

# BRS

(Business Requirement Specification)

For

**Nordic Balance Settlement**

**A market model for data exchange between  
eSett and TSOs/Market Operators**

**Business process:** Nordic Balance Settlement for  
TSOs and Market Operators

**Version:** 2.0.C

**Status:** For implementation

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## 1 Introduction

### 1.1 Background

The Nordic Balance Settlement (NBS) project has completed the design phase and the regulators of Finland, Norway and Sweden has decided to support the implementation of NBS, thus the NBS project has entered the implementation phase.

As part of preparation for implementation, eSett has asked the Nordic Ediel Group (NEG) to come up with a detailed requirement specification for the NBS processes. This document is a Business Requirement Specification (BRS) for the Nordic Balancing System, made by a project group with participants from eSett (TSOs) and NTC (NEG Technical Committee). The project is run as a Nordic project with the Nordic Ediel Group (NEG) as the steering group.

This document is a Business Requirement Specification (BRS) for the Nordic Balancing System, detailing the document exchanges. The basis for the document was the NBS Final Design Report from December 22<sup>nd</sup> 2011. The focus of the document is the business aspects of the document exchanges and the basis for the document to be exchanged are the ENTSO-E and ebIX<sup>®</sup> Implementation Guides and BRSs, see [1] and [2]. In addition the Harmonised Electricity Market Role Model from ENTSO-E, ebIX<sup>®</sup> and EFET, see [3], is used for identifying the relevant roles used in the BRS.

### 1.2 Nordic Energy Domain Model

A Nordic Energy market Domain model, giving an overall overview of the structure and processes used in the Nordic Energy market, can be found in [6].

### 1.3 Project organisation

The project is organised as a project group within the Nordic Ediel Group, with the following members at the time of publication:

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### 1.4 Terms and notations used in this BRS

Documents are described by a class diagram showing the full set of attributes in the related xml schema. In addition the usage of the document is described by one or more tables detailing the usage of each attribute. Optional attributes from the class diagram, not used in the specific data exchange, are omitted from the table.

### 1.5 References

- [1] ENTSO-E implementation guides, see <https://www.entsoe.eu/publications/electronic-data-interchange-edl-library/work%20products/Pages/default.aspx>, e.g.:
  - ENTSO-E Modelling Methodology (EMM)
  - ENTSO-E UCTE SO-SO Process
  - ENTSO-E Scheduling System, ESS
  - ENTSO-E Settlement Process, ESP
  - ENTSO-E Reserve Resource Planning, ERRP
  - ENTSO-E Capacity Allocation and Nomination System, ECAN
  - ENTSO-E Status Report, ESR
  - ENTSO-E Acknowledgement process
- [2] ebIX® Business Requirement Specifications, see <http://www.ebix.org/>
- [3] The Harmonised Role Model, ENTSO-E, ebIX® and EFET, see <http://www.ebix.org/>
- [4] UN/CEFACT Unified Modelling Methodology (UMM), see <http://umm-dev.org/>
- [5] Ediel Implementation guides, see <http://www.ediel.org/>
- [6] Nordic Energy Market Domain Model, see <http://www.ediel.org/>
- [7] BRS for Nordic trading system, will be published at <http://www.ediel.org/>
- [8] BRS for Nordic Scheduling and Ancillary Services process, see <http://www.ediel.org/>
- [9] BRS for Nordic Balancing System (for the retail market), see <http://www.ediel.org/>
- [10] Common Nordic XML rules and recommendations, see <http://www.ediel.org/>
- [11] NBS Design report, see <http://www.nbs.coop/sites/default/files/materials/NBS%20Final%20Design%20report.pdf>
- [12] NBS Handbook, see <http://www.nbs.coop/>
- [13] BRS for Nordic Balance Settlement, Exchange of Master Data, see <http://www.ediel.org/>

### 1.6 Change log

Ver/rel/rev	Changed by	Date	Changes
2.0.C	Ove Nesvik	20170505	<ul style="list-style-type: none"> <li>• Removed Nord Pool logo on the front page</li> <li>• Update of sequence diagram in Figure 4, including:                             <ul style="list-style-type: none"> <li>○ Removal of arrow 7, 8 and 9; Documented in BRS for Schedules</li> <li>○ Removal of arrow 10 (not used)</li> <li>○ Removal of arrow 4 and 5; documented in BRS for Trade</li> <li>○ Removal of arrow 7, 8 and 9; documented in BRS for Schedules</li> </ul> </li> <li>• Update of Figure 11:                             <ul style="list-style-type: none"> <li>○ Removal of “Flow [In Sweden]”</li> </ul> </li> <li>• Update of Figure 13:                             <ul style="list-style-type: none"> <li>○ Removal of “Flow [Only in Sweden]”</li> </ul> </li> <li>• Addition of clarifying text related to Business Type B24 and B25; reporting of sales and purchases is seen from the Imbalance Settlement Responsible (not the BRP).</li> </ul>
2.0.B	Ove Nesvik	20170213	<ul style="list-style-type: none"> <li>• Updated logos on the front page</li> </ul>

			<ul style="list-style-type: none"> <li>Replaced Nord Pool and NPS with Market Operator</li> <li>Replaced Elspot with Day-ahead</li> <li>Replaced Elbas with Intraday</li> <li>Updated NTC and NEG member list</li> <li>Renamed Svenska Kraftnät to Svenska kraftnät</li> <li>Removed arrow 6 and 7 in the sequence diagram for NBS Metering and settlement phase, and added a note to new arrow 7 and 8 “only used in Sweden”</li> <li>Corrected the usage of time zones for settlement structure in chapter 5.7.2.1</li> </ul>
2.0.A	Ove Nesvik	20161121	The status of the document is changed from “For test implementation” to “For implementation”.
1.6.C	Ove Nesvik	20161014	Error correction: The sequence of the elements in the “Schedule Document” part of the paragraph “5.1.3 Attribute usage: ENTSO-E ESS Schedule document, Elspot/Elbas trade” is changed, so that “Domain” is before “Subject Party”.
1.6.B	Ove Nesvik	20160905	NEG ERRP Reserve Allocation Result Document: <ul style="list-style-type: none"> <li>Process Type is set to [1]</li> <li>The related dependency matrix is extended with a Process Type</li> </ul>
1.6.A	Ove Nesvik	20160531	<ul style="list-style-type: none"> <li>ENTSO-E ESS Schedule document, Elspot/Elbas trade: <ul style="list-style-type: none"> <li>Addition of clarifying text for Capacity Agreement Identification</li> <li>Removal of “Portfolio ID”</li> <li>Addition of Subject Party in the header level (currently not used)</li> <li>Addition of Trader (optional) in the In Party.</li> <li>Removal of Out Area (same as In area)</li> <li>Removal of Out Party (Market Operator)</li> <li>The term “Trader ID” is renamed to “Retailer ID” for InParty.</li> </ul> </li> <li>NEG ECAN Publication Document <ul style="list-style-type: none"> <li>Changed cardinality for Price to [0..1]</li> <li>Removed Business Type “<b>A87</b>, Balancing energy price”</li> </ul> </li> <li>Chapter 5.1.4 “Attribute usage: ENTSO-E ESS Schedule document, Elspot/Elbas flow”: <ul style="list-style-type: none"> <li>Flows will be always reported with positive values</li> </ul> </li> <li>NEG ERRP Reserve Allocation Result Document: <ul style="list-style-type: none"> <li>Addition of clarifying text regarding usage of Settlement Amount</li> <li>Tendering party for Reason Code <b>Z38</b> is corrected to be BRP (only used in Finland)</li> <li>Reserve Object is corrected to N/A for Reason Code <b>Z22</b></li> <li>Addition of clarifying text regarding updates and usage of Settlement Amount</li> <li>Correction of spelling errors</li> </ul> </li> <li>Addition of a new chapter 7 Technical Business Rules</li> </ul>
1.5.C	Ove Nesvik	20151027	<ul style="list-style-type: none"> <li>Addition of clarifying text and error corrections</li> </ul>

1.5.B	Ove Nesvik	20151002	<ul style="list-style-type: none"> <li>• Correction of Reason codes in NEG ERRP Reserve Allocation Result Document</li> <li>• Correction of spelling errors, such as: <ul style="list-style-type: none"> <li>○ Correction to “2-13 calendar days” in Figure 5</li> </ul> </li> </ul>
1.5.A	Ove Nesvik	20150923	<ul style="list-style-type: none"> <li>• Measure Unit Energy Price is removed from “NEG ERRP Reserve Allocation Result Document”</li> <li>• Removal of arrow 8 (Confirmation of BRPs and Traders trade in Elspot and Elbas) from figure 4 (Sequence diagram: The NBS scheduling phase)</li> <li>• Removal of NEG addition of Curve Type in Planned resource schedule document (no consequence for NBS messaging)</li> <li>• Addition of clarifying text and error corrections</li> </ul>
1.4.B	Ove Nesvik	20150421	<ul style="list-style-type: none"> <li>• Addition of clarifying text</li> </ul>
1.4.A	Ove Nesvik	20150123	<ul style="list-style-type: none"> <li>• Update of description of content of areas, parties and quantity in ESS Schedule document for bilateral trade</li> <li>• Update of references</li> <li>• The term “master data” is used instead of “structure information” where applicable.</li> <li>• NBS is renamed to Imbalance Settlement Responsible (ISR) or eSett, when used as a role.</li> </ul>
1.3.B	Ove Nesvik	20141205	<ul style="list-style-type: none"> <li>• Update the harmonised roles in chapter 3, i.e. addition of Metering Point Administrator</li> </ul>
1.3.A	Ove Nesvik	20141017	<ul style="list-style-type: none"> <li>• Document status is changed to “For test implementation”</li> <li>• Alignment of chapter “2, Overview of the Nordic energy market domain” with [9]</li> <li>• NEG ERRP Reserve Allocation Result Document: <ul style="list-style-type: none"> <li>○ Addition of reason codes: <ul style="list-style-type: none"> <li><b>Z29</b> FCR</li> <li><b>Z30</b> FRR-A</li> <li><b>Z31</b> FRR-M, Balancing Power</li> <li><b>Z32</b> FRR-M, Countertrades</li> <li><b>Z33</b> FRR-M, Peak Load Reserve Regulation</li> <li><b>Z34</b> FRR-M, Quarter regulation</li> <li><b>Z35</b> FRR-M, Special Regulation</li> <li><b>Z36</b> Hour Change Regulation</li> <li><b>Z37</b> Power Transaction</li> <li><b>Z38</b> TSO Internal Countertrades</li> <li><b>Z39</b> Day Ahead Production Adjustment</li> </ul> </li> <li>○ Reason (Reserve allocation result Time Series Level) is changed from optional [0..1] to Required [1]</li> </ul> </li> <li>• Addition of Portfolio ID in ENTSO-E ESS Schedule document, Elspot/Elbas trade</li> <li>• Textual clarifications</li> <li>• Updated Business Type codes: <ul style="list-style-type: none"> <li><b>Z55 -&gt; B20</b> Balance up regulation price</li> <li><b>Z56 -&gt; B21</b> Balance down regulation price</li> <li><b>Z57 -&gt; B22</b> Main direction</li> <li><b>Z58 -&gt; B23</b> Consumption imbalance price</li> <li><b>Z59 -&gt; B24</b> Production sales imbalance price</li> <li><b>Z60 -&gt; B25</b> Production purchase imbalance price</li> </ul> </li> </ul>

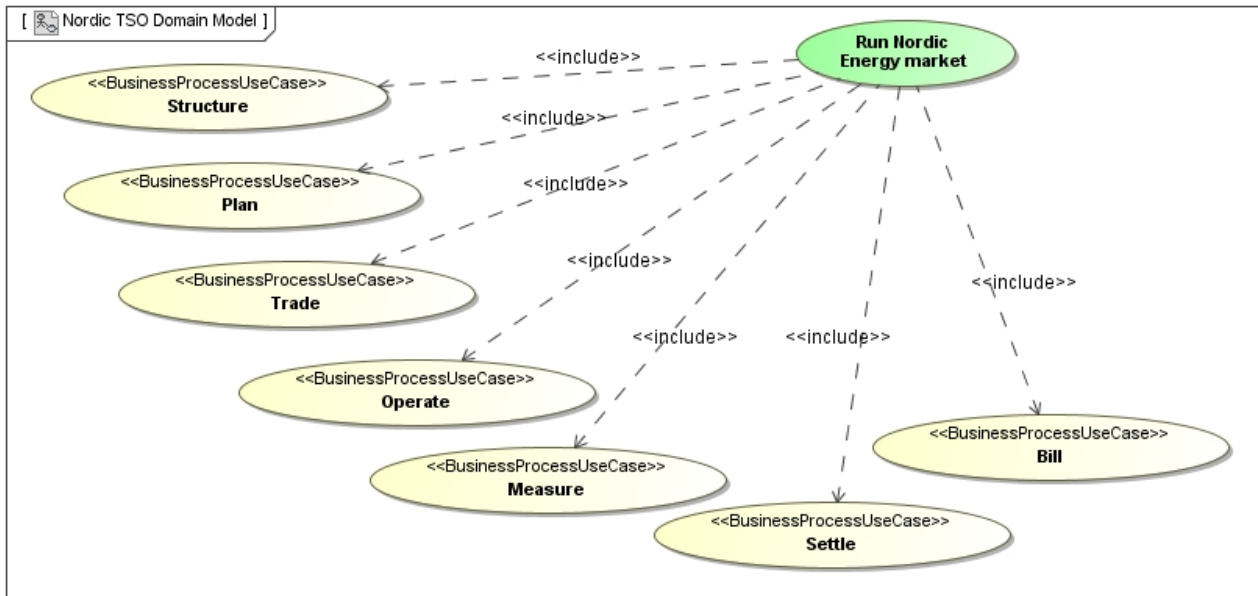
			<b>Z61 -&gt; B26</b> Average balance price between MBAs (Renamed to “MBAs prices between Market Balance Areas”)
1.2.C	Ove Nesvik	20140422	<ul style="list-style-type: none"> <li>Textual corrections (clarifications)</li> </ul>
1.2.B	Ove Nesvik	20140418	<ul style="list-style-type: none"> <li>Textual corrections (clarifications)</li> </ul>
1.2.A	Ove Nesvik	20140411	<ul style="list-style-type: none"> <li>Addition of new Business types in EPD document: <ul style="list-style-type: none"> <li><b>Z55</b> Balance up regulation price</li> <li><b>Z56</b> Balance down regulation price</li> <li><b>Z57</b> Main direction</li> <li><b>Z58</b> Consumption imbalance price</li> <li><b>Z59</b> Production sales imbalance price</li> <li><b>Z60</b> Production purchase imbalance price</li> <li><b>Z61</b> Middle balance price between MBAs</li> </ul> </li> <li>Addition of Direction in the Interval class in the EPD document</li> <li>Correction of relations in “<b>Figure 7</b>: Outline of the Harmonised role model within the scope of NBS settlement system”</li> <li>Addition of NBS acknowledgement principles</li> <li>Restriction of <i>Resolution Duration</i> to always cower one hour</li> <li>Addition of <i>Unit type</i> MWh</li> <li>Restriction of <i>Energy Quantity</i> to max Watt resolution</li> </ul>
1.1.D	Ove Nesvik	20140117	<ul style="list-style-type: none"> <li>Addition of clarifying text and error corrections</li> </ul>
1.1.C	Ove Nesvik	20131201	<ul style="list-style-type: none"> <li>Time frame for exchange of data for imbalance settlement will is corrected to <b>2 - 13 days</b></li> <li>Addition of a new arrow 23, Confirmation of production plans, in the sequence diagram for the Scheduling phase</li> <li>Updated acknowledgement process in chapter 5</li> <li>Addition of clarifying text and corrections of spelling errors</li> </ul>
1.1.B	Ove Nesvik	20131108	<ul style="list-style-type: none"> <li>Corrections of spelling errors</li> </ul>
1.1.A	Ove Nesvik	20131108	<ul style="list-style-type: none"> <li>Update of links to other documents in the sequence diagrams</li> <li>Error corrections, such as: <ul style="list-style-type: none"> <li>Rename of <b>ebix®</b>, <i>Confirmation of Aggregated Data per Neighbouring Grid For Settlement Responsible to <b>NEG</b></i>, <i>Confirmation of Aggregated Data per Neighbouring Grid For Settlement Responsible</i></li> <li>Rename of code E?? to Z08</li> </ul> </li> </ul>
1.0.A	Ove Nesvik	20130906	<ul style="list-style-type: none"> <li>First approved version for review and comments</li> </ul>



## 2 Overview of the Nordic energy market domain

### 2.1 Settlement in the overall context (Domain model)

The *Domain model* describes the main business process areas needed to have a well-functioning energy market. The model is important for having a common and agreed understanding on how the energy market works as a basis for development of common methods for exchange of information.



