Line set (NO1A/DK1A) Explanation document

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Optimization of Day-Ahead Transmission Capacities

The transmission system operators (TSOs) determine the trading capacity between each bidding area. The available trading capacities for the next day are published on Nord Pool's website at 10:00 CET.

To optimize the use of the transmission grid, Nord Pool uses both transmission capacities on individual interconnectors, and sum limitations for a group of interconnectors, so-called line sets, in the price calculation. Interconnections which are part of a line set are marked with an A. The two regions having line sets implemented in the current market setup are DK1A and NO1A (December 2014).

The DK1A Line set consists of the following connections:
- DK1 ↔ SE3
- DK1 ↔ NO2

The NO1A Line set consists of the following connections
- NO1 ↔ NO5
- NO1 ↔ NO2

The solution applied in the PCR algorithm, Euphemia, is the same for Denmark and Norway even though the physical limitations and background for implementing the line set is different.

The market setup in the Southern part of Norway

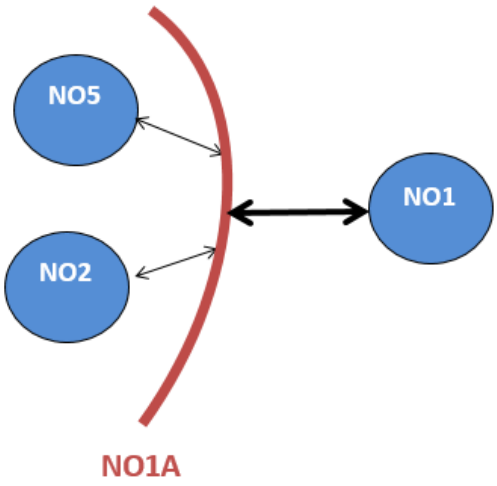

Figure 1: Line set NO1A WITH RELATED CONNECTIONS

The total sum of power into NO1 from Western and Southern Norway cannot be larger than the sum of the transmission capacity from NO5 into NO1, and from NO2 into NO1. The additional constraint between NO5/NO2 and NO1, is referred to as NO1A, where the “A” indicates that a line set is implemented on the related connections.

Total sum of power flowing from NO2 and NO5 into NO1 = Max [(Power flow on (NO5-NO1) + Power flow on(NO2-NO1)]

The sum of import/export to/from NO1 equals the physical flow on the interconnectors NO5-NO1 and NO2-NO1. The import/export cannot be higher than the NO1A-NO1 limitation. Hence the flow out of/into NO1 on each of the interconnectors can be restricted by the NO1A-NO1 limit even though there is available capacity on each single interconnector.

Background information on Line Set implementation in Southern Norway

The line set NO1A represents an internal bottleneck in the South of Norway, and reflects the sum of net export/import capacity available for the Day-ahead calculation, east of the internal bottleneck from areas NO2 and NO5.

Example:
The NO2-NO1 and NO5-NO1 corridors have a total theoretical capacity of 6700 MW. The cut that constitutes the majority of these corridors has a dynamical stability limit of 5500 MW while the secondary cut has a thermal limit of approximately 800 MW, resulting in a maximum combined capacity in the range of 6300 MW, which is represented by the line set NO1A.

Full utilization of both corridors at the same time is expected when consumption in the Oslo-area peaks at daytime in the winter months. Reductions aimed at managing the combined capacity is handled by the Line Set restriction. For the remaining parts of the year the issue of full utilization of both corridors simultaneously is expected to be insignificant. This means that apart from the winter months the combined capacity can be higher in order to maximize the usage of one corridor at the time. For more information on how the line set in Southern part of Norway is handled, please see Principles for determining the transfer capacities in the Nordic Power Market, which can be found here.

The line set in Southern Norway was implemented in January 2015.

The market setup on Jutland in Denmark

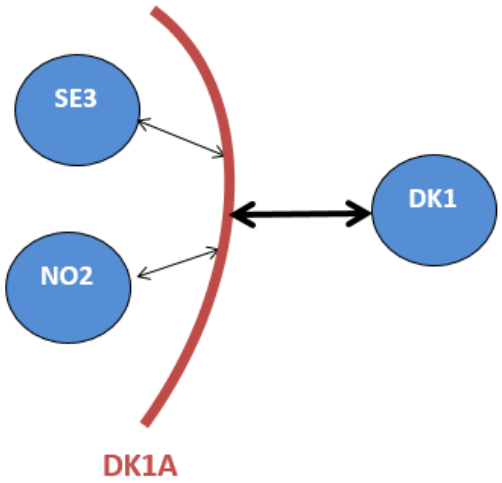

Figure 2: LINE SET DK1A WITH RELATED CONNECTIONS

The total sum of power into DK1 cannot be larger than the sum of the transmission capacity from SE3 into DK1, and from NO2 into DK1. The internal constraint in DK1, is referred to as DK1A, where the "A" indicates that a line set is implemented on the related connections.

Total sum of power flowing into DK1 = Max [(Power flow on (NO2-DK1) + Power flow on (NO2-DK1)]

Background information on Line Set implementation on Jutland in Denmark

Cut B in Denmark is an internal bottleneck in the north of Jutland. Cut B reflects the sum of net export/import capacity available for the Day-ahead calculation, north of Cut B towards areas NO2 and SE3.

The sum of import/export to/from DK1 equals the physical flow on the interconnectors DK1-NO2 and DK1-SE3. The import cannot be higher than the Cut B limitation. Hence the flow out of/into Denmark on each of the interconnectors can be restricted by the Cut B limit even though there is available capacity on each single interconnector

For more information on how the line set on Jutland in Denmark is handled, please see Principles for determining the transfer capacities in the Nordic Power Market which can be found here.

The line set on Jutland was implemented in February 2004.