

**Affärsverket Svenska kraftnät
Energinet
Fingrid Oyj
Kraftnät Åland Ab
Statnett SF**

Cooperation Agreement

Nordic balancing cooperation

- (1) **Affärsverket Svenska kraftnät**, a Swedish state utility, having its registered office at P.O. Box 1200, SE-172 24 Sundbyberg, Sweden, registered under the number 202100-4284 ("**Svk**");
 - (2) **Energinet**, a state owned independent public enterprise incorporated under the laws of Denmark, having its registered office at Tonne Kjærsvej 65, DK-7000 Fredericia, Denmark, registered with the Danish Business Authority under number 28980671 ("**EN**");
 - (3) **Fingrid Oyj**, a public limited liability company incorporated under the laws of Finland, having its registered office at Läkkipäntie 21, FI-00620 Helsinki, Finland, and registered in the Finnish Trade Register with number 1072894-3 ("**FG**");
 - (4) **Kraftnät Åland Ab**, a limited liability company incorporated under the laws of Finland, having its registered office at Elverksgatan 10, 22101 Mariehamn, Finland, and registered in the Finnish Trade Register with number 1068562-1 ("**KnÅ**"); and
 - (5) **Statnett SF**, a Norwegian state owned enterprise with limited liability, company registration number 962 986 633 and registered office at Nydalen Allé 33, 0484 Oslo, Norway ("**SN**");
- hereinafter also referred to jointly as "**Parties**" and separately as "**Party**",

have today the 8th of March 2018 entered into the following Cooperation Agreement (the "**CA**");

1. **Background**

Whereas:

- a) Svenska kraftnät, Energinet, Fingrid, Kraftnät Åland and Statnett, are the transmission system operators ("**TSOs**") in the Nordic power system.
- b) System security in the Nordic power system is challenged by major changes, including increased volatility due to changes in the generation mix and increased HVDC interconnection capacity.
- c) Major efforts are required to develop and implement new system and market solutions (including IT systems) in order to manage and accommodate accelerating technological change.
- d) Implementation of a new European framework with i.e. regulations on network codes and guidelines, including the guideline of electricity transmission system operation ("**SO GL**") and the guideline for electricity balancing ("**GL EB**"), is a substantial task with demanding deadlines.
- e) Svk and SN currently have the task of maintaining the frequency and time deviation within the set limits in the Nordic Synchronous system (Agreement regarding operation of the interconnected Nordic power system (System Operation Agreement), Appendix 3 Art. 1).
- f) Svk, SN and EN have on the 13 October 2017 entered into an Agreement in Principle ("**AiP**") which among other things provide for a new balancing concept based on modernized ACE. The AiP will become invalid when this CA is signed.
- g) All Parties see benefits of a joint Nordic balancing market.
- h) The Parties recognize the need for a faster progress in the development of the Nordic balancing cooperation and a need for an efficient decision-making and implementation process.
- i) Responsibility for operational security and/or national security of supply will remain under control of the national TSO, who is responsible for its system. The national

TSO need to be in the position to carry out whatever actions that is necessary to secure national operational security and/or security of supply not hindered by the other TSOs.

- j) The Parties have on the 19 January 2018 entered into a Memorandum of Understanding regarding future Nordic balancing cooperation.

2. Purpose of the Cooperation Agreement

The purpose of this CA is to agree upon the principles for the design, development and operation of Nordic balancing as described more in detail in the tables included in Annex 1a and 1b as well as in Annex 2 (the "**New Balancing Concept**").

The provisions of this CA are a basis for a common proposal for the LFC structure (as required by SO GL art 141(2)). This common proposal shall consist of one Nordic LFC block (the "**Nordic LFC Block**") and LFC Areas corresponding to bidding zones (currently 11 in the Nordic synchronous area).

Further, the provisions of this CA shall form a basis for the future cooperation on design, development and operation of balancing in the Nordic region, including but not limited to operational agreements that the Parties are obliged by SO GL (art. 118 – art. 126) to negotiate and agree, including but not limited to the LFC Block operational agreement (art. 119) and synchronous area operational agreement (art. 118) (the "**Operational Agreements**").

The Parties consider the principles of this CA to be in line with SO GL, GL EB and other applicable EU and national law.

3. NRA Approvals

The terms, conditions and methodologies developed in accordance with SO GL and GL EB in relation to this CA, will be subject to approval by national regulators ("**NRAs**"), to the extent required in the legislation.

4. Definitions

All expressions used in this CA (including the Annexes) which are defined in the relevant network codes and guidelines, shall have the same meaning herein, unless otherwise stated in this CA.

5. Submission of proposal for LFC structure and LFC Block Agreement

The Parties agree that the LFC structure shall consist of one Nordic LFC block and (currently) 11 LFC Areas according to the bidding zone configuration.

A common proposal for LFC structure in accordance with Article 141(2) of the SO GL will be submitted once all Parties have signed this CA.

This proposal for LFC structure introducing modernized ACE shall be developed by the Parties, consulted and submitted to the relevant national regulators, when the Parties have

signed this CA. Any input from customers and stakeholders in the consultation process shall be duly taken into account prior to the submission of the proposal for regulatory approval. A sound justification for including or not including the views resulting from the consultation shall be provided in accordance with the SO GL Art. 11(3).

Provided the NRAs approve the common proposal for LFC structure, the Parties shall agree on the LFC block operational agreement (the "**LFC Block Agreement**") where this CA is one of the basis and submit the terms and conditions and methodologies within LFC Block Agreement to the NRAs for approval to the extent required by SO GL art. 141(2) and 6(3)(e). The Parties shall take all reasonable steps to ensure that the relevant terms and conditions and methodologies within LFC Block Agreement shall be submitted within the timeline set out in SO GL (September 2018).

6. Time line for LFC Block Proposal and LFC Block Agreement

The Parties have agreed on following timeline for the steps envisaged by this CA:

March 2018:	Public Consultation of the proposal for LFC block structure
Early April 2018:	Submission of the proposal for LFC block structure to the NRAs
July/August 2018:	Public consultation of the relevant terms, methodologies and conditions in the LFC Block Agreement
14 September 2018:	Submission of the relevant terms, conditions and methodologies in the LFC Block Agreement to the NRAs for approval.

7. Main goals of the New Balancing Concept

The New Balancing Concept shall be compliant with the following general principles:

- a) Efficiency on a Nordic level;
- b) Non-discrimination; and
- c) Objective and transparent solutions and criteria.

The main goals of the New Balancing Concept shall be:

- a) Strengthening and improving the short and long term operational security in the Nordic LFC Block;
- b) integration with European market platforms for balancing products;
- c) Improving efficiency in development of market and system operation;
- d) Well-functioning and transparent markets to support operational security and/or security of supply and socio-economic welfare;
- e) Improving clarity for the Parties with respect to responsibilities and freedom of action; and
- f) Enabling a transition to clean and intermittent power system.

8. Fundamentals and main design principles

The New Balancing Concept shall be based on these fundamentals:

- a) "Polluter pays", implying that each Party shall be responsible for imbalances originating from own control area;
- b) The cooperation shall aim for common Nordic benefits. The benefits shall be divided in a fair way, which is beneficial for each country as opposed to a "stand alone" concept;
- c) The use of market based solutions and use of price signals shall be increased;
- d) Compliance with SO GL and GL EB, including future amendments, as well as other network codes, guidelines and other new EU legislative instruments;
- e) Integration with European market platforms for balancing products, once they become operational;
- f) The requirements for each Party shall be realistic and reasonable, so that it is possible for it to comply without inappropriate costs;
- g) Securing efficient use of all available and differentiated balancing resources in the Nordic power system;
- h) Increasing the role of customers and stakeholders in market development.
- i) Early, close and effective involvement of stakeholders, and encouraging stakeholders to engage in the development of future balancing;
- j) Open dialogue and early regional public consultation for stakeholders in order to secure an equal and efficient decision process;
- k) The Parties shall establish joint Nordic markets for balancing services aiming at regional and European integration;
- l) IT tools required for implementing the New Balancing Concept shall be procured with open and transparent way, respecting applicable procurement legislation. Each Party shall have equal position on terms, conditions, methodologies and market design.. Common Nordic IT tools shall take into account efficient integration to Common European balancing and other relevant European market platforms.
- m) If any Party intends to change procedures that potentially could have an impact on market or system operation the Party should inform and consult the other Parties regarding the intended change of procedures well before implementation.

The New Balancing Concept for the Nordic LFC Block includes the introduction of modernized ACE as a central element.

Area Control Error ("**ACE**") is a measure of the instantaneous power imbalance in an area of the power system. ACE is calculated by comparing the flow on all borders of an area with the planned flows, correcting for flows due to the activated primary reserves (FCR) and agreed balancing contracts. Modernized ACE uses modern IT solutions to combine the balancing needs, available transmission capacity and available balancing resources in a coordinated and optimal way.

The New Balancing Concept rests on the following main design principles (using the definitions in SO GL, GL EB and the ENTSO-E glossary):

- a) The Nordic LFC Block is divided into bidding zones corresponding to the main bottlenecks in the grid. Each bidding zone shall also correspond to an LFC Area. The bidding zone constitutes the main building block in the New Balancing Concept.

- b) The New Balancing Concept is based on a 15 minute balancing energy market, Market Time Unit, and a corresponding 15 minute Imbalance Settlement Period is applied for the Imbalance Settlement process.
- c) Each Party shall ensure access to sufficient reserve capacity (according to Nordic FRR dimensioning rules to be described in the LFC Block Agreement) in all Market time units and in all bidding zones within its control area. If necessary, market based procurement of balancing capacity shall be used to ensure this, subject to regulatory approval.
- d) The FRR dimensioning rules shall be based on historical imbalances and the dimensioning incident. The FRR dimensioning rules are specified in Annex 3. In addition each Party shall secure necessary reserves for balancing purposes after congestion has been handled. The FRR dimensioning rules shall accommodate proactive balancing of mFRR and reactive balancing done mainly with aFRR.
- e) FRR dimensioning shall follow the below stepwise process.
 - i) Dimensioning per bidding zone, based on above principles;
 - ii) Sharing of reserves within each control area in the Nordic LFC Block;
 - iii) Sharing of reserves between control areas in the Nordic LFC Block, while respecting the responsibility of each control area for operational security; and
 - iv) Each TSO shall have the right to share FRR with a TSO in an adjacent synchronous area within the rules set by Annex 3.
- f) The Parties shall develop a methodology to exchange balancing capacity. The exchange of balancing capacity shall be used as a tool to ensure sufficient balancing reserves in each LFC Area and to increase economic efficiency. The methodology shall respect capacity exchange limitations that stems from the control area responsibility to maintain operational security.
- g) The Parties of this CA target for exchange of balancing capacity to be secured by reservation of transmission capacity. Countertrade shall not be used as an alternative to reservation of transmission capacity for balancing.
- h) The manual FRR product shall under normal operation be used to proactively balance the system. Proactive balancing implies forecasted imbalances and to release expected automatic FRR activation. mFRR control requests from each bidding zone shall be coordinated by a central European or Nordic activation optimization function in accordance with Annex 2. The activation process shall be supervised by a Nordic security function, to be developed.
- i) Each Party is economically responsible for balancing of the imbalances within its own control area.
- j) The automatic FRR product shall be used for reactive balancing and is activated based on aFRR control of each bidding zone, coordinated by a central activation optimization function which ensures a cross bidding zone border optimized aFRR activation in the Nordic LFC Block. Available transmission capacity, including potentially reserved transmission capacity between the bidding zones is utilized by the central activation optimization function (to be developed) to exchange aFRR balancing energy.
- k) The balancing market design shall provide adequate price signals for balancing services and imbalance settlement for the Parties, BSPs and BRPs, per 15 minute time period and per bidding zone. Scarcity pricing shall be applied. Scarcity situations shall be defined based on the FRR dimensioning rules, see Annex 3.

- l) The balancing process shall strive to be non-discriminatory and transparent in all activities established under the balancing process. This implies to publish relevant market information not later than 30 minutes after real-time as long as publication does not create system operational inefficiencies or any competitive advantages or disadvantages to any market participants. Respecting this, each Party has a right to publish relevant market information, including balancing prices, as soon as the information is available.

It is acknowledged that the implementation of modernized ACE will result in increased operational responsibility for each Party to maintain balance in its control area compared with the current position.

In order to achieve system security and provide appropriate incentives, the products required to implement the above design features shall have specifications with respect to activation time, duration and other relevant aspects which:

- a) Allow for secure operation of the Nordic power system;
- b) Minimize Nordic costs; and
- c) Makes it possible for all Parties to comply with their obligations without excessive costs.