**Figure 1:** UseCase diagram: ebIX® Energy Market Domain Model

The domain model of the energy market covers all stages from the structuring of the market until the settlement and billing of consumption and transport of energy, with a focus on the exchange of information:

- Exchange of master data including the Change of Supplier processes
- Planning of production, consumption, exchange and transport
- Trade on different markets, including ancillary services, bilateral trade, etc.
- Operation
- Measuring of production, consumption, exchange and transport
- Settlement
- Billing

The Nordic Settlement System process includes parts of the process areas Trade and Plan.

For a more elaborated description of the processes included in the domain model, see [6].

## 2.2 Breakdown of the settlement phase

In the rest of this document, the processes related to the Nordic Balancing System, with a focus on the *Business area (UseCase) Settle*, is further elaborated.

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 power exchange 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 balance regulation market.
- 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.

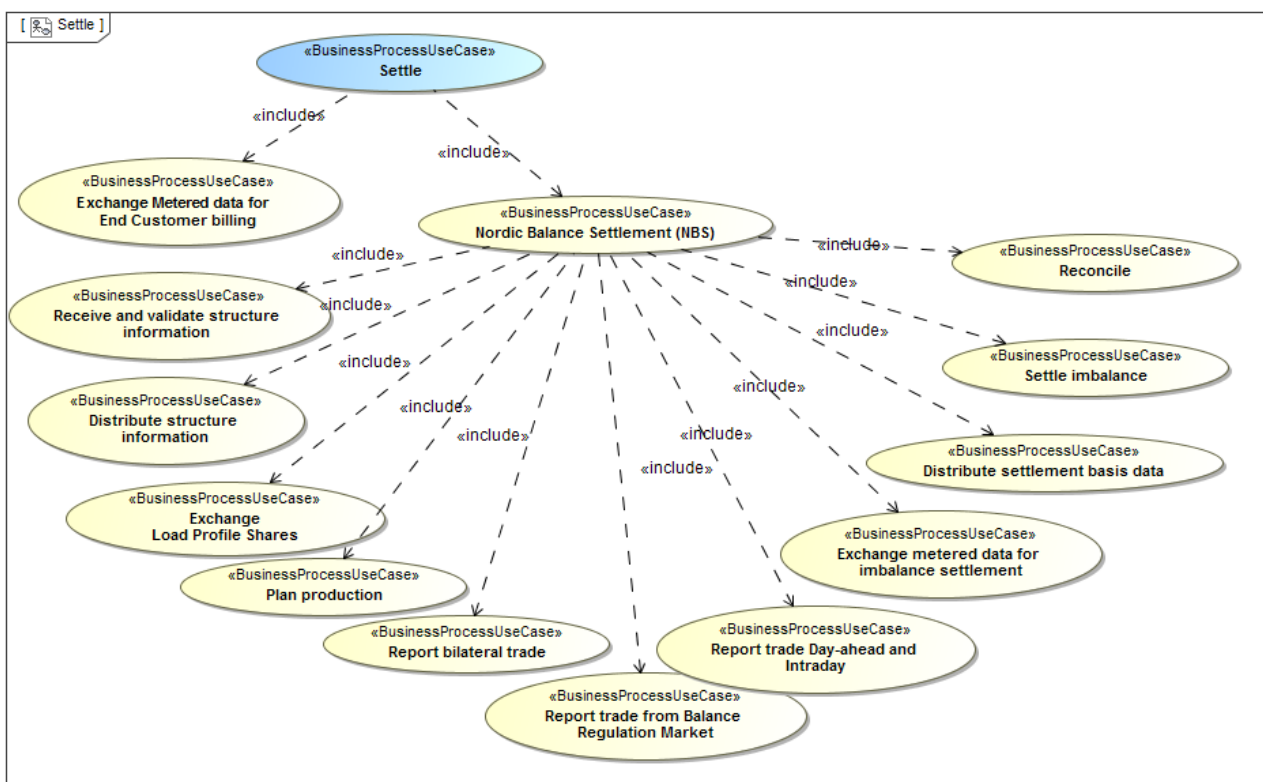


Figure 2: UseCase diagram: Breakdown of the settlement phase

The settlement phase, outlined in Figure 2, 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 Balance Suppliers.
- *Balance 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 (Power exchange)*, who supplies the Imbalance Settlement Responsible with the result of the trade on the day-ahead and intraday markets.

## Nordic settlement system for data exchange between eSett and TSOs/Market Operators

- *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 Market Balance Area, entitling the party to operate in the market.

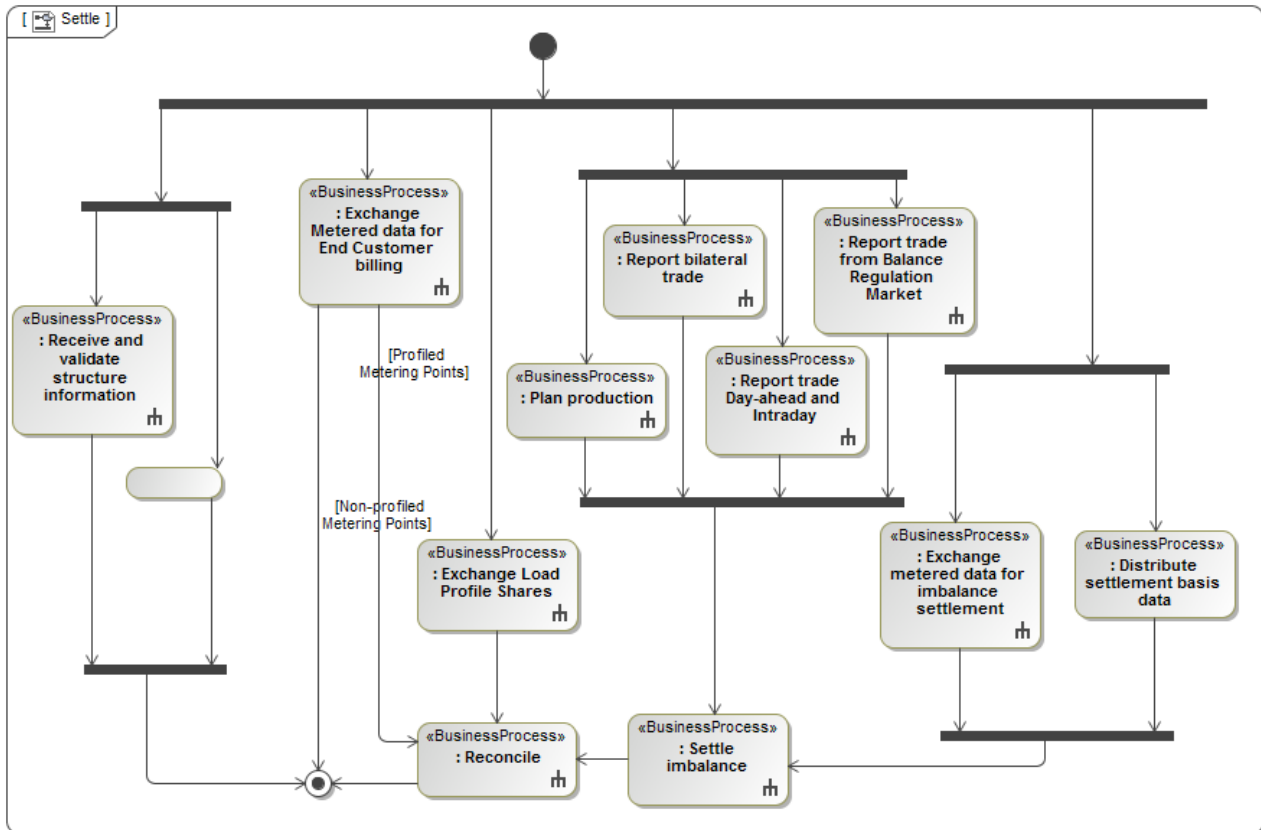
The basic data that is required for imbalance settlement includes the following:

- 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 Market Balance Area). 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 the day after the delivery day, 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.

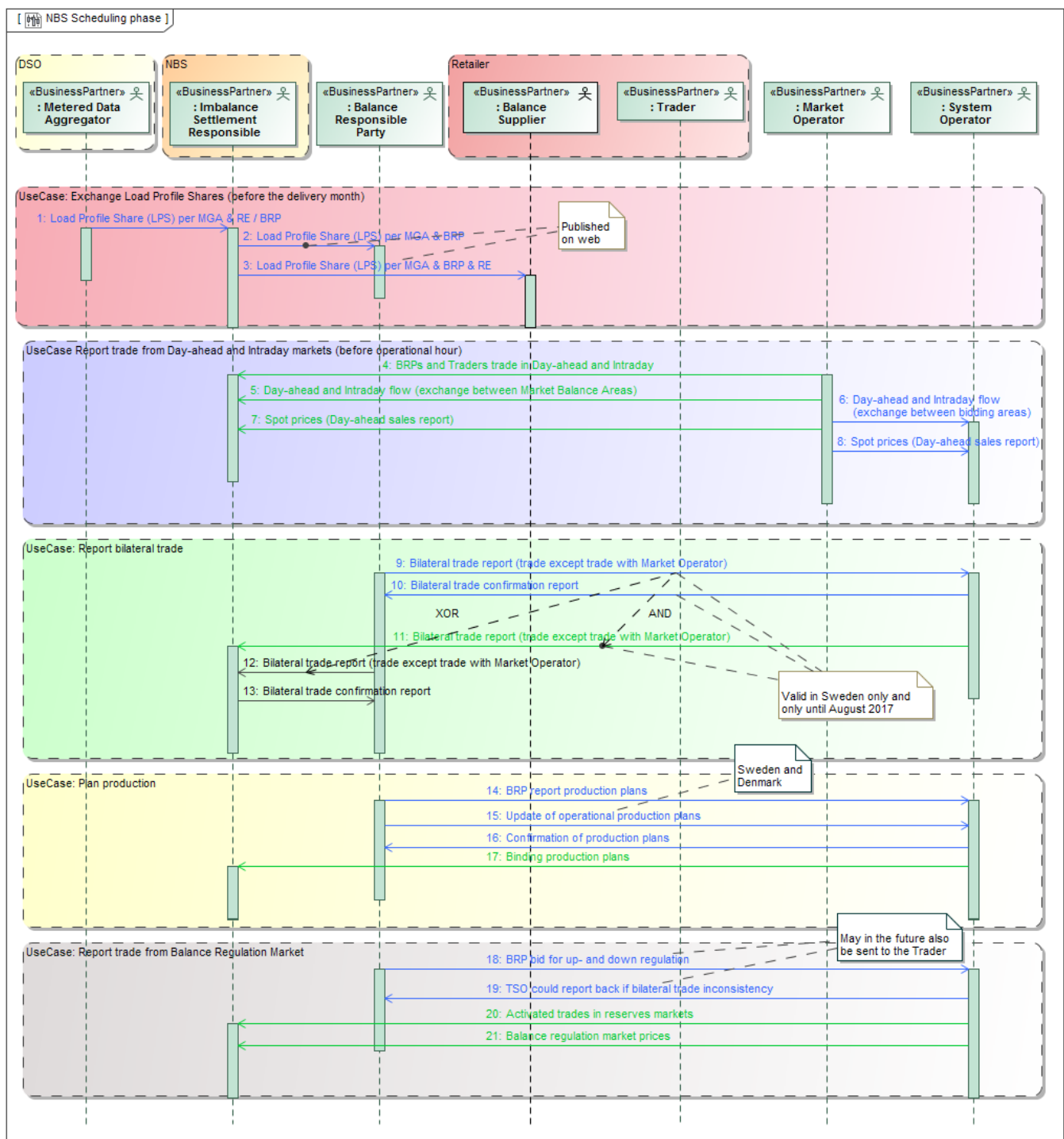
The *System Operator* sends activated reserves (volume and amounts) to the *Imbalance Settlement Responsible*.

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.



**Figure 3** Activity diagram: The Nordic Settlement process

## 2.3 Overview of information exchange for the NBS scheduling phase



**Figure 4** Sequence diagram: The NBS scheduling phase

### Comments to the diagram:

- Only documents exchanged between eSett, and TSOs and Market Operators, i.e. only documents (arrows) with green colour, is further elaborated in this document.

