European Network of
Transmission System Operators
for Electricity

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Alternative configurations of the Bidding Zone Review Region "Nordics" which are to be considered in the Bidding Zone Review Process

Version 1.0

Bidding Zone Review Region Nordic Region

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1) Overview of the configurations of the Bidding Zone Review Region Nordic

The following table summarizes the alternative configurations to be further considered in the Bidding Zone Review Region Nordic (BZRR Nordics).

Nordic	TSO	BZ1	Action Plan	Config 1	Config 2	Config 3	Config 4
				Current Configuration	Split of NO4 (NO4a and NO4b)	Merge of current SE3 and SE4, and new SE4	Config 2 and config 3 combined
Denmark[1]	Energinet	DK2	No	1 BZ	1 BZ	1 BZ	1 BZ
Sweden	Svenska kraftnät	SE1, SE2, SE3, SE4	No	4 BZ	4 BZ	4 BZ (expert based)	4BZ (expert based)
Finland	Fingrid	FI	No	1 BZ	1 BZ	1 BZ	1 BZ
Norway	Statnett	NO1, NO2, NO3, NO4, NO5	No	5 BZ	6 BZ (expert based)	5 BZ	6BZ (expert based)

Table 1: Alternative configurations to be further considered in the BZRR Nordics.

[1] Denmark is a part of two Bidding zone review regions, and DK1 is included in the continental Europe region.

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2) Detailed information per configuration