All Parties shall comply with the reserve obligations and other requirements of the LFC Block Agreement.

Annex 4 defines a mechanism ensuring a financial compensation which provides an efficient, robust but not unproportional incentive to comply. The legality of such mechanism is subject to approval from the NRAs.

After the Nordic reserve requirements have been met, and provided other relevant requirements (regulatory, contractual or otherwise) are complied with, each Party shall have no restrictions under this CA with respect to any remaining reserves/potential in its control area.

9. Settlement

General

The activation and settlement processes for balancing energy as well as imbalance settlement in general are highly influenced by the European framework stipulated directly by the GL EB or methodologies jointly developed by the European TSOs to fulfill GL EB requirements. This means that the Parties have a set of parent key design principles to take into account when designing the settlement processes in for the Nordic LFC Block and the Nordic synchronous area. The settlement of balancing capacity is to less extent regulated by a European framework.

The main principles for settlement shall be:

- a) Adequate economic signals shall be provided to all the Parties, BRPs and BSPs.
- b) The settlement processes should be transparent and non-discriminatory and be designed to avoid any market distortions.
- c) The settlement rules shall comply with relevant articles of GL EB and methodologies based on GL EB, and with relevant articles of SO GL and methodologies based on SO GL.

d) The exchange of balancing services shall be based on a TSO-TSO model.

The Parties have agreed on the following principles which shall be specified more in detail and confirmed to be in compliance of GL EB, SO GL and any other relevant EU legislation, and agreements related to European balancing platforms (MARI, PICASSO).

Exchange of balancing capacity

The exchanged volume shall be calculated and priced separately for upward balancing capacity and downward capacity (except for FCR-N as long this is traded as a symmetrical product), i.e. the volumes should not be netted within the imbalance settlement period.

The Parties of this CA target for exchange of balancing capacity to be secured by reservation of transmission capacity. Transmission capacity can only be reserved if the value of using transmission capacity for balancing capacity is likely to be higher than the value of using transmission capacity in the day-ahead market on the margin.

Settlement of procured balancing capacity shall be based on marginal pricing towards the BSPs unless market imperfections justifies otherwise. The exchange of balancing capacity between the Parties is settled to the average of marginal bid values in importing and exporting areas (middle price). If there is no bottleneck in exchange of the products, the full exchange of the product will be settled to the purchase price. There is a lot of special cases in TSO-TSO exchange of balancing reserve products. More detailed agreements for settlement will need to be developed between the Parties in accordance with these general guiding principles.

Exchange of balancing energy

Each balancing activation shall be settled between the requesting and providing Parties.

Settlement of procured balancing energy shall be based on marginal pricing towards the BSPs unless market imperfections justifies otherwise.

The exchange of balancing energy between the Parties is settled to the average of the marginal prices in the importing and exporting area (middle price). If there is no bottleneck in exchange of the products, the full exchange of the product will be settled to the purchase price. There is a lot of special cases in TSO-TSO exchange of balancing reserve products. More detailed agreements for settlement will need to be developed between the Parties in accordance with these general guiding principles.

Exchange resulting from imbalance netting

The benefits of imbalance netting are avoidance of aFRR activations. The settlement of exchange resulting of imbalance netting should lead to a distribution of benefits giving each Party an economical advantage of participating in a cost efficient solution for imbalance netting.

Exchange for other purposes than balancing

The marginal price towards BSPs of a balancing product shall as far as possible reflect all activations, also activations for other purposes than balancing the Nordic Synchronous Area.

Settlement of unintended energy exchange

The settlement rules for energy due to imbalances not managed by activation balancing products and deviation between the measured and planned flows shall ensure a distribution of costs and benefits between the Parties that gives each Party financial incentives to reduce imbalances within control area. These are described in Annex 4.

The price of unintended exchange should reflect prices for upward and downward energy dependent on flow direction.

The volume of unintended energy exchange should be calculated with as fine time resolution as technically possible and thereby avoid netting of flows as far as possible.

10. DK1 / market extension

With respect to Jylland/Fyn (DK1) which is part of the continental synchronous area and where the continental balancing requirements apply, the Parties confirm that current arrangements with respect to regulating power ("*regulerkraft*"), may continue until the Parties connect to the European platform for mFRR activation. In case of an early establishment of a Nordic platform as a development step towards a European platform, the arrangements can continue, but will be redesigned in order to accommodate exchange on the European mFRR platforms.

As for participation by DK1 in the Nordic aFRR capacity market, the Parties are in principle positive.

The Parties shall look favourably upon extension of the market solutions beyond the Nordic countries, including extension to additional territories such as the Netherlands, the Baltic countries, Great Britain, Germany and Poland.

11. Roles and responsibilities

Svk and Statnett currently have the task of maintaining the frequency and time deviation within the set limits in the Nordic Synchronous system (SOA Appendix 3 Art. 1).

The tasks and functions related to the New Balancing Concept, including modernized ACE model, are identified and the common functions are specified in Annexes 1.a and 1.b.

Common tasks mandatory to the Nordic LFC Block are to be allocated to Svk/SN. These are identified and specified in Annex 1.a.

Common tasks related to the Common markets within the Nordic LFC Block are to be allocated to Svk/SN. These are identified and specified in Annex 1.b.

Svenska kraftnät and Statnett can use Fifty AS (the IT development company established by Svk and SN on a 50-50 basis – "**Fifty**") to provide IT for the services they are assigned to deliver.

In addition to this CA, the Operational Agreements shall specify the roles and responsibilities with respect to balancing and clarify roles, where required by the SO GL.

The allocation of common tasks to one or more of the Parties shall be without prejudice to the responsibility for performing that role imposed on the assigning Party under national law.

12. Efficient work and decision making process

The principle of consensus according to the requirements in SO GL and GL EB will apply.

The Parties recognize the need for progress and efficient work and decision making processes, and thus agree upon the following elements in such processes:

- a) The development work shall be steered from a committee consisting of two (or such number the Parties agree upon) representatives from each Party (the "**Nordic Balancing Steering Committee**").
- b) Working groups/projects shall develop proposals, including relevant reasoning, for issues submitted to them by the Nordic Balancing Steering Committee, and to propose to the Steering Committee issues to be addressed.
- c) The Steering Committee shall seek to establish consensus if the representatives in the working groups/projects seem to fail to agree on a single alternative.
- d) If a consensus is not reached in the Steering Committee, the issue shall be escalated to the CEO meeting. In the event that an issue is escalated from the Steering Committee to the CEO meeting, the following provisions shall apply:
 - i) Alternative proposals shall be prepared by the disagreeing Parties, indicating why such proposal should be preferred.
 - ii) If a Party believes that the proposal is illegal or contravenes the fundamentals or principles of the CA (or any other provision hereof), it shall indicate to the other Parties the basis for such belief.
 - iii) The documentation in items (i) and (ii) shall, if possible, be provided together with the notice of escalation, and in any event not later than 2 weeks after the notice.
 - iv) The CEO meeting shall be held as soon as possible, so also to allow any applicable submission deadlines to be met.
 - v) The CEO meeting shall strive to reach consensus.

Nomination of chairperson for Nordic Balancing Steering Committee, working groups and projects shall be based on expertise and qualification. All Parties shall have the right to nominate candidates for these positions, subject to the provisions stated below. The appointment of chairpersons for the projects or working groups shall be made by the Nordic Balancing Steering Committee.

The Parties recognize that Svk and SN will have the right to lead the work linked to IT development related to the common functions for which the assigned TSOs will provide services, as defined in this CA including Annexes 1.a and 1.b and the tables included in them.

With regard to implementing the common tasks of modernized ACE, Svk and SN will have the right:

- a) to appoint the chairperson of the Nordic Balancing Steering Committee; and
- b) to appoint chairpersons/conveners of projects or working groups for work streams related to the common tasks, under the condition that they can provide qualified candidates.

The process and time plan for the work for implementing the common tasks of modernized ACE are described in Annex 2.

All Parties shall have the right to participate in steering committees and working groups on equal terms.

13. Time plan for implementation of modernized ACE

A time plan for the development and implementation of the Nordic Balancing Concept, with deliverables, milestones and deadlines are described in Annex 2. It is the ambition of all Parties that the first generation of modernized ACE implementation shall be operational by the agreed time.

All Parties commit to work according to this time plan. All Parties acknowledge that implementation of the time plan will occur in a step-wise fashion, with substantial activities in parallel.

14. IT systems for Common services

The Parties agree that the Party(s) responsible for the common tasks will have the right to select the necessary IT tools for performing these tasks and that the costs for these services and the related fees will be shared between the Parties as agreed in Annexes 1a and 1b and in more detailed in separate service provider agreements ("**SPA**"). In the SPAs it shall be agreed, among other things, the content of the provided service, service fees, service levels and financial sanctions for possible deviations from the agreed service level as well as each Party's right to carry out the external audit. The cost of agreed service shall be reasonable, efficient and proportionate. These costs shall be shared between the Parties based on the relative share of mean annual power consumption in the bidding zones receiving Common services according to Annexes 1.a and 1.b respectively.

The allocation key shall be calculated for 5 year periods, the first period consisting of 2013-2017, and applied for a fixed period of 5 years.

The Party(s) performing the common tasks, will then also have the responsibility for to ensure that any procurement for this purpose is in line with EU and applicable national procurement legislation.

In selecting the IT tools and performing the allocated common tasks, the principles of efficiency, cost efficiency and transparency shall apply.

Svk and SN have announced that that they will use Fifty for this purpose.

The IT solutions developed/provided for this purpose shall allow for connection with other TSO specific systems, to the extent necessary.

In the event of an amendment of the LFC structure pursuant to cl. 15, the exiting Party or Parties shall have the right to use any IT solutions developed (or under development) relating to balancing for the Nordic LFC Block. Svenska kraftnät and Statnett, in their capacities as owners of Fifty and providers of common assigned tasks relating to balancing, shall grant the exiting Party or Parties the appropriate rights from Fifty and/or themselves, as the case may be, against payment of a reasonable compensation, reflecting inter alia, the residual value relating to their participation.

15. Amendment of the LFC structure

Each Party has a responsibility for its own national system. The Parties recognize that if there is lack of compliance or significant disagreements that prevent sufficient progress for the development and implementation work pursuant to this CA and/or the LFC Block Agreement, and a Party thus recognizes that there is a need to amend the approved LFC Block, such Party shall have the right to request an amendment.

The amendment shall follow the process set in Article 141(2) and Article 7(4) of the SO GL.

The Parties recognize that TSOs has the right to form their own LFC Block(s) according to SO GL Article 141(11) and Article 5(7).

16. Update and changes of the CA

Changes in this CA shall be made by a consensus decision, and shall be drawn up in writing and signed by all Parties.

17. Breach of the CA

If a Party is in breach of the CA, the Party shall immediately give the other Parties a written explanation to why he is in breach and how he is to rectify the breach. The Party in breach shall also, without undue delay, explain which measures that will be taken in order to avoid future breaches.

18. Exchange of information

Each Party shall inform the other Parties as soon as practically possible about events and issues that might have, an influence on the other Party or Parties or the Nordic power system.

19. Contradictions, inconsistencies and compliance

In the event of any variance between the contents of the CA including its Annexes and the Operational Agreements the order of merit shall be as follows

1. The Operational Agreements, and relevant agreements in accordance with GL EB
2. This CA, including the Annexes.

While the Parties have based this CA on the assumption of compliance with EU and national law, as per clause 2, and will prepare the Operational Agreements on the same basis, non-compliance might arise, particularly due to subsequent legal developments. In such event the following shall apply:

- a. In the event of conflicts between contractual provisions and applicable EU legislation (including SO GL and GL EB), the affected contractual obligation shall not be applied by the Parties. The Parties shall discuss and agree upon how the agreement in question can most appropriately be modified, bringing it into line with EU legislation but at the same time preserving to the extent possible the ambitions and effectiveness of the agreement, its contractual balance and the remaining

provisions. In the event that there is substantial uncertainty as to whether there is non-compliance, the Parties shall discuss and agree upon the most favorable approach to take.

- b. In the event of conflicts between contractual provisions and national legislation, the affected contractual obligation shall not be applied by the Parties. The Parties shall discuss and agree upon how the agreement in question can most appropriately be modified.

20. Liability

The Parties will only be liable to each other for direct damage resulting from gross negligence or willful misconduct.

21. Confidentiality

Within the limits of their national legislation, the Parties and the representatives of the Parties shall maintain strict confidentiality regarding all commercial and other confidential information provided in connection with the this CA. The obligation of confidentiality shall continue after any termination of this CA.