## Nordic settlement system for data exchange between eSett and TSOs/Market Operators

NBS document	Roles	Identified object(s)	Documentation
<b>Before the delivery month</b>			
1. Load Profile Share (LPS) per MGA & RE / BRP			Not handled in the first version of a common Nordic Balance Settlement.
2. Load Profile Share (LPS) per MGA & BRP			Only published on web
3. Load Profile Share (LPS) per MGA & RE			Only published on web
<b>Before gate closure</b>			
4. BRPs and Traders trade in Elspot and Elbas	MO → ISR	MBA, BRP or Trader (RE)	ENTSO-E ESS Schedule Document [1] <b>For details see:</b> 5.1
5. Elspot and Elbas flow (exchange between Market Balance Areas)	MO → ISR	MBA 1, MBA 2	ENTSO-E ESS Schedule Document [1] <b>For details see:</b> 5.1
6. Elspot and Elbas flow (exchange between Market Balance Areas)			ENTSO-E ESS Schedule Document [1] <b>For details see:</b> BRS for Nordic Scheduling Process [8]
7. Spot prices (Day-ahead sales report)	MO → ISR	MBA	ENTSO-E ECAN Publication Document [1] <b>For details see:</b> 5.4
8. Spot prices (Day-ahead sales report)			ENTSO-E ECAN Publication Document [1] <b>For details see:</b> BRS for Nordic Trading System [7]
9. Bilateral trade report (trade except trade with Market Operators)			ENTSO-E ESS Schedule Document [1] <b>For details see:</b> BRS for Nordic Scheduling Process [8]
10. Bilateral trade confirmation report			ENTSO-E ESS Confirmation Report [1] <b>For details see:</b> BRS for Nordic Scheduling Process [8]
11. Bilateral trade report (trade except MO trade)	SO → ISR	MGA 1, MGA 2, Trader 1, Trader 2	ENTSO-E ESS Schedule Document [1] <b>For details see:</b> 5.1
12. Bilateral trade report (trade except MO trade)	BRP → ISR	MGA 1, MGA 2, Trader 1, Trader 2	ENTSO-E ESS Schedule Document [1] <b>For details see:</b> BRS for Nordic Balance Settlement [9]
13. Bilateral trade confirmation report	ISR → BRP	MGA 1, MGA 2, Trader 1, Trader 2	ENTSO-E ESS Confirmation Report [1] <b>For details see:</b> BRS for Nordic Balance Settlement [9]
14. BRP report production plans			ENTSO-E ERRP Planned Resource schedule [1] <b>For details see:</b> BRS for Nordic Scheduling Process [8]
15. Update of operational production plans			ENTSO-E ERRP Planned Resource schedule [1] <b>For details see:</b> BRS for Nordic Scheduling Process [8]
16. Confirmation of production plans			ENTSO-E ERRP Resource schedule confirmation report [1] <b>For details see:</b> BRS for Nordic Scheduling Process [8]

## Nordic settlement system for data exchange between eSett and TSOs/Market Operators

NBS document	Roles	Identified object(s)	Documentation
17. Binding production plans	SO → ISR	MBA, RO, BRP, RE	ENTSO-E ERRP Planned resource schedule [1] <b>For details see:</b> 5.2
18. BRP bid for up- and down regulation			ENTSO-E ERRP Reserve Bid Document for Reserve Tenders [1] <b>For details see:</b> BRS for Nordic Trading System [7]
19. TSO could report back if bilateral trade inconsistency			ENTSO-E ESS Confirmation Report [1] <b>For details see:</b> BRS for Nordic Scheduling Process [8]
<b>Short time after gate closure</b>			
20. Activated trades in reserves markets A) Reserves Up B) Reserves Down C) Supportive power Sold D) Supportive power Bought	SO → ISR	A) and B): MBA, BRP, RO  C) and D): MBA 1, MBA 2, TSO	NEG ERRP Reserve Allocation Result Document [1] <b>For details see:</b> 5.3
21. Balance regulation market prices	SO → ISR	MBA	ENTSO-E ECAN Publication Document [1] <b>For details see:</b> 5.4

**Table 1:** NBS scheduling phase documents

## 2.4 Overview of information exchange for the NBS metering and settlement phase

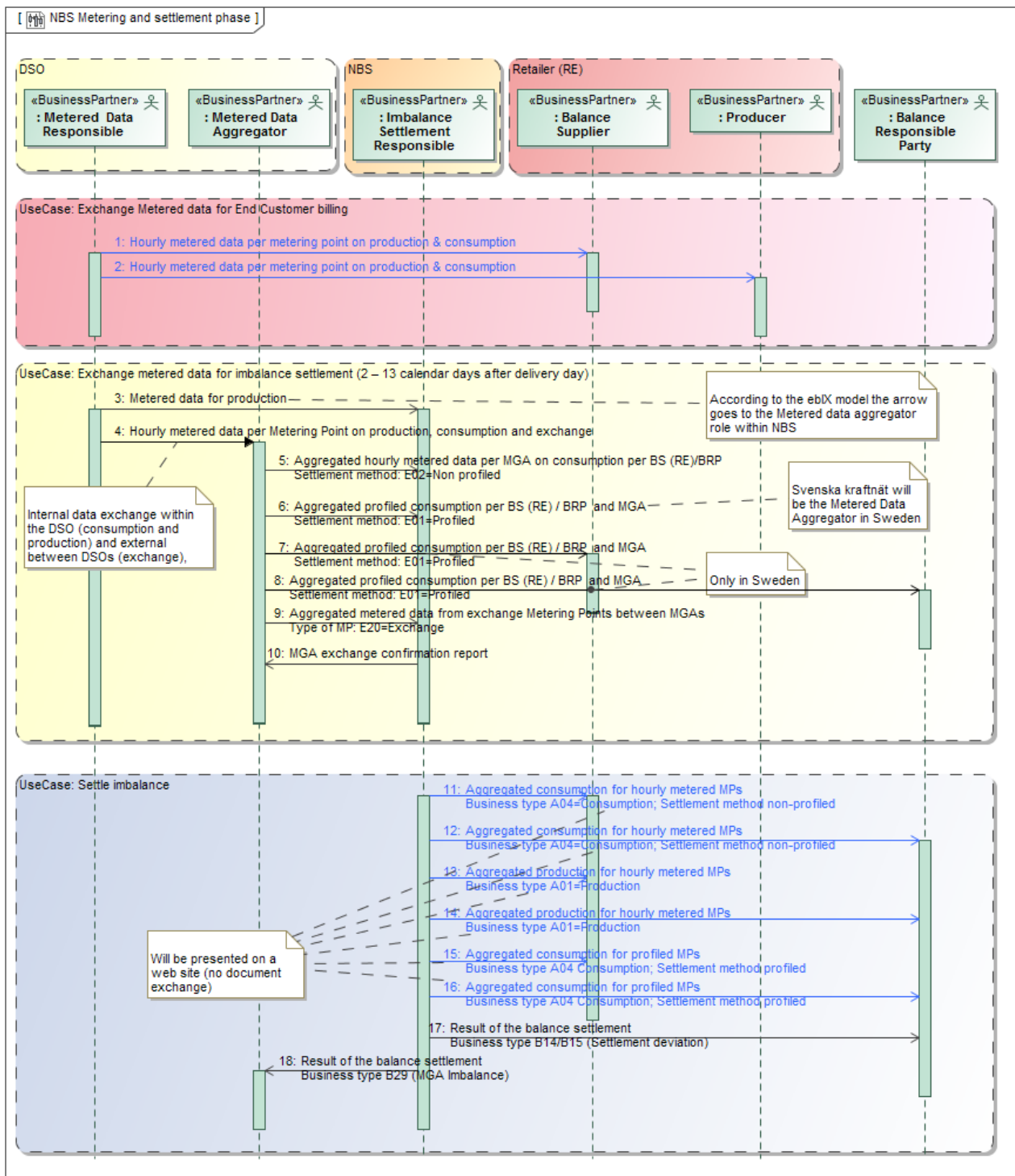


Figure 5 Sequence diagram: The NBS metering and settlement phase

### Comments to the diagram:

- Documents (arrow) 1; Hourly metered data per metering point on production & consumption, is used for settlement between the Balance Supplier and the Party Connected To Grid (Consumers and Producers).
- The documents (arrow) 3, production, will always be reported using positive values.
- The documents (arrow) 13 to 18 will be published on a web-site
- None of the documents (arrows) shown above are further elaborated in this document.



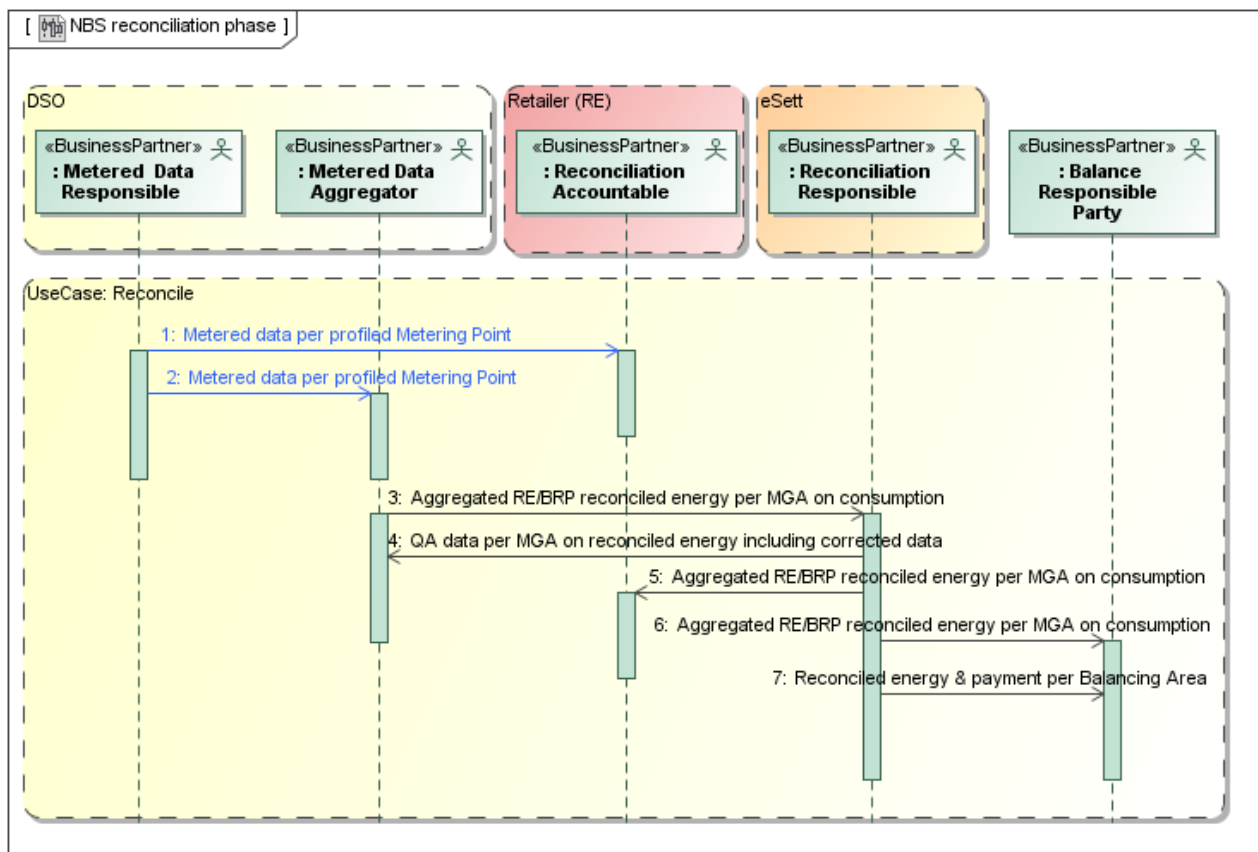
NBS document	Roles	Identified object(s)	Documentation
<b>Reporting metered data 2 – 13 days after delivery day</b>			
1. Hourly metered data per metering point on production & consumption			ebIX® EMD model measure for billing, Validated Data for Billing Energy (E66, E88) [2]  <b>For details see:</b> BRS for Nordic Settlement System [9]
2. Hourly metered data per metering point on production & consumption			ebIX® EMD model measure for billing, Validated Data for Billing Energy (E66, E88) [2]  <b>For details see:</b> BRS for Nordic Settlement System [9]
3. Metered data for production	DSO → ISR	MP (RO)	ebIX® EMD model measure for Imbalance Settlement , Validated Data for Settlement for Aggregator (E66, E44 (Settlement)) [2]  <b>For details see:</b> BRS for Nordic Settlement System [9]
4. Hourly metered data per metering point on production, consumption and exchange	DSO → DSO	MGA1 and MGA2	ebIX® EMD model measure for Imbalance Settlement , Validated Data for Settlement for Aggregator (E66, E44 (Settlement)) [2]  Internal data exchange within the DSO (consumption and production) are not further elaborated.  <b>For details see:</b> BRS for Nordic Settlement System [9]  <b>Note:</b> This message is not within the scope of ISR
5. Aggregated BS (RE) / BPR hourly metered data per MGA on consumption Settlement method: E02=Non profiled	DSO → ISR	MGA, BRP, BS	ebIX® EMD model measure for imbalance settlement, Aggregated Data per MGA for Imbalance Settlement to Settlement Responsible (E31, E44) [2]  <b>For details see:</b> BRS for Nordic Settlement System [9]
6. Profiled consumption per BS (RE)/BPR per MGA Settlement method: E01=Profiled	DSO → ISR	MGA, BRP, BS	ebIX® EMD model measure for imbalance settlement, Aggregated Data per MGA for Imbalance Settlement to Settlement Responsible (E31, E44) [2]  <b>For details see:</b> BRS for Nordic Settlement System [9]
7. Profiled consumption per BS (RE) / BPR per MGA Settlement method: E01=Profiled	DSO → BS	MGA, BRP, BS	ebIX® EMD model measure for imbalance settlement, Aggregated Data per MGA for Imbalance Settlement to Settlement Responsible (E31, E44) [2]  <b>For details see:</b> BRS for Nordic Settlement System [9]  <b>Note:</b> This message is not within the scope of eSett
8. Profiled consumption per BS (RE) / BPR per MGA Settlement method: E01=Profiled	DSO → BRP	MGA, BRP, BS	ebIX® EMD model measure for imbalance settlement, Aggregated Data per MGA for Imbalance Settlement to Settlement Responsible (E31, E44) [2]  <b>For details see:</b> BRS for Nordic Settlement System [9]  <b>Note:</b> This message is not within the scope of eSett
9. Aggregated metered data from exchange Metering Points between MGAs Type of MP: E20=Exchange	DSO → ISR	MGA 1, MGA 2, Responsible MGA	ebIX® EMD model measure for imbalance settlement, Aggregated Data per Neighbouring Grid For Settlement Responsible (E31, E44) [2]  <b>For details see:</b> BRS for Nordic Settlement System [9]

## Nordic settlement system for data exchange between eSett and TSOs/Market Operators

NBS document	Roles	Identified object(s)	Documentation
10. MGA exchange confirmation report	ISR → DSO	MGA 1, MGA 2, Responsible MGA	NEG Confirmation of Aggregated Data per Neighbouring Grid For Settlement Responsible (Z08, E44) [2]  <b>For details see:</b> BRS for Nordic Settlement System [9]
11. Aggregated consumption for hourly metered MPs			Will be published on a web site. Not documented.
12. Aggregated consumption for hourly metered MPs			Will be presented on a web site (no document exchange)
13. Aggregated production for hourly metered MPs			Will be presented on a web site (no document exchange)
14. Aggregated production for hourly metered MPs			Will be presented on a web site (no document exchange)
15. Aggregated consumption for profiled MPs			Will be published on a web site. Not documented.
16. Aggregated consumption for profiled MPs			Will be presented on a web site (no document exchange)
<b>After the Balance settlement</b>			
17. Result of the balance settlement Business type B14/B15 (Settlement deviation)	ISR → BRP	MBA, BRP	ENTSO-E ESP Energy account report (EAR)  <b>For details see:</b> BRS for Nordic Settlement System [9]
18. Result of the balance settlement - MGA Imbalance Business type B29 (MGA Imbalance)	ISR → MPA	MGA, BRP	ENTSO-E ESP Energy account report (EAR)  <b>For details see:</b> BRS for Nordic Settlement System [9]

**Table 2:** NBS metering and settlement phase documents

## 2.5 Overview of information exchange for the NBS reconciliation phase



**Figure 6** Sequence diagram: The NBS reconciliation phase

### Comments to the diagram:

- None of these documents (arrows) are currently elaborated in detail:
  - Documents (arrows) with blue colour will be elaborated by the NordREG project “Common harmonised Nordic retail market - Message format, content and interface”
  - The documents (arrow) 3 to 7 will not be handled in the first version of a common Nordic Balance Settlement, i.e. currently not further elaborated in this document

