

Roadmap for NBM

Webinar May 29th 2019

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Opening the meeting

The webinar format

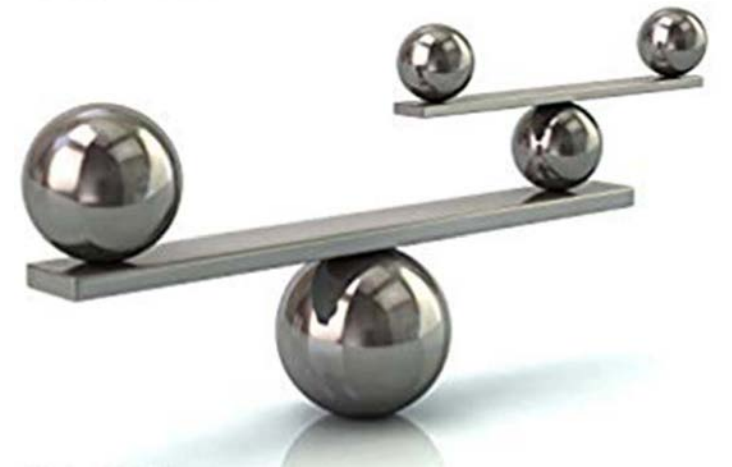
- Please leave questions or comments during the webinar using Slido
 - <https://app2.sli.do/event/vpsiwizu>
- The webinar and presentation will be published on the NBM website
 - <http://nordicbalancingmodel.net/>

Webinar agenda

- Opening the meeting
- What is Nordic Balancing Model (NBM) and what are the dependencies between NBM and 15 minutes time resolution?
- Stakeholder involvement and consultation on NBM Roadmap
- Introduction to TSO proposal on NBM roadmap and important milestones
- Questions and comments from Slido

Adapting to green future require extensive changes

- The current Nordic way of balancing creates great value, however it is not scalable for the green future
- The NBM program implies the most comprehensive restructuring of our operations since the deregulation of the power market
- The presented Roadmap is based on today's knowledge and high-level design



Stakeholder involvement is needed – and wanted

- NBM implies significant changes for market players, distribution system operators (DSOs) and other stakeholders
- A successful and robust implementation depends on close cooperation and mutual involvement between the TSOs and affected stakeholders
- Nordic TSOs have taken measures to significantly strengthen stakeholder involvement and transparency in planning and execution

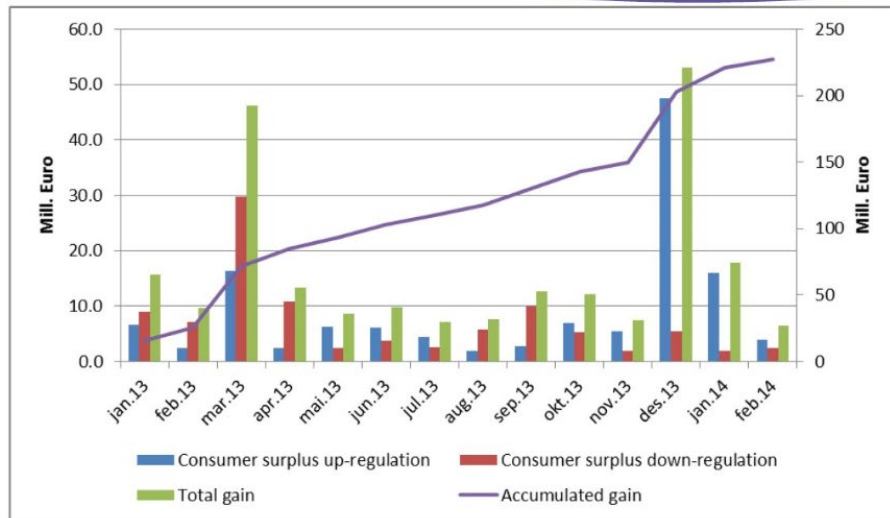


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What is Nordic Balancing Model and what are the dependencies between NBM and 15 minutes time resolution?

The common Nordic Balancing Market is very efficient

Consumer surplus (in the Nordics)



The gain varies from month to month. In this period the accumulated increase in consumer surplus is EUR 229 mill.

- For more than 15 years the Nordic TSOs have operated a cross border balancing energy market.
- Nordic consumer benefits have several times been calculated to be in the range of +200 mEUR per year
- This welfare should be maintained also in the new world with 15 min ISP, smaller bid size etc....
- Hence the transition towards the new world should be carefully planned
- Next step for the Nordic Balancing Market is to harvest welfare from a common capacity markets

15 minutes imbalance settlement period (ISP)

