

The logo for Statnett, featuring the word "Statnett" in a bold, sans-serif font. "Stat" is in grey and "nett" is in red.The logo for Fingrid, featuring the word "FINGRID" in a bold, red, sans-serif font.The logo for Svenska Kraftnät, featuring a stylized graphic of horizontal lines on the left and the text "SVENSKA KRAFTNÄT" in a bold, black, sans-serif font.The logo for Energinet DK, featuring the text "ENERGINET/DK" in a bold, sans-serif font. "ENERGINET" is in blue and "DK" is in red, with a red diagonal slash between them.

Nordic project on finer time resolution

- Information to stakeholders -

This document serves as information to stakeholders on the status of the Nordic finer time resolution project, the outcome of the first stakeholder involvement as well as the next steps in the project.

The Nordic TSOs would like to thank all the stakeholders that have provided input during the first round of stakeholder involvement. The input has supported the TSOs in selecting the implementation concepts that will be investigated further in a Cost-Benefit Analysis (CBA). Also, the stakeholder involvement has revealed topics of importance for the stakeholders, which can be included in the evaluation performed in the CBA.

Some of the feedback obtained through the stakeholder involvement was that an auction element in 15-minute resolution either in the intraday or day-ahead timeframe could help the market players optimize their trade. Also, stakeholders prefer an implementation process with only few steps, and for the same stakeholders timing of the implementation is of high importance.

Based on the feedback provided by stakeholders and the evaluation performed by TSOs, the TSOs have chosen to include the auctioning element and the timing in the further analysis.

TSOs are currently working on elaborating the implementation concepts and preparing a methodology for the CBA. Once this has been done, stakeholders will be invited for a dialogue about the implementation concepts and for providing input to the CBA.



1. The reasons why we have the project

The Nordic TSOs are performing an analysis on the implementation of finer time resolution in the Nordics. Finer time resolution relates to the resolution of the imbalance settlement period (ISP) and thereby also the minimum resolution of products on the wholesale market. The Nordics currently have an imbalance settlement period of 60 minutes. The Nordic TSOs are jointly investigating the costs and benefits of changing to a 15 min imbalance settlement period.

15 min imbalance settlement period is part of the upcoming guideline on electricity balancing (GL EB). GL EB aims at harmonizing the balancing mechanisms across Europe including the imbalance settlement. Currently, there are three different imbalance settlement periods in Europe; 15 min, 30 min, and 60 min. 15 min imbalance settlement period is the preferred solution for a European harmonization. However, some uncertainty related to the final wording in GL EB exists, since GL EB will not be finally approved by all member states before at the earliest Q1 2017.

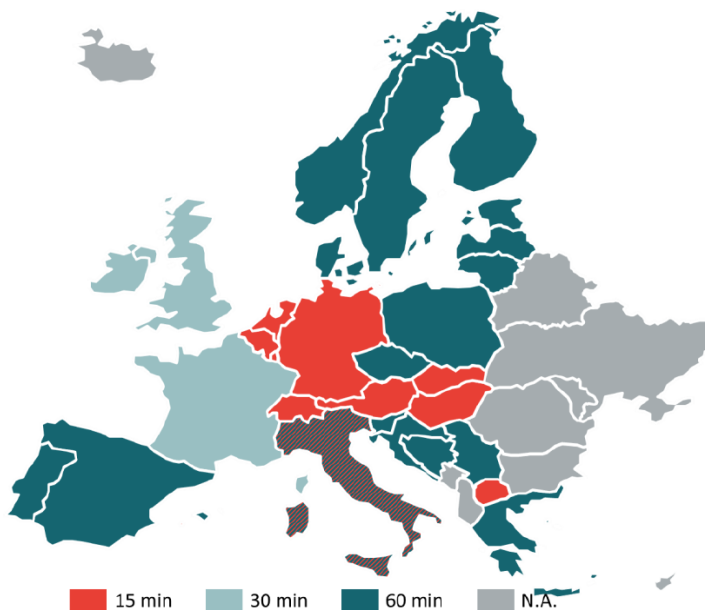


Figure 1: Overview of resolution of the imbalance settlement period in Europe.