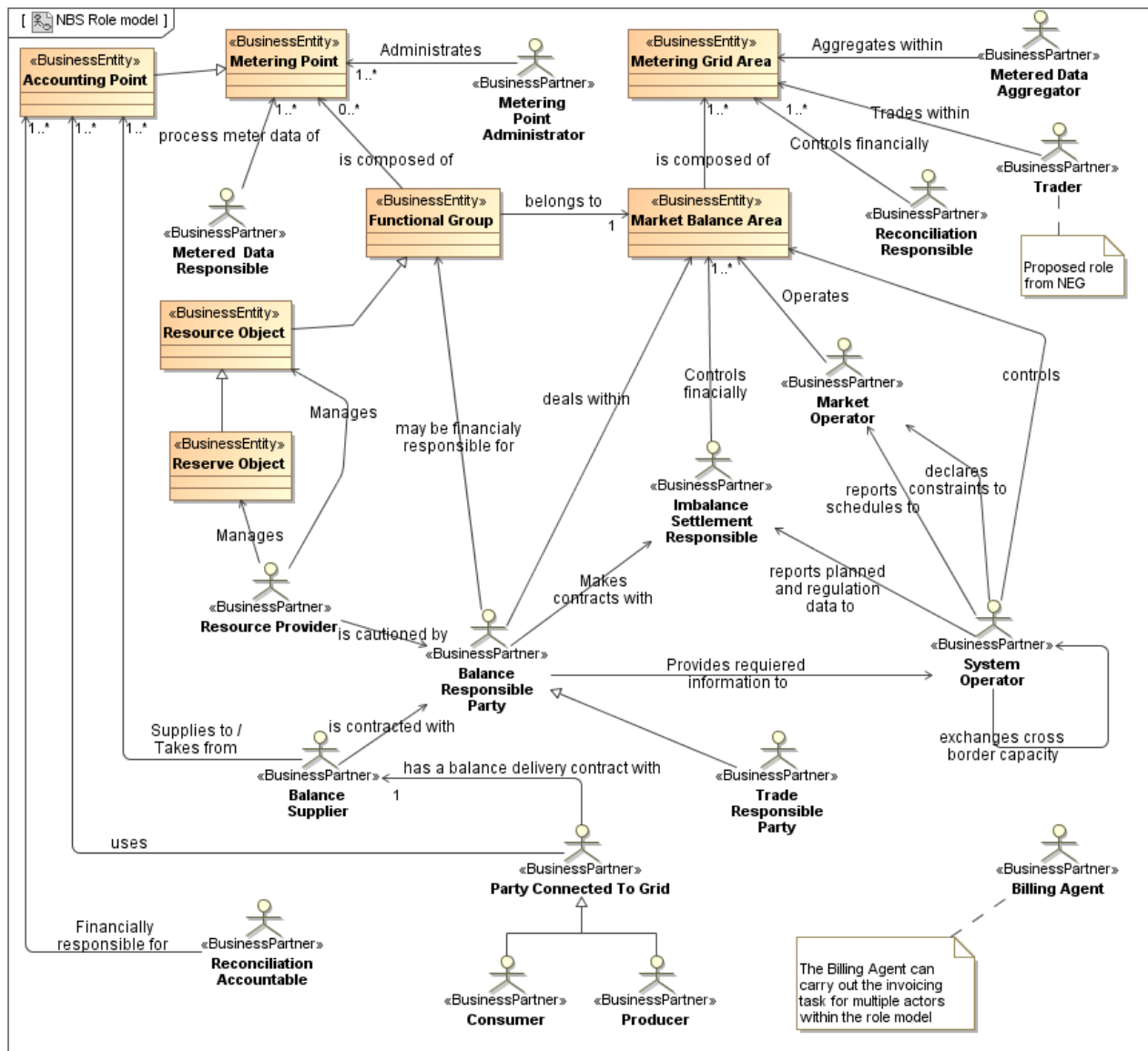
## Nordic settlement system for data exchange between eSett and TSOs/Market Operators

NBS document	IG and document
<b>Reporting of metered data of Profiled Metering Points</b>	
1. Metered data per profiled Metering Point	ebIX® EMD Validated Data For Reconciliation (E66 / E43 (Reconciliation)) [2]  <b>For details see:</b> BRS for Nordic Settlement System [9]
2. Metered data per profiled Metering Point	Internal dataflow within the DSO. Not documented.
<b>Reporting reconciliation settlement</b>	
3. Aggregated RE/BRP reconciled energy per MGA on consumption	Not handled in the first version of a common Nordic Balance Settlement.
4. QA data per MGA on reconciled energy including corrected data	Not handled in the first version of a common Nordic Balance Settlement.
5. Aggregated RE/BRP reconciled energy per MGA on consumption	Not handled in the first version of a common Nordic Balance Settlement.
6. Aggregated RE/BRP reconciled energy per MGA on consumption	Not handled in the first version of a common Nordic Balance Settlement.
7. Reconciled energy & payment per Balancing Area	Not handled in the first version of a common Nordic Balance Settlement.

**Table 3:** NBS reconciliation phase documents

### 3 Harmonised roles used in Nordic settlement system

In **Figure 7** the relevant parts of the ebIX®, EFET and ENTSO-E Harmonised role model are outlined.



**Figure 7:** Outline of the Harmonised role model within the scope of NBS settlement system

#### 3.1 Definitions (from the ebIX®, EFET and ENTSO-E Harmonised role model):

##### 3.1.1 Roles

**Balance Responsible Party:** A party that has a contract proving financial security and identifying balance responsibility with the Imbalance Settlement Responsible of the Market Balance Area entitling the party to operate in the market. This is the only role allowing a party to nominate energy on a wholesale level.

##### Additional information:

The meaning of the word “balance” in this context signifies that the quantity contracted to provide or to consume must be equal to the quantity really provided or consumed.

<b>Balance Supplier:</b>	<p>A party that markets the difference between actual metered energy consumption and the energy bought with firm energy contracts by the Party Connected to the Grid. In addition the Balance Supplier markets any difference with the firm energy contract (of the Party Connected to the Grid) and the metered production.</p> <p><b>Additional information:</b> There is only one Balance Supplier for each Accounting Point.</p>
<b>Billing Agent:</b>	<p>The party responsible for invoicing a concerned party.</p>
<b>Consumer:</b>	<p>A party that consumes electricity.</p> <p><b>Additional information:</b> This is a Type of Party Connected to the Grid.</p>
<b>Imbalance Settlement Responsible:</b>	<p>A party that is responsible for settlement of the difference between the contracted quantities and the realised quantities of energy products for the Balance Responsible Parties in a Market Balance Area.</p> <p><b>Note:</b> The Imbalance Settlement Responsible has not the responsibility to invoice. The Imbalance Settlement Responsible may delegate the invoicing responsibility to a more generic role such as a Billing Agent.</p>
<b>Market Operator:</b>	<p>The unique power exchange of trades for the actual delivery of energy that receives the bids from the Balance Responsible Parties that have a contract to bid. The Market Operator determines the market energy price for the Market Balance Area after applying technical constraints from the System Operator. It may also establish the price for the reconciliation within a Metering Grid Area.</p>
<b>Metered Data Aggregator:</b>	<p>A party responsible for the establishment and qualification of metered data from the Metered Data Responsible. This data is aggregated according to a defined set of market rules.</p>
<b>Metered Data Responsible:</b>	<p>A party responsible for the establishment and validation of metered data based on the collected data received from the Metered Data Collector. The party is responsible</p>
<b>Metering Point Administrator:</b>	<p>A party responsible for registering the parties linked to the metering points in a Metering Grid Area. He is also responsible for maintaining the Metering Point technical specifications. He is responsible for creating and terminating metering points.</p>
<b>Party Connected To Grid:</b>	<p>A party that contracts for the right to consume or produce electricity at an Accounting Point.</p>
<b>Producer:</b>	<p>A party that produces electricity.</p> <p><b>Additional information:</b></p>

This is a type of Party Connected to the Grid.

**Reconciliation Accountable:** A party that is financially accountable for the reconciled volume of energy products for a profiled Accounting Point.

**Reconciliation Responsible:** A party that is responsible for reconciling, within a Metering Grid Area, the volumes used in the imbalance settlement process for profiled Accounting Points and the actual metered quantities.

**Note:**

The Reconciliation Responsible may delegate the invoicing responsibility to a more generic role such as a Billing Agent.

**Resource Provider:** A role that manages a resource object and provides the schedules for it.

**System Operator:** A party that is responsible for a stable power system operation (including the organisation of physical balance) through a transmission grid in a geographical area. The SO will also determine and be responsible for cross border capacity and exchanges. If necessary he may reduce allocated capacity to ensure operational stability.

Transmission as mentioned above means "the transport of electricity on the extra high or high voltage network with a view to its delivery to final customers or to distributors. Operation of transmission includes as well the tasks of system operation concerning its management of energy flows, reliability of the system and availability of all necessary system services." (The definition is taken from the UCTE Operation handbook Glossary).

**Note:**

Additional obligations may be imposed through local market rules.

**Trade Responsible Party:** A party who can be brought to rights, legally and financially, for any imbalance between energy nominated and consumed for all associated Accounting Points.

**Note:**

A power exchange without any privileged responsibilities acts as a Trade Responsible Party.

**Additional information:**

This is a type of Balance Responsible Party.

**Trader:** A party 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 Market Balance Area, entitling the party to operate in the market.

**Note:** The NordREG role *National Point of Information (NPI)* is represented as the role *Metered Data Aggregator* in the BRS.

### 3.1.2 Domains

<b>Accounting Point:</b>	<p>An entity under balance responsibility where balance supplier change can take place and for which commercial business processes are defined.</p> <p>Additional information: These entities are usually defined in a contract. Typical business processes where this would be used may be “compensation management”, “settlement”, “calculation of energy volumes”, etc</p> <p>This is a type of metering point.</p>
<b>Functional Group:</b>	<p>A collection of Metering Points for consumption and generation within a Market Balance Area.</p>
<b>Market Balance Area:</b>	<p>A geographic area consisting of one or more Metering Grid Areas with common market rules for which the settlement responsible party carries out a balance settlement and which has the same price for imbalance. A Market Balance Area may also be defined due to bottlenecks.</p>
<b>Metering Grid Area:</b>	<p>A Metering Grid Area is a physical area where consumption, production and exchange can be metered. It is delimited by the placement of meters for period measurement for input to, and withdrawal from the area. It can be used to establish the sum of consumption and production with no period measurement and network losses.</p>
<b>Metering Point:</b>	<p>An entity where energy products are measured or computed.</p>
<b>Reserve Object:</b>	<p>resource technically pre-qualified using a uniform set of standards to supply reserve capabilities to a System Operator associated with one or more Metering Points and tele-measuring devices.</p> <p>Additional information: This is a type of Resource Object</p>
<b>Resource Object:</b>	<p>A resource that can either produce or consume energy and that is reported in a schedule.</p> <p>Additional information: This is a type of Functional Group</p>



## 4 Process areas within Nordic settlement system

### 4.1 Process area: Receive and validate Master Data

See separate BRS [13].

### 4.2 Process area: Master Data

See separate BRS [13].

### 4.3 Process area: Exchange Load Profile Shares

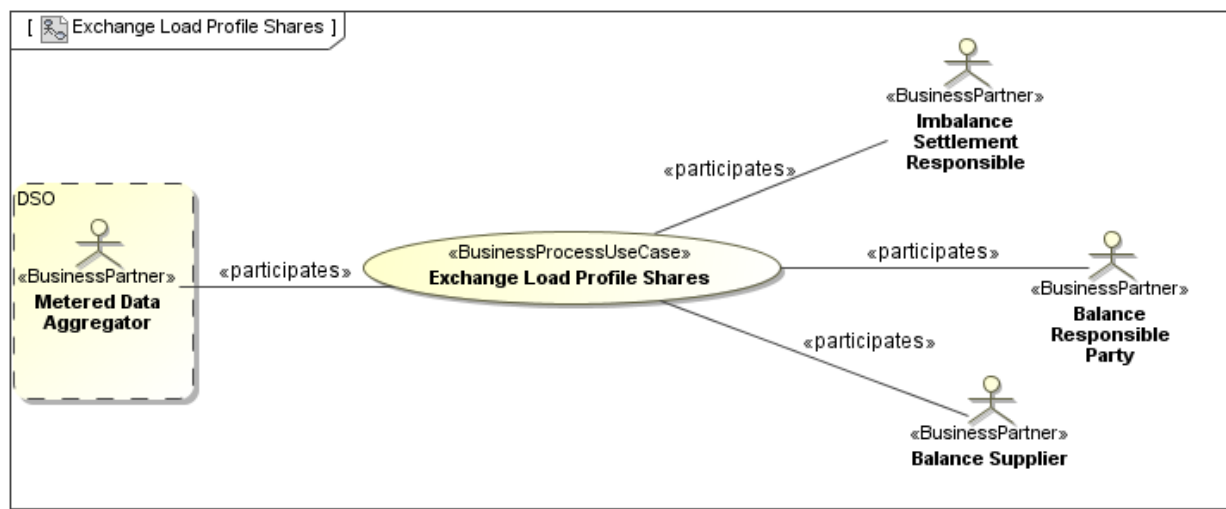


Figure 8: UseCase: Exchange Load Profile Shares

The Load Profile Shares (LPS) per Metering Grid Area (MGA) and Balance Supplier / Balance Responsible Party must be reported by the Metered Data Aggregator to the Imbalance Settlement Responsible according to market rules. The Imbalance Settlement Responsible will thereafter publish LPS on a website.

The Metered Data Aggregator is responsible for the data quality of the LPS.

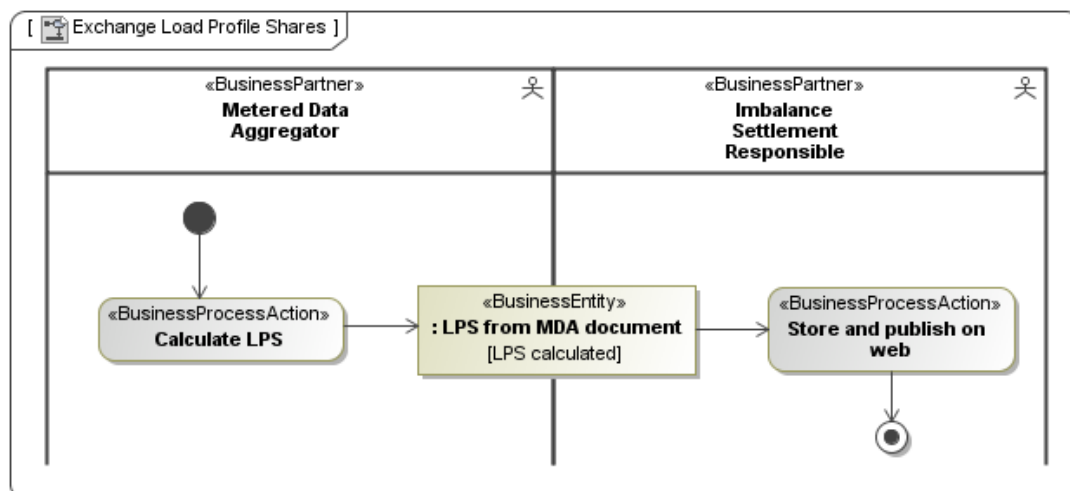
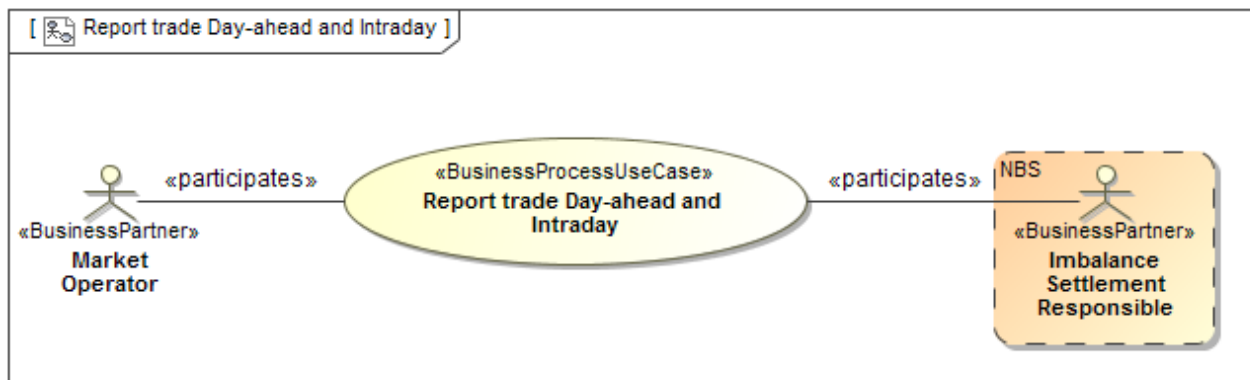


Figure 9: Activity diagram: Exchange Load Profile Shares

#### 4.4 Process area: Report trade from Elspot and Elbas



**Figure 10:** UseCase: Report trade from Elspot and Elbas

On the *day-ahead (Elspot) market*, hourly power contracts are traded daily for physical delivery in the next day's 24-hour period. The price calculation is based on the balance between bids and offers from all market participants – finding the intersection point between the market's supply curve and demand curve. This trading method is referred to as equilibrium point trading, auction trading, or simultaneous price setting. The price mechanism in *day-ahead (Elspot) market* adjusts the flow of power across the interconnectors, and also on certain connections within the Norwegian and Swedish grids, to the available trading capacity given by the Nordic Transmission System Operators. Thus, *day-ahead (Elspot) market* is a common power market for the Nordic countries, with an implicit capacity auction on the interconnectors between the *Market balance areas*.