Each Party shall take reasonable measures to ensure that its officers, agents and employees, in relation to each item of Confidential Information of each other Party:

- a) preserve the confidentiality of the Confidential Information;
- b) only use the Confidential Information for the purpose of performing its obligations under the network codes and guide lines as well as the CA.

A Party may, to the extent necessary, disclose Confidential Information of another Party:

- a) with the prior written consent of the other Parties;
- b) to the extent expressly permitted by the CA;
- c) as may be directed or ordered or required in order to comply with any applicable law or order;
- d) as may be required by any court, arbitrator or administrative tribunal in the course of proceedings before it to which the disclosing Party is a party; or
- e) in order to ensure compliance with a license issued under applicable Law or to obtain clearances or consents from a competent authority which reasonably requests disclosure.

22. Force majeure

None of the Parties will in any circumstances be in breach of the CA or liable for delay in performing, or failure to perform, any of its obligations under the CA if such delay or failure results from a Force Majeure, provided that the affected Party:

- a) As soon as reasonably possible notifies the other Parties of the Force Majeure identifying: (i) the nature of the event; (ii) the likely effect of the event on its ability to perform its obligations; and (iii) the likely duration of the event; and

- b) has used all reasonable endeavors to mitigate the effect of the Force Majeure, to carry out its obligations under the CA in any way that is reasonably practicable and to resume the performance of its obligations as soon as reasonably possible.

In this CA, Force Majeure means a situation where a Party fails to perform its obligation(s) under this CA and where the non-performance is due to an impediment beyond the control of the Party affected, provided that such Party could not reasonably be expected to have taken the impediment into account at the time of concluding this CA and could not reasonably be expected to avoid the impediment or its consequences.

23. Dispute resolution and applicable law

This CA shall be governed by and construed in accordance with the laws of Sweden.

Should a dispute arise in connection with the CA, The Parties shall attempt in good faith to solve the dispute through negotiation. If no solution is reached, the disputes shall be settled by arbitration in accordance with the Rules of the Arbitration Institute of the Swedish Chamber of Commerce. The arbitration procedure shall take place in Stockholm. The arbitration proceedings shall be conducted in English.

24. Entry into force

The CA enters into force on the date it has been validly signed by all the Parties. Should the Parties not sign it on the same date, the date of last signature shall be considered as the date that the CA comes into force.

The AiP will be invalid when this CA is signed by all Parties.

This CA has been executed in five originals, one for each Party.

Annexes:

- 1a Roles, responsibilities and principles for Common services mandatory for the Nordic LFC Block
- 1b Roles, responsibilities and principles for common services related to common markets in the Nordic LFC Block
- 2 Roadmap for the New Balancing Concept
- 3 Dimensioning of FRR capacity
- 4 Financial incentives

Affärsverket svenska kraftnät

Ulla Sandborg

Name: ULLA SANDBORGH

Position: CEO

Date: 2018-03-08

Energinet



Name: PEDER ANDREASEN

Position: CEO

Date: 08.03.2018

Fingrid Oyj



Name: Jukka Ruusunen
Position: President & CEO
Date: March 8, 2018

Kraftnät Åland Ab



Name: Jan Kahlroth

Position: CEO

Date: 8th of March 2018

Statnett SF



Name: Quinn RVE
Position: Attorney-in-fact
Date: 8/3-18

Annex 1a: Roles, responsibilities and principles for Common services mandatory for the Nordic LFC Block

1. PURPOSE

The overall purpose of this annex is to secure efficient implementation and future operation of the Nordic LFC Block by allocating roles and responsibility for Common services mandatory to the Nordic LFC block. In order to achieve the overall objective, this annex will

- Specify the Common services mandatory to the Nordic LFC block
- Specify the allocation of these mandatory services to Svk and/or SN
- Specify principles for development and operation of Common services mandatory for the Nordic LFC block

2. DEFINITIONS

In this annex the definitions in the main body of the Cooperation Agreement as well as Annex 2 thereof shall apply. Terms defined in the SO GL and GL EB shall have the same meaning when used herein.

In addition the following definitions shall apply:

"Local tasks" means obligations for all TSOs (Participants) in the LFC Block.

"Common tasks" means tasks that are necessary to handle in a coordinated or centralized manner on behalf of all TSOs in the LFC Block or the Nordic synchronous area.

Responsibility for all Common tasks are assigned to Svk and/or SN according to the main body of the Cooperation Agreement.

"Mandatory common tasks" means tasks that are required by EU regulations or required by the Parties to the Cooperation Agreement as a premise for the LFC Block cooperation.

A **"Common service"** means a service necessary in order to implement and operate a Common task.

"Implementation of Common services" means activities and processes related to the development of a Common service, taking place before a Common task is in operation.

"Operation of Common services" includes IT operation (hosting of a Common service) and IT Application maintenance.

A **"Common service provider"** means one or more TSO being allocated responsibility for Common task(s) and thereby provides Common services in order to implement and operate the Common task in question. Such Common services shall be governed by service provider agreement(s) ("**SPA**").

"Participant" means each of the TSOs in the LFC Block being responsible TSO for a control area. The Participants receive Common services but also contribute to the implementation of Common task(s) as there may be a need for integration with Local tasks.

"PTDF" means power transfer distribution factor.

"Backlog" means a continuously updated ordered list of everything that is known to be needed in an IT product (or a release).

When used in this annex, **"TSO(s)"** means Svk, EN, FG and SN; KnÅ not having any separate balancing responsibility at the Nordic level.

3. MAIN PRINCIPLES FOR ALLOCATION OF RESPONSIBILITY FOR COMMON TASKS MANDATORY TO THE NORDIC LFC BLOCK

The main body of the Cooperation Agreement states that Common tasks mandatory to the Nordic LFC Block are to be assigned to Svk and/or SN.

Roles to be appointed according to EU regulations for handling Common tasks for LFC Block or the Nordic synchronous area shall be allocated to one of the TSOs responsible for Common tasks. Where regulations require the appointment of one single TSO for a role, all the TSOs of the Nordic LFC Block will decide upon a proposal from Svk and SN.

"*LFC Block monitor*" and "*Synchronous area monitor*" are roles defined in SO GL, which are to be appointed by all TSOs of the LFC Block or the synchronous area as the case may be. Although not decided yet, the Parties recognize that there could be synergies in also allocating Common tasks from NC ER to Svk and/or SN.

The Common tasks mandatory for the Nordic LFC Block are identified in table 1 as are Local tasks mandatory for the Nordic LFC Block.

4. COMMON TASKS MANDATORY TO THE NORDIC LFC BLOCK AND LOCAL TASKS WITHIN THE NEW BALANCING CONCEPT

Table 1 describes the tasks related to the main processes necessary in order to ensure balancing in line with the requirements for LFC Block cooperation. These are mandatory tasks for all the Participants in the Nordic LFC Block. Responsibility for the Common tasks mandatory to the Nordic LFC Block is allocated to Common service providers. The table also describes essential Local tasks where each Participant is responsible for handling the task in a timely manner according to Roadmap (Annex 2).

The intention of the table is to define Common tasks for which responsibility is allocated to Svk and/or SN, and the essential Local tasks in order to implement the main processes. The list and the descriptions are not exhaustive.

New Common tasks mandatory to the Nordic LFC IBlock allocated to Svk and SN additional to this list will be agreed by the Nordic Balancing Steering Committee.

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Table 1 – Common and Local tasks mandatory to the LFC block

Main process in New Balancing Concept	Task (or function)	Description	Responsibility	Equivalent activity in Roadmap
N/A	<p>Current balancing of Nordic Synchronous area</p> <p>As per SOA, Appendix 3 Art. 1.</p>	<p>Maintaining the frequency and time deviation within set limits according to responsibility allocated to Svk and/or SN in the Nordic System Operation Agreement.</p> <p>This includes the use of functionality for common balancing in NOIS and in Fifty MMS.</p>	<p>Common service provider</p> <p>This is an operational task allocated to Svk and/or SN. This task and the responsibility will change during implementation of the New Balancing Concept as new main processes for balancing, containing both new Common and Local tasks is implemented. There are two major milestones for change of responsibility for current balancing process (see Annex 2 Roadmap)</p> <p>The balancing functionality of NOIS will need to be replace</p>	(0)

Main process in New Balancing Concept	Task (or function)	Description	Responsibility	Equivalent activity in Roadmap
			Local installations at FG and EN handles current Local tasks.	
Dimensioning process	Mandatory task of the Nordic LFC Block Dimensioning process	Common methodology for reserve requirements, monitoring and post operation analysis. Follow up on rules for financial incentives.	Common service provider Calculation of TSOs reserve requirements based on agreed methodology. Monitoring and post operational analysis Settlement of financial incentives for reserve requirements based on the rules agreed in Annex 4.	
(m)ACE enabled mFRR and aFRR	Bottleneck review and adequacy check	Identify bids that cannot be activated due to internal bottlenecks (within LFC Area). Mark such bids as unavailable to the platforms.	Participant Each TSO responsible for handling Local task in timely manner according to Roadmap	(6)

Main process in New Balancing Concept	Task (or function)	Description	Responsibility	Equivalent activity in Roadmap
(m)ACE enabled mFRR and aFRR	Collect energy bids	Collect energy activation bids (aFRR and mFRR) from BSPs and make bids available for bottleneck review and AOF. Elements to consider: 1) Easy for BSP to participate across multiple countries 2) Time to establish a common aFRR energy activation market 3) Fallback to control area activation	Participant Each TSO responsible for handling Local task in timely manner according to Roadmap	(7)
(m)ACE enabled mFRR	Imbalance prognosis	Calculate prognosis of LFC Area imbalance for the next hours. Minimum 5 min resolution. Could be developed as Common service due to cost or time.	Participant Each TSO responsible for handling Local task in timely manner according to Roadmap.	(8)
(m)ACE enabled mFRR	mFRR request for activation per LFC Area	Calculate mFRR request for the LFC Area based on the imbalance prognosis.	Participant Each TSO responsible for handling Local task	(9)

Main process in New Balancing Concept	Task (or function)	Description	Responsibility	Equivalent activity in Roadmap
		Each TSO must be able to calculate and make request for mFRR activations.	in timely manner according to Roadmap.	
(m)ACE enabled mFRR	Measures for handling resdispatch/internal bottlenecks	Activation of reserves for grid control purposes is performed ahead of the balancing process as well as ad-hoc during the balancing process using bids available for this purpose.	Participant Each TSOs responsibility to ensure sufficient measures for handling resdispatch/bottlenecks in timely manner according to Roadmap.	(10)
(m)ACE enabled mFRR	TSO electronic mFRR ordering	Handle ordering of mFRR activation to BSPs. Each TSO to evaluate need and solutions toward BSPs, including automatic activation of mFRR based on electronic orders from TSO.	Participant Each TSO responsible for handling Local task in timely manner according to Roadmap Each TSO responsible that sufficient solutions at BSPs is in place in timely manner according to Roadmap.	(11)

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Main process in New Balancing Concept	Task (or function)	Description	Responsibility	Equivalent activity in Roadmap
(m)ACE enabled aFRR	aFRR activation toward BSPs	Send aFRR activation signal to BSP based on input from aFRR AOF and local MOL. Estimate amount of activated aFRR.	Participant Each TSO responsible for handling Local task in timely manner according to Roadmap	(12)
(m)ACE enabled mFRR and aFRR	ACE calculation	Calculate ACE and ACE open loop per LFC Area. Near real-time (<10s).	Participant Each TSO responsible for handling Local task in timely manner according to the Roadmap	(13)
(m)ACE enabled aFRR	aFRR controller per bid area	Establish aFRR controller in TSOs LFC Areas. Calculate aFRR demand for LFC Area based on ACE and currently activated aFRR. Calculate aFRR activation based on ACE with correction from AOF. Near real-time (<10s).	Participant Each TSO have the responsibility to establish aFRR controller in their LFC Areas and handling Local task in a timely manner according to the Roadmap.	(14)
(m)ACE enabled mFRR and aFRR	Grid model and available ATC	As default the available ATC after intra day shall be made available	Participant	(15)

Main process in New Balancing Concept	Task (or function)	Description	Responsibility	Equivalent activity in Roadmap
		<p>to the AOF (aFRR and mFRR). Instant reduction of ATC in cases of sudden outage etc. should be supported.</p> <p>The FRR platforms needs a grid model to calculate optimal activations (Flow based/PTDF might suffice).</p>	<p>Each TSO is responsible to provide grid models and available ATC as input for AOF(s). Each TSO is responsible for limits and remaining capacity between bidding zones in its control area. Neighbouring TSO are responsible for limits and remaining capacity between adjacent bidding zones to their control areas.</p>	
Settlement	Settlement TSO-TSO		<p>Participant</p> <p>Bilateral TSO-TSO settlement.</p>	(17)
Settlement	Settlement BSPs	<p>15 minutes pricing aFRR and mFRR must be implemented for mFRR and aFRR and marginal pricing must be implemented for aFRR</p>	<p>Participant</p> <p>TSO responsibility towards BSPs</p>	(18)