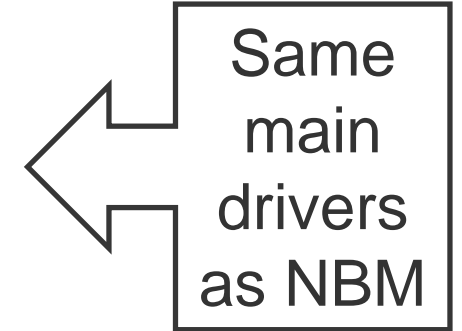


Phasing out of coal power plants

Increasing share of wind and other intermittent energy resources

Phasing out of Swedish nuclear power plants

More interconnectors out of the Nordic synchronous area



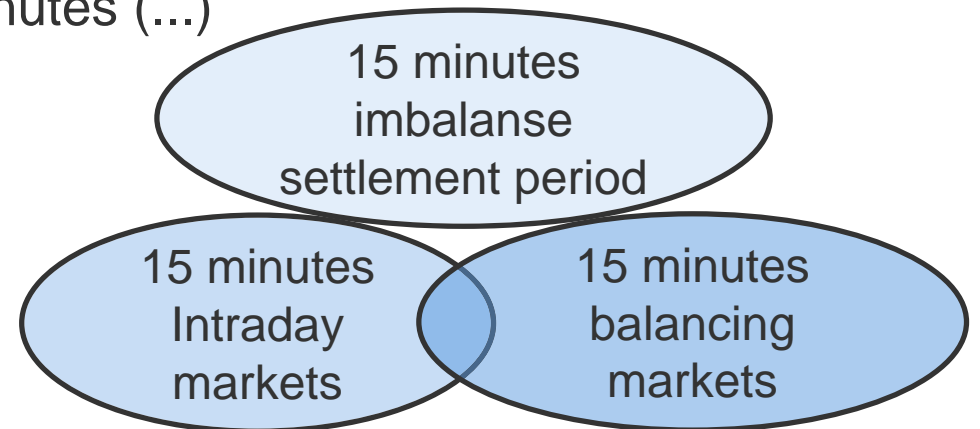
- EB GL 53.1: By three years after the entry into force of this Regulation, all TSOs shall apply the imbalance settlement period of 15 minutes (...)

Cost Benefit Analysis for Electricity Balancing – ISP harmonisation methodology

A report for ENTSO-E

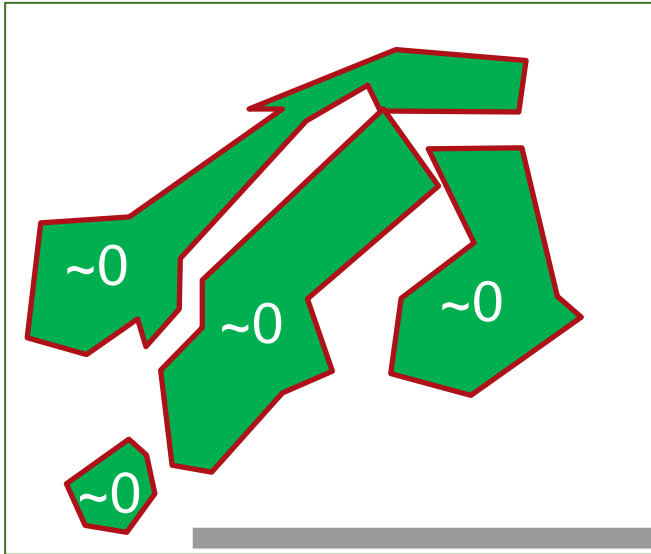
Prepared by Frontier Economics and Consentec

20 October 2015



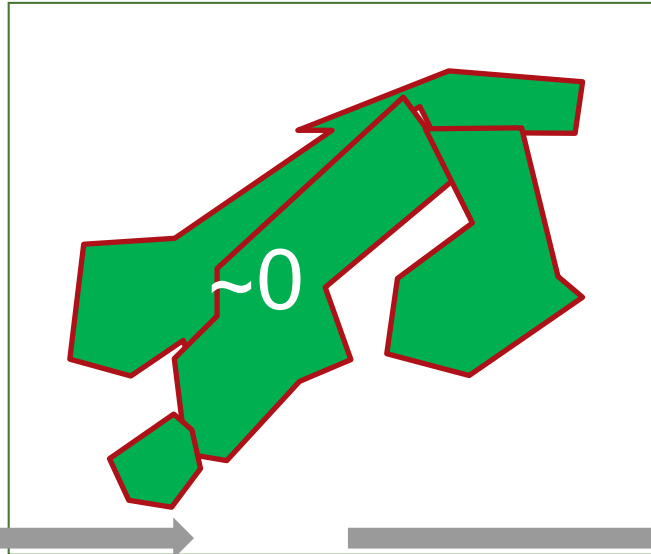
Development of Nordic balancing philosophy

ACE in each country



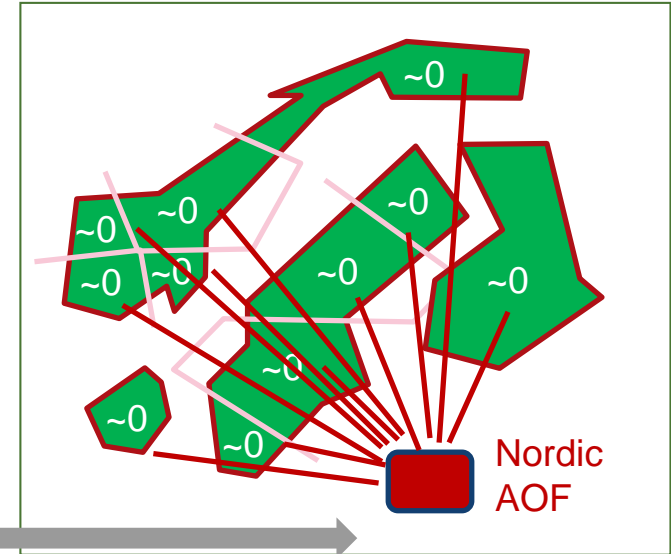
More efficient use of resources
Netting of imbalances
Merit order bid list