All participants who meet the requirements set by the Market Operator are given access to the *day-ahead (Elspot) market*. However, day-ahead (Elspot) market participants must have a balancing agreement with the respective Transmission System Operator or through a third party.

The intraday market (Elbas) is a tool for Trade Responsible Parties to adjust their balance during intraday. The parties on the intraday market are Producers, Consumers and Traders.

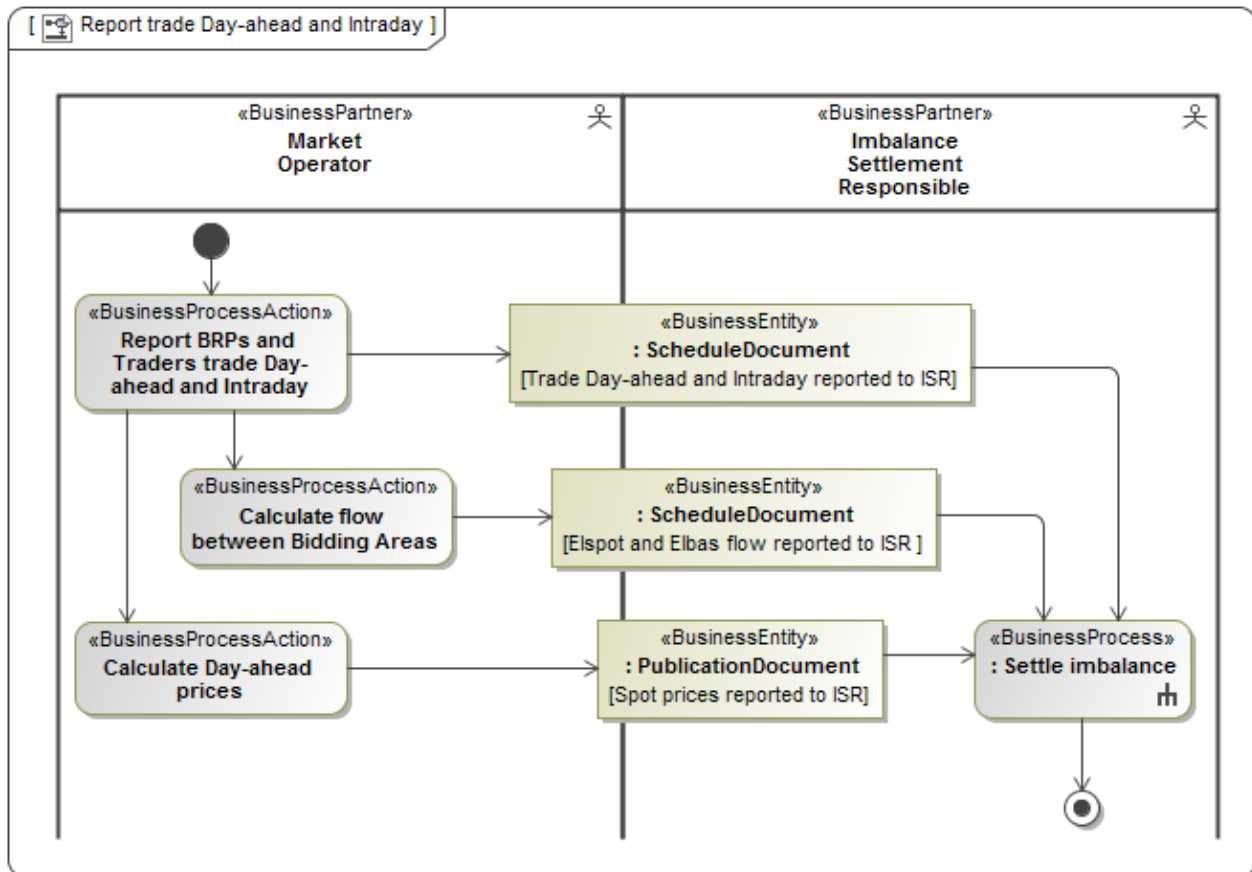


Figure 11: Activity diagram: Report trade from Elspot and Elbas

Comment to the diagram:

- Only actions and documents related to eSett is shown

#### 4.5 Process area: Report bilateral trade

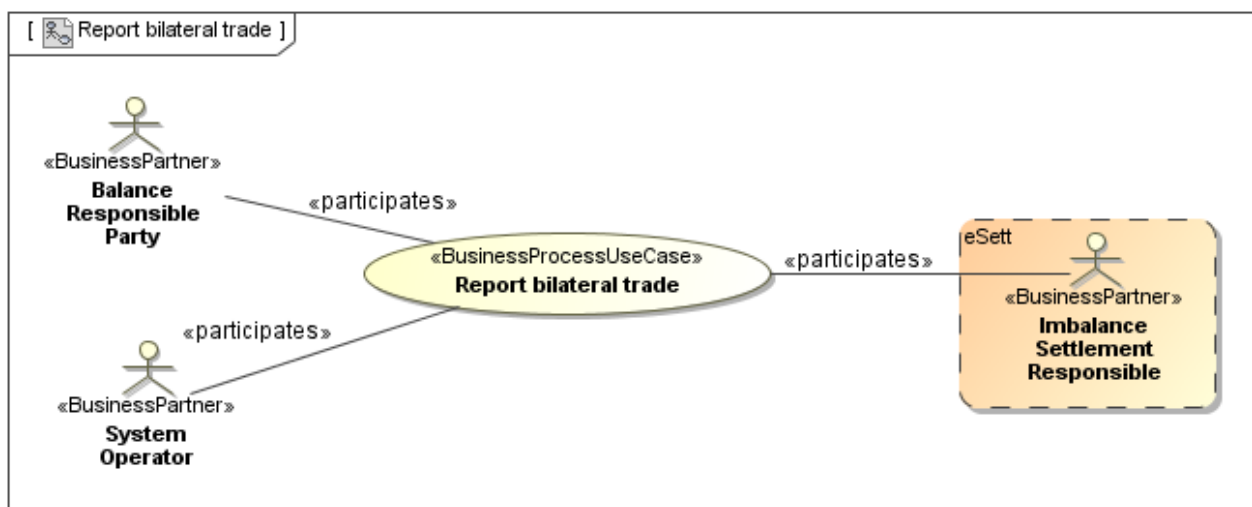


Figure 12: UseCase: Report bilateral trade

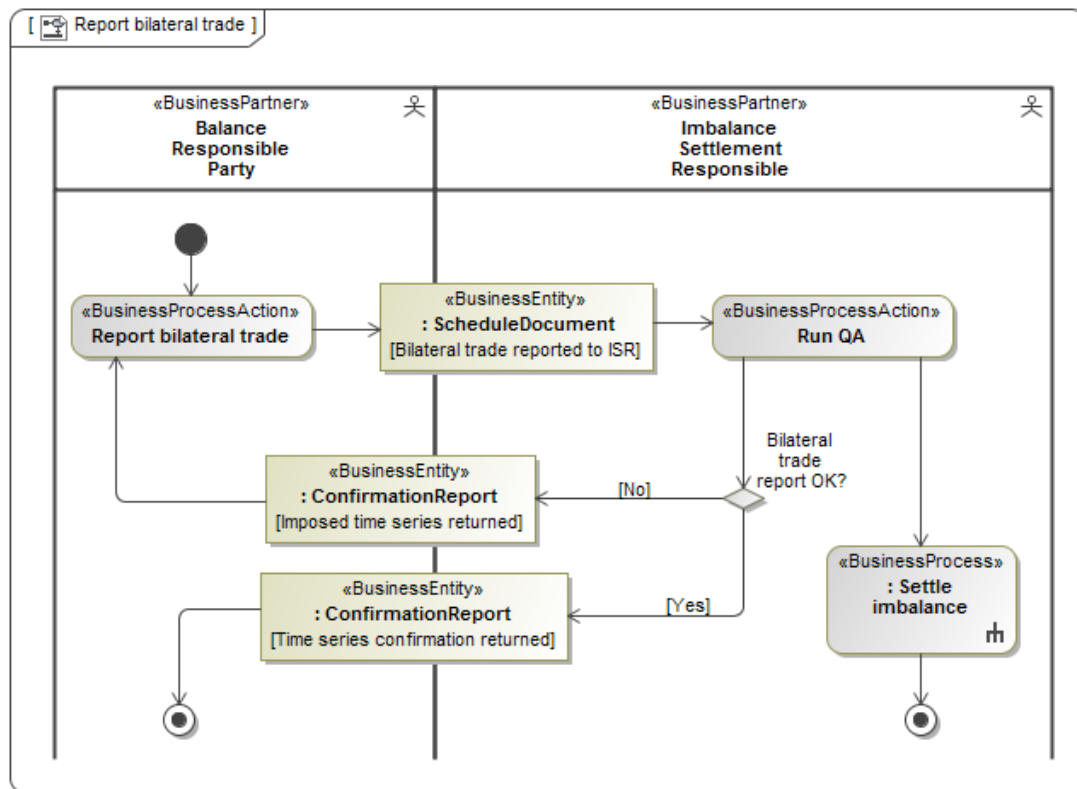


Figure 13: Activity diagram: Report bilateral trade

#### 4.5.1 The NBS confirmation process

The matching validation is carried out for every *ESS schedule time series* received, independent of what is received from the counterparty, based on the following rules:

- When eSett receives a valid *ESS Schedule Time Series* within a *Schedule Document* without having received an *ESS Schedule Time Series* from the counterparty, *Confirmation Reports* are returned to both the originator and the counterparty:
  - A *Time Series Confirmation* to the originator of the *ESS Schedule Time Series*
  - An *Imposed Time Series* to the counterparty. The counterparty does not need to act (i.e. send an *ESS Schedule Time Series*) if he finds that the *Imposed Time Series* is correct.
- If eSett receives a matching *ESS Schedule Time Series* within a *Schedule Document* from the counterparty, eSett sends a *Confirmation Report* with a *Time Series Confirmation* to both the originator and the counterparty.
- If eSett receives an *ESS Schedule Time Series* within a *Schedule Document* that does not match the corresponding *ESS Schedule Time Series* from the counterparty, *Confirmation Reports* are returned to both the originator and the counterparty:
  - A *Time Series Confirmation* if there are no changes to the received *ESS Schedule Time Series*
  - An *Imposed Time Series* if there are changes to the received *ESS Schedule Time Series*

#### 4.6 Process area: Plan production

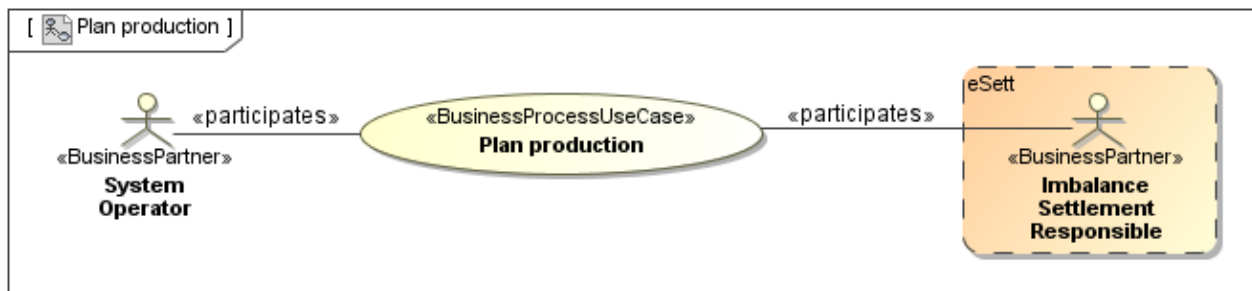


Figure 14: UseCase: Plan production

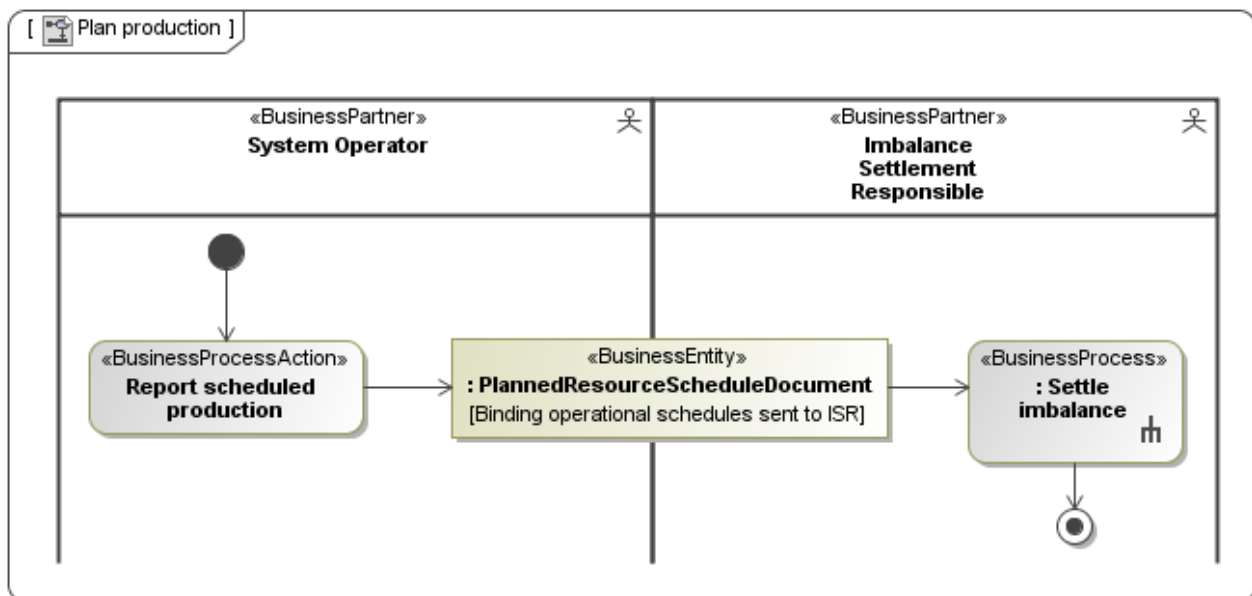


Figure 15: Activity diagram: Plan production

#### 4.7 Process area: Report trade from Balance Regulation Market

The trade on the balance regulation market is documented in [7], BRS for the Nordic trading system. The Activated Trade in Reserves Market is reported from the *System Operator* to the *Imbalance Settlement Responsible* as the interface between the *Nordic trading system* and the *Nordic Balancing System*.