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Main process in New Balancing Concept	Task (or function)	Description	Responsibility	Equivalent activity in Roadmap
		TSOs using eSett Oy will handle pay-out to BSPs		
Settlement	Settlement BRPs	BRP settlement should be handled by TSO/eSett Oy Related to full cost of balancing and 15 minutes ISP	Participant TSO responsibility towards BRPs	(19)
Reporting	Mandatory task of the LFC block Analysis/reporting (post operation)	Data must be collected, made available to TSOs for download, analysis and periodical reporting.	Common service provider This is related to tasks for LFC Block monitor (SO GL) to be appointed for each LFC Block, as well as the tasks for Synchronous Area monitor (SO GL) to be appointed for each synchronous area.	(20)

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Main process in New Balancing Concept	Task (or function)	Description	Responsibility	Equivalent activity in Roadmap
<p>Nordic security function</p>	<p>Mandatory task of the LFC block</p> <p>Monitoring and security function (in operational phase)</p>	<p>Collect and present data for the Nordic LFC Block operation in order to monitor the balancing situation. Supervise the overall function of the Nordic LFC Block balancing.</p> <p>Coordinate actions that involve multiple TSOs in real-time (such as loop-flows)</p>	<p>Common service provider</p> <p>This is related to tasks for LFC Block monitor (SO GL) to be appointed for each LFC Block</p>	<p>(21)</p>

5. PRINCIPLES FOR MANDATORY COMMON SERVICES

With regard to implementing the Common services mandatory to the LFC block, Svk and SN will have the right, as defined in the main body of the Cooperation Agreement:

- a) To appoint the chairperson of the Nordic Balancing Steering Committee
- b) To appoint chairpersons/conveners of projects or working groups for work streams related to the Common tasks, under the condition that they can provide qualified candidates
- c) To lead and execute the Implementation of such Common services
- d) To deliver the Operation of such Common services

Leading Implementation of such Common services, c) above, is defined as

- i. Responsible for development process of necessary common IT tools & - services, including development and contract strategies with 3rd parties
- ii. Coordinating relevant activities to assure go-live of such a Common Service

All such Common Services shall be provided by Svk and/or SN. For Implementation and operation of such Common Services the principles of cost efficiency, transparency and agility shall apply. Svk/SN will use Fifty to handle i) above.

If common development of local responsibilities are considered appropriate from a cost, quality or time efficient point of view, this can be included in such a Common service. This may be development of a common IT solution for tasks that are a local responsibility, and/or providing other Common services for Local tasks.

Svk/SN will prepare an SPA for the implementation and operation of such a Common service. The SPA will include development and operation of Common services (operation and IT hosting).

The SPA shall secure the agreement of objective, cost, quality and implementation time for the Common service in question. The SPA shall include a first level description of operation and IT hosting for the Common service in question. This section is to be updated before "go-live".

Each Participant is responsible for identifying its own local efforts necessary to assure successful integration with the Common service in question, and shall commit to the overall timeline for implementation. This could include milestones for regulatory approval, milestones for new BSP agreements, implementation of local IT functionality and integrations etc.

6. IMPLEMENTATION OF COMMON SERVICES

The implementation of mandatory Common tasks has two dimensions:

1. Defining objectives, and premises for development
2. IT development including interface design to local solutions

Implementation of a Common service is followed by operation after "Go-live" of the service.

6.1 Defining objectives and premises for development

Objectives and premises for development shall be developed by all Participants and approved by Nordic Balancing Steering Committee as a part of agreeing on the SPA.

6.2 Market design and design of operational processes

If Common tasks mandatory to the Nordic LFC Block involves decisions or development of market design and designs of operational processes this is to be agreed by all Participants and approved by Nordic Balancing Steering Committee. This will constitute the basis for the agreement on the SPA.

Terms and conditions or methodologies according to network codes related to tasks as defined in table 1 allocated to the Common service provider shall be developed for and agreed by all Parties in the Nordic Balancing Steering Committee.

Terms and conditions or methodologies and market design and/or principles shall to a sufficient extent be developed and agreed by all Parties before responsibility for IT development is allocated to the Common service provider.

In order to ensure agile development during the IT-development of the Common services it shall be possible to further detail or make changes the market design and design of operational processes agreed during the IT development. Such changes should be approved by Nordic Balancing Steering Committee, or by bodies to whom this is delegated, in order to ensure agile and rapid decision making processes.

6.3 IT development

The responsibility for the IT-development of Common services is delegated to Svk and/or SN, and within the scope of the SPA. IT development decisions are made by Svk and SN, although decisions related to market design and design of operational processes are still governed by the Participants and agreed by the Nordic Balancing Steering Committee.

The SPA shall be approved in the Nordic Balancing Steering Committee before major development is started. As a minimum the shared cost and main objective for development should be included. The development section of the SPA shall include goals and objectives, stipulated cost, resource requirement from the Participants, assumptions and an overall timeline for the development. Objectives shall be described as outcomes (results) and outputs (products).

The guiding principles for IT development shall be:

- 1) Svk and/or SN has the authority to add and reprioritize the content in the product backlog as long as the agreed objectives and other agreements/specifications for the Common service are fulfilled;
- 2) Decisions related to market design and design of operational processes during the IT development will be agreed by the Nordic Balancing Steering Committee respecting the need for agile and efficient processes not hindering the overall Development of the Common service;
- 3) In the event of resource conflict between the development of local and Common services the Common service shall prevail. Meaning local projects will have amendments in scope, deadline or quality if this is due to dependency on resource used for development for Common services;
- 4) Each Participant shall be responsible for their own necessary local implementation projects;
- 5) To coordinate and assure IT solutions that are working well together, Participants must assign necessary resources to the development process lead by Svk and/or SN. This comes in addition to efforts for local integration. The principles of trust, agility, openness, loyalty and confidentiality shall apply for working in the development process. A minimum of participation shall be:
 - i. Local project responsible for coordination to relevant local TSO activity during development, e.g. dependencies to Local tasks, communication to BSPs,

- preparations and execution of testing of local integrations, preparing go-live activities
- ii. Local project prepare design specification in the development of Common services, before market design is closed/finalized. As a minimum this will include information security, communication standards, information exchange, data management;
 - iii. Domain expert(s) supporting clarifications, relevant anchoring and testing.
- 6) The overall timeline included in the SPA shall describe the main milestones for the IT development. As a minimum it shall include:
 - Interface design to local solutions finalized
 - Time period for end-to-end value chain testing
 - Go-live target of Common Service
 - 7) Svk and/or SN are responsible for defining and implementing 3rd party contract strategies that are cost effective, and that support the necessary implementation capacity and quality of services needed to fulfil the Roadmap (Annex 2). The 3rd party strategies need to comply with the relevant procurement legislations.
 - 8) Svk and/or SN will use Fifty to carry out development. Fifty will work in an integrated manner with the Svk/SN balancing organization to assure high quality delivery of Common services.
 - 9) All parties shall work in a loyal manner to fulfil the agreed timeline of Development. Lack of involvement from Participants shall not slow down the Implementation process of Common services.

6.3 IT

Svk/SN will use Fifty to implement necessary IT support in Common services.

The details of this chapter will be specified in more detail in the SPA and thus will be subject to amendments when agreeing upon the SPA.

Svk and/or SN will prepare for all Parties approval the SPA for the implementation and operation of a Common service.

The SPA shall give the parties thereto a common understanding of the main objective, cost, quality and implementation time for the Common service in question. The SPA shall include also a first level description of operation and IT hosting for the Common service in question. This section is to be updated before "go-live".

The parties thereto shall agree in the SPA, among other things:

- the content of the provided service defined as one of the Common service provider tasks within table 1
- Principles for contractual arrangements with IT vendors and rights to IT software
- service fees based on cost of the IT investment and operation (IT hosting & maintenance and operations)
- service levels and financial sanctions for possible deviations from the agreed service level
- on the rights for each Party to carry out external audit

6.31 IT solutions

It is anticipated that the following common IT services will be established as part of the Common Services mandatory to the Nordic LFC Block. The list is non-exhaustive, the contents, sequence and timings is dependent on the Roadmap, and is expected to be adjusted over time in agreement with the Participants of the Nordic Balancing Steering Committee.

- i. Common service for supporting the dimensioning process and mechanism for financial incentives
- ii. Common service for analysis/reporting
- iii. Common service for monitoring and security function (operational phase)

6.32 Contractual counterparty for IT vendors and rights to software

Fifty shall be the contracting entity towards 3rd party vendors. With respect to third party deliveries, Fifty shall on behalf of Svk and/or SN, receive and hold:

- a) A perpetual right to use software for which it is not granted intellectual property rights (such as standard software), and
- b) Intellectual property rights for developed software that is not part of the third party supplier standard software library or components to which the third party supplier has obtained intellectual property rights

Participants will have user rights to common software through SPAs with Svk and/or SN for Common services.

A Participant whose participation is terminated shall be granted a non-exclusive right to use software developed for Common services, in its own organization. It may have to acquire licenses, if applicable, for the suppliers' standard software, at its own cost. The Participant in question does not have the right to sell or license the developed software to a third party.

The procurement processes arranged by Fifty with software suppliers etc. shall provide for these rights.

6.4 Operation of Common services

Svk/SN will update the SPA with a section for operation and IT hosting for a particular Common service upon operation. The updated SPA should be approved in the Nordic Balancing Steering Committee in a timely manner before go-live of a new Common service.

The SPA will consist of at least three parts relevant for operation:

1) IT operation / hosting

Within IT operation the SPA shall as a minimum define:

- a. Availability & continuity
- b. Incident management
- c. Data confidentiality and security

2) IT Application maintenance

Within maintenance, the SPA shall as a minimum define:

- a. Bug fixing process
- b. Enhancements- and maintenance to ensure an effective and well working service in a full lifespan of the service

3) Other services if applicable

Svk/SN will establish a single point of contact for incident management for these services, as a 3rd level support for all Participants. The level of support shall be high and the same level of support shall apply for all users of the same service.

It is assumed that each Participant will perform 1st and 2nd level support for its own end-users and external user (e.g. BSPs). Svk/SN 3rd level support must be aligned with local SLA, as long this is aligned with principles for operation of Common Services.

6.6 Transparency, efficiency and cost sharing

The cost for a Common Service shall be made up of

1. The investment cost
2. Annual cost of operation, including IT hosting & maintenance, and operator service if any. Annual cost for hosting is dependent on the agreed level on availability and continuity and needs to be agreed for each Common service in the SPA

There must be full transparency on costs for all parties for both investment and operation. This is:

- The Fifty owners will provide transparency on operational and development costs including the separation of the costs of common functions from other Fifty development.
- The Fifty owners have strong incentives for efficient development due to the cost sharing arrangement set forth below. Fifty will compare realized costs to relevant benchmarks where deemed valuable to ensure comfort for all parties on cost-efficiency.
- Where relevant/appropriate "second opinions" and external audits could be used to support and document cost-efficiency in the development of the Fifty based IT platforms to support common functions

The main principles for cost sharing of Common Services shall apply:

- i. If the underlying assumptions for the SPA change in a way that significantly affects the scope and/or cost/timing of Common service, Svk and SN are entitled to put forward an amendment to the existing SPA for approval in the Nordic Balancing Steering Committee.
- ii. For Common mandatory tasks for the Nordic LFC Block, the SPA shall describe a mechanism ensuring that all Participants are exposed to a share of costs occurring due to delayed Development as a consequence of Participants not agreeing to changes/detailing to e.g market design or SPA.
- iii. The Participant shall pay a Common service license fee to Svk/SN
- iv. The annual Common Service license fee will include each Participant's share of the investment cost in the SPA based on a pay-down time of 5 years, in addition to each Participant's share of the annual operation cost (based on the updated SPA before Go-Live of the Common service)
- v. Basis for the allocation key for cost sharing is the percentage mean annual power consumption of the country's share of mean annual power consumption in the four Nordic countries. However, for solutions that do not include DK1, it is the consumption in DK2 only that is relevant for Denmark. The allocation key shall be calculated for 5 year periods, the first period consisting of 2013-2017, and applied for a fixed period of 5 years.