Frequency control



Digitalization of balancing
Better control with flows
Clearer responsibilities

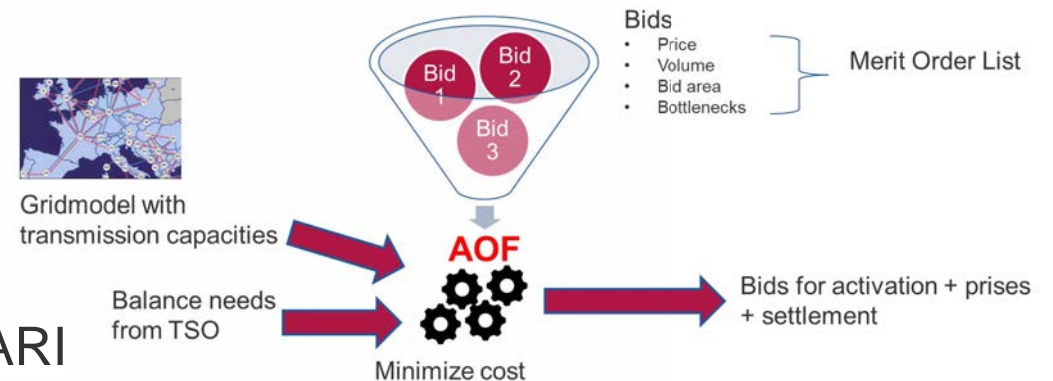
mACE



Activation Optimization Function (AOF) give efficient trade and netting

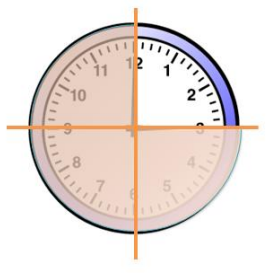
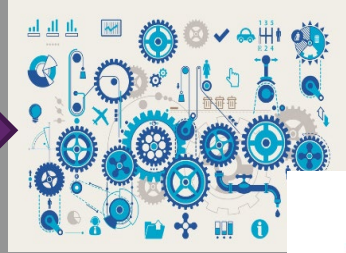
Imbalances and available reserves in each bid-area are optimized in a central algorithm. This secures:

- Optimized use of grid capacity
- Efficient exchange of balancing products
- Fair settlement between buyers and sellers
- Necessary backup for European platform MARI



NBM The next step for Nordic balancing

Nordic Balancing Model



From manual processes based on operator knowledge and experience to automated processes. Necessary due to increase in complexity, and requires:

- Extensive change of control room processes
- Formalization of knowledge and routines
- Considerable IT-investments
- Significant improvement in data quality



Transition to control based balancing within each bidding-area

- Smaller building blocks a prerequisite for automated processes
- Provides consistency between authority and responsibility between TSOs
- Basis for correct settlement and proper incentives
- Depending on regulatory approvals