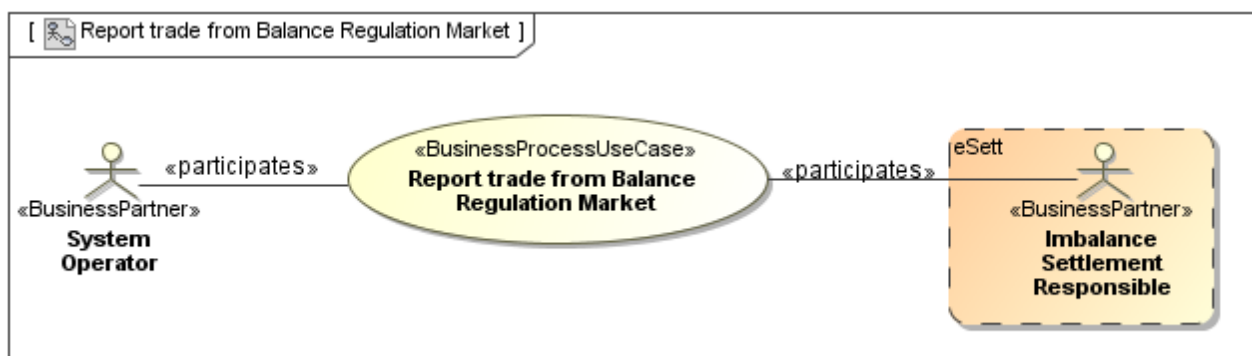


Figure 16: UseCase: Report trade from Balance Regulation Market

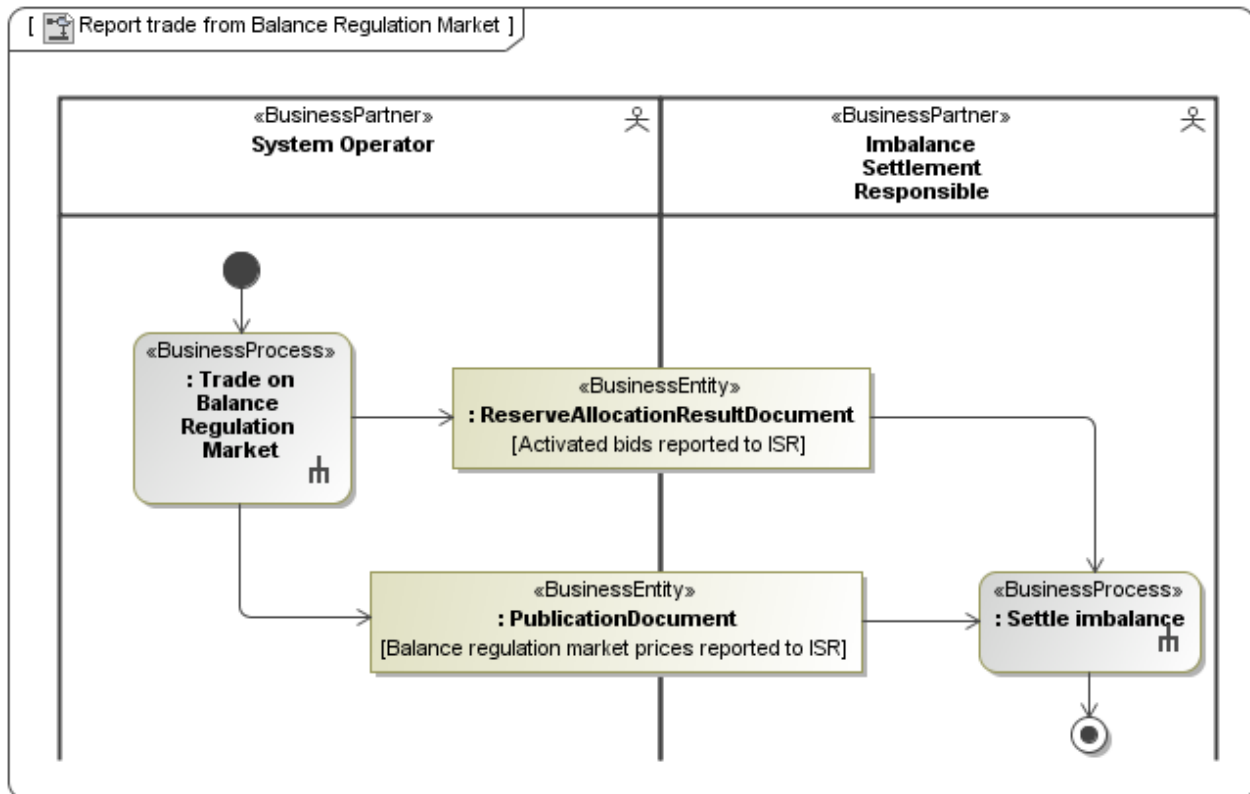


Figure 17: Activity diagram: Report trade from Balance Regulation Market

#### 4.8 Process area: Exchange metered data for imbalance settlement

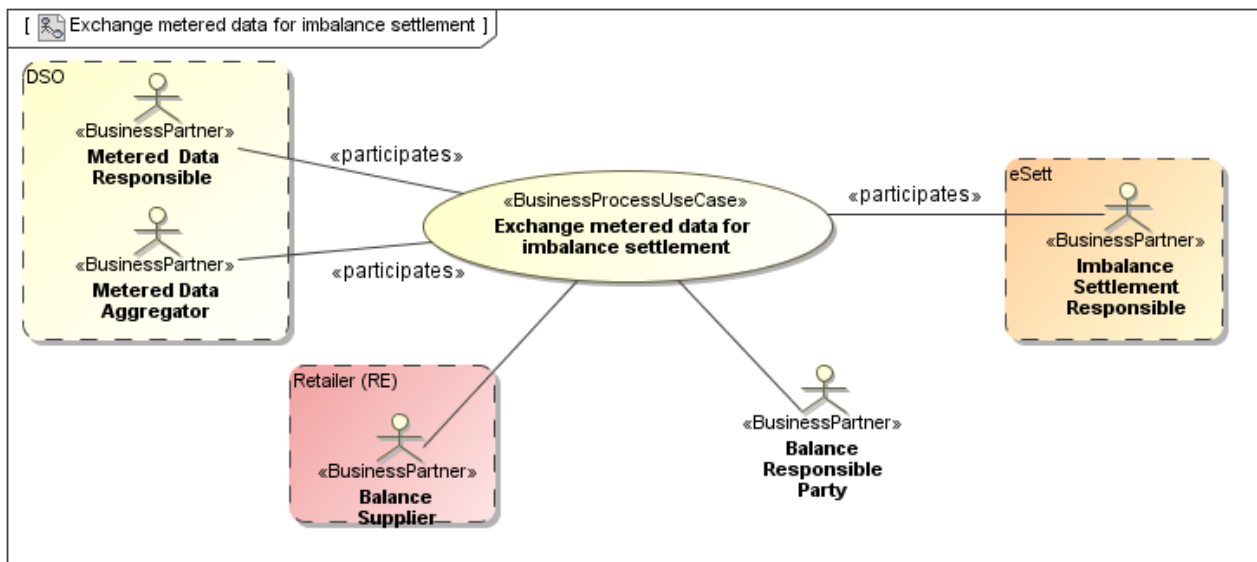


Figure 18: UseCase: Exchange metered data for imbalance settlement

The Metered Data Responsible (DSO) is reporting aggregated metered data to the Imbalance Settlement Responsible:

- Aggregated metered data from exchange Metering Points between MGAs
- Aggregated hourly metered consumption per Balance Supplier, Balance Responsible Party and MGA

- Aggregated hourly metered production per Production Unit, Producer (RE), Balance Responsible Party and MGA
- Aggregated hourly preliminary profiled consumption per Balance Supplier, Balance Responsible Party and MGA

The metered data will be made available at the Imbalance Settlement Responsible database for Balance Responsible Parties and Balance Suppliers as aggregated volumes per Balance Supplier and Balance Responsible Party.

Missing daily collected metered data in a single metering point will be estimated before aggregation.

The Imbalance Settlement Responsible makes available quality assurance data per Metering Grid Area (e.g. balance per Metering Grid Area) to the Metered Data Aggregator (DSO).

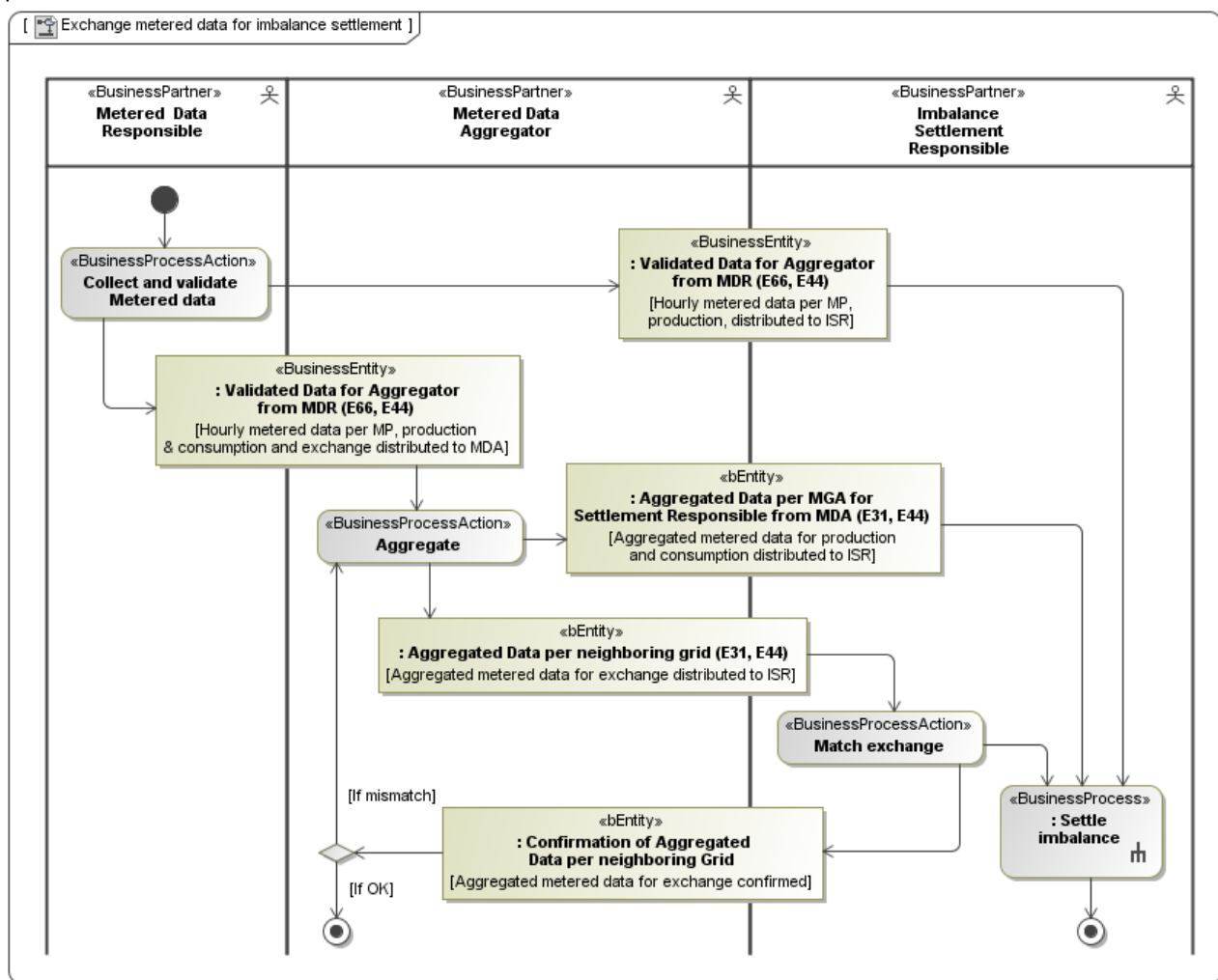


Figure 19: Activity diagram: Exchange metered data for imbalance settlement

### 4.9 Process area: Distribute settlement basis data

Not handled in the first version of a common Nordic Balance Settlement.

#### 4.10 Process area: Settle imbalance

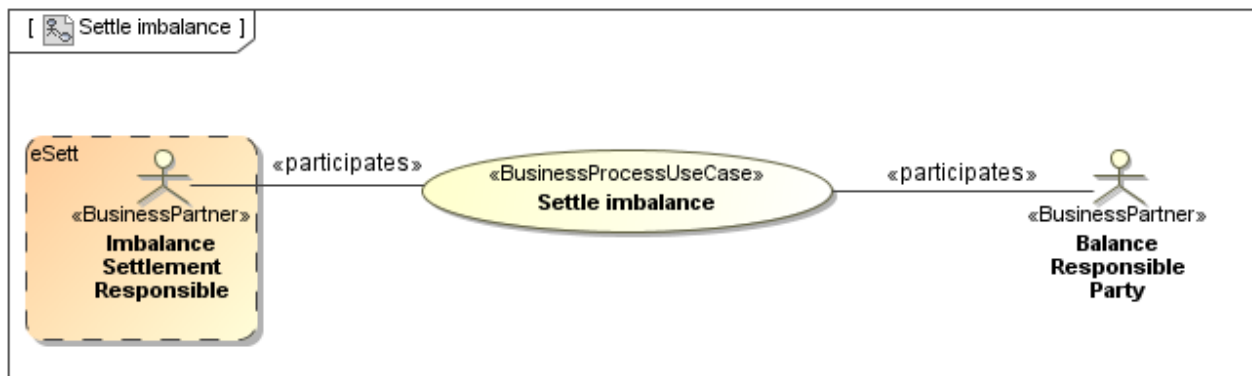


Figure 20: UseCase: Settle imbalance

The Imbalance Settlement Responsible provides the result of the imbalance settlement to the Balance Responsible Parties.

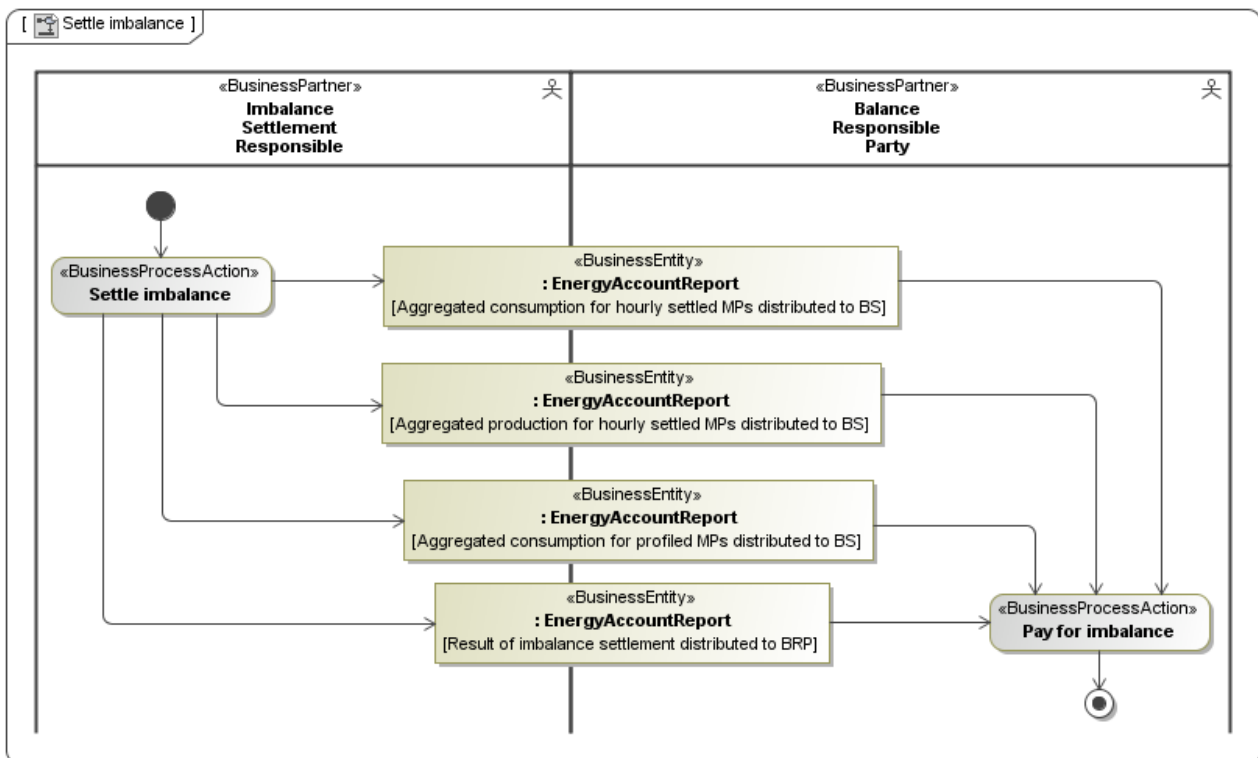


Figure 21: Activity diagram: Settle imbalance

#### 4.11 Process area: Reconcile

Not handled in the first version of a the Imbalance settlement Responsible.



