

Security Of Supply Assessment in relation to aFRR CM

The Nordic NRAs in NordREG have 16 September 2022 provided guidance to the content of “The evaluation report for the go-live of the Nordic aFRR Capacity Market”. In the guidance, the NRAs urge TSOs to present and distinguish the relationship between security of supply, operational security, the use of other balancing products as well as other alternatives and their consequences on other markets.

This note provides an initial assessment of the Nordic aFRR capacity market’s influence on security of supply and operational security in form of frequency quality.

Introduction:

The recent developments in the energy markets (extremely high energy prices due to war in Ukraine, increase of intermittent, variable generation) have resulted in increasing variability not only in price, but also in the liquidity in the reserve market places. The introduction of aFRR capacity market with reservation for the exchange of balancing energy will provide liquidity in the individual bidding zones.

In general, aFRR reserves evenly distributed in the Nordics is needed to take care of the imbalances. Lines will be overloaded if reserves are only placed in the hydro production areas. It is foreseen that the present situation with high energy flows to the Continental part of Europe causing a more loaded system. This will continue and probably evolve to more hours as we now see a higher risk of energy inadequacy in Continental part of Europe. To continuously operate a system with unevenly distributed aFRR will increase and endanger the risk of security of supply.

The opening of a Nordic aFRR capacity market will make it possible for all areas to contribute and increase the liquidity as the players meet a bigger market. Resources that already are in the market can be better used in the different timeframes and add value to the market and the security of supply.

The resources to do countermeasures are in high-price situation very limited in the regulation power market and gives in these cases no possibility to reach the imbalances in the right area. In the current situation it is important that the liquidity of aFRR is increasing and available in all areas.

The aFRR impact on frequency and security of supply

When operating the system, the aim among others is balancing the system and thus maintaining the frequency within the frequency band, i.e., 50 Hz +/- 100 mHz. A frequency on 50 Hz is reached when production covers the consumption.

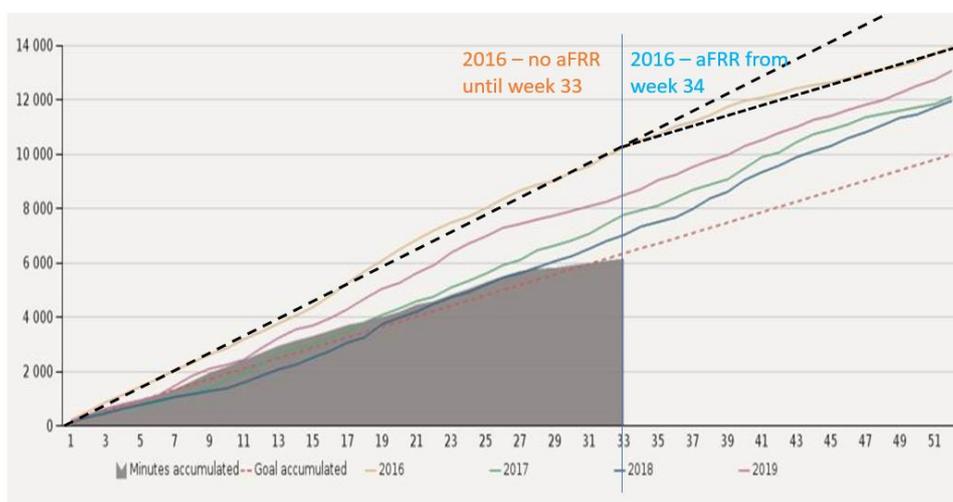
In scenarios with decreasing production or decreasing consumption, the frequency is respectively decreasing or increasing. The increase or decrease in frequency is due to surplus of consumption or production.

Improving the liquidity of aFRR in the Nordic bidding zones will reduce the frequency fluctuations due to its characteristic of equalizing imbalances by adjusting production and consumption.

The Nordic TSOs have in 2020 carried out an analysis of the interrelationship between availability of aFRR in the Nordic region and frequency quality during 2016-2019. The result of the analysis is presented in the graph below.

Concerning 2016, the graph indicates that aFRR effect on the frequency due to procurement of aFRR was not available until week 33. During the first 33 weeks of 2016 the slope of *Cumulative minutes outside the normal frequency band* was steeper than the remaining weeks indicating aFRR positive effect on frequency quality and hence operational security. The reason for the steeper trend in the first 33 week of 2016 is due to frequency quality had a strong negative influence in 2016 compared with previous years.

MONB 2016-2020: Cumulative values and aFRR hours



The recent development in the market situation causes more frequent changes in flow direction on HVDC connections and high flow towards Continental Europe resulting in further negative influence on the frequency quality. For this reason, aFRR positive effect on frequency quality is particularly relevant for the coming winter.

