ENERGINET FINGRID Statnett SVENSKA KRAFTNÄT

NORDIC ENERGY MARKET DOMAIN MODEL

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1 INTRODUCTION

1.1 Background

Today the actors in the Nordic energy market exchange messages based on several different formats and standards, such as EDIFACT (DELFOR, MSCONS etc.), ENTSO-E, ebIX® and Excel documents. In addition, there are communications towards other European countries, such as Germany, the Netherlands and Poland, using even more standards.

For efficiency reasons the four Nordic TSOs have established the Nordic Market Expert Group (NMEG), with the intent to harmonise the message exchanges in the Nordic countries. NMEG is run as a Nordic working group. The aim is to define message exchange models, implementation support and implementable formats that can be used for all message exchanges between the actors in the Nordic energy market.

This document is made by NMEG and shows a Nordic Energy Market Domain model, giving an overall overview of the structure and processes used in the Nordic Energy Market. Many of the *Business Areas* shown in this document are further elaborated in a series of *Business Requirement Specifications*. These BRSs are based on implementation guides and BRSs from ENTSO-E [1], IEC and ebIX® [2], and the ebIX®, EFET and ENTSO-E Harmonised role model [3].

1.2 NMEG

The document is written by NMEG (Nordic Market Expert Group), from members, see www.ediel.org.

1.3 References

[1] ENTSO-E implementation guides, see ENTSO-E Electronic Data Interchange (EDI) Library
[2] ebIX® BRSs, see http://www.ebix.org/
[3] The Harmonised Role Model, ENTSO-E, ebIX® and EFET, see The Harmonised Role Model, ENTSO-E, ebIX® and EFET
[4] UN/CEFACT Unified Modelling Methodology (UMM), see UN/CEFACT Unified Modelling Methodology (UMM)
[5] Nordic BRSs, see www.ediel.org

1.4 Change log

Ver/rel/rev	Changed by	Date	Changes
1.2.A	ove.nesvik@edisys.no	20220908	Updated of role and domain names, such as: • Replaced Market Balance Area with Scheduling Area or Bidding Zone several places. • Replaced Balance Supplier with Energy Supplier.
1.1.A	ove.nesvik@edisys.no	20170704	General update of layout and text with changes to NEG BRSs after publication of version 1.0.A.
1.0.A	ove.nesvik@edisys.no	20100215	First official version.

2 Overview of Business areas in the Nordic energy market

This chapter gives a brief overview of the structure of the Nordic Energy market.