15 min Time Resolution

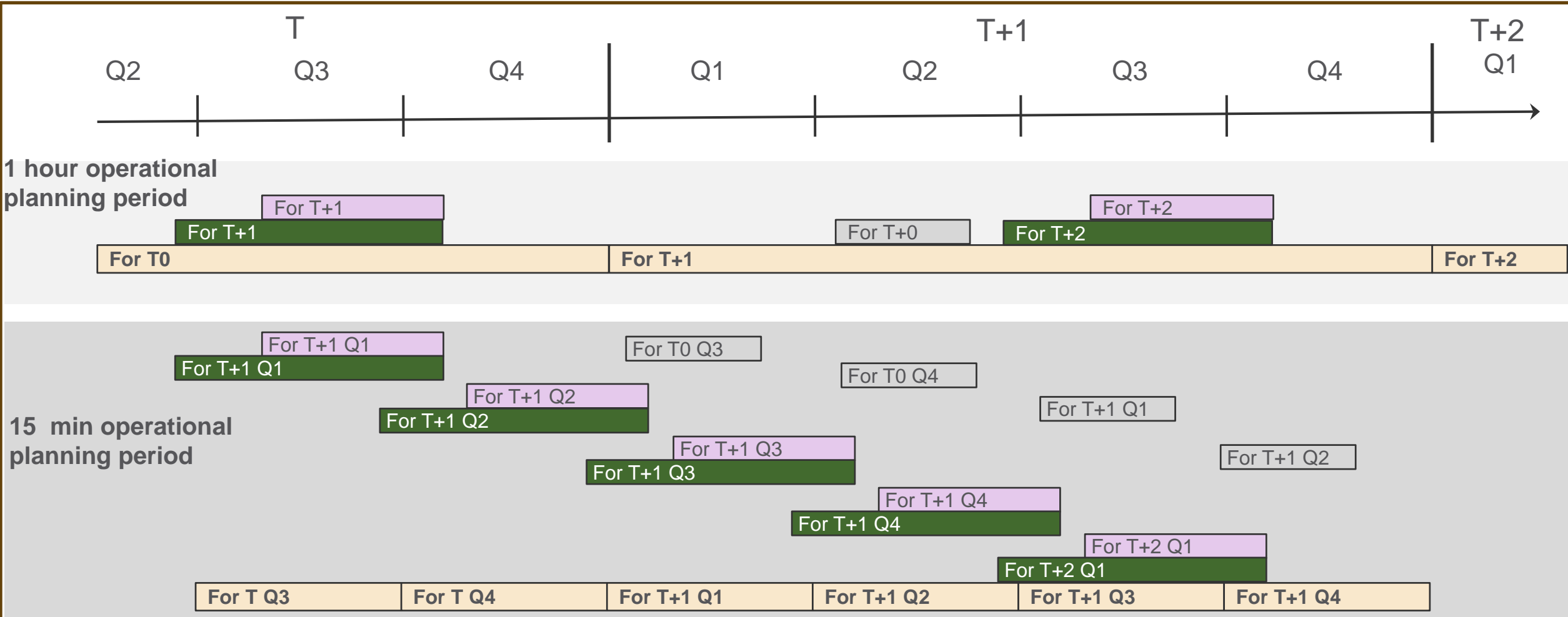
1.Generation NBM

2.Generation NBM



From an ambitious roadmap in parallel with other major development in system operation – to an ambitious and realistic plan for implementation.

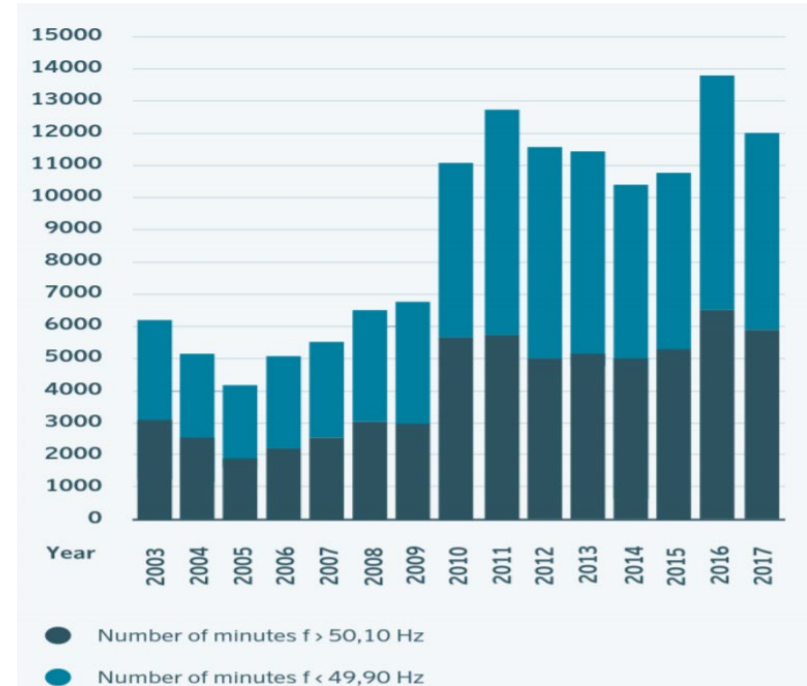
Digital support needed with 15 minute markets – Operational planning period changes from 1 hour to 15 minute



Proactive congestion handling and balancing	Monitoring and continues balancing and congestion handling
Periode shift planning – Smooth production changes	Determine price

Not possible to implement 15 minutes settlement without changes to the Nordic balancing

- Today's balancing of the Nordic system is already at its limit. If we add more complexity, the operational risk is unacceptable without new solutions and automation
- As long as 15 minutes imbalances are visible to market actors, we risk moving into a 15 minutes world



Frequency deviation 2003 - 2017

The regulations require simultaneous implementation

- EBGL and the Clean Energy Package (CEP):
 - The ISP within a bidding zone shall be 15 minutes
 - The market time unit within a bidding zone shall be equal to the ISP.
 - The cross border market time unit shall be equal the highest market time unit of the adjacent bidding zones.
 - The TSOs shall calculate an imbalance price for each ISP
 - NEMOs shall offer products at least as short as the ISP in both the day-ahead and intraday markets.

