch	Güstrow
15	Bentwisch - Güstrow 544	11T0L544-----C	SOHERTZ	Bentwisch	Güstrow
16	Bertkow - Papevalk 305	11T0L305-----N	SOHERTZ	Bertkow	Papevalk
17	Charlottenburg - Mitte 906	11T0L906-----T	SOHERTZ	Charlottenburg	Mitte
18	Dresden/Süd - Freiberg/Nord 592	11T0L592-----K	SOHERTZ	Dresden/Süd	Freiberg/Nord
19	Dresden/Süd - Rohnsdorf 591	11T0L591-----S	SOHERTZ	Dresden/Süd	Rohnsdorf
20	Eisenach - Vieselbach 454	11T0L454-----D	SOHERTZ	Eisenach	Vieselbach
21	Eisenhüttenstadt (Abzweig) - Eisenhüttenstadt 547-3	11T0L547-----P	SOHERTZ	Eisenhüttenstadt	Eisenhüttenstadt



Static Grid Model CORE

<https://www.jao.eu/static-grid-model>

Challenges of FB domain forecasting

Wish list

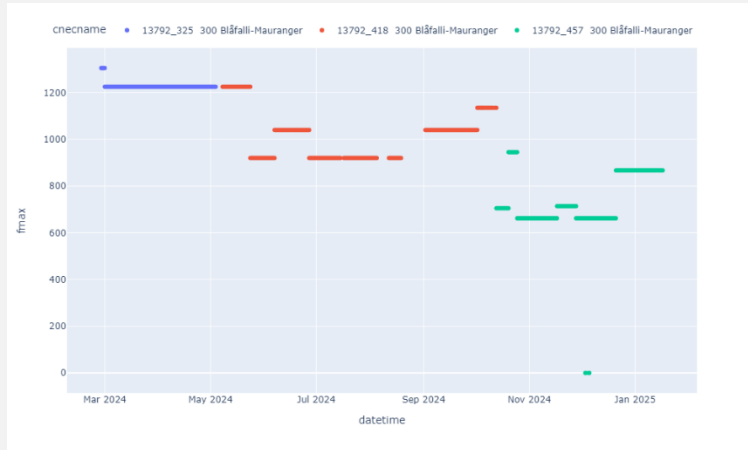
- Increased transparency
 - GSK
 - RAM (Fmax, AAC, NRAO, RM)
 - Distribution of “base”-generation and demand at buses
 - List of CNECs
- UMM in FB parameters
- Remove anonymity of CNECs in Sweden



Challenges of FB domain forecasting

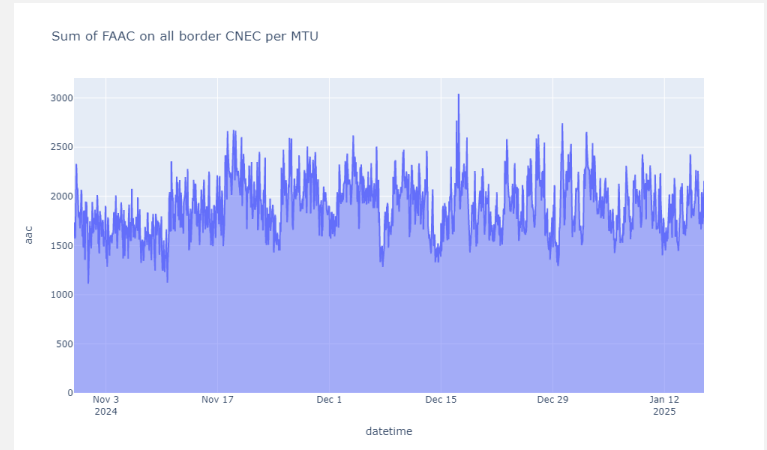
F Max

Example: Bláfalli-Mauranger (NO2-NO5)