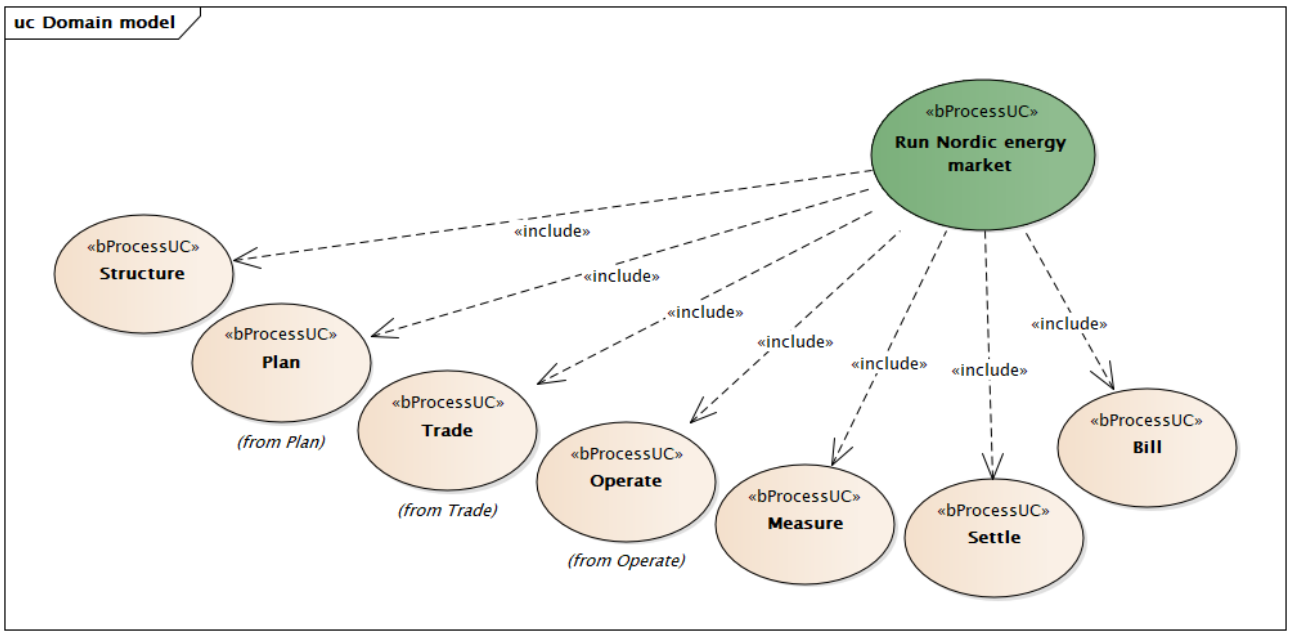

Figure 1: Overview of the Nordic Energy market

The top-level structure of the Nordic Energy market as shown in *Figure 1* is based on the ebIX® Energy market domain model [2]. The domain model splits the market into phases that logically occur in a timeline, however with some overlaps. An example of overlap is the business area *Plan*, where parts of the input to the *Balance settlement* are generated.

2.1 Structure

In the structuring phase the actors exchange information (master data) necessary for the later business processes. The different parties request creation of, changes to or deletion of energy market business objects, such as Metering Points, Meters, Contracts etc., or to its attributes. Thereafter the information related to the created, changed or deleted business object or its attributes is exchanged between relevant parties (roles). The alignment of master data between the actors in the energy market should result in all participants having the needed information to fulfil their obligations to the market.