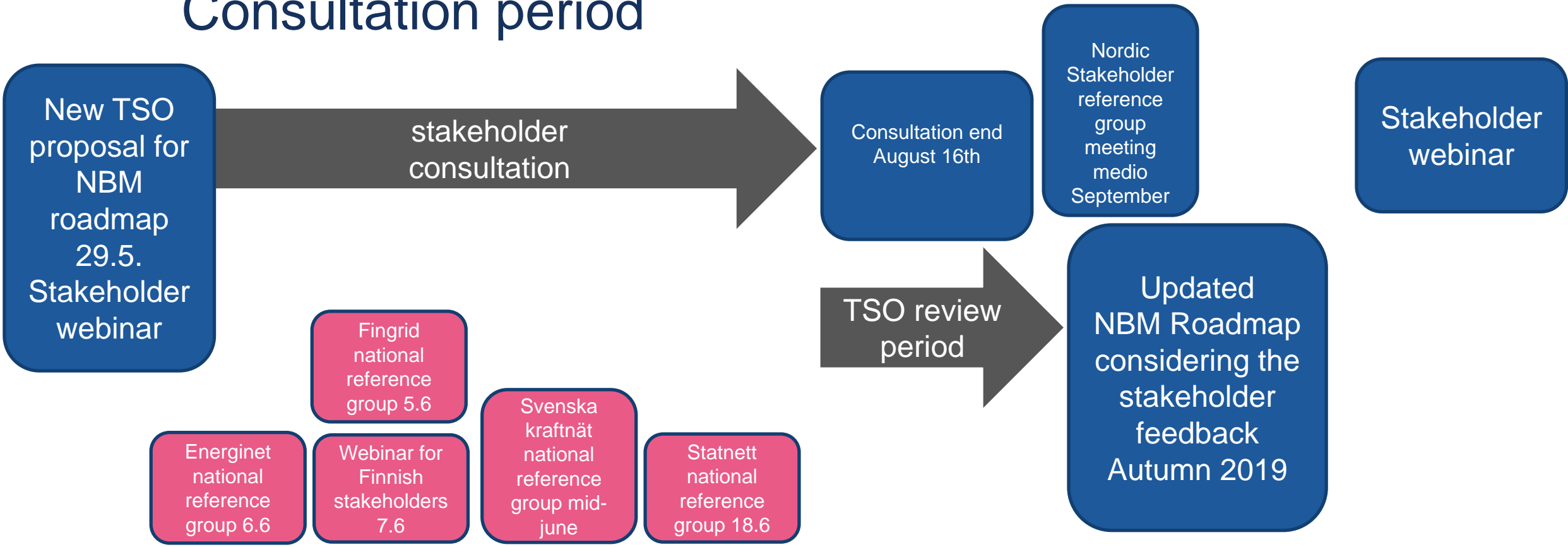


A comprehensive program covering the new balancing model and markets, 15 minutes ISP, and 15 minutes market time unit in the intraday and possibly day ahead markets

3

Stakeholder involvement and consultation

Consultation period



The consultation

- All necessary information on NBM web
 - <http://nordicbalancingmodel.net/>
- ENTSO-E consultation tool will be used
- TSOs will be available for questions in consultation period except July
- Contact persons within each TSO listed at consultation website

Expectation of Nordic TSOs on consultation process

- The Nordic TSOs strongly value stakeholder contributions and feedback
 - General and specific matters
 - Nordic TSOs appreciate explanation and reasoning of views

Example on what Nordic TSOs would appreciate feedback on

- Have the Nordic TSOs described the most important issues from your perspective for changes towards the Nordic Balancing Model? What should possibly be kept/added/deleted?
 - Is the level of the details for the presented roadmap and milestones adequate?
 - Have the TSOs possibly in your view missed some explanations or milestones?
 - Are there any undefined dates in the current roadmap that in your opinion are crucial to be added as soon as possible? Please explain the reasoning.

4

Introduction to TSO proposal on NBM roadmap and important milestones

DISCLAIMER

This presentation illustrates draft work in NBM roadmap update process

Presented timelines are indicative

Final roadmap will be presented after stakeholder feedback, further detailing is also required from TSO side

1. Nordic aFRR capacity market

2. Nordic mFRR capacity market

3. Single price – Single balance model

4. 15 min time resolution

- National remarks (datahubs, metering)

5. mFRR balancing process automation (including changes to the mFRR energy activation market)

- New mFRR processes for TSOs
- New mFRR standard product
- Congestion management
- Nordic Balancing Platform with Activation Optimization Function (AOF)

6. Data and transparency

Main building blocks of roadmap

1. Nordic aFRR capacity market

- Legal proposals submitted to NRA approval on 12th of April
- NordREG currently consulting on proposals – Consultation open until 3rd of June¹
- Implementation of market platform (IT) well advanced
- **Expected go-live Q1/2020**
- aFRR volume needs to be increased in the Nordic system as shorter market time unit (15 min) is implemented

¹ <https://www.nordicenergyregulators.org/2019/05/consultation-on-proposals-for-nordic-afrr-capacity-market-and-cross-zonal-capacity-allocation-methodology/>

2. Nordic mFRR capacity market

- The Nordic mFRR capacity market design is planned to be based mainly on the same principles as the Nordic aFRR capacity market
 - Thus there's a connection to aFRR regulatory approval process
- Implementation of mFRR capacity market has low impact on other milestones of NBM roadmap
- **Preliminary go-live Q3/2021**

3. Single price model

- Part of European harmonization process. EB GL requires European harmonization of imbalance settlement
- Ongoing NRA approval of All EU TSOs harmonization proposal
- The proposal shall be understood in conjunction to the EB GL requirements for publication of information
- Main options for implementation: Implementation as prescribed by EBGL (~Q1/2021) or together with 15 min ISP (~Q4/2022).
- Implementation plan for Single price model needs further assessment

4. 15 min time resolution

- Imbalance settlement in 15 min is a prerequisite for 15 min markets
 - NEMOs may/should implement 15 min products on intraday and day-ahead markets
 - TSOs expect that 15 min intraday products are implemented at the same time as shorter imbalance settlement period
- NBM roadmap will look closer national dependencies:
 - Datahubs, metering, national regulations etc
- Expected go-live Q4/2022