F AAC

Sum of F AAC on all border CNECs

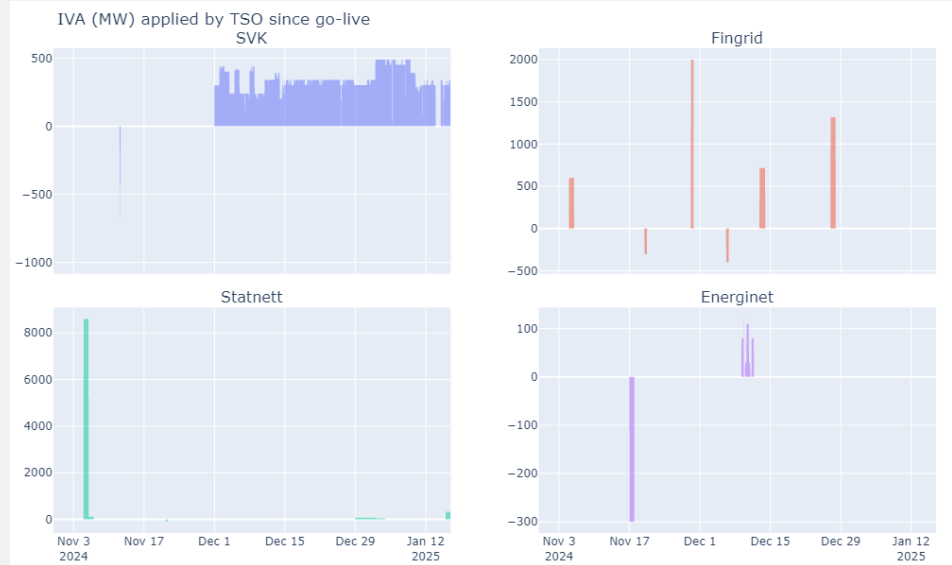


Examples of how challenging it is to forecast something we have very little information on how/why it changes over time

Challenges of FB domain forecasting

IVA

- Anonymity of Swedish CNECs affects communication regarding applied IVA.
- Communication in Sweden is strictly limited.
- SVK has been consistently applying IVAs since beginning of December. Difficult to understand why.



Date	CNEC Name	mRID	TSO	IVA	Justification
2024-11-05 00:00:00	FL_PTC_FL_FS_EXPORT	097b93fc-7b46-11eb-913e-0050569764bb	FINGRID	600	Exceptional contingency or forced outage - Olkiluoto-Ulvila B transmission outage
2024-11-05 00:00:00	NO2->DK1	ef683e6c-2e4d-4fba-b6be-32e91e0825e8	STATNETT	8599	Exceptional contingency or forced outage - Skagerak reduction
Date	CNEC Name	mRID	TSO	IVA	Justification
2024-12-03 00:00:00	519ee7bf2c214c22a2f3c9f4ce2b25b4	4bee72fef14a42d4a1cdc12742855e47	SVK	400	Mistake in input data - operational security
2024-12-05 00:00:00	fa7a1a8c86dc4e5687e4b3e4616947be	04e35a97ed9741781440836351f01dcb	SVK	201	Exceptional contingency or forced outage - null

Challenges of FB domain forecasting

FRM

- **Statnett** changed FRM values for some CNECs since 21st of December.
- **SVK** is analysing possible changes, no date announced for changes.
- SVK mentioned in Swedish market participant meeting that the underlying data used for taking the decision on changing FRM would not be made public

→ *Actors won't be able to forecast future changes in FRM despite clear rule of risk level of 95%.*

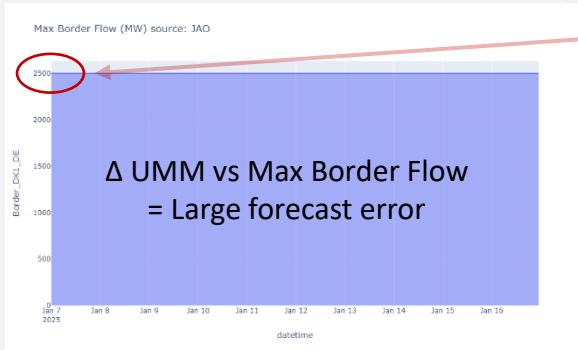
From our perspective, we have not received enough information on the implications. We would like to see a **numerical analysis!**



Challenges of FB domain forecasting

UMM in NTC

- Example of how wrong it can be if we use UMM in NTC.
- Big uncertainty in the financial markets, how much will the UMM impact in reality?



(One example out of the 11 borders impacted by the UMM)

NORD POOL UMM Platform 13:29 EUROPE/STOCKHOLM ? Login

MESSAGES

Unavailability of electricity facilities : Transmission

SE3 → DK1, DK1 → DK2, DK1 → NL, DE-TenneT → DK1, DK1 → DE-TenneT, NL → DK1, DK1 → NO2, DK1 → SE3, DK1 → GB, GB → DK1, NO2 → DK1

Published	Event Start	Event Stop	Duration	Type of Unavailability	Reason Code	Reason for the Unavailability	Remarks
2025-01-05T13:08:16	from 2025-01-07T09:00	to 2025-01-24T16:00	17 days 7 hours	Planned	Foreseen maintenance	Relay refurbishment	Capacity updated. As it's an internal outage, flowbased capacity calculation will define the actual capacities D-1.