a) Current bidding zone configurations

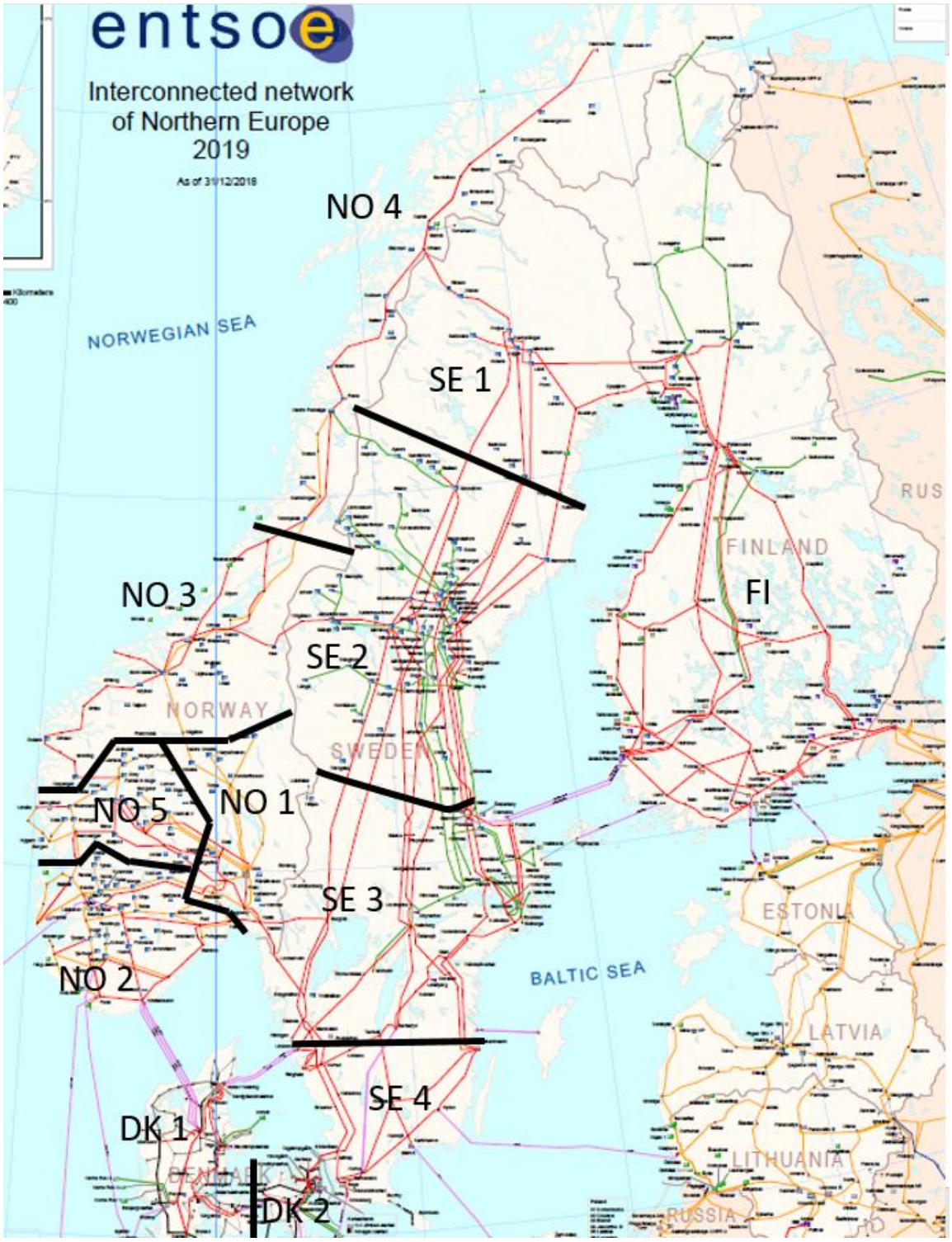

Figure A: Current configurations.

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b) A geographical overview of alternative bidding zone delineations to be assessed

Figure B: Alternative configuration to be analysed for Sweden and Norway. In the proposed configuration regarding Sweden, a modified BZ SE3 is introduced in the Stockholm Metropolitan Area. The current BZ SE4 is expanded to include the remaining area of current BZ SE3. In Norway a split of NO4 is proposed, and a new BZ NO6 is introduced. For Denmark and Finland no alternative configuration will be assed at this stage.

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The network elements which will form the Bidding Zone Borders of this configuration, is given in table 2.

Bidding Zone Border	TSO1	TSO2	Voltage level [kV]	Type	New/different compared to status quo?
SE1-SE2	Svk	Svk	400 kV	Southbound 400 kV tie-lines	Status quo
SE2-SE3	Svk	Svk	400 kV & 220 kV	Southbound 400 and 220 kV tie-lines	Status quo
SE3-New SE4	Svk	Svk	220 kV	220 kV and 400 kV in-feed network elements	Different
NO1-NO2	Statnett	Statnett	420, 300 kV	Tie-lines	Status quo
NO2-NO5	Statnett	Statnett	300 kV	Tie-line	Status quo
NO5-NO1	Statnett	Statnett	420, 300 kV	Tie-lines	Status quo
NO3-NO5	Statnett	Statnett	420 kV	Tie-line	Status quo
NO1-NO3	Statnett	Statnett	300 kV	Tie-line	Status quo
NO3-NO6	Statnett	Statnett	420, 300 kV	Tie-lines	Status quo (currently NO3-NO4)
NO6-NO4	Statnett	Statnett	420 kV	Tie-line	New
NO1-SE3	Statnett	SvK	420 kV	Tie-lines	Status quo
NO3-SE2	Statnett	SvK	420 kV	Tie-line	Status quo
NO6-SE2	Statnett	SvK	220 kV	Tie-line	Status quo (currently NO4-SE2)
NO4-SE1	Statnett	SvK	420 kV	Tie-line	Status quo

Table 2: Bidding Zone Borders of alternative configuration Sweden and Norway. As regards Norway and Sweden, All BZ borders to the rest of the Nordic TSOs are unchanged in the proposed configuration. The current border NO4-SE2 is renamed NO6-SE2 in the proposal, but the tie-line of the border is unchanged.