Currently the processes used in the structuring phase in the Nordic market are defined on national bases, however based on common Nordic Ediel implementation guides and ebIX® BRSs [2].

2.2 Plan

The messages used in the planning phase enable Balance Responsible Parties (i.e. trade responsible, production responsible and consumption responsible parties) to send their schedules (planned consumption, production, capacity, transport, exchange etc.) to the System Operators and/or the Transmission Capacity Allocators, for congestion management, the day ahead. The messages may also be used for the transmission of intraday schedules associated with day-ahead schedules and for prognosis and ancillary services (reserve resources).

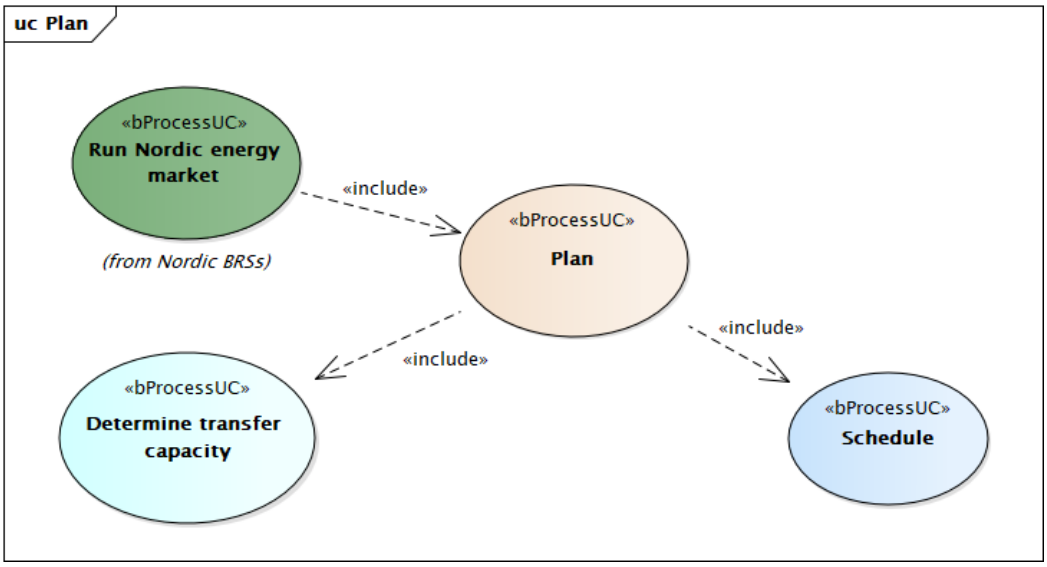

Figure 2: UseCase diagram: The Nordic planning process

The “Determine transfer capacity process” and the “Scheduling process” are documented in a separate BRSs, see [5].