Any involvement of Svk/SN or Fifty as the case may be, in local implementation projects shall be charged separately and based on costs. That is cost-reflective hourly rates including a margin of 6% to cover a reasonable administrative surcharge.

Any involvement of FG, SVK, SN, EN in the IT development of Common services can/shall be charged separately and based on costs. That is cost-reflective hourly rates including a margin of 6% to cover a reasonable administrative surcharge

Annex 1b: Roles, responsibilities and principles for Common services related to Common markets in the Nordic LFC Block

1. PURPOSE

The overall purpose of this annex is to secure efficient implementation and future operation of the New Balancing Concept by allocating responsibility and define principles for Common services related to Common markets. In order to achieve the overall objective, this annex will

- specify Common markets related to the New Balancing Concept that will be allocated to SvK and/or SN
- Specify principles for development and operation of Common services for Common markets

2. DEFINITIONS

In this annex the definitions in the main body of the Cooperation Agreement as well as Annex 2 thereof shall apply.

Terms defined in the SO GL and GL EB shall have the same meaning when used herein.

In addition the following definitions shall apply:

"Common tasks" means tasks that are necessary to handle in a coordinated or centralized manner on behalf of all TSOs in the LFC Block or the Nordic synchronous area.

Responsibility for all Common tasks are allocated to SvK and/or SN according to the main body of the Cooperation Agreement.

"Mandatory common tasks" means tasks that are required by EU regulations or required by the Parties to the Cooperation Agreement as a premise for the LFC Block cooperation. They are governed by Annex 1.a.

A **"Common service"** means a service necessary in order to implement and operate a Common task.

"Implementation of Common services" means activities and processes related to the development of a Common service, taking place before a Common task is in operation.

"Operation of Common services" includes IT operation (hosting of a Common service) and IT Application maintenance.

A **"Common service provider"** means one or more TSOs being allocated responsibility for Common task(s) and thereby providing Common services in order to implement and operate the Common task in question. Such Common services shall be governed by service provider agreement(s) ("**SPA**").

"Common market" means a market established for the purpose of procuring aFRR or mFFR, or other products necessary for balancing. Common markets constitute Common tasks which are essential in the realization of the New Balancing Concept where participation is the intention, but not mandatory for all Participants in the LFC block.

"Participant" means each of the TSOs in the LFC Block being responsible TSO for a control area. The Participants receive Common services but also contribute to the implementation of Common task(s) as there may be a need for integration with Local tasks.

"Backlog" means a continuously updated ordered list of everything that is known to be needed in an IT product (or a release).

When used in this annex, "**TSO(s)**" means Svk, EN, FG and SN; KnÅ not having any separate balancing responsibility at the Nordic level.

3. MAIN PRINCIPLES FOR PARTICIPATION IN COMMON MARKETS

Common markets are essential in the realization of the New Balancing Concept. Although not mandatory, all Participants are committed to Common markets as agreed in the roadmap in annex 2.

3.1. Market design and design of operational processes related to Common markets

As Common service providers SN and Svk shall prepare and offer SPA(s) for Common services related to Common markets.

Market design and design of operational processes shall be agreed within the Nordic Balancing Steering Committee before responsibility for Development is delegated to the Common service providers through an SPA.

In order to ensure agile development during the IT development of the Common services it shall be possible to further detail or make changes to the market design and design of operational processes agreed during the IT development. Such changes shall be approved by the Nordic Balancing Steering Committee. The Common service providers and the other Participants shall agree/negotiate changes to the offered SPA.

All parties shall work in a loyal manner according to the Article 12 in the main body to fulfil the agreed timeline of development in accordance with the agreed roadmap in annex 2. Lack of progress or involvement from Participants shall not slow down the Implementation process of Common services and/or prevent the other parties from continuing the implementation process of the Common markets.

All Participant(s) are committed to implement any additional Local task necessary to not prevent the remaining Participants from implementing the New Balancing Concept according to Roadmap (Annex 2).

3.1 Exit from Common markets

It will be possible to exit Common markets after the implementation of all Common tasks within New Balancing Concept, it being anticipated that at such time European platforms will be established.

A Common service provider can only exit with the approval of the other Participants who participate in the market in question.

4. COMMON TASKS RELATED TO COMMON MARKETS WITHIN THE NEW BALANCING CONCEPT

Table 1 describes the Common tasks related to Common markets necessary in order to ensure balancing in line with the New Balancing Concept in a secure and efficient way. Responsibility for the Common tasks is allocated to Common service providers.

The intention of the table is to define Common Tasks / Common markets for which responsibility is allocated to Svk and SN in order to implement the main processes. The list and the descriptions are not exhaustive.

New Common tasks related to Common markets within the Nordic LFC Block allocated to Svk and SN additional to this list will be agreed by the Nordic Balancing Steering Committee

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Table 1 – Common and Local tasks related to Common markets

Main process in New Balancing Concept	Task	Description	Responsibility	Equivalent activity in Roadmap
N/A	<p>Current balancing of Nordic Synchronous area</p> <p>As of SOA, Appendix 3 Art. 1.</p>	<p>Maintaining the frequency and time deviation within set limits according to task allocated to Svk and SN in Nordic System Operation Agreement.</p>	<p>Common service provider</p> <p>This is an operational task allocated to Svk and SN. This task and the responsibility will change during implementation of the new balancing concept as new main processes for balancing, containing both new Common and Local tasks is implemented. There are two major milestones for change of responsibility for current balancing process, M1 and M2 (see Roadmap).</p>	<p>(0)</p>

Main process in New Balancing Concept	Task	Description	Responsibility	Equivalent activity in Roadmap
<p>Common capacity market mFRR</p>	<p>Common services related to Common markets</p> <p>Capacity procurement/grid capacity reservation mFRR</p>	<p>System for common balancing capacity procurement market of mFRR, including grid capacity reservation when it is socio-economically beneficial. Possibly done in the same optimization as the aFRR capacity procurement</p>	<p>Common service provider</p> <p>Common service includes implementing and operating Capacity market including collecting bids, monitoring capacity reservation algorithm and TSO-TSO settlement basis calculation</p> <p>Participant</p> <p>Reserve procurement volume and providing available grid capacity during operation</p> <p>Provide necessary communication with BSPs (infrastructure)</p> <p>Manage settlement toward BSPs</p> <p>Bilateral TSO-TSO settlement.</p>	<p>(1)</p>

Main process in New Balancing Concept	Task	Description	Responsibility	Equivalent activity in Roadmap
<p>Common capacity market aFRR</p>	<p>Common services related to Common markets</p> <p>Capacity procurement/grid capacity reservation aFRR</p>	<p>System for common balancing capacity procurement market of aFRR, including grid capacity reservation when it is socio-economically beneficial.</p> <p>Implementation of this is an ongoing project in Fifty, and is scheduled to be ready H1 2019.</p>	<p>Common service provider</p> <p>Common service includes implementing and operating Capacity market including collecting bids, monitoring capacity reservation algorithm and TSO-TSO settlement basis calculation.</p> <p>Participant</p> <p>Procurement of reserve volume and providing available grid capacity.</p> <p>Provide necessary communication with BSPs (infrastructure).</p> <p>Manage settlement toward BSPs.</p> <p>Bilateral TSO-TSO settlement.</p>	<p>(2)</p>

Main process in New Balancing Concept	Task	Description	Responsibility	Equivalent activity in Roadmap
mACE enable mFRR and aFRR	Updated balancing energy exchange plans	aFRR and mFRR transactions between bidding zones leads to a change in the desired flow across the borders. This should be used as input (at least) for the ACE calculation.	Common service provider Could be part of AOF(s).	(3)
mACE enable mFRR	Common services related to Common markets Nordic mFRR AOF for different products	Scheduled activation of standard product: Optimization of scheduled mFRR activation over all LFC areas based on mFRR demands and bid prices per LFC area while respecting ATC. After implementation of MARI the Nordic AOF may work as a fall-back for MARI Other activation including: <ul style="list-style-type: none"> • Direct activation of standard product • Direct activation of specific product(s) 	Common service provider Common service includes developing and operating AOF. Roles and responsibility for cross-border FRR activation process to be allocated according to SO GL.	(4)

Main process in New Balancing Concept	Task	Description	Responsibility	Equivalent activity in Roadmap
		<ul style="list-style-type: none"> Potential coordination of activation of system regulations <p>The Nordic mFRR AOF should handle all products, including scheduled product until MARI is operational. After MARI, scheduled activation may only be done in fall-back situations.</p>		
<p>mACE enabled aFRR</p>	<p>Common services related to Common markets</p> <p>Nordic aFRR AOF</p>	<p>Optimization of aFRR activation and netting over all LFC areas based on aFRR demands and bid prices per LFC area while respecting ATC.</p> <p>The Nordic AOF should follow as close as possible the principles and algorithm of PICASSO. This will reduce both operational risks in implementation phase and limit the</p>	<p>Common service provider</p> <p>Common service includes IT developing and operating AOF.</p> <p>Roles and responsibilities for imbalance netting process and cross-border FRR activation process to be allocated according to SO GL.</p>	<p>(5)</p>

Annex 1b of Cooperation Agreement Nordic Balancing cooperation

Main process in New Balancing Concept	Task	Description	Responsibility	Equivalent activity in Roadmap
		<p>consequence if PICASSO is delayed.</p> <p>After implementation of Picasso the Nordic AOF may work as a fall-back for PICASSO</p>		
Reporting	<p>Common services related to Common markets</p> <p>Transparency</p>	<p>Relevant data should be made available for the market participants and all TSOs according to GL EB. Provide Nordic market results to ENTSO-E transparency site, and if needed, additional Nordic solutions for providing market information.</p>	<p>Common service provider</p> <p>For Common markets it is efficient to manage publishing of market information as a Common task.</p>	(16)
Settlement	<p>Common services related to Common markets</p> <p>Settlement TSO-TSO</p>	<p>Settlement of exchanged activated mFRR and aFRR must come at the same time as mACE implementation of mFRR and mACE implementation of aFRR. For settlement of</p>	<p>Common service provider</p> <p>TSO-TSO settlement basis calculation is a Common task.</p> <p>Participant</p>	(17)

Annex 1b of Cooperation Agreement Nordic Balancing cooperation

Main process in New Balancing Concept	Task	Description	Responsibility	Equivalent activity in Roadmap
		<p>Capacity – see text on capacity markets above</p> <p>Settlement for financial incentives for ACE quality.</p> <p>Settlement of unintended exchanges will come after settlement of exchanged reserves.</p> <p>These principles will be implemented after mACE implementation.</p>	<p>Bilateral TSO-TSO settlement.</p>	

5. PRINCIPLES FOR COMMON SERVICES RELATED TO COMMON MARKETS

With regard to implementing the Common services for the Common markets, Svk and SN will have the right, as defined in the main body of Cooperation Agreement:

- a) To appoint the chairperson of the Nordic Balancing Steering Committee
- b) To appoint chairpersons/conveners of projects or working groups for work streams related to the Common tasks for the Common markets, under the condition that they can provide qualified candidates
- c) To lead and execute the Implementation of such Common services
- d) To deliver the Operation of such Common services

Leading Implementation of such Common Services, c) above, is defined as

- i. Responsible for development process of necessary common IT tools & - services, including development and contract strategies with 3rd parties
- ii. Coordinating relevant activities to assure go-live of such a Common Service

All such Common services shall be provided by Svk and/or SN. For implementation and operation of Common services the principles of cost efficiency, transparency and agility shall apply. Svk and/or SN will use Fifty to handle i) above.

If common development of local responsibilities are considered appropriate from a cost, quality or time efficient point of view, this can be included in such a Common service. This may be development of a common IT solution for tasks that are a local responsibility, and/or providing other Common services for Local tasks.

Svk and/or SN will prepare an SPA for the implementation and operation of such a Common service. The SPA will include development and operation of Common services (operation and IT hosting).

The SPA shall secure the agreement of objectives, cost, quality and implementation time for the Common service in question. The SPA shall include a first level description of operation and IT hosting for the Common service in question. This section is to be updated before "go-live".

Each Participant is responsible for identifying its own local efforts necessary to assure successful integration with the Common service in question, and shall commit to the overall timeline for implementation. This could include milestones for regulatory approval, milestones for new BSP agreements, implementation of local IT functionality and integrations etc.

6. IMPLEMENTATION OF COMMON SERVICES

The implementation of Common tasks related to Common markets has two dimensions:

- Market design and design of operational processes
- IT development including interface design to local solutions

Implementation of a service is followed by operation after "Go-live" of the service.

