

Memo – Statnett and Svenska kraftnät explanation of the dependency between NBM and the Flow-based Capacity Calculation process

June 2022

Summary

As part of the update of the NBM roadmap, and especially the new go-live window for mFRR EAM, the Nordic TSOs have further formalized the dependency chart that explains the dependencies between milestones within NBM, and between NBM and other projects.

In this overview, the Nordic TSOs have pointed at the strong dependency between the introduction of mFRR EAM (automated operation) and the need to manage transfer flows between Sweden and Norway. This explicitly means a clarification of the dependency between the go-live of the flow-based capacity calculation for the day ahead (DA) process and the NBM milestone "Nordic mFRR EAM". The dependency means that the go-live of Flow-based capacity calculation in the DA market, will be a pre-condition for keeping the current timeline for the go-live of the Nordic mFRR EAM.

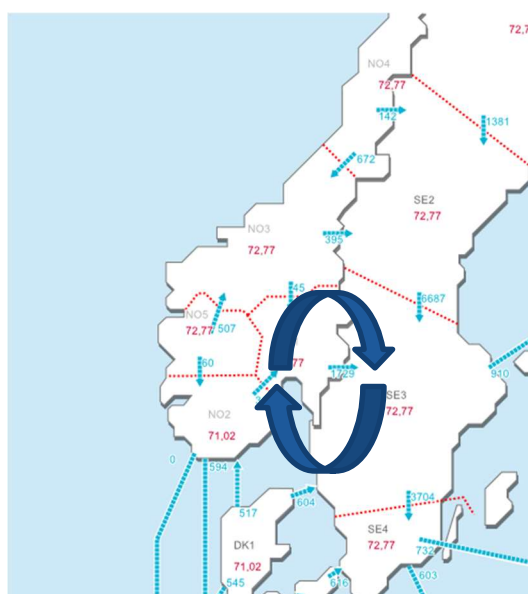
It is important to note that the dependency and the complexity related to transit flows have been well known by Statnett and Svk for a long time. However, with the work revising the NBM road map and EAM timeline, Statnett and Svk insight in what it takes to reach automated balancing has significantly increased, and through this also what it takes to manage the transit flows in the context of NBM.

This document has been prepared by Svk and Statnett. It gives a short and condensed description for the rationale behind the mentioned dependency.

Transit flows and resulting challenges

Today, we see large deviations in some corridors between the market flow and the physical flow, that we often refer to as "**transit flows**".

Transit flows occur when transactions from one bidding zone to another bidding zone partly flow through other bidding zones. Such flows may cause exceedance of security limits on corridors, which are not identified and thus not avoided by the day-ahead (and intraday) market clearing algorithms. A particular problem in the Nordic system is caused by flows from NO5 to SE3, that partly deviate through NO3 and SE2, causing exceedance of flow limits on the corridor from SE2 to SE3 ("Snitt 2").



72.71 *Figure 1: Illustration of transfer flow*

These transit flows often occur after the clearing of the day-ahead market and the determination of the generation schedules, and it is therefore often possible to identify them in the afternoon/evening of D-1. In principle they could then be handled in this phase, although it can happen that new transit flows occur from intraday trade.

Presently, the overloads caused by these flows are handled in real time by the operators, often with considerable efforts. The operators monitor the Nordic frequency and the flow on critical cuts in the network and choose appropriate activations for both keeping frequency within acceptable

limits and avoid overloads on cuts. How much of an overload is due to transit flows is not quantified, but it is known that this often is a major reason for the overload.

With automated balancing, activations are no longer based on monitoring of frequency. Instead, there is a separate market platform that determines activations based on requests in each bidding zone, which again are based on imbalance forecasts. All bidding zones could be in perfect balance and still there could be overloads due to transit flows, as transit flows arise due to deviations between market flows and physical flows. This

means that Statnett and Svk needs a separate load flow analysis to identify overloads due to transit flows and handle these proactively before the energy activation market is run. **The automation of the balancing process implied by NBM makes manual intervention much harder, and it is as an absolute necessity for Statnett and Svk to ensure that there exist ways to manage these transit flows in the context of an automated balancing process.**

Implementation of flow-based is expected to reduce the transit flows

If the problem with transit flows won't be mitigated/reduced, it will be an impediment to go-live of the automated balancing process.

The flow-based (FB) market clearing is based on a methodology for calculating capacities that shall ensure that the market flows are within physical limits of the network. FB market coupling represents a considerable improvement of the representation of the physics of the grid, compared with the present NTC method, and there are calculated margins to deal with the uncertainties resulting in the FB methodology. It is therefore expected that transfer flows will be significantly reduced once FB is implemented. An analysis has been initiated to follow up the external FB parallel runs to get early indications if this approach indeed will be successful.

Other measures than simply await the implementation of FB, to mitigate transit flows, would impose an increased challenge for the Statnett/Svk local development and go-live plan for mFRR EAM. It would either require new local systems/tools, processes, increased reserves in certain areas, or create a need for introducing a counter trade process that will not be possible to establish before the planned go-live¹. **These alternative local solutions would delay the mFRR EAM, imposing larger timeline risk for the consecutive milestones for the program (15minISP, MARI, PICASSO).**

Thus, relying on the FB calculations to reduce transfer flows to an acceptable level, significantly reduces development efforts within Statnett and Svk in a NBM context. This creates a strong dependency of NBM on the FB implementation.

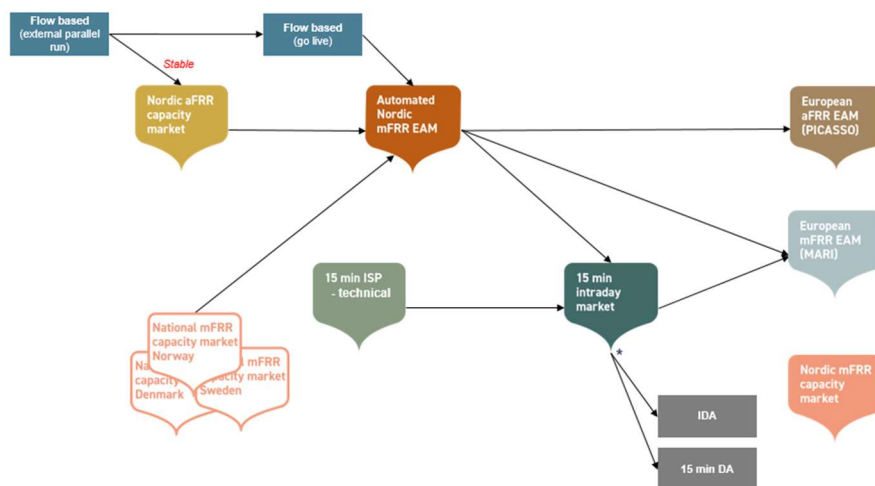


Figure 2: Dependency chart of NBM

¹ Apart from Denmark, there is no formal counter trading in the Nordic countries today. Designing at setting up a process for this from scratch will obviously take time. The "simplest" solution would probably be to use negative capacities in Intraday auctions (negative capacities meaning that capacity given to previous market transactions will be reduced), but this also faces many challenges and uncertainties.