The process area Plan concerns principally schedules and prognosis supplied by the different Balance Responsible Parties and the System Operator for a given Scheduling Area or a group of Scheduling Areas. It also deals with the exchange of schedules between two Scheduling Areas via System Operators and the Market Information Aggregator. Some of the resulting schedules are afterwards sent to the Imbalance Settlement Responsible after validation, to be used in the Settlement process. Furthermore, the planning phase, include exchanges related to Reserve resources and Publication of outages.

2.3 Trade

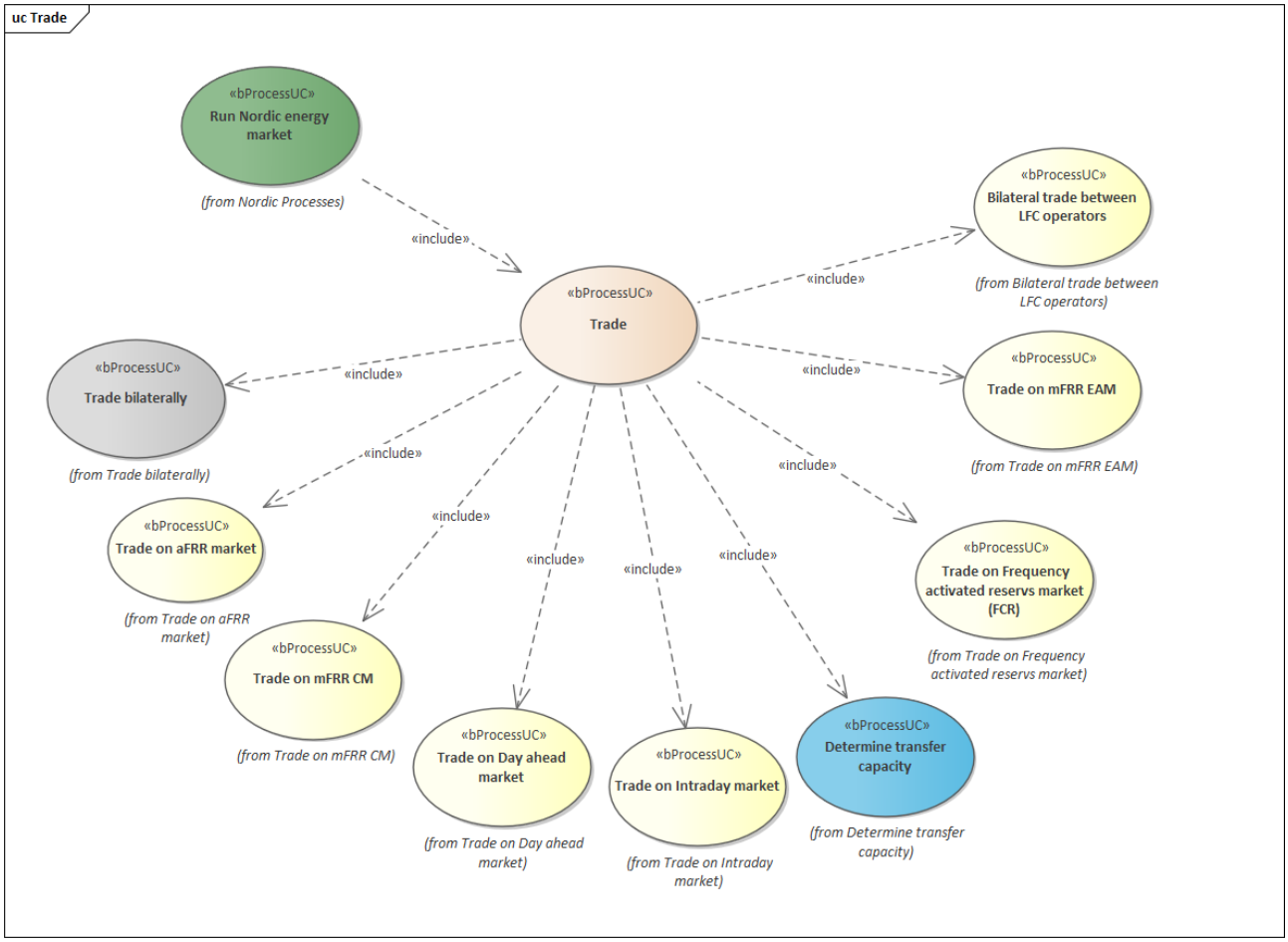

Figure 3: UseCase diagram: The Nordic trading system process

In the Trading phase, the Balance Responsible Parties (or actors having a contract with a Balance Responsible Party) are buying and selling energy for fulfilling their contractual obligations. The Trading phase includes trade through the Market Operators (power exchanges).

Bilateral trade is restricted to a given Bidding Zone, while trade on the Day-ahead, Adjustment and mFRR EAM markets may be between Bidding Zones, i.e. through the Market Operators, System Operators or between System Operators.

The mFRR CM is a tool to ensure enough fast reserves for the mFRR EAM, especially during wintertime when the load is high. The market is based on weekly contracts. There is no common mFRR CM within the Nordic power system and currently only used in Denmark and Norway.

The Frequency Activated Reserves Market is a market that is weekly, daily and hourly based. In addition to national markets, the Frequency Activated Reserves are traded between the Nordic TSOs on a bilateral basis.

2.4 Operate

The business process operate includes the message exchanges to handle the mFRR EAM, e.g. the System Operator orders up and down regulation to keep the balance in the system. Examples of processes are Bids from Producers or Traders to the System Operator for the mFRR EAM, and the processes of ordering up and down regulation to the Producers or orders to the Grid Operators for disconnecting “flexible installations”.