## 5 Business Data View

This chapter describes class diagrams, showing the content of the business documents defined in the previous defined UML diagrams. The class diagram shows the important information needed to identify the document header, time series and observations to be exchanged, such as:

- The reported object, such as Metering point, Resource object (Station group or Regulation object), In area and Out area
- The level of aggregation, such as per Balance supplier and Balance responsible party
- The characteristics needed to express the nature of the time series, such as *Business type* and *Product*

Technical elements related to the communication channel (SMTP, WS...) and syntax (EDIFACT, XML....) are skipped.

## 5.1 ENTSO-E ESS Schedule document

The *ENTSO-E ESS Schedule document* is documented in the *ENTSO-E Scheduling System (ESS) Implementation Guide*, see [1].

### 5.1.1 Class diagram: ENTSO-E ESS Schedule document

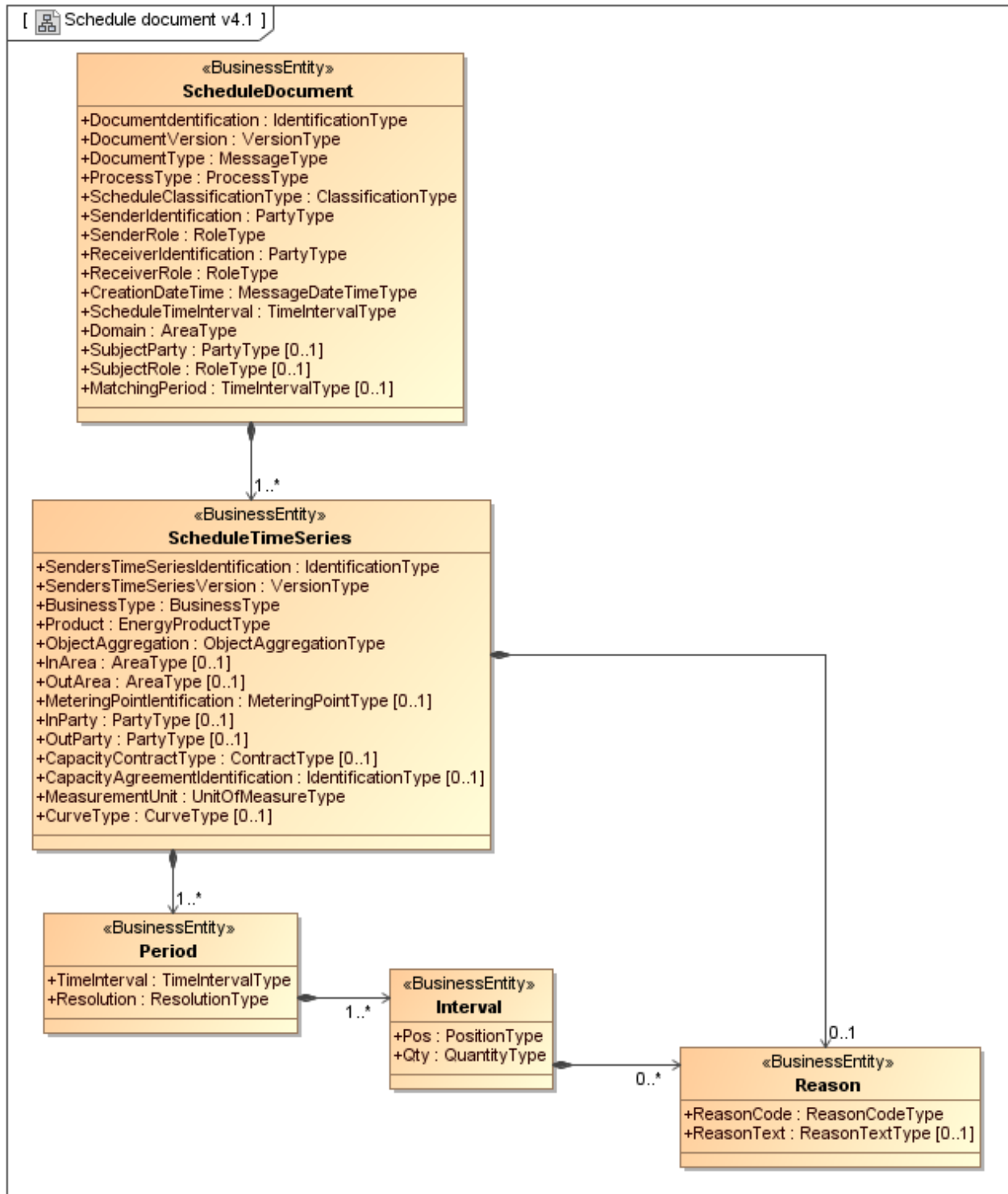


Figure 22: Class diagram: ENTSO-E ESS Schedule document

*The document is used in the following exchanges:*

- **Table 1:** NBS scheduling phase documents:
  - 4, BRPs and Traders trade in Elspot and Elbas
  - 5, Elspot and Elbas flow (exchange between Market Balance Areas)
  - 11, Bilateral trade report (trade except MO trade)

5.1.2 Attribute usage: ENTSO-E ESS Schedule document, Bilateral trade

ESS Attribute	Cl.	Content	Descriptions and comments
<b>Schedule Document</b>	[1]		
Document Identification	[1]	Document ID	Unique identification of the document
Document Version	[1]	Version	Fixed 1
Document Type	[1]	<b>A01</b>	<b>A01</b> Balance responsible schedule
Process Type	[1]	<b>Z05</b>	<b>Z05</b> Bilateral trade
Schedule Classification Type	[1]	<b>A02</b>	<b>A02</b> Summary type
Sender Identification	[1]	SO or BRP ID	Unique identification of the sender
Sender role	[1]	<b>A04</b> or <b>A08</b>	<b>A04</b> System Operator <b>A08</b> Balance Responsible Party
Receiver Identification	[1]	ISR ID	Unique identification of the Receiver
Receiver role	[1]	<b>A05</b>	<b>A05</b> Imbalance Settlement Responsible
Creation Date Time	[1]	Creation date/time	The date and time that the message was prepared for transmission by the application of the sender.
Schedule Time Interval	[1]	Start and end date of the time series	The beginning and ending date and time of the period covered by the message containing the schedule.
Domain	[1]	Nordic Market Area ID	Identification of the area covered by the document, i.e. <b>10Y1001A1001A91G</b> (Nordic market area)
<b>Schedule Time Series</b>	[1..*]		
Senders Time Series Identification	[1]	Time series ID	Unique identification of the Time Series (unique over time for the sender in question)
Senders Time Series Version	[1]	Version	Fixed 1
Business Type	[1]	<b>A08</b>	<b>A08</b> Net internal trade (Within a Market balance area) (Net internal trade - where the direction from out party (seller) to in party (buyer) is positive and the opposite direction is negative (with minus signs)).
Product	[1]	<b>8716867000030</b>	<b>8716867000030</b> Active energy
Object Aggregation	[1]	<b>A01</b>	<b>A01</b> Area
In Area	[1]	MBA ID	The Market Balance Area where the trade has taken place.
Out Area	[1]	MBA ID	The same Market Balance Area as defined in In Area, i.e. where the trade has taken place.
In Party	[1]	BRP 1	The Balance Responsible Party acting as the buyer in the bilateral trade.
Out Party	[1]	BRP 2	The Balance Responsible Party acting as the seller in the bilateral trade.

ESS Attribute	Cl.	Content	Descriptions and comments
Capacity Agreement Identification	[0..1]	Bilateral Trade ID	An ID, only used when reporting trade on a Balance Supplier (Retailer) level, identifying the two involved Balance Suppliers and the related Market Balance Area. The Bilateral Trade ID will be unique in combination with In Party, Out Party and MBA.  <b>Note:</b> Currently not used
Measurement Unit	[1]	<b>KWH</b> or <b>MWH</b>	<b>KWH</b> kWh <b>MWH</b> MWh
<b>Period</b>	[1..*]		
Time Interval	[1]	Start and end date time	The start and end date and time of the time interval of the period in question.
Resolution	[1]	Resolution	The resolution is expressed in compliance with ISO 8601 in the following format:  PnYnMnDTnHnMnS.  Where nY expresses a number of years, nM a number of months, nD a number of days. The letter "T" separates the date expression from the time expression and after it nH identifies a number of hours, nM a number of minutes and nS a number of seconds.  In NBS hourly resolution is used, i.e. <b>PT1H</b> or <b>PT60M</b>
<b>Interval</b>	[1..*]		
Pos	[1]	Position	Position
Qty	[1]	Quantity	Quantity  The direction from out party (seller) to in party (buyer) is positive, while the opposite direction is negative (with minus signs))  The resolution is maximum in Watt, i.e. max 3 decimals for kWh and max 6 decimals for MWh

**Table 4:** Attribute usage: ENTSO-E ESS Schedule document, Bilateral trade

5.1.3 Attribute usage: ENTSO-E ESS Schedule document, Elspot/Elbas trade

ESS Attribute	Cl.	Content	Descriptions and comments
<b>Schedule Document</b>	[1]		
Document Identification	[1]	Document ID	Unique identification of the document
Document Version	[1]	Version	Fixed 1
Document Type	[1]	<b>A01</b>	<b>A01</b> Balance responsible schedule
Process Type	[1]	<b>A01</b> <b>A19</b>	<b>A01</b> Day-ahead ( <i>Elspot</i> ) <b>A19</b> Intraday accumulated ( <i>Elbas</i> )
Schedule Classification Type	[1]	<b>A02</b>	<b>A02</b> Summary type
Sender Identification	[1]	MO or SO ID	Unique identification of the sender
Sender Role	[1]	<b>A04</b> <b>A11</b>	<b>A04</b> System Operator <b>A11</b> Market Operator
Receiver Identification	[1]	ISR ID	Unique identification of the Receiver
Receiver Role	[1]	<b>A05</b>	<b>A05</b> Imbalance Settlement Responsible
Creation Date Time	[1]	Creation date/time	The date and time that the message was prepared for transmission by the application of the sender.
Schedule Time Interval	[1]	Start and end date of the time series	The beginning and ending date and time of the period covered by the message containing the schedule.
Domain	[1]	Nordic Market Area ID	Identification of the area covered by the document, i.e. <b>10Y1001A1001A91G</b> (Nordic market area)
Subject Party	[1]	BRP ID	Unique identification of the BRP in question
Subject Role	[1]	<b>A08</b>	<b>A08</b> Balance Responsible Party
<b>Schedule Time Series</b>	[1..*]		
Senders Time Series Identification	[1]	Time series ID	Unique identification of the Time Series (unique over time for the sender in question)
Senders Time Series Version	[1]	Version	Fixed 1
Business Type	[1]	<b>A08</b>	<b>A08</b> Net internal trade (Within a Market balance area) (Net internal trade - where the direction from out party (seller) to in party (buyer) is positive and the opposite direction is negative (with minus signs)).
Product	[1]	<b>8716867000030</b>	<b>8716867000030</b> Active energy
Object Aggregation	[1]	<b>A01</b>	<b>A01</b> Area
In Area	[1]	MBA ID	Market Balance Area (Elspot area)
In Party	[0..1]	Retailer ID	The unique identification of the Retailer (Company) in question
Measurement Unit	[1]	<b>KWH</b> or <b>MWH</b>	<b>KWH</b> kWh <b>MWH</b> MWh
<b>Period</b>	[1..*]		
Time Interval	[1]	Start and end date time	The start and end date and time of the time interval of the period in question.

## Nordic settlement system for data exchange between eSett and TSOs/Market Operators

ESS Attribute	Cl.	Content	Descriptions and comments
Resolution	[1]	Resolution	<p>The resolution is expressed in compliance with ISO 8601 in the following format:</p> <p style="text-align: center;">PnYnMnDTnHnMnS.</p> <p>Where nY expresses a number of years, nM a number of months, nD a number of days. The letter "T" separates the date expression from the time expression and after it nH identifies a number of hours, nM a number of minutes and nS a number of seconds.</p> <p>In NBS hourly resolution is used, i.e. <b>PT1H</b> or <b>PT60M</b></p>
Interval	[1..*]		
Pos	[1]	Position	Position
Qty	[1]	Quantity	<p>Quantity</p> <p>The resolution is maximum in Watt, i.e. max 3 decimals for kWh and max 6 decimals for MWh</p> <p>The direction from out party (seller) to in party (buyer) is positive, while the opposite direction is negative (with minus signs))</p>

**Table 5:** Attribute usage: ENTSO-E ESS Schedule document, Elspot and Elbas trade

## Nordic settlement system for data exchange between eSett and TSOs/Market Operators

### 5.1.4 Attribute usage: ENTSO-E ESS Schedule document, Elspot/Elbas flow

ESS Attribute	Cl.	Content	Descriptions and comments
<b>Schedule Document</b>	[1]		
Document Identification	[1]	Document ID	Unique identification of the document
Document Version	[1]	Version	Fixed 1
Document Type	[1]	<b>A55</b>	<b>A55</b> Summarised Market Schedule (A compilation of all external schedules concerning two Market Balance Areas of all balance responsible parties)
Process Type	[1]	<b>A01</b> <b>A19</b>	<b>A01</b> Day-ahead ( <i>Elspot</i> ) <b>A19</b> Intraday accumulated ( <i>Elbas</i> )
Schedule Classification Type	[1]	<b>A02</b>	<b>A02</b> Summary type
Sender Identification	[1]	MO ID	Unique identification of the Market operator (sender)
Sender role	[1]	<b>A11</b>	<b>A11</b> Market Operator
Receiver Identification	[1]	ISR ID	Unique identification of the Imbalance Settlement Responsible (receiver)
Receiver role	[1]	<b>A05</b>	<b>A05</b> Imbalance Settlement Responsible
Creation Date Time	[1]	Creation date/time	The date and time that the message was prepared for transmission by the application of the sender.
Schedule Time Interval	[1]	Start and end date of the time series	The beginning and ending date and time of the period covered by the message containing the schedule.
Domain	[1]	Nordic Market Area ID	Identification of the area covered by the document, i.e. <b>10Y1001A1001A91G</b> (Nordic market area)
<b>Schedule Time Series</b>	[1..*]		
Senders Time Series Identification	[1]	Time series ID	Unique identification of the Time Series (unique over time for the sender in question)
Senders Time Series Version	[1]	Version	Fixed 1
Business Type	[1]	<b>A66</b>	<b>A66</b> Energy flow
Product	[1]	<b>8716867000030</b>	<b>8716867000030</b> Active energy
Object Aggregation	[1]	<b>A01</b>	<b>A01</b> Area
In Area	[1]	MBA 1 ID	One Market Balance Area (Elspot area)
Out Area	[1]	MBA 2 ID	The other Market Balance Area (Elspot area)
Measurement Unit	[1]	<b>KWH</b> or <b>MWH</b>	<b>KWH</b> kWh <b>MWH</b> MWh
<b>Period</b>	[1..*]		
Time Interval	[1]	Start and end date time	The start and end date and time of the time interval of the period in question.
Resolution	[1]	Resolution	<p>The resolution is expressed in compliance with ISO 8601 in the following format:</p> <p style="text-align: center;">PnYnMnDTnHnMnS.</p> <p>Where nY expresses a number of years, nM a number of months, nD a number of days.</p> <p>The letter "T" separates the date expression from the time expression and after it nH identifies a number of hours, nM a number of minutes and nS a number of seconds.</p> <p>In NBS hourly resolution is used, i.e. <b>PT1H</b> or <b>PT60M</b></p>