5. mFRR balancing process automation (including changes to the mFRR energy activation market) 1/2

- New mFRR process for TSOs:
 - Better decision support for TSO control room operators. The demand for mFRR is determined per bidding zone based on forecasted imbalances
 - Scheduled and direct activation of mFRR
 - First phase only scheduled activations are planned to be part of Nordic optimization
- New European mFRR standard product
 - Partly implemented on go-live of Nordic mFRR energy market
- Congestion management
 - mFRR is relevant product for congestion management. Bid filtering functionality to be developed.
 - The need and extent of congestion management interventions varies a lot among the Nordic TSOs

5. mFRR balancing process automation (including changes to the mFRR energy activation market) 2/2

- Nordic mFRR Balancing Platform with Activation Optimization Function
 - Provides automated bid selection and energy activation prices
 - Crucial part for automation and operator support
- Features will be aligned with European MARI platform when possible

- Requires major IT development
- Automation of the mFRR balancing process is a prerequisite for implementation of 15 min time resolution
- **Expected go-live Q4/2022**

6. Data and transparency

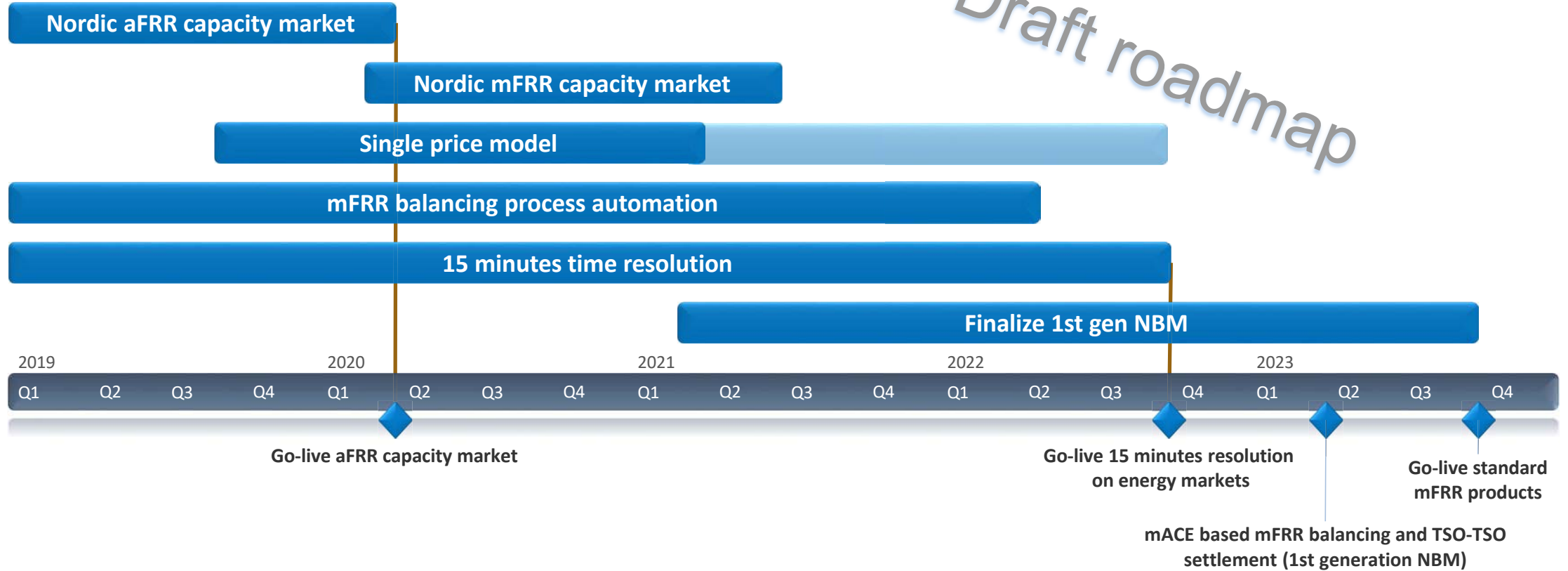
- Mainly part of European harmonization process. Electricity Balancing Guidelines requires market and balancing data to be published on ENTSO-E transparency platform
- Data quality important also for operation of the power system
- Expected go-live will follow go live of NBM market reforms
 - further developed as NBM program proceeds