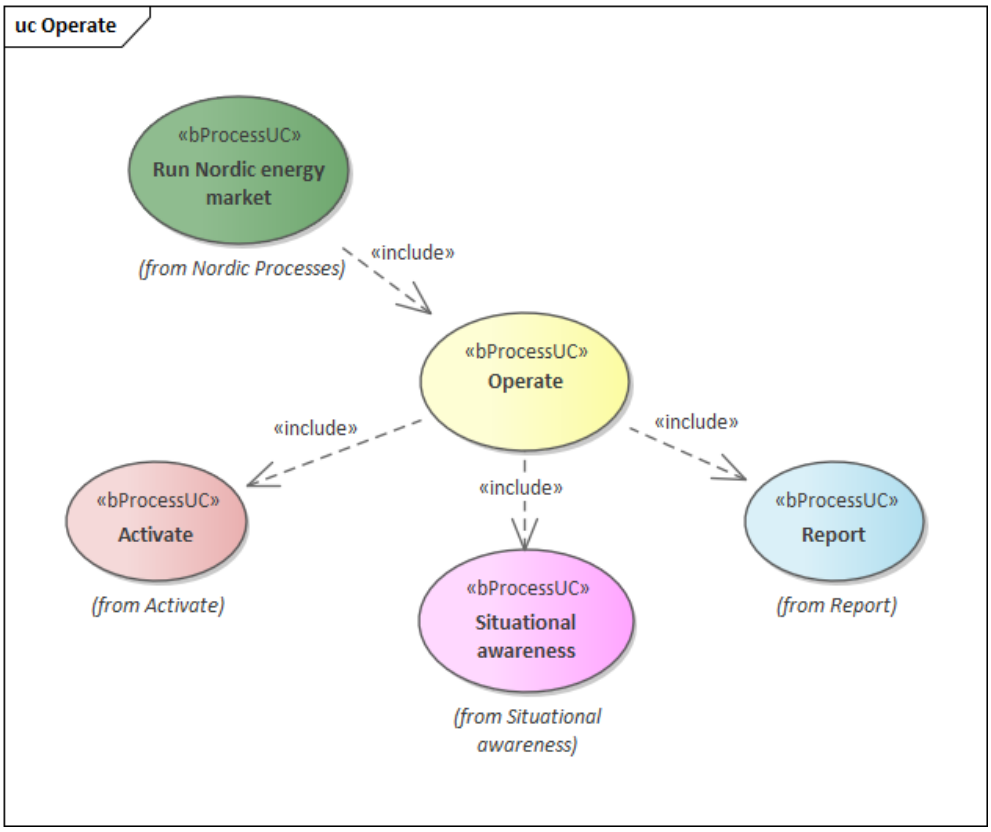

Figure 4: UseCase diagram: The Nordic operational system process

The *Business Area Operate* outlined in *Figure 4*, concerns principally the activation and the Situational awareness process, and after the operational day, reporting to concerned parties. The activation process is a part of the mFRR EAM. An activation is always within a Bidding Zone. The Situational awareness process, the System Operator informs the Market Information Aggregator (NBM) of real-time Area Control Error Open Loop (ACE OL) Point Values.

2.5 Measure

The Measure phase (Exchange of metered data) covers all stages from the collecting of the metered data until the settlement and reconciliation phase, with a focus on the exchange of information between Metered Data Collectors, Metered Data Aggregators, Imbalance Settlement Responsible and Balance Responsible Parties. e.g. the Metered Data Collectors read Registers (within Meters) and distribute metered data (transport, production, consumption). Thereafter the metered data are validated, aggregated and distributed to relevant roles.

Currently the processes used in the measuring phase in the Nordic market are defined on national bases, however based on common Nordic Ediel implementation guides and ebIX® BRSs [2].

2.6 Settle

The messages defined in this phase enable Imbalance Settlement Responsible Parties to receive aggregated executed schedules, regulation- and metered information, and to send imbalance reports and bills (invoices) to the Balance Responsible Parties (consumption, production, capacity, etc.). The Reconciliation Responsible Party makes the final reconciliation and distributes data to relevant roles.

The core imbalance settlement activity takes place once the operational phase is completed. However, there are some preceding processes run before operation, such as exchange of Load Profile Shares (LPS) and exchange of traded volumes, both at the Market Operator and bilaterally. The imbalance settlement is composed of three basic activities:

- The first activity receives all the schedules agreed and regulation data that has been required for balancing the area.
- The second activity recuperates the measured values of the delivered products, for each continuous metered Metering Point and settles the imbalance in the mFRR EAM.
- The final activity reconciles the values for the profile-metered Metering Points, identifies the imbalances and establishes the imbalance settlement amounts, thus requiring pricing information.