6.1 Market design and design of operational processes

Where Common tasks involve establishing market platforms the market design and design of operational processes is to be developed by all Participants within the decision-making structure of the Nordic Balancing Steering Committee. All aspects of market design shall be approved by the Nordic Balancing Steering Committee and constitute the basis for the SPA. A certain level of maturity in the agreed market design and processed shall be reached

before responsibility for the IT development is delegated to the Common service providers. Any changes or further detailing of market design and/or operational processes taking place during IT development shall be approved by the Nordic Balancing Steering Committee or to bodies to whom this is delegated.

Terms and conditions or methodologies and market design and/or principles shall to a sufficient extent be developed and agreed by all Parties before responsibility for IT development is allocated to the Common service provider.

All parties shall work in a loyal manner to fulfil the agreed timeline of development in accordance with the agreed roadmap in annex 2. Lack of involvement and or lack of progress from Participants shall not slow down the Implementation process of Common services and/or prevent the other parties for continuing the implementation process of the Common markets.

6.2 IT development

The responsibility for the development of Common services is delegated to Svk and/or SN, and within the scope of the SPA, all development decisions are made by Svk and SN. Overall market design and design of operational processes is however still governed by the Participants and agreed by the Nordic Balancing Steering Committee.

The SPA shall be agreed in the Nordic Balancing Steering Committee before major development is started. As a minimum the shared cost and main objective for development should be included. The development section of the SPA shall include goals and objectives, stipulated cost, resource requirements from the Participants, assumptions and an overall timeline for the development. Objectives shall be described as outcomes (results) and outputs (products).

The guiding principles for development shall be:

- 1) Svk/SN has the authority to add and reprioritize the content in the product Backlog as long as the agreed objectives and other agreements/specifications for the Common service are fulfilled.
- 2) Decisions related to market design and design of operational processes during the Development phase will be agreed by the Nordic Balancing Steering Committee respecting the need for agile and efficient processes not hindering the overall Development of the Common service
- 3) In the event of resource conflict between the development of local and Common services the Common service shall prevail. Meaning local projects will have amendments in scope, deadline or quality if this is due to dependency on resource used for development for Common services.
- 4) Each Participant shall be responsible for their own necessary local implementation projects
- 5) To coordinate and assure IT solutions that are working well together, Participants must assign necessary resources to the development process lead by Svk and/or SN. This comes in addition to efforts for local integration. The principles of trust, agility, openness, loyalty and confidentiality shall apply for working in the development process. A minimum of participation shall be:
 - i. Local project responsible for coordination to relevant local TSO activity during development, e.g. dependencies to Local tasks, communication to BSPs, preparations and execution of testing of local integrations, preparing go-live activities
 - ii. Local project prepare design specifications to be included in the IT development of Common services, before market design is closed/finalized.

As minimum this will include information security, communication standards, information exchange, data management

- iii. Domain expert(s) supporting clarifications, relevant anchoring and testing.
- 6) The overall timeline included in the SPA shall describe the main milestones for the development. As a minimum it shall include:
 - Market design finalized
 - Interface design to local solutions finalized
 - Time period for end-to-end value chain testing
 - Go-live target of Common Service
- 7) Svk and/or SN are responsible for defining and implementing 3rd party contract strategies that are cost effective, and that support the necessary implementation capacity and quality of services needed to fulfil the Roadmap (Annex 2). The 3rd party strategies need to comply with the relevant procurement legislations.
- 8) Svk and/or SN will use Fifty to carry out development. Fifty will work in an integrated manner with the Svk and/or SN balancing organization to assure high quality delivery of Common services.
- 9) All parties shall work in a loyal manner to fulfil the agreed timeline of development. Lack of involvement from Participants shall not slow down the Implementation process of Common services.
- 10) The Participant should fulfill its obligations regarding:
 - a) CA, including roadmap
 - b) SPAs, including milestones for regulatory approval, milestones for new BSP agreements, implementation of local IT functionality and integrations etc.
 - c) Necessary resources to the development process lead by Svk and/or SNIf a party is not able to fulfill the above obligations it should not hinder the launch of the Common markets for those Participants that are ready in accordance with the roadmap in annex 2.
- 11) Participation in the Common service(s) related to the Common market of table 1 is not mandatory for the Parties of the CA. If a Participant who has left a Common service wishes to take part in such Common service again at a later stage, it has to be agreed explicitly with all other Participants.

6.2 IT

Svk/SN will use Fifty to implement necessary IT support in Common services.

The details of this chapter will be specified in more detail in the SPA and thus will be subject to amendments when agreeing upon the SPA.

Svk and/or SN will prepare for all Parties approval the SPA for the implementation and operation of a Common service.

The SPA shall give the parties thereto a common understanding of the main objective, cost, quality and implementation time for the Common service in question. The SPA shall include also a first level description of operation and IT hosting for the Common service in question. This section is to be updated before "go-live".

The parties thereto shall agree in the SPA, among other things:

- the content of the provided service defined as one of the Common service provider tasks within table 1
- Principles for contractual arrangements with IT vendors and rights to IT software
- service fees based on cost of the IT investment and operation (IT hosting & maintenance and operations)

- service levels and financial sanctions for possible deviations from the agreed service level
- on the rights for each Party to carry out external audit

6.21 *IT solutions*

It is anticipated that the following common IT services will be established as part of the Common Services to the Common markets. The list is non-exhaustive, the contents, sequence and timings is dependent on the Roadmap, and is expected to be adjusted over time in agreement with the Participants of the Nordic Balancing Steering Committee.

- i. aFRR Nordic Capacity Market, supporting the New Balancing Concept
- ii. mFRR Nordic Capacity Market, supporting the New Balancing Concept
- iii. Replacement of balancing functions from NOIS, New Balancing Concept enabled (partly integrated below)
- iv. mFRR AOF / Nordic Energy Activation Market Platform
- v. aFRR AOF/Nordic Energy Activation Market Platform

6.22 *Contractual counterparty for IT vendors and rights to software*

Fifty shall be the contracting entity towards 3rd party vendors. With respect to third party deliveries, Fifty shall on behalf of Svk and/or SN, receive and hold:

- a) A perpetual right to use software for which it is not granted intellectual property rights (such as standard software), and
- b) Intellectual property rights for developed software that is not part of the third party supplier standard software library or components to which the third party supplier has obtained intellectual property rights

Participants will have user rights to common software through SPAs with Svk and/or SN for Common services.

A Participant whose participation is terminated shall be granted a non-exclusive right to use software developed for Common services, in its own organization. It may have to acquire licenses, if applicable, for the suppliers' standard software, at its own cost. The Participant in question does not have the right to sell or license the developed software to a third party.

The procurement processes arranged by Fifty with software suppliers etc. shall provide for these rights.

6.3 Operation of Common Services

Svk/SN will update the SPA with a section for operation and IT hosting for a particular Common service upon operation. The updated SPA should be approved by all Participants in a timely manner before go-live of a new Common service.

The SPA will consist of at least three parts relevant for operation:

1) IT operation / hosting

Within IT operation the SPA shall as a minimum define:

- a. Availability & continuity
- b. Incident management
- c. Data confidentiality and security

2) IT Application maintenance

Within maintenance, the SPA shall as a minimum define:

- a. Bug fixing process

- b. Enhancements- and maintenance to ensure an effective and well working service in a full lifespan of the service
- 3) Market operation and other services if applicable

Within market operation the SPA shall as a minimum define:

- a. Information transparency. Exchange/availability of information/data from operation of local and Common task, to support equal position for operational optimization.

Svk/SN will establish a single point of contact for incident management for these services, as a 3rd level support for all Participants. The level of support shall be high and the same level of support shall apply for all users of the same service.

It is assumed that each Participant will perform 1st and 2nd level support for its own end-users and external user (e.g. BSPs). Svk/SN 3rd level support must be aligned with local SLA, as long this is aligned with principles for operation of Common Services.

6.5 Transparency, efficiency and cost sharing

The cost for a Common Service shall be made up of

1. The investment cost
2. Annual cost of operation, including IT hosting & maintenance, and operator service if any. Annual cost for hosting is dependent on the agreed level on Availability and Continuity and needs to be agreed for each Common service in the SPA

There must be full transparency on costs for all parties for both investment and operation. This is:

- The Fifty owners will provide transparency on operational and development costs including the separation of the costs of common functions from other Fifty development.
- The Fifty owners have strong incentives for efficient development due to the cost sharing arrangement set forth below. Fifty will compare realized costs to relevant benchmarks where deemed valuable to ensure comfort for all parties on cost-efficiency.
- Where relevant/appropriate "second opinions" and external audits could be used to support and document cost-efficiency in the development of the Fifty based IT platforms to support common functions

The main principles for cost sharing of Common Services shall apply:

- i. If the underlying assumptions for the SPA change in a way that significantly affects the scope and/or cost/timing of Common service, Svk and SN are entitled to put forward an amendment to the existing SPA for approval in the Nordic Balancing Steering Committee.
- ii. For Common services related to Common markets, the SPA shall describe a mechanism ensuring that all Participants are exposed to a share of costs occurring due to delayed development as a consequence of Participants not agreeing to changes/detailing to e.g market design or SPA.
- iii. The Participant shall pay a Common service license fee to Svk and/or SN
- iv. The annual Common Service license fee will include each Participant's share of the investment cost in the SPA based on a pay-down time of 5 years, in addition to each

Participants share of the annual operation cost (based on the updated SPA before Go-Live of the Common service)

- v. Basis for the allocation key for cost sharing is the percentage mean annual power consumption of the country's share of mean annual power consumption in the four Nordic countries. However, for solutions that do not include DK1, it is the consumption in DK2 only that is relevant for Denmark. The allocation key shall be calculated for 5 year periods, the first period consisting of 2013-2017, and applied for a fixed period of 5 years.

Any involvement of Svk and/or SN or Fifty as the case may be, in local implementation projects shall be charged separately and based on costs. That is cost-reflective hourly rates including a margin of 6% to cover a reasonable administrative surcharge.

Any involvement of FG, SVK, SN, EN in the IT development of Common services can/shall be charged separately and based on costs. That is cost-reflective hourly rates including a margin of 6% to cover a reasonable administrative surcharge

Annex 2: Roadmap for the New Balancing Concept

1. PURPOSE

The purpose of this annex is to describe a high level time-plan that shows the stepwise implementation of the New Balancing Concept and modernized ACE.

2. DEFINITIONS

In this annex the definitions in the main body as well as Annexes 1.a and 1.b shall apply. Terms defined in the SO GL and GLEB shall have the same meaning when used herein. In addition the following definitions shall apply:

ACE OL	Area Control Error Open Loop
AOF	Activation Optimization Function
ATC	Available Transfer Capacity
ISP	Imbalance Settlement Period
MARI	the new European manual frequency restoration reserve platform
PICASSO	the new European automatic frequency restoration reserve platform

When used in this Annex, TSO shall mean Svk, EN, FG and SN; KnÅ not having any separate balancing responsibility at the Nordic level.