Transmission Units

Unit Name	Unit EIC	Area	Installed Capacity	Available Capacity	Unavailable Capacity	Fuel Type	Power Feed-In	From	To
SE3 → DK1		SE3 → DK1	715 MW	300 MW	415 MW			2025-01-07T09:00	2025-01-24T16:00
DK1 → DK2		DK1 → DK2	590 MW	100 MW	490 MW			2025-01-07T09:00	2025-01-24T16:00
DK1 → NL		DK1 → NL	700 MW	200 MW	500 MW			2025-01-07T09:00	2025-01-24T16:00
DE-TenneT → DK1		DE-TenneT → DK1	2500 MW	1100 MW	1400 MW			2025-01-07T09:00	2025-01-24T16:00
DK1 → DE-TenneT		DK1 → DE-TenneT	2500 MW	750 MW	1750 MW			2025-01-07T09:00	2025-01-24T16:00
NL → DK1		NL → DK1	700 MW	250 MW	450 MW			2025-01-07T09:00	2025-01-24T16:00
DK1 → NO2		DK1 → NO2	1632 MW	650 MW	982 MW			2025-01-07T09:00	2025-01-24T16:00
DK1 → SE3		DK1 → SE3	715 MW	200 MW	515 MW			2025-01-07T09:00	2025-01-24T16:00
DK1 → GB		DK1 → GB	1456 MW	700 MW	756 MW			2025-01-07T09:00	2025-01-24T16:00
GB → DK1		GB → DK1	1456 MW	700 MW	756 MW			2025-01-07T09:00	2025-01-24T16:00
NO2 → DK1		NO2 → DK1	1632 MW	800 MW	732 MW			2025-01-07T09:00	2025-01-24T16:00

Assets

45T0000000000700 : ASR_400_TJE

Market Participants

Publisher
Energinet

Market Participants
NUCS(ACER: 0000000000)
Energinet(ACER: A0000003F.DK)

Related Messages

2025-01-05T13:08 (currently viewing)
2024-12-30T10:12
2024-11-01T09:56

Messages from the same connection(s)

Planned, Foreseen maintenance: 2025-01-14T12:22 on 2025-01-21T07:00 - 13:00
Planned, Foreseen maintenance: 2025-01-09T21:11 on 2025-01-13T05:00 - 06:00
Planned, Foreseen maintenance: 2025-01-09T21:11 on 2025-01-06T09:00 - 10:00
Planned, Foreseen maintenance: 2025-01-09T21:11 on 2025-01-14T16:00 - 18:00
Planned, Foreseen maintenance: 2025-01-09T21:11 on 2025-01-06T10:00 to 2025-01-09T17:00

Challenges of FB domain forecasting

Anonymous CNECs

1. UMMs have information about which CNE is unavailable.
 - This CNE could be seen as a contingency that has materialized.
 - Comparing data for Max Border Flow with the CNE in and out gives information about how the unavailability impact flows between areas.
2. A CNEC in domain contains information about CNE with/without contingences RAM and PTFD.

It is not exactly same information, but fairly similar.

**→ First one is ok, but the second one is not!
So, how is the national security law implemented?**



Map of the Swedish national grid, obtained from <https://www.svk.se/en/national-grid/map-of-the-national-grid/>

Anonymous CNECs

We know that several market participants are working on network models, trying to **identify** and include the anonymous CNECs in their models. **Question, is this even allowed according to the national security law?**

We would like to avoid this from happening!

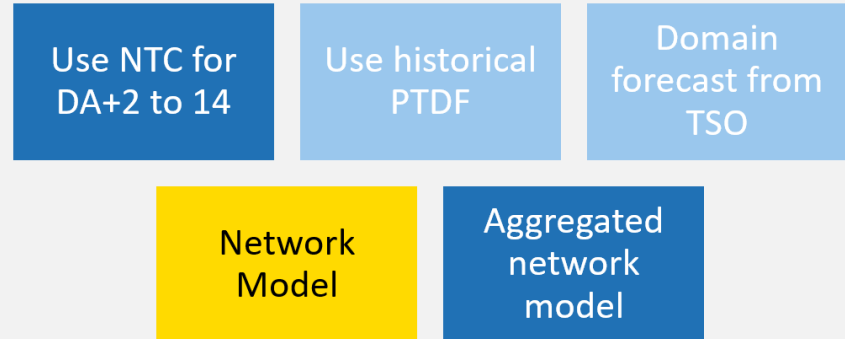
LATEST NEWS

NORDIC POWER PRODUCER ACCUSED OF
ESPIONAGE WHILE TRYING TO IDENTIFY
CLASSIFIED INFORMATION ON THE POWER
GRID INFRASTRUCTURE

[Read more on page 26](#)

Conclusion

- Unfortunately, from the modelling perspective we haven't found a preferred solution yet.
- There are still many challenges due to lack of openness of data.
- After almost 3 months since go-live, we are more aware on how the missing data affects forecastability and see more challenges now than we did before.
- **Every day the knowledge "archive" resets, when Swedish CNECs get a new name.**



An aerial photograph of a large, roughly circular pond with dark blue water, surrounded by a thick forest of green trees. The pond is the central focus, with the text 'Thank you! Q&A' overlaid in white. The surrounding forest is dense and vibrant green, with some lighter patches of grass or bare earth visible near the water's edge.

Thank you!
Q&A