The Nordic TSOs have taken this opportunity to initiate a project that will analyze 15 min imbalance settlement period in a Nordic context. The project will both analyze different trading options for market players and the main features of the implementation process including timing of the implementation in relation to expected costs and benefits.

Besides from 15 min imbalance settlement period being part of the GL EB, the Nordic TSOs also see benefits for the Nordics, when changing from 60 min to 15 min.



Increased flexibility for new technologies

Shorter product duration facilitates the market participation of technologies with limited storage capacity and delivery period. These technologies – e.g. consumption and batteries – can offer their flexibility to the market, but only for limited time periods of time and will often require a restoration period after delivery.

Potential for increased cross border trade

Several European countries have already implemented 15 min imbalance settlement period and 15 min products in the intraday time frame. With the continuous work on European market coupling and especially the European intraday project, namely XBID project, it is expected that the intraday markets will be coupled in the near future. By maintaining a 60 min imbalance settlement period in the Nordics, Nordic market parties will not be able to participate in the cross-border trade with 15 min products. Changing the imbalance settlement period to 15 min is therefore expected to increase the flexibility in cross-border trading options for the Nordic market parties.

Potential for increased capacity to the market

The ramping on HVDC connections in the Nordics is currently restricted due to a combination of market and network reasons. The hourly markets allow for ramping only one time per hour, which is limited to some minutes before and after the hour shift. This restriction influences the available capacity on the interconnectors in individual hours since several hours may be needed in order to change the flow from full import to full export. Finer time resolution and market actors trade of products in a 15 min market time frame, is expected to allow increased ramping during the hour. The TSOs intend to evaluate this potential increase of ramping and its influence on the interconnector capacity made available to the market.

System operation benefits related to structural imbalances

From a system operation point of view finer time resolution is expected to benefit the operational security. Finer time resolution addresses structural imbalances, which are imbalances that occur due to differences between the market design and the physical world. These imbalances include intra-hour imbalances, which are the result of hourly markets – and thereby production plans with hourly steps – and continuous increase or decrease in consumption within the hour. The resulting intra-hour imbalances are currently handled by the TSOs through regulating power. With finer time resolution part of these imbalances can be handled by the market via trade of 15 min products.

In the Cost-Benefit Analysis, when processing the potential benefits, also the related costs of introducing a finer time resolution are to be brought into the analysis. Here e.g. the costs of meters are relevant and are dependent on the envisaged transition period from 60 to 15-minute ISP and whether the changes introducing a finer time resolution are mandatory or voluntary ones in their nature.



2. What have been done and the results

The Nordic project for finer time resolution is structured with two phases; a feasibility study and a Cost-Benefit Analysis.

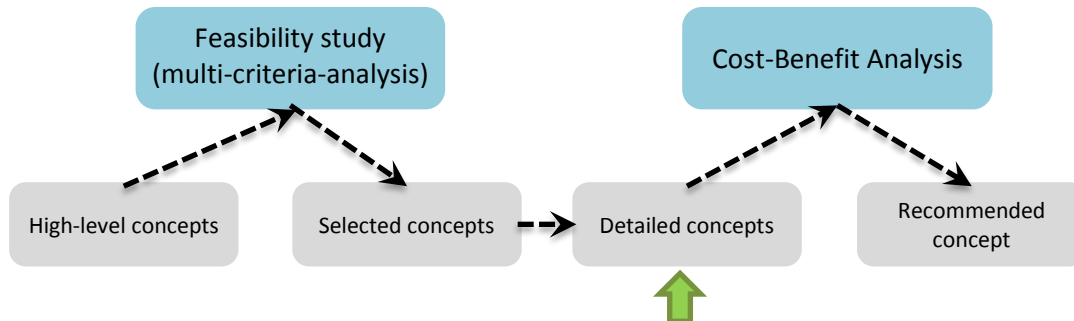


Figure 2: The feasibility study has been concluded and the selected concepts are being detailed further before the next step of the analysis.