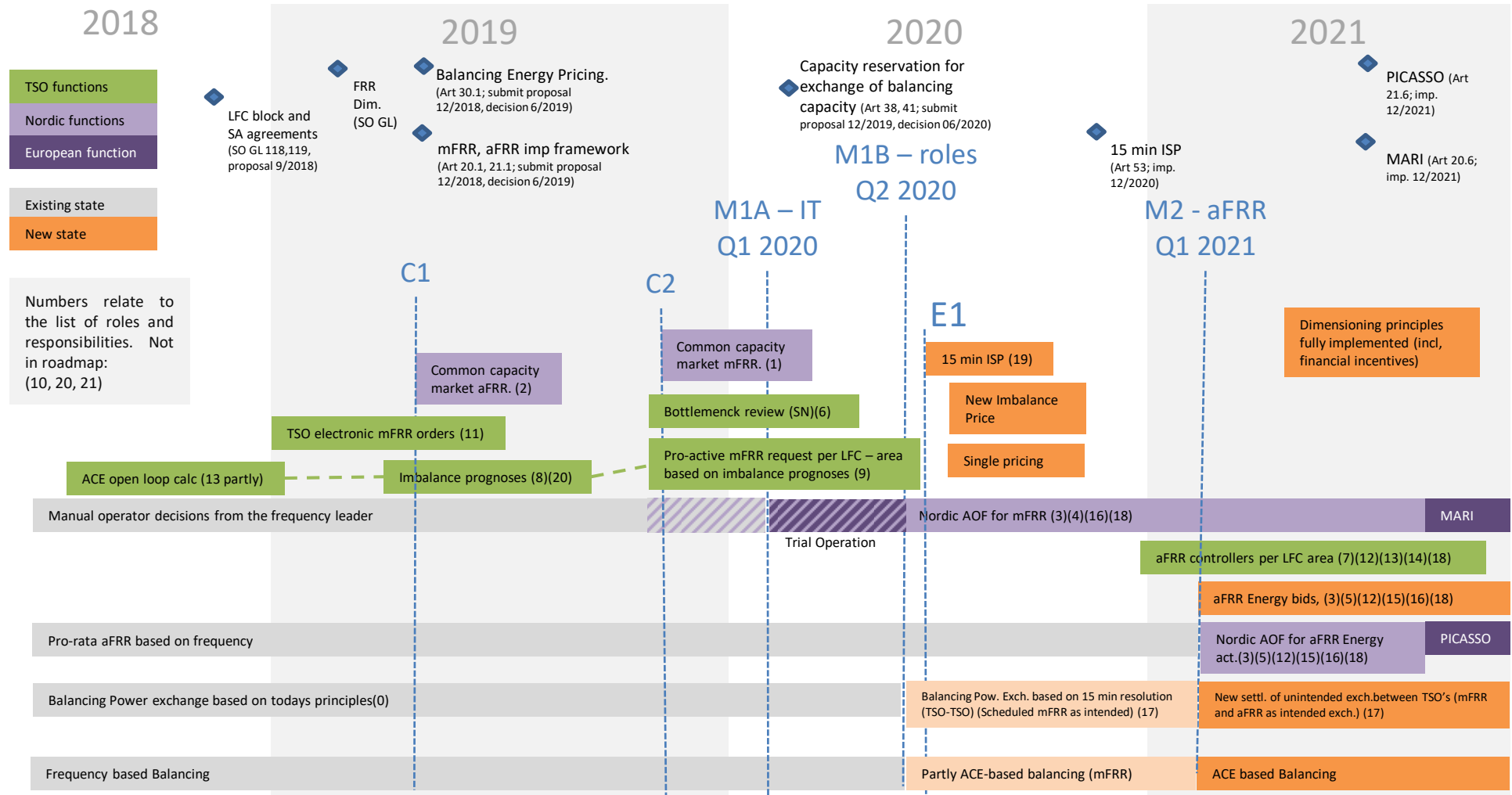
3. MILESTONES

The roadmap is based around some key milestones. These milestones are given target dates.

C1:	Common Nordic capacity market for aFRR (Q2 2019)
C2:	Common Nordic capacity market for mFRR (Q4 2019)
M1A-IT:	Nordic AOF for mFRR IT solution ready (Q1 2020)
M1B-Roles:	ACE-based proactive operation of the mFRR energy activations based on 15-minute mFRR request per LFC area. (Q2 -2020, not linked to ISP Change)
M2:	Nordic AOF for aFRR: ACE-based activation of aFRR based on the aFRR demand per LFC area. Marginal price based on energy bids. (Q1 2021)
E1:	Introduction of 15 min ISP in the imbalance settlement. (This milestone is not controlled by this project, expected at Q2 2020)

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4. ROADMAP FOR THE NEW BALANCING CONCEPT



5. LIST OF ELEMENTS IN THE ROADMAP

Roadmap element	Description	Milestone/ Timing	Dependencies	TSO requirements
ACE OL calculation Annex 1a, table 1: [13]	Calculate ACE and ACE OL per LFC area. Near real-time	2018	Need an IT system and infrastructure to collect data and distribute the results to all TSOs	All TSOs need to provide data to the ACE OL calculation. Calculation and registration
TSO electronic mFRR orders Annex 1a, table 1: [11]	Handle ordering of mFRR activation to BSPs The majority of the activation shall be covered by electronic orders	Before M1	BSPs must be ready with their systems	Each TSO is responsible for activating their local bids after getting information from the AOF. All TSOs need this functionality. Current status: FG: some BSPs, but not all EN: all BSPs Svk: pilot in 2018, all in 2019 SN: implementing Q2 2018, almost all in 2018
Imbalance prognosis Annex 1a, table 1: [8, 20]	Calculate prognosis of LFC area imbalance for the next hours. Min 5 minutes resolution	Before M1 – gradual deployment from 12 months before M1	ACE OL calculation	All TSOs in the synchronous area must produce an imbalance prognosis
Common capacity market aFRR Annex 1b, table 1: [2]	System for common balancing capacity procurement market of aFRR, including grid capacity reservation when it is socio-economically beneficial	C1 Q2 2019 Timing is based on the ongoing implementation project in Fifty	Requires approval from NRA of methodology to reserve transmission capacity	A Nordic capacity market will allow participation of all TSOs but does <i>not</i> require participation from all TSOs. The market can start even if some TSOs are not ready to join

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Roadmap element	Description	Milestone/ Timing	Dependencies	TSO requirements
Common capacity market mFRR Annex 1b, table 1: [1]	System for common balancing capacity procurement market of mFRR, including grid capacity reservation when it is socio-economically beneficial. Possibly done in the same optimization as the aFRR capacity procurement	C2 Q4 2019 IT implementation requires 6 months after C1	Market design by Q3 2018 Similar market design as aFRR capacity market (No new product complexity)	A Nordic capacity market will allow participation of all TSOs but does <i>not</i> require participation from all TSOs. The market can start even if some TSOs are not ready to join The TSOs must be able to adapt local systems, and is responsible for BSP coordination
Bottleneck review Annex 1a, table 1: [6]	Identify bids that cannot be activated due to internal bottlenecks (within LFC area). Mark such bids as unavailable to the platforms	Before M1	Individual Grid Models/Common Grid Model SN SCADA	First of all an SN requirement (many internal bottlenecks within the elspot area), SvK has the Väst kust cut, FG has the P1-cut
Pro-active mFRR request per LFC – area based on imbalance prognoses Annex 1a, table 1: [9]	Calculate mFRR request for the LFC area based on the imbalance prognosis and send it to the Nordic AOF	Before M1 – test period is needed before taken into full operation	Imbalance prognosis An early version of the Nordic AOF to receive and present requests	Requires all TSOs participation. Each TSO is responsible for calculating and sending the request to the AOF. Internal bottleneck check within LFC areas
Nordic AOF for mFRR – IT systems Annex 1b, table 1: [3,4,16] Annex 1a, table 1: [18]	IT systems needed for performing scheduled/proactive activation of mFRR. Optimization of scheduled mFRR activation over all LFC areas based on mFRR demands and bid prices per LFC area while respecting ATC	M1A Q1 2020	Bottleneck review (SN) Imbalance calculation Necessary TSO IT-systems required for the mFRR operation should be ready	TSOs shall send in their mFRR requests. TSOs must collect bids and send them to the Nordic AOF. All TSOs must be ready to send in an mFRR request every 15 min

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Roadmap element	Description	Milestone/ Timing	Dependencies	TSO requirements
	The milestone defines the starting point for a trial operation phase of 15 min proactive balancing based on requests per bidding zone			
<p>Nordic AOF for mFRR – Operation</p> <p>Annex 1b, table 1: [3,4,16]</p> <p>Annex 1a, table 1: [18]</p>	<p>Scheduled/proactive activation of mFRR. Optimization of scheduled mFRR activation over all LFC areas based on mFRR demands and bid prices per LFC area while respecting ATC</p> <p>After implementation of MARI the Nordic AOF will work as a fall-back for MARI</p> <p>The milestone defines point the TSOs are responsible for activating mFRR for their areas.</p>	<p>M1B</p> <p>M1A + 3 months</p>	<p>M1A</p> <p>Has to be before E1</p> <p>Does not require implementation of the new standard products.</p> <p>ACE based activation of direct activated mFRR <i>can</i> be introduced later than M1B</p>	<p>TSOs are responsible for and shall send in their mFRR requests.</p> <p>TSOs must collect bids and send them to the Nordic AOF.</p> <p>All TSOs must be ready to send in an mFRR request every 15 min</p>
<p>Balancing power exchange based on 15 min, Scheduled mFRR as intended exchange</p> <p>Annex 1a, table 1: [17]</p>	<p>Requested mFRR energy is settled as intended exchange. Balancing power is settled on 15 min</p>	<p>M1B</p>	<p>15 min resolution on meters between TSOs</p>	<p>TSOs must submit requests, and this is the basis for settlement</p>
<p>aFRR controller pr LFC area</p>	<p>Calculate aFRR demand for LFC area based on ACE and</p>	<p>Sufficiently tested before M2</p>	<p>ACE calculation</p>	<p>All TSO's responsible for having this developed for each LFC area</p>

Annex 2 of Cooperation Agreement Nordic Balancing cooperation

Roadmap element	Description	Milestone/ Timing	Dependencies	TSO requirements
Annex 1a, table 1: [7,12,13,14,18]	currently activated aFRR compliant with PICASSO. Calculate aFRR activation based on ACE with correction from AOF. Near real-time (<10s).		SCADA IT development	PICASSO compliant solution
Nordic AOF for aFRR energy activation Annex 1a, table 1: [12,15,18] Annex 1b, table 1: [3,5,16]	Optimization of aFRR activation and imbalance netting over all LFC areas based on aFRR demands and bid prices per LFC area while respecting ATC The Nordic AOF should follow as close as possible the principles and algorithm of PICASSO	M2 Q1 2021	All LFC areas must have a working LFC Controller SN bottleneck review in place 15 min ISP, and new imbalance price that include aFRR price should be in place (missing money)	TSOs need a LFC controller, and is responsible for TSO-BSP interface, bid collection etc.
New settlement of unintended exchange between TSOs (Scheduled mFRR and aFRR as intended exchange) Annex 1a, table 1: [17]	Settlement of exchanged activated aFRR must come at The same time as mACE implementation of aFRR Settlement of unintended exchanges will come after settlement of exchanged reserves Settlement for financial incentives for ACE quality	M2 Settlement of unintended exchange can start after settlement of both mFRR and aFRR as intended exchange	5 minute meters on relevant borders(if chosen)	

Annex 2 of Cooperation Agreement Nordic Balancing cooperation

Roadmap element	Description	Milestone/ Timing	Dependencies	TSO requirements
		Settlement of unintended exchange has to come after 2020 due to GLEB (proposal 6/2019 + 6 months NRA)		
Dimensioning principles fully implemented (incl. financial incentives)	Dimensioning principles for aFRR and mFRR and the financial settlement	6 months after M2 (Q3 2021)	Methodology and agreements according to deadlines in SO GL	

6. ROADMAP FOR IMPLEMENTATION OF PRINCIPLES FOR DIMENSIONING AND FINANCIAL INCENTIVES

6.1 aFRR capacity market

A total Nordic volume shall be set for each hour, and the amount of hours shall be increased according to 6.21 and 6.22.

6.2 aFRR ramp-up plan

The volumes of available aFRR reserves shall gradually be increased until the new dimensioning methodology is implemented. The number of hours with available aFRR will be increased first, before the volume will be increased from today's level (300MW). A gradual increase over some time is necessary to mature the aFRR market participants and give time for a capability increase. Increased volumes will show commitment to the market participants.

More aFRR in the system will lead to better balancing and better frequency quality.

6.21 *Ramp up of hours*

The number of hours shall be gradually increased from 35 hours/week today to all hours per week until the start of the AOF for mFRR (M1B).

The need for an increase in the hours from now until C1 shall continuously be evaluated and decided based on the agreed frequency quality target (10000 minutes/year). An evaluation and decision shall be done for each quarter of the year by RGN.

The introduction of the aFRR capacity market is intended to make the purchase of aFRR more cost effective. This allows a faster increase in the number of hours after the introduction of this market (C1).

Starting from C1 (or at the latest 6 months before M1B) the number of hours shall be adjusted every three months. The hours shall be increased in even steps targeting the full number of hours at M1B. Postponement of M1B beyond 01.07.2020, and hence the ramp up as described, requires full agreement from the Nordic Balancing Steering Committee.

Each TSO is allowed to improve the aFRR capability of their control area by procuring more than agreed in this Annex at its own cost, taking into account potential operational security risks.

6.22 *Ramp up of volumes*

The volumes of aFRR shall be increased after M1B, when ACE based mFRR starts. The required volume in the target model is expected to be larger than the volume of 300MW that we have today. In order to ensure that we have enough capability at M2, the volumes should be increased prior to that, starting 6 months before M2. The M2 target tentative volume is 600 MW. After M2 the volumes will be determined by the new dimensioning principles by each TSO.

If agreed appropriate due to frequency quality ramp up of volumes could happen earlier than stated above.

6.23 *Cost sharing and current aFRR agreement*

Starting from the introduction of the aFRR capacity market (C1) the agreed principles such as dimensioning and cost sharing principles from the Agreement on a Nordic Market on Frequency Restoration Reserves with automatic activation shall apply.