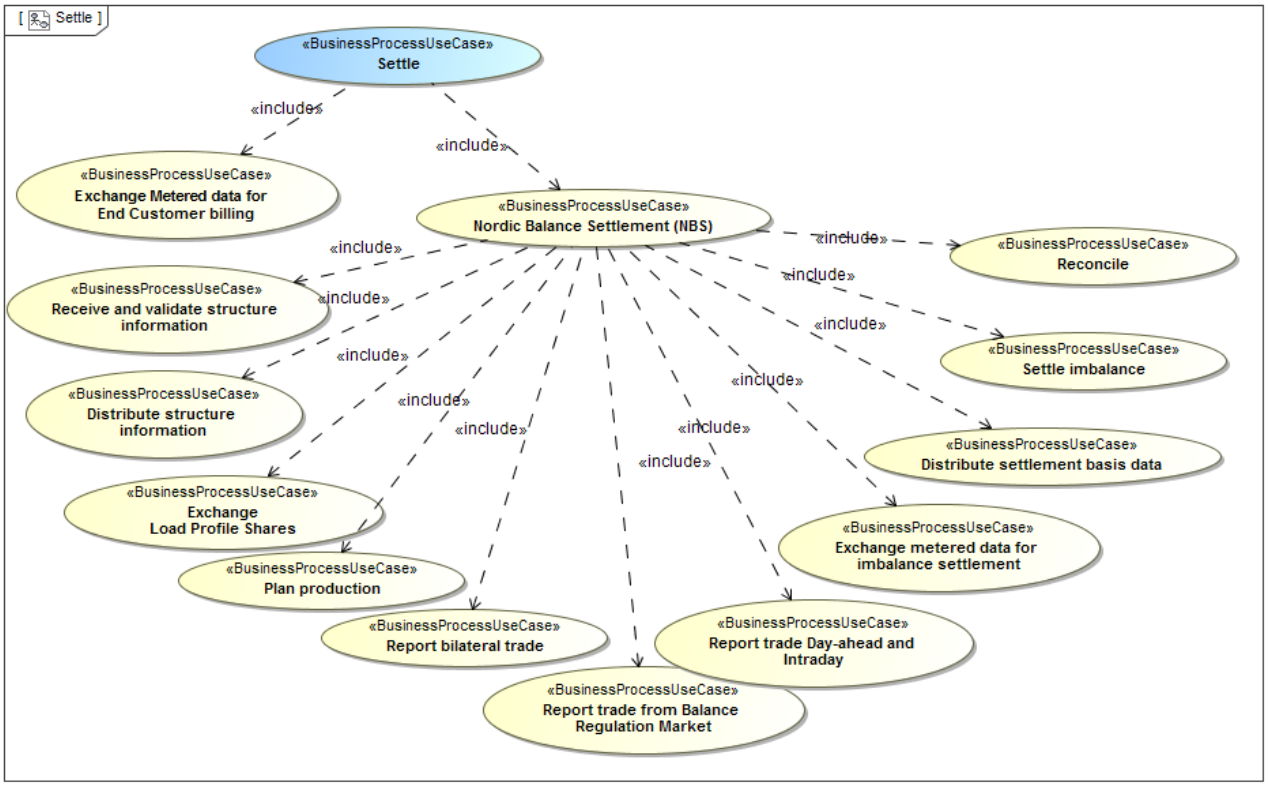

Figure 5: UseCase diagram: Breakdown of the settlement phase

The settlement phase, outlined in *Figure 5*, describes the principal UseCases of the Nordic Balance Settlement system.

The roles that take part in the imbalance settlement process are:

- *Balance Responsible Party*, who receives the settlement information on both Metering Point- and aggregated level for invoicing of the Energy Suppliers.
- *Energy Supplier*, who receives the settlement information on a Metering Point level for invoicing of the Parties connected to grid (Consumers and Producers).
- *Billing Agent*, who invoices the Balance Responsible Parties.
- *Market Operator*, who supplies the Imbalance Settlement Responsible with the result of the trade on the day-ahead and intraday markets.
- *Imbalance Settlement Responsible*, who establishes the imbalance (quantities and amounts).

- *Metered Data Aggregator*, who provides aggregated metered information. The Metered Data Aggregator may have Local Metered Data Aggregators that provide initial aggregated input for consolidation and validation before being sent to the Imbalance Settlement Responsible.
- *Reconciliation Accountable*, who is paying for the imbalances from the reconciliation process.
- *Reconciliation Responsible*, who is calculating the reconciliation settlement (second settlement).
- *System Operator*, who provides the finalised schedule information and regulation data.
- *Trader,* who buys and sells electricity, either on an electricity exchange or by bilateral contracts. Opposite to a Trade Responsible Party, a trader does not necessarily have to be a Balance Responsible Party. A Trader must however have a contract with a Balance Responsible Party, which provides financial security and identifies balance responsibility with the Imbalance Settlement Responsible of the Bidding Zone, entitling the party to operate in the market.

The basic data that is required for imbalance settlement includes the following:

- Finalised schedules that originate at the last stage of the ENTSO-E Scheduling process and could be day ahead or intraday schedules.
- Aggregated metered values for each Balance Responsible Party and area (Metering Grid Area or Bidding Zone). These consist of values for each schedule interval (60 minutes) for the complete accounting settlement period.
- Regulation data, such as ancillary services. These are established by the System Operator and consist of time series information used in the imbalance settlement.
- Settlement pricing information.

The DSO will send metered data, acting in the role of Metered Data Responsible and Metered Data Aggregator, to the Imbalance Settlement Responsible. The Imbalance Settlement Responsible is then in position to conduct the balance settlement.

The System Operator sends activated reserves (volume and amounts) to the Imbalance Settlement Responsible.

The Imbalance Settlement Responsible will conduct a limited QA of received metered data and calculate the imbalance settlement using Nordic harmonised rules. Data will thereafter be made available for the Balance Responsible Parties, either through messages or through a web-application, on an aggregated level.