The feasibility study was conducted during spring and has now been concluded. During the study a qualitative evaluation of in total 12 high-level implementation concepts was conducted. The concepts focused on trading options for market players, different combinations of the trading options, and the order of introduction of the trading options. In total four different trading options were introduced and combined into the 12 high-level concepts.

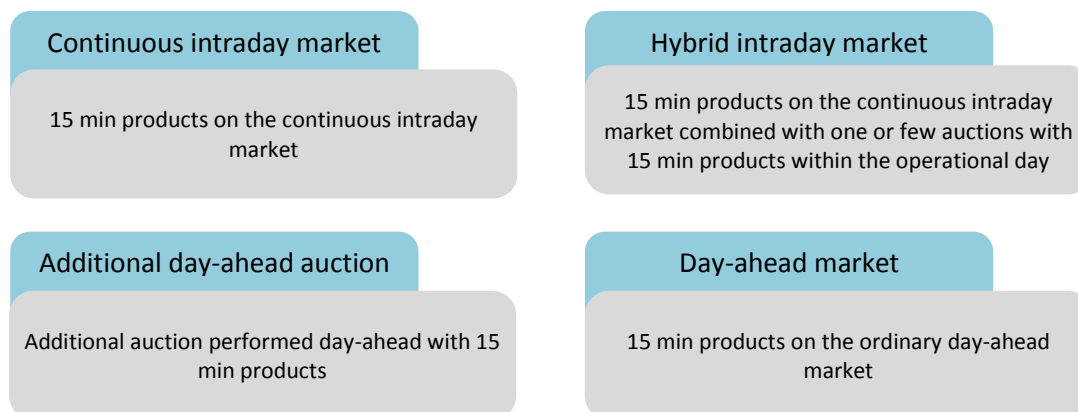


Figure 3: Four different trading options were introduced as part of the high-level implementation concepts.

The implementation concepts were evaluated qualitatively by both TSOs and stakeholders from all four Nordic countries. The evaluation was centered on the following parameters: Operational security, Integration of markets, Facilitation of trade and market liquidity, Costs, Integration of new technologies and RES, and Incentive structure.

The evaluation performed by stakeholders indicated a strong focus on the possibility to trade 15 min products on the continuous intraday market, potentially combined with an auction element. The auction element could be placed in the day-ahead time frame. Further, the evaluation showed that stakeholders prefer implementation concepts with only few or no steps in the implementation process i.e. if more than one trading option, then the implementation of the trading options should be coordinated.



The stakeholders also provided qualitative comments on both the implementation concepts and finer time resolution in general. The comments are in line with the evaluation of the implementation concepts. A summary of the main comments from stakeholders on a Nordic level is provided below.

Intermediate steps

Some market players are concerned that intermediate steps will increase the costs related to implementation as well as adjustments to the new market design. The TSOs are therefore encouraged to take this into account in their analysis and focus on long-term market solutions.

Intraday market

Some market players commented that the liquidity on the existing intraday market is quite low. They encourage TSOs to work on creating well-functioning intraday markets.

Trading options

The market players commented that continuous trade of 15 min products on the intraday market is sufficient for trading their imbalances. However, some argued that an auction will make the optimization of portfolios more efficient. Some commented that the new trading options should preferably be within normal working hours.

Interconnector capacity to the market

Market players argued that the possibility to provide extra capacity on HVDC interconnectors should be taken into account. If the capacity cannot be released through continuous trade on the intraday market, alternative market designs should be investigated.

Comparing the evaluation performed by market players with the evaluation performed by TSOs shows significant convergence. TSOs consider continuous trade of 15 min products an option for market players to adjust their market position close to real time. In addition, an auction may provide an efficient trading option for market players and lower the administration related to trading 15 min products.