If common Nordic capacity market is not operational at Q2/2019, volume sharing principles and cost sharing principles from "Agreement on a Nordic Market for Frequency Restoration Reserves with automatic activation (aFRR), November 2016" hereafter "Initial aFRR

Agreement" will be applicable until M2, although lasting for a maximum of 2 years, otherwise it will have to be renegotiated.

Cost sharing after M2 should be in line with principles in the Cooperation Agreement main body.

6.3 FRR dimensioning methodology

After the NRA approval of the new dimensioning methodology (Q2 2019), the principles shall be gradually implemented until they are fully implemented. After approval of the dimensioning methodology, the principles for mFRR dimensioning can be implemented. The volume requirements can be satisfied with either purchased capacity or free bids.

At M2 the TSOs will determine their aFRR capacity volumes to be purchased for their LFC Areas. The volume requirements after M2 can be satisfied with either purchased capacity or free bids. The financial incentives for TSOs to meet the dimensioning criteria will be put into effect 6 months after M2. At M2, also the new settlement principles for unintended exchange, including settlement of ACE, will be implemented. From this point all intended exchange due to mFRR or aFRR activations shall be settled explicitly, and the remaining exchange shall be truly "unintended".

Annex 3: Dimensioning of FRR capacity

1. PURPOSE

The purpose of this annex is to describe the TSOs responsibilities in regards to the dimensioning of FRR capacity in the New Balancing Concept. Further, the annex sets out the principles for the dimensioning criteria, the dimensioning process and the sharing of FRR capacity which will be applicable in the Nordic LFC Block and which will be applied to the FRR dimensioning rules (SO GL Article 157) where relevant.

2. DEFINITIONS

In this annex the definitions in the main body of the Cooperation Agreement as well as Annexes 1a, 1b and 2 shall apply. Terms defined in the SO GL and GLEB shall have the same meaning when used herein. In addition the following definitions shall apply:

ISP Imbalance Settlement Period

RGN Regional Group Nordic

When used in this annex, TSO shall mean Svk, EN, FG and SN; KnÅ not having any separate balancing responsibility at the Nordic level.

3. TSO RESPONSIBILITIES

- a) Each TSO is, for all ISPs and for all LFC Areas within its control area, responsible for ensuring access to the required FRR capacity determined by the dimensioning process. If necessary, procurement of FRR capacity shall be used to ensure this.
- b) Each TSO is, for all ISPs and for all LFC Areas within its control area, responsible for the determination of its dimensioning incident(s), the statistical characteristics of the historical imbalances and the FRR capacity needed for handling congestions, and for providing this information as input to the dimensioning process.
- c) Each TSO is responsible for providing additional information within its control area necessary for the dimensioning process.
- d) The TSOs shall evaluate the dimensioning methodologies at least on a yearly basis to determine if the resulting availability of reserves is at a suitable level. Methodologies shall be adjusted if needed. The evaluation must be based on criteria following objectives set by SO GL.

4. DIMENSIONING CRITERIA

- a) The Nordic LFC Block shall have access to enough FRR capacity to balance the aggregated block imbalance during at least 99 percent of the time considering transmission constraints between LFC Areas.
- b) Each TSO shall have access to enough FRR capacity to balance the dimensioning incidents in all of its LFC Areas. As a minimum, the FRR capacity shall be enough to cover the largest dimensioning incident of the LFC Areas within the control area. Network constraints in the control area's grid shall be taken into account when determining the total volume of FRR capacity needed and its distribution between LFC Areas.
- c) An analysis of the future requirement for balancing reserves in the LFC Block including FCR-N, aFRR, mFRR and RR and the gradual change from the present

balancing regime to a new balancing regime shall be initiated as a part of the development of the new Nordic Balancing Concept. The project shall be based on the principles in SO GL with respect for challenges and possibilities in the Nordic synchronous system.

The analysis shall determine any requirements regarding the composition of different products in the required volumes of FRR products.

The working group will report to RGN that also has to accept the scope of the work. The work has to be finalized for decision in the Nordic Balancing Steering Committee by end of 2018 at the latest.

- d) The above FRR reserves should be available for balancing after internal congestions within LFC Areas have been managed.
- e) The ratio between aFRR and mFRR in each LFC Area shall take into account the possibility to predict imbalances, the dynamics of the imbalances, market characteristic and the need for reactive aFRR and mFRR activations. The intention is that scheduled mFRR shall mainly be used for predictable imbalances and aFRR to handle the imbalances. Reactive activation within an ISP will also be needed to handle congestions and disturbances in and between each LFC Area in real time.
- f) The ratio between aFRR and mFRR shall be considered as a dynamic parameter in years, seasons, days and hours, and can be defined by LFC Area.

5. THE DIMENSIONING PROCESS

- a) All TSOs in the Nordic LFC Block shall apply a common FRR dimensioning process.
- b) The dimensioning process shall be executed daily (D-2).
- c) The dimensioning process shall for each ISP determine the required FRR capacity for each LFC Area in the Nordic LFC Block.
- d) The starting point for the dimensioning of the historical imbalances is to determine how much FRR capacity each LFC Area requires without considering available transmission capacity between LFC Areas. In the next step, the actual available transmission capacity between LFC Areas is taken into account in order to determine how much the total required FRR capacity can be reduced by using available transmission capacity for aggregation of FRR capacity between LFC Areas and netting of imbalances with different directions (negative/positive).

6. SHARING OF FRR CAPACITY

- a) As the aggregation of imbalances is taken into account in the dimensioning process for the historical imbalances, only FRR capacity for dimensioning incidents may be shared.
- b) The TSOs shall aim at establishing sharing of FRR-capacity between control areas of the Nordic LFC Block, when this is in accordance with reasonable levels of operational security. Sharing between two or more control areas requires agreement by all TSOs.
- c) Each TSO shall have the right to suggest and perform sharing of FRR capacity with a TSO in an adjacent synchronous area within the objectives by SO GL and according to sharing methodologies agreed to by all TSOs.

Annex 4: Financial Incentives

1. DEFINITIONS

In this annex the definitions in the main body of the Cooperation Agreement as well as Annexes 1.a and 1.b shall apply. Terms defined in the SO GL and GL EB shall have the same meaning when used herein. In addition the following definitions shall apply:

$k\Delta f$ The frequency component of Area Control Error

PICASSO the new European automatic frequency restoration reserve platform

When used in this annex, TSO shall mean Svk, EN, FG and SN; KnÅ not having any separate balancing responsibility at the Nordic level.

2. FINANCIAL INCENTIVES FOR COMPLYING WITH RESERVE REQUIREMENTS

By the 15th of June 2018 the TSOs of the Nordic LFC Block shall develop a framework for financial incentives for complying with reserve capacity requirements. Chapters 2.1 – 2.4 constitute the starting point for this work.

2.1 Purpose of financial incentives for complying with reserve requirements

The overall purpose of the financial incentives for complying with reserve capacity requirements is to avoid systematic under-fulfilment of reserve requirement, avoid over-procurement of balancing capacity and ensure robust long-term capability incentives. The idea is to allow each TSO in the Nordic LFC Block to separately determine a sufficient volume of pre-contracted capacity FRR bids in relation to expected availability of non-contracted balancing energy bids.

2.2 The non-compliance volume

The non-compliance volume is determined at LFC Area level as the difference between the reserve capacity requirements determined in the Dimensioning process and the sum of pre-contracted and available non-contracted balancing energy bids, where exchange with neighboring LFC Areas and available cross zonal capacity is taken into account.

The point in time when non-compliance with reserve capacity requirements is determined is at the gate closure of the aFRR energy market and mFRR energy market respectively. The TSOs in the Nordic LFC Block however recognize this process as separate from the escalation procedure to be established in the LFC Block Agreement.

Non-compliance volume is an ex-post calculation performed for each FRR energy market time unit where the respective capacity market platform was in operation.

The following should also be considered:

- How to take into account available bids from neighboring areas
- How to take into account the possibility that bids could be activated prior to market gate closure, for instance in the case of disturbance
- How to handle incidents with IT disturbances affecting available bids on the platforms

2.3 The non-compliance price

The purpose of the non-compliance price is to ensure that non-compliance at LFC Area level is always more expensive than the alternative.

Non-compliance price is determined for mFRR and aFRR separately.

The non-compliance price shall equal the most expensive capacity bid that should have been activated in order to make all LFC Areas in the Nordic LFC Block compliant with the dimensioning requirements, increased by 30 percent. In a situation where there is an insufficient volume of available capacity bids for all LFC areas to be compliant with the reserve requirements, the price is set to the most expensive bid increased by 30 percent.

The percentage value (30 %) shall be evaluated one year after the entry into force of these principles. Thereafter, the percentage value shall be evaluated at least once every third year or at request from at least one TSO in the Nordic LFC Block. The evaluation criteria shall reflect the purpose of the financial incentives for complying with reserve requirements, and any adjustments of the percentage value shall be implemented to ensure compliance with the same.

In case of unforeseen incidents resulting in a severe risk of insufficient FRR capacity at LFC Area level, all TSOs in the Nordic LFC Block shall act in good faith and take coordinated actions in line with the escalation procedures.

2.4 Allocation of non-compliance fee

Non-compliance with reserve requirement results in a non-compliance fee per LFC Area and FRR energy market time unit and is calculated as a product of the non-compliance volume [MW] and the non-compliance price [EUR/MW].

The non-compliance fee shall be distributed to all TSOs in the Nordic LFC Block proportionally to the previous year annual power consumption in each control area, being understood that DK1 is not exposed to a non-compliance fee, only the consumption from DK2 will count. The non-compliance fee shall be further applied in each Control area in accordance with national methodologies and regulations (e.g. grid tariff, BRP/BSP fees). Nevertheless, the allocation shall be compliant with the overall purpose of the financial incentive for complying with reserve capacity requirements, thus not neutralizing the effect of the same and promote long term incentives for balancing capability.

3. FINANCIAL INCENTIVES FOR MAINTAINING ACE QUALITY

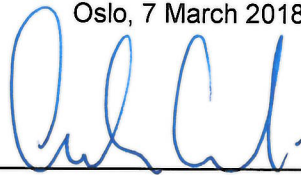
- A. By the 15th of June 2018 the TSOs of the Nordic LFC Block shall develop a framework for financial settlement of ACE, $k\Delta f$ and ramping. The framework shall include at least:
- a) Proposals for:
 - i. Settlement period for ACE equal to or shorter than 5 minutes
 - ii. Settlement period for $k\Delta f$ equal to or shorter than 5 minutes
 - iii. Reference price for ACE
 - iv. Reference price for $k\Delta f$
 - v. Ramping period and pricing method of ramping energy
 - vi. Accounting and settlement entity
 - b) Considerations and proposals on separate or combined settlement of ACE and $k\Delta f$ and whether the price shall be dependent on the deviation from the nominal values of $k\Delta f$ and ACE.
 - c) High level description of:
 - i. The accounting and settlement process
 - ii. The accounting and settlement platform functionality
 - iii. High level requirements on metering data and data collection
- B. The settlement of $k\Delta f$ (energy) shall be consistent with a future Nordic FCR capacity market.
- C. The framework shall promote robust but not unproportioned or adverse financial incentives for the TSOs to ensure an ACE quality in line with the FRCE target parameters stipulated in the LFC Block Agreement.
- D. The framework shall be based on the following definitions:
- a) Unintended exchange of energy as a result of ACE deviating from 0 integrated over a predetermined settlement period and corrected with PICASSO FRCE adjustment factor, referred to as 'settlement of ACE'.
 - b) Intended exchange of energy as a result of the frequency deviating from the nominal value of 50 Hz, referred to as 'settlement of $k\Delta f$ '
 - c) Intended exchange of energy as a result of a predefined ramp in the exchange schedule, referred to as 'settlement of Ramping'
- E. The framework shall be developed by the synchronous area working group that is assigned to propose methodologies pursuant to GL EB, article 50.3 and article 51.1. It shall also be used as a baseline in the methodology proposals pursuant to GL EB article 50.4 and 51.2 in order to warrant consistency between related methodologies.

POWER OF ATTORNEY

I hereby authorize Mr Øivind Rue to enter into and sign, on behalf of Statnett SF, the Cooperation Agreement relating to Nordic balancing cooperation, with Affärsverket Svenska Kraftnät, Energinet, Fingrid Oyj and Kraftnät Åland Ab, as well as any other agreement or document relating thereto which he deems necessary or appropriate.

This Power of Attorney shall expire on 30 March 2018.

Oslo, 7 March 2018



Auke Lont
President & CEO