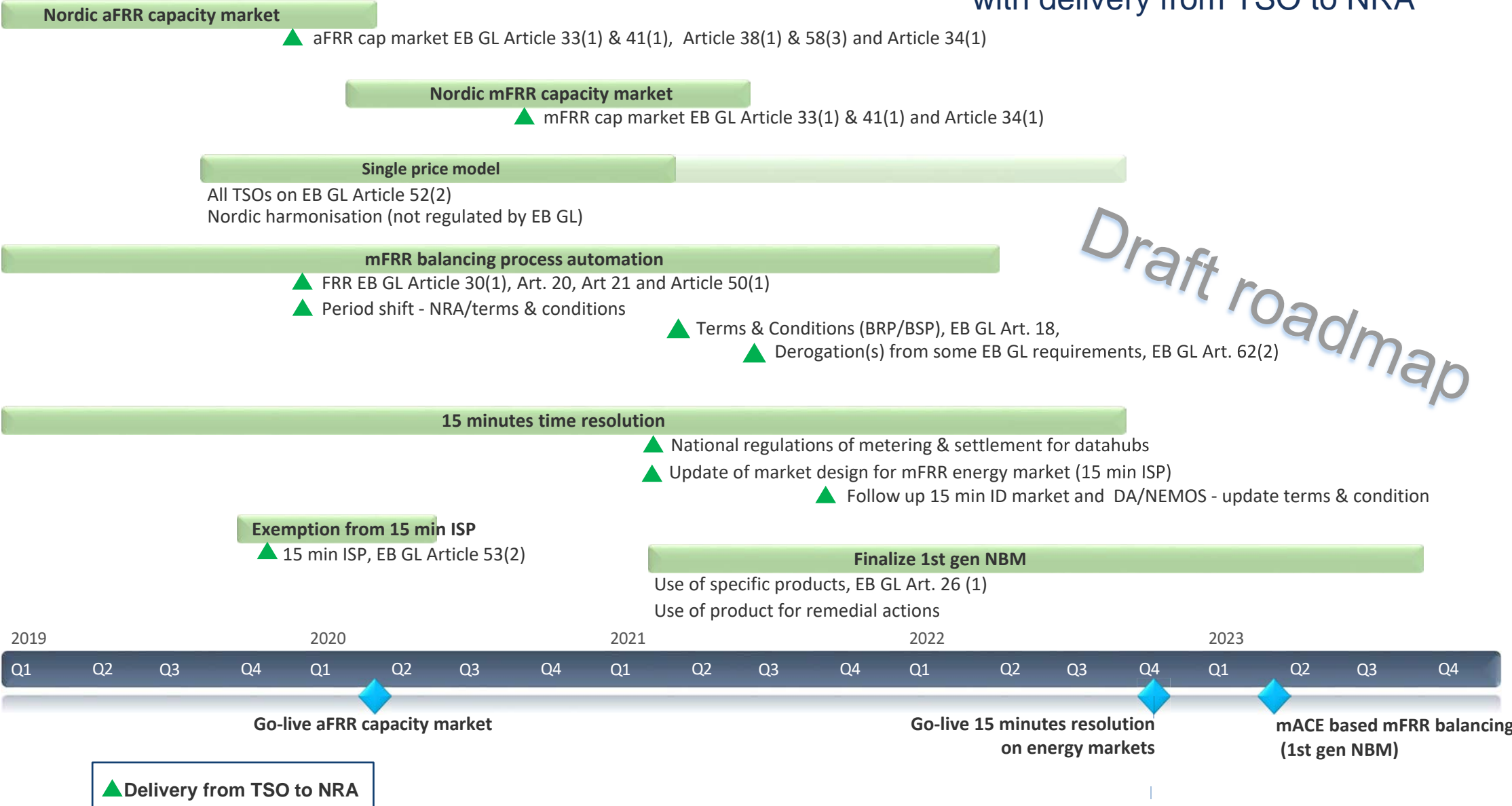
Outlook for energy activation markets

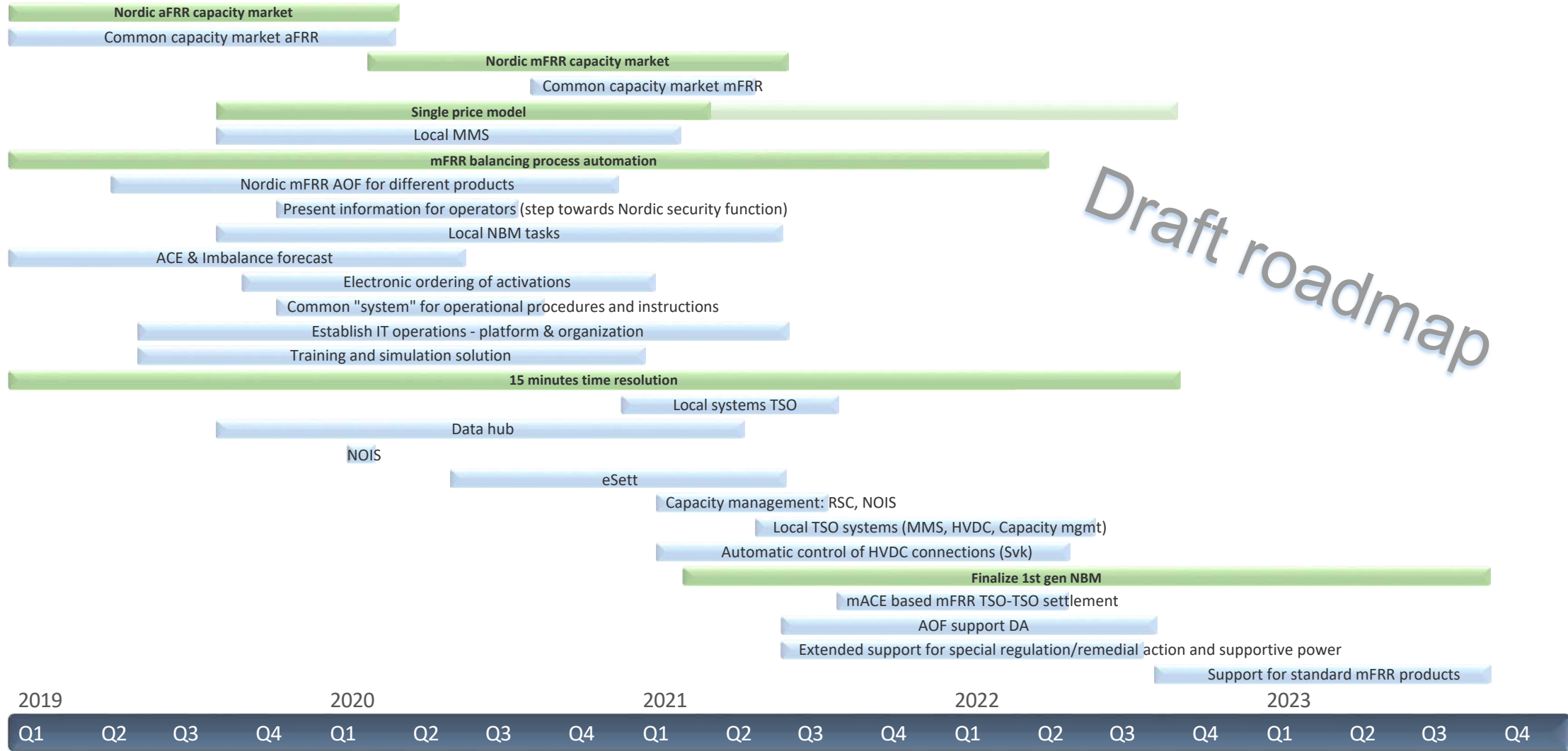
- 2nd generation NBM
 - European mFRR standard product
 - aFRR energy activation market
 - Full mACE model implementation
- Onboarding MARI
 - mFRR standard product must be implemented in the Nordics
 - Operational security and efficiency of the changed Nordic mFRR balancing process must be successfully in operation over some months
 - MARI must be ready for onboarding of Nordic countries.
- Onboarding PICASSO
 - aFRR energy market management needs to be establish
 - major changes in LFC controllers must be made
 - the balancing platform interfaces needs to be implemented
 - Standard products will be introduced for aFRR