Regarding the auction, the TSOs will not pursue implementation concepts where the existing day ahead market is changed from 60 min products to 15 min products. The reason is that the Nordics is part of the multi-regional-market coupling, which means it will not be possible to do this change for the Nordics alone. An additional regional auction, however, is a possibility. Since the auctioning element was important for the market players – even in the day ahead time frame - this option will be investigated further.

Also, timing was revealed as an important parameter in the evaluation by both market players and TSOs. Especially the deadline for the implementation of finer time resolution has been given quite some attention. The pace of implementation and the implementation process will therefore be investigated further in the CBA. This includes investigating if some countries can pilot finer time resolution,



meaning that some countries implement finer time resolution prior to the implementation of the common, Nordic solution.

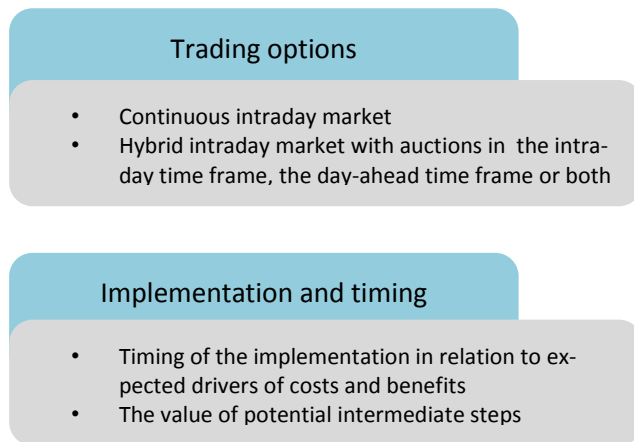


Figure 4: Elements that will be included in the further analysis

3. How the project will continue

The TSOs are currently detailing the implementation concepts that will be investigated in the CBA. This includes elaborating the concepts, identifying main drivers of the costs and benefits, and identifying which factors may influence the implementation process.

Based on the updated implementation concepts an evaluation methodology to be used in the CBA will be developed. Once the CBA methodology has been developed stakeholders will be invited for dialogue. During the dialogue TSOs will inform the stakeholders about the progress in the project and the intention of the TSOs, as well as obtaining input to the CBA and general feedback on the updated implementation concepts.

The format of the stakeholder involvement has not been decided upon yet, but is expected to be more extensive than the questionnaire used in the last round of stakeholder involvement. The dialogue is expected to commence during January 2017.

Below is shown a figure on the TSOs upcoming work with finer time resolution.

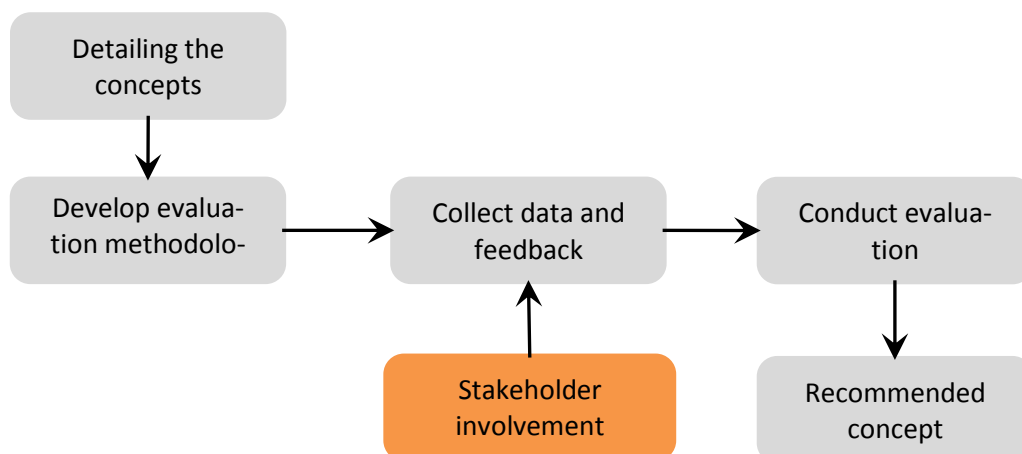


Figure 5: Illustration of the further work in the Nordic finer time resolution project