

The common Nordic aFRR capacity market is an important stepping stone for the NBM program and crucial for reducing end user costs

There has during the last year been an intense debate in the Nordic between TSOs, NRAs and stakeholders on the need for a common Nordic aFRR capacity market. With this short memo the TSOs would like to highlight why a common Nordic aFRR capacity market is needed and how a delay potentially will impact the other milestones in the NBM program, such as implementing 15 min ISP and connecting to the European platforms.

One of the purposes of the NBM program is to transform the existing Nordic way of balancing the system to the European target model as described in EBGL and SOGL. A fundamental requirement from SOGL is that TSOs have to implement the aFRR process, and thus we need to have the aFRR capability also from the market participants and in all bidding zones. The starting point in the Nordic is, however, quite different from continental Europe, especially the fact that we have frequency-based balancing and a high number of relatively small bidding zones. In order to be able to connect to the European platforms there are two major prerequisites that have to be fulfilled, namely ACE-based balancing, where each bidding zone shall keep its balance, and the change to 15 min Imbalance Settlement Period.

A pre-requisite for ACE-based balancing is that each bidding zone has access to a sufficient amount of aFRR resources. DK1 has during the last 15 years been performing ACE-based balancing, and the needed amount of aFRR has been around 90-140 MW. The needed amount of aFRR will differ from bidding zone to bidding zone and depend on the nature of imbalances, the size of the bidding zone and the TSO balancing philosophy. Currently the Nordic TSOs procure in total 300 MW aFRR reserve during 104 hours per week (i.e. only 60 percent of the time) for all 11 bidding zones. Hence, it's already well known that for the Nordic to change to ACE-based balancing a higher amount of aFRR than 300 MW will be needed in all hours. It's currently unknown how much aFRR we will need in the end, and which bidding zones that will have the highest demand, but something in the range of 600-1000 MW would be a good estimate.

The socioeconomical benefit of a common aFRR capacity market is significant

aFRR resources can be supplied either via an aFRR capacity market or via voluntary aFRR energy bids. Hence, it is not given that all the needed amount of aFRR has to be procured via a aFRR capacity market. The importance is, however, that each bidding zone has access to the aFRR capability either within the bidding zone or via a cross zonal supply. First step in starting up a market is to establish a demand of balancing capacity, that will incentivize the market participants to invest and deliver aFRR. In principle this could be done by establishing an aFRR capacity market in each bidding zone, and only procure the needed amount within that bidding zone. However, several bidding zones in the Nordic have a severe lack of aFRR capability, and in practice this would mean several bidding zones with either no competition or the supply would not be enough to meet the demand. This would then of course imply severe costs for reserves, or simply need for actions ensuring operational security.

By establishing a cross-zonal capacity market (**as just approved by ACER**), it will be possible to solve both the lack of competition and supply, and by that ensure that each bidding zone from the beginning have access to the needed amount of aFRR. The socioeconomical benefit of this is significant - procuring 300 MW

in a common market compared to a procurement at country level has been calculated to be +50 mEUR per year. This is 50 mEUR per year that will benefit the electricity consumers. The value would be significantly higher, if it was compared with a procurement at bidding zone level. As the demand will be even higher than the 300 MW – the benefit will be even larger than so-far calculated.

When we have an established an energy activation market (PICASSO connection), then a certain fraction of the aFRR demand can be ensured via access to voluntary bids. A cross zonal balancing capacity market requires a reservation of transmission capacity, and this has an impact on the day-a-head market. The benefit of +50 mEUR for the “300 MW calculation” is a **net benefit**, which is the sum of a gain of 57 mEUR in the balancing market and a loss in the day-a-head market of around 4 mEUR.

From 2015-2020 there was a cross-border setup between DK1 and NO, where 100 MW aFRR was delivered from Norway. In that period the monthly average aFRR capacity cost was 8,3 mDKK. Since January 2020 the 100 MW aFRR has been procured solely in DK1 with an average monthly cost of 32,2 mDKK, corresponding to an increase of 290%

The link between the order of the projects in the NBM program

The change from frequency based balancing to ACE-based balancing cannot just happen overnight, and several steps are needed. First step is that each bidding zone start to forecast its imbalances, and Nordic operators will use this as input for mFRR activations instead of the common Nordic frequency input. This transition will most likely cause the frequency in the Nordic to temporarily worsen, unless more aFRR is available for real time adjustment of the system. Hence the Nordic TSOs are expecting an increased demand of aFRR as soon as we start the transition towards ACE-based balancing. This is simply to safeguard the system throughout a period with substantial changes of the core processes used to operate the Nordic power system. If we do not have the opportunity to exchange aFRR capacity between bidding zones, then some bidding zones cannot keep their balance. Hence, if we cannot start the common aFRR capacity market next year, but have to wait until flowbased has been fully implemented in a way that its parameters are used in allocation, then we most likely have to delay the transition towards ACE-based balancing, which will further delay the connection to the European platforms. Also, the change to 15 min ISP is expected to create some fluctuations in the system, at least until both the operators and market participants have adjusted to the new situation, hence this transition might also temporarily create a demand for more aFRR.

When the Nordic system has changed to ACE-based balancing, the system can be further optimized via the aFRR energy activation market, as the aFRR capacity procurement potentially can be reduced due to well function market with high availability of voluntary aFRR energy bids.

It is also of importance to understand that all changes/milestones in the NBM program will have a large impact on the system operators/IT-developers and market participants. Hence, it is vital that the TSOs plan the NBM program with sufficient time in between fundamental changes. A delay of aFRR capacity market go-live, which will also in worst case will be dependent on other, external processes, will push the aFRR go-live closer to the go-live of the mFRR energy action market ("parallel run"). This will mean a need for re-planning within the NBM program, with the risk for either 1) even further delay of aFRR capacity market go-live, or 2) delaying the go-live of mFRR EAM, and by that endangering the 15min ISP go-live.

Regarding a common Nordic mFRR capacity market, the benefits are more of an economic nature, as Nordic already has built up a certain capability of mFRR energy supply in most bidding zones. Still some

bidding zones, however, also have a lack of mFRR reserves. Using the ACER approved methodologies for allocation of cross-zonal capacity to the balancing market, will thus also be a huge improvement in transparency compared to how cross-zonal capacities for balancing are allocated and reserved today. Today not all cross-zonal capacity is given to the day-ahead market – but if needed, a certain fraction is reserved in order to ensure that the mFRR reserves can flow between bidding zones. In principle TSOs could increase the use of this non-transparent way of allocating cross-zonal capacity to the balancing market in order to ensure aFRR can be procured in any bidding zone. This since operational security needs to be taken care of also in those bidding zones not having aFRR capacity.

The Nordic transition toward the European target model for balancing is extremely complex, and the NBM program has been using 1-2 years to plan and reassess this transition. The journey consists of a number of building blocks, and the order of these blocks has been carefully chosen, also to ensure a spread out implementation of changes from an operational perspective. It's impossible just to move around or delete some of the blocks, without impacting the others or significantly increase the cost of this transition. The reason why the aFRR capacity market is one of the first building blocks is because this is a fundamental stepping stone, for the Nordic to reach the European target model. Any delays in establishing this market will potentially delay the further NBM implementation or make the transition extremely costly.