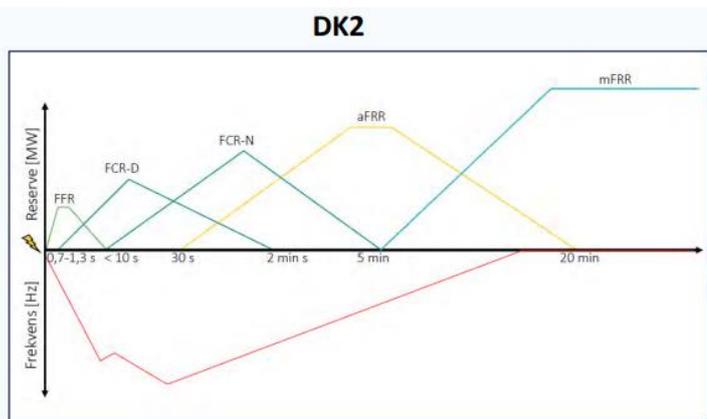
In conclusion, aFRR contributes to maintaining the frequency within the frequency band and thus will liquidity of aFRR be critical for the coming winters.

At the same time high flow towards Continental Europe resulting in enclosing bids causing issues getting aFRR-reserves to the area where it is needed for an imbalance. If aFRR capacity is not fully utilized this will lead to a decrease in security of supply for this winter.

The use of other balancing products:

Several reserves with different properties exist. FRR and FCR(D-N) can contribute with an amount of energy for a very short period. To maintaining the balance over a longer period the reserve mFRR is utilized. These different characteristics introduce a gap where the aFRR is needed to maintain the operational security by keeping the system within a secure limit until mFRR is to take over. This

determines that there are no other products capable of covering the properties of aFRR.



Finland:

In Finland there has been variations in the liquidity for a longer period, but those have been mainly seasonal and appeared mainly during the spring flood season. During the last 6 months this pattern has change and increasing fluctuations in the liquidity are appearing so that the margins to fulfill the required capacities at each marketplace are becoming more and more narrow. If this trend continues, major temporary challenges to meet the required reserve allocation may appear already during the winter season '22/'23 and this will not only increase the risks related to system security, but also risk of electricity outages, controlled load disconnections, as the liquidity at the reserve markets is one of the measures that is being applied as a measure to avoid rolling load shedding. Regarding this, it shall be noted also, that there are liquidity shifts between the marketplaces and improving liquidity at any market, most likely has positive impact also on other marketplaces.

From Finnish perspective the main short-term measure to counteract the temporary but increasing issues with liquidity would be extension of the markets. This is the key short-term measure that would possibly significantly improve the situation. Other actions are also being started, but they are such that the improvements will be achieved most likely more in mid-term time frame (likely starting H2/'23).

Sweden:

In southern Sweden the situation is worse than in Finland and the area is in deficit mode. There is no liquidity in SE3 and only 30 MW of aFRR in the market in SE4 compared with the total need of around 70 MW for SE3-4.

The deficit of liquidity in SE3-4 increase the risk for the Swedish TSO and if reserves can't be transported from the north or other neighboring areas in the south load shedding is the next step to secure that the system is stable.

Only the aFRR capacity in SE1-2 is enough to maintain the system state and that needs to be transferred to the imbalance in the south of Sweden.

The coming market will give incentives for market players not only in SE but also the contribution from Denmark is important for a correct system response, as Sweden is the transit country in the Nordics and an imbalance in the southern part of the Nordics gives overloaded corridors. In this specific situation the use of

the corridors SE2→SE3 and SE3→SE4 could be used better and as the countermeasures in reserves in the south are decreasing it is getting more critical for the security of supply when imbalances can't be dealt with where it occurs.

Denmark:

In Denmark (DK2) there is currently not an aFRR market. An aFRR market is first to be established in the transition to the Nordic aFRR capacity market. Establishing a local aFRR market beforehand will not be possible due to low liquidity, given the short time frame before this winter and need for change in e.g., signals as well as response time. To mitigate not currently having an aFRR market, Energinet purchase FCR knowingly not having the same system support as aFRR.

The recent situation causing high flows both towards Continental Europe and between the Nordic countries causes almost constant maximum flows during the winter. This resulting in an issue getting aFRR to the areas having the imbalance and causing overloading in the system as it will be transferred from other areas.

Norway:

Norway has not contracted aFRR liquidity in NO3 and NO4 to prevent overloading the Swedish Corridor SE2→SE3, as long the distribution of aFRR is not good enough. There is a dialogue with the Market players and there are not anticipated any problem contracting the dimensioning liquidity in these areas. In southern Norway there is enough required liquidity.