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## Effects of aFRR capacity allocation to the day-ahead market prices in the Finnish bidding zone

### 1 Introduction

Fingrid has been asked by the Finnish Energy Authority (Energiavirasto) to assess the impact of aFRR reservation of cross-zonal capacity on the day-ahead electricity market. Fingrid has simulated two scenarios using its latest available transmission forecasting model (the EMPS model) for year 2023 and compared the bidding zone prices of these scenarios to the base case situation where the aFRR reserve is not procured and the aFRR cross-zonal capacity reservation is not applied.

The two scenarios considered in the analysis differ from the base case as follows:

- **Scenario 1 (all aFRR capacity is procured from other Nordic bidding zones):** It is assumed that Fingrid's aFRR capacity obligation 80 MW will be procured in its entirety on the Nordic market outside Finland. In the simulation model, cross-zonal capacity from the Swedish SE1 bidding zone to Finland is limited by applying 80 MW cross-zonal capacity reservation for aFRR on the SE1- FI bidding zone border. The amount of aFRR upward control capacity to be procured in Finland is 0 MW.
- **Scenario 2 (all aFRR capacity is procured from the Finnish bidding zone):** It is assumed that Fingrid's aFRR reserve capacity obligation 80 MW will be procured in its entirety in Finland (i.e., current national aFRR market continues). Cross-zonal capacity from the Swedish SE1 bidding zone to Finland is not reserved for aFRR. In this scenario, it is assumed that the Finnish aFRR comes from Finnish production, which does not set a marginal cost on the day-ahead market. The contribution of this aFRR production in the simulation model is scaled down by 80 MW correspondingly, as it is earmarked for the obligation to maintain the aFRR reserve.

The simulated day-ahead market prices resulting from the two above scenarios have been compared to the day-ahead market prices obtained in base case simulations in the analysis.

### 2 Effects of aFRR capacity allocation to Finnish bidding zone border

The price effects of two different scenarios have been estimated for each quarter in 2023 and whole year 2023. The results are presented in Table 1.

Table 1 shows that in both scenarios, Finnish bidding zone price in the day-ahead electricity market increases relative to the base case situation. The differences between the scenarios in the price change are not significant, from which it can be concluded that it is not important for the formation of the day-ahead electricity market price whether the aFRR capacity is reserved from the production capacity in the Finnish bidding zone or whether cross-zonal capacity is reserved for aFRR to be procured in other Nordic bidding zones. If the aFRR is procured from a resource in the Finnish bidding zone, this proportion of production capacity will be excluded from the day-ahead electricity market in any case. If, on the other hand, the aFRR is purchased in the adjacent bidding zone(s)

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and the cross-zonal capacity is reserved for trading aFRR, the aFRR not purchased from the production facilities in Finland is available on the day-ahead electricity market in the Finnish bidding zone.

Table 1. Changes in the day-ahead market prices in the Finnish bidding zone for the studied two scenarios in year 2023 (€/MW). Each scenario has been compared to the base case.

	<b>Scenario 1 (Nordic aFRR reservation) (€/MW)</b>	<b>Scenario 2 (National aFRR reservation) (€/MW)</b>
<b>Q1/2023</b>	5,98	6,13
<b>Q2/2023</b>	1,77	2,38
<b>Q3/2023</b>	2,12	2,20
<b>Q4/2023</b>	2,39	2,87
<b>Year/2023</b>	3,07	3,39