Roadmap

Draft roadmap

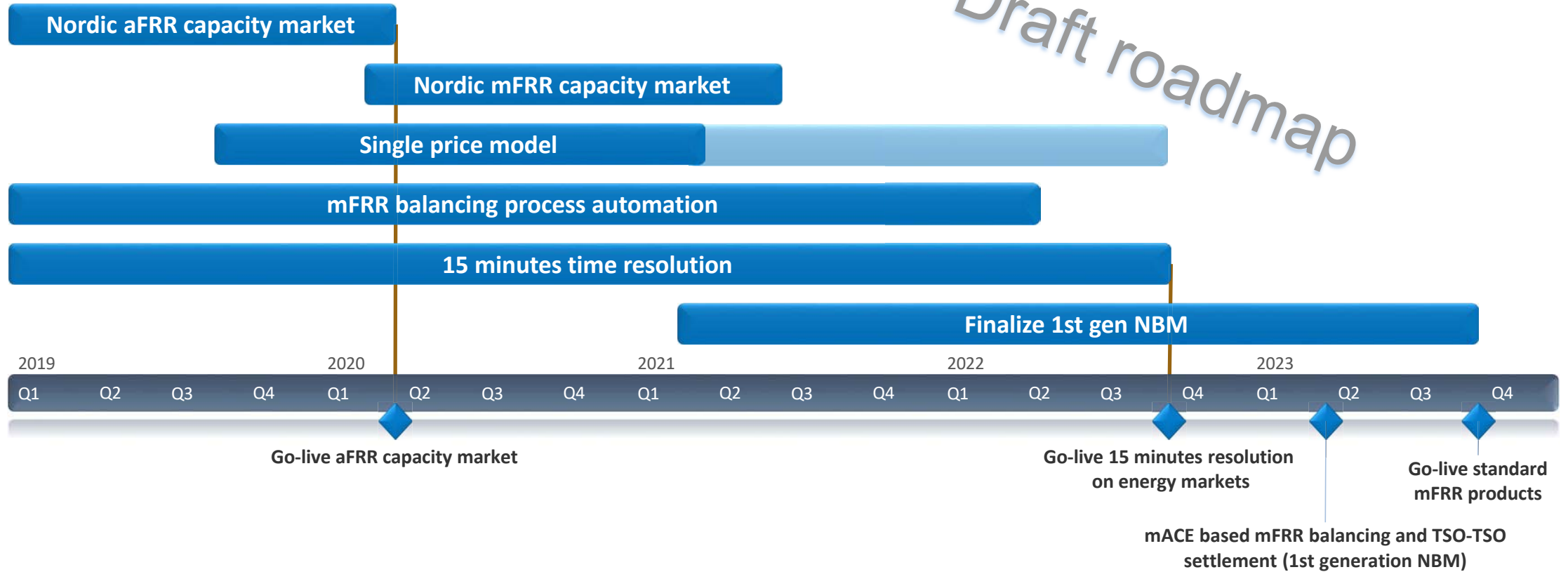






Roadmap

Draft roadmap



5

Questions and answers (based on Slido)

NBM

Nordic Balancing
Model