Sweden

Identification and assessment of the exact network elements that constitute the border between SE3 and the new BZ SE4 in the alternative configuration for Sweden will be part of the upcoming regional BZ review.

3) Justification/Explanation

Sweden

In the Nordic regional BZ review, an assessment of an alternative BZ configuration where (1) the Stockholm Metropolitan Area constitutes a new BZ, and (2) current BZ SE4 is merged with the rest of current BZ SE3 is proposed. Power flows and trade patterns in the Swedish National Grids are changing rapidly as a result of thermal power plant decommissioning near traditional load centers in the southern parts of the country and a strong urbanisation trend. In the Stockholm Metropolitan Area, with a peak load

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demand of about 4 GW, preliminary market coupling simulations combined with load-flow and security analysis indicate congestions in the region are present in scenarios for 2020, 2025 and up until 2030. The same preliminary modelling exercise have indicated few market outcomes that result in congestions between the borders of current BZs SE3 and SE4. The main factors that contribute to this development is nuclear power plant decommissioning, new cross-BZ interconnectors and upcoming investments in the transmission grid.

The structural bottlenecks on the Swedish east coast in and around the Stockholm Metropolitan Area are foreseen to be mitigated by future investments in the mid 2030's at the latest. As the time horizon to fully alleviate congestion problems through investments is 10+ years, Svenska kraftnät proposes to include the configuration alternative in the Nordic regional BZ review.

Norway
Statnett analyses indicate that congestions out of the northernmost bidding zone, NO4, will increase in the future. Splitting the NO4 will help us manage the bottlenecks efficiently.

From NO4 there are connections to Middle Norway (NO3), Northern Sweden (SE1 and SE2) and a weak non-market connection to Finland. The sum capacity of these lines is good. However, skewed loading of the different corridors prevents full utilization.

We expect this situation to become more frequent in the future, as the surplus in NO4 increases, partly due to increased wind power capacity, and because it can be even harder to predict the location of the generators that produce within the area. The challenge is mainly the interaction between the lines to Norway (NO3) and Sweden (SE1). Our simulation results show that the line to SE1 in many cases fill up first, leaving capacity to NO3 unused.

When we solve this type of congestion, it is challenging that the current NO4 bidding zone is such a large geographical area. This makes it necessary to predict the distribution of generation between the northern and southern parts of the area. Additionally, it is challenging that we do not know where the generation will be located until close to the hour of operation. Altogether, this makes the current NO4 zone a poor tool for keeping the flow within safe limits of operation, and we think a split will be beneficial for system operation.

The consequences of a split are further discussed in the Statnett Long-term Market Analysis 2018-40.

Finland
The ACER/CEER Annual Report on the Results of Monitoring the Internal Electricity Markets in 2017 found Finland's performance to be adequate related both to 1) availability of HVAC capacity for cross-zonal trading and 2) use of costly remedial actions. Furthermore, ENTSO-E Bidding Zone Configuration Technical Report 2018 shows generally a very low amount of congestion on internal Finnish lines, while the amount of congestion was also reduced in 2017 compared to 2015-2016. Based on these findings, as well as plans to commission additional internal reinforcements in the early 2020s, studying alternative Bidding Zone configurations is not considered to be relevant for Finland in the upcoming Bidding Zone Review.

Denmark
From DK, Energinet is not proposing a split of the bidding zones due to the fact that we currently do not see any significant challenges with meeting the 70% requirement. In todays capacity calculation the point of departure is 100% capacity on the network elements and a few dynamic restrictions which will not be influenced by a bidding zone split. In addition to this, the ENTSO-E technical report from 2018 shows that the congestions in relation to Denmark is found on the interconnectors to other bidding zones and not inside the two Danish Bidding zones.

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Summary
We propose that the above showed alternative configuration should be analysed during the official process foreseen for such an investigation, i.e. the bidding zone review of the concerned TSOs, and assessed by the criteria defined in Article 33 of EU Regulation 2015/1222.

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