ESS Attribute	Cl.	Content	Descriptions and comments
Interval	[1..*]		
Pos	[1]	Position	Position
Qty	[1]	Quantity	<p>Quantity</p> <p>Flows will always be reported with positive values. For each connection, flows will be reported as two time series, one for each direction. Positive values for flow from Out Area to In Area and zero in the corresponding position in the other time series.</p> <p>The resolution is maximum in Watt, i.e. max 3 decimals for kWh and max 6 decimals for MWh</p>

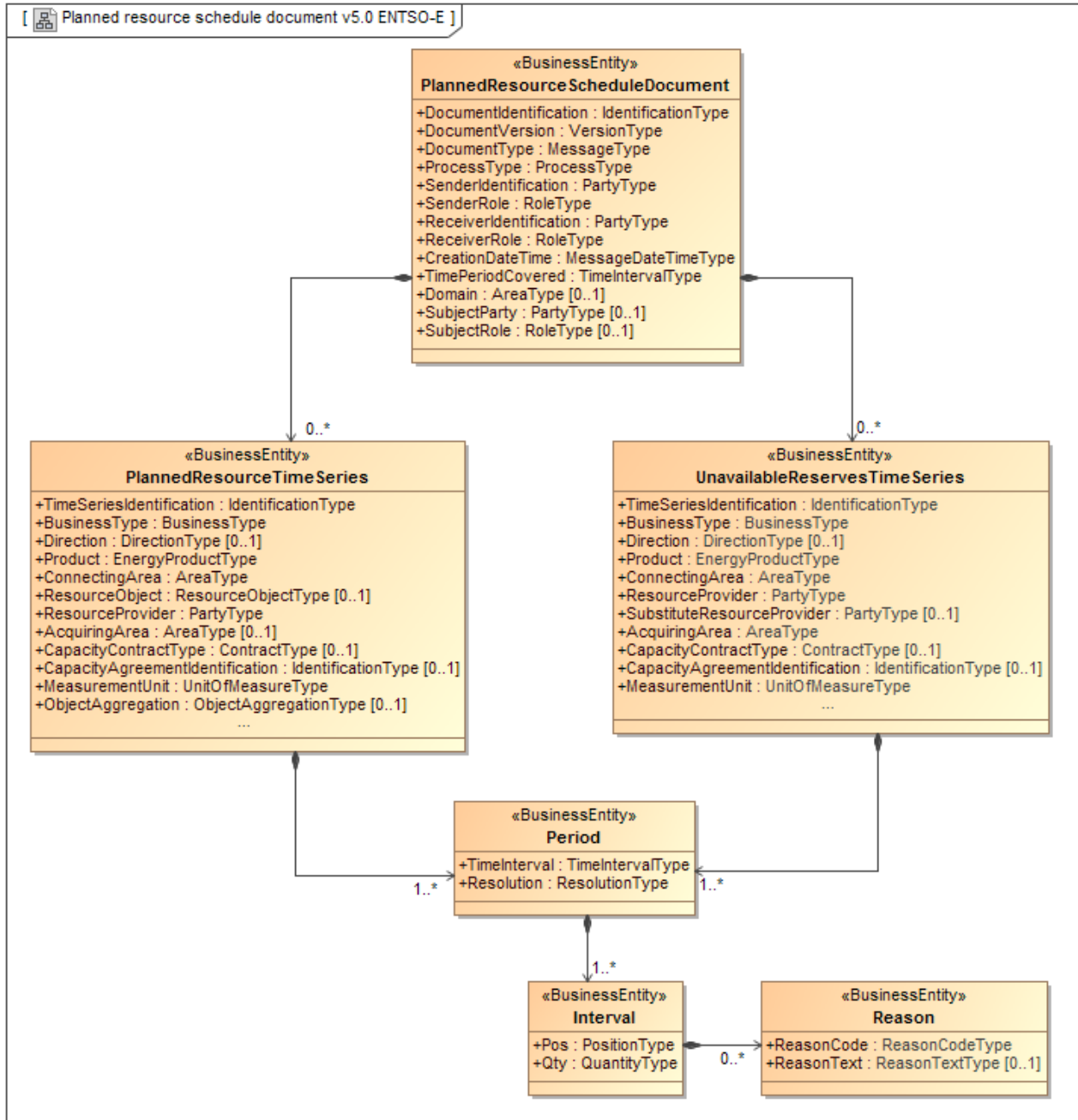
**Table 6:** Attribute usage: ENTSO-E ESS Schedule document, Elspot/Elbas flow



## 5.2 ENTSO-E ERRP Planned resource schedule

The *ENTSO-E ERRP Planned resource schedule* is documented in the *ENTSO-E Reserve Resource Process (ERRP) Implementation Guide*, see [1].

### 5.2.1 Class diagram: ENTSO-E ERRP Planned resource schedule



**Figure 23:** Class diagram: ENTSO-E ERRP Planned resource schedule

The document is used in the following exchanges:

- **Table 1:** NBS scheduling phase documents:
  - 17, Binding production plans

5.2.2 Attribute usage: ENTSO-E ERRP Planned resource schedule

ERRP Planned Resource Schedule Attribute	Cl.	Content	Descriptions and comments
Planned Resource Schedule Document	[1]		
Document Identification	[1]	Document ID	Unique identification of the document
Document Version	[1]	"1"	Fixed 1
Document Type	[1]	<b>A14</b>	<b>A14</b> Resource Provider Resource Schedule
Process Type	[1]	<b>A17</b>	<b>A17</b> Schedule day - The process concerns the day ahead, intraday and eventually ex-post scheduling in a single document. The schedule will be transferred within the total position including historic information (The trade balance of a party at a given time)
Sender Identification	[1]	SO ID	Unique identification of the System Operator, sending the schedule
Sender role	[1]	<b>A04</b>	<b>A04</b> System Operator
Receiver Identification	[1]	ISR ID	Unique identification of the Imbalance Settlement Responsible, receiving the schedule
Receiver role	[1]	<b>A05</b>	<b>A05</b> Imbalance Settlement Responsible
Creation Date Time	[1]	Creation date/time	The date and time that the document was prepared for transmission by the application of the sender.
Time Period Covered	[1]	Start and end date of the time series	The beginning and ending date and time of the period covered by the document.
Domain	[1]	Nordic Market Area ID	Identification of the area covered by the document, i.e. <b>10Y1001A1001A91G</b> (Nordic market area)
Subject Party	[0..1]	RE ID	The Retailer (RE) is only used in Finland
Subject Role	[0..1]	<b>A12</b>	<b>A12</b> Balance supplier (Retailer), only used in Finland
Planned Resource Schedule Time Series	[1..*]		
Time Series Identification	[1]	Time series ID	Unique identification of the Time Series (unique over time for the sender in question)
Business Type	[1]	Business Type	<b>A01</b> Production <b>A04</b> Consumption (general consumption) <b>Z52</b> Small scale production
Product	[1]	<b>8716867000030</b>	<b>8716867000030</b> Active energy
Connecting Area	[1]	MBA ID	Unique identification of the Market Balance Area
Resource Object	[1]	RO ID	The Resource Object of the production plans
Resource Provider	[1]	BRP ID	The Resource Provider (BRP) of the production plans
Measurement Unit	[1]	<b>KWH</b> or <b>MWH</b>	<b>KWH</b> kWh <b>MWH</b> MWh
Object Aggregation	[1]	<b>A06</b>	<b>A06</b> Resource Object
Period	[1..*]		
Time Interval	[1]	Start and end date time	The start and end date and time of the time interval of the period in question.

ERRP Planned Resource Schedule Attribute	Cl.	Content	Descriptions and comments
Resolution	[1]	Resolution	<p>The resolution is expressed in compliance with ISO 8601 in the following format:</p> <p style="text-align: center;">PnYnMnDTnHnMnS.</p> <p>Where nY expresses a number of years, nM a number of months, nD a number of days. The letter “T” separates the date expression from the time expression and after it nH identifies a number of hours, nM a number of minutes and nS a number of seconds.</p> <p>In NBS hourly resolution is used, i.e. <b>PT1H</b> or <b>PT60M</b></p>
Interval	[1..*]		
Pos	[1]	Position	Position
Qty	[1]	Quantity	<p>Quantity</p> <p>The resolution is maximum in Watt, i.e. max 3 decimals for kWh and max 6 decimals for MWh</p>

**Table 7:** Attribute usage: ENTSO-E ERRP Planned resource schedule

### 5.3 NEG ERRP Reserve Allocation Result Document

The *ENTSO-E ERRP Reserve Allocation Result Document* is documented in the *ENTSO-E Reserve Resource Process (ERRP) Implementation Guide*, see [1].

#### 5.3.1 Class diagram: NEG ERRP Reserve Allocation Result Document

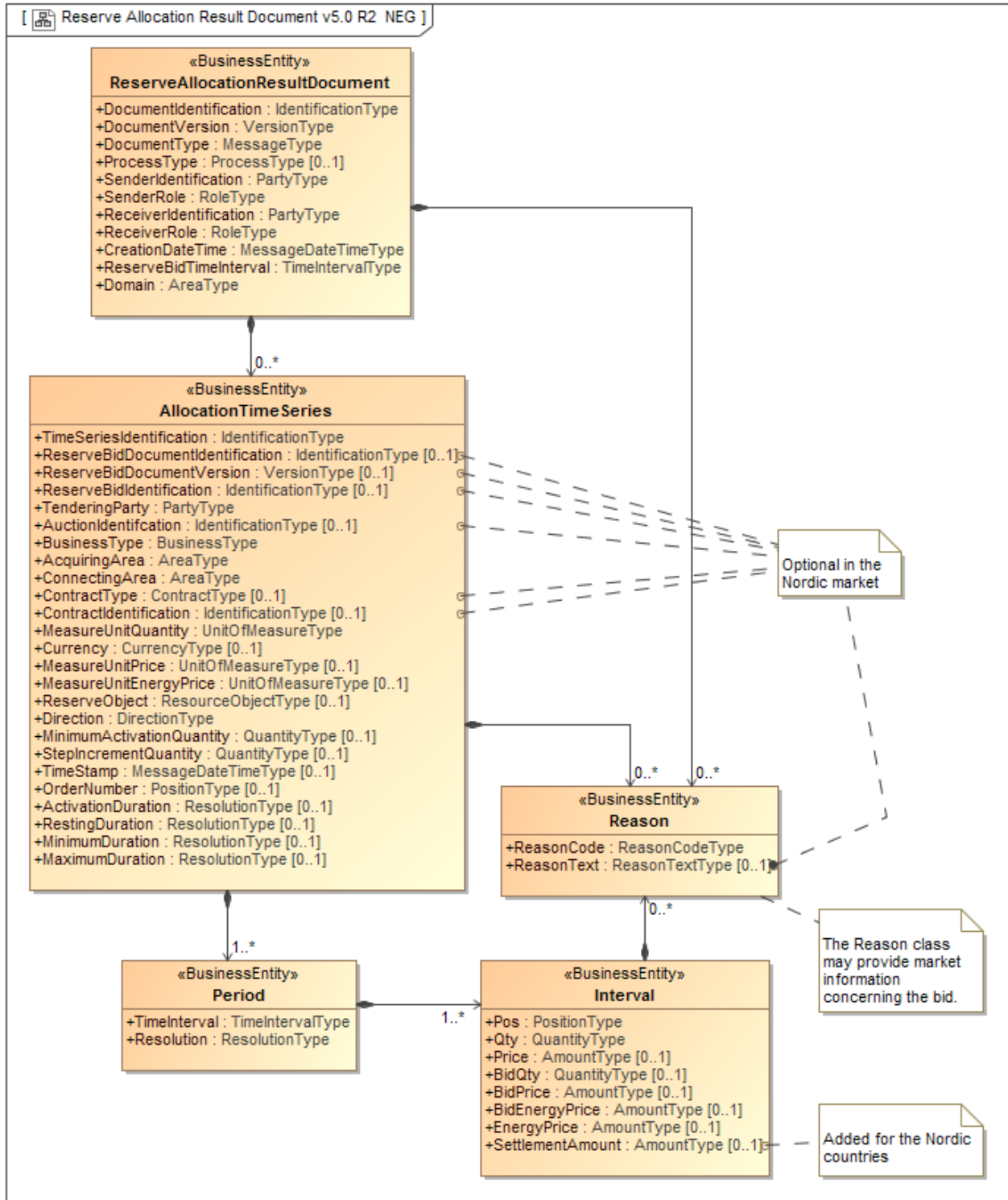


Figure 24: Class diagram: NEG ERRP Reserve Allocation Result Document

*The document is used in the following exchanges:*

- **Table 1:** NBS scheduling phase documents:
  - 20, Activated trades in reserves markets:
    - Reserves Up
    - Reserves Down
    - Supportive power Sold
    - Supportive power Bought

5.3.2 Attribute usage: NEG ERRP Reserve Allocation Result Document

NEG ERRP Reserve Allocation Result Document Attribute	Cl.	Content	Descriptions and comments
<b>Reserve Allocation Result Document</b>	[1]		
Document Identification	[1]	Document ID	Unique identification of the document
Document Version	[1]	"1"	Fixed 1
Document Type	[1]	<b>A38</b>	<b>A38</b> Reserve Allocation Result
Process Type	[1]	Process Type	<b>A28</b> Primary reserve process <b>A29</b> Secondary reserve process <b>A30</b> Tertiary reserve process
Sender Identification	[1]	SO ID	Unique identification of the System Operator, sending the document
Sender role	[1]	<b>A04</b>	<b>A04</b> System Operator
Receiver Identification	[1]	ISR ID	Unique identification of the Imbalance Settlement Responsible, receiving the schedule
Receiver role	[1]	<b>A05</b>	<b>A05</b> Imbalance Settlement Responsible
Creation Date Time	[1]	Creation date/time	The date and time that the document was prepared for transmission by the application of the sender.
Reserve Bid Time Interval	[1]	Start and end date of the time series	The beginning and ending date and time of the period covered by the document.
Domain	[1]	Nordic Market Area ID	Identification of the area covered by the document, i.e. <b>10Y1001A1001A91G</b> (Nordic market area)
<b>Allocation Time Series</b>	[0..*]		
Time Series Identification	[1]	Time series ID	Unique identification of the Time Series (unique over time for the sender in question)
Tendering Party	[1]	BRP or TSO ID	See dependency matrix below
Business Type	[1]	Business Type	<b>A10</b> Tertiary control <b>A11</b> Primary control <b>A12</b> Secondary control
Acquiring Area	[1]	MBA ID	Unique identification of the Market Balance Area (MBA) where the energy is purchased. This will be the same MBA as the Connecting Area, except for supportive power (incl. transit) where the resource is connected in another MBA.
Connecting Area	[1]	MBA ID	Unique identification of the Market Balance Area (MBA) where the resource is connected.
Measure Unit Quantity	[1]	<b>KWH</b> or <b>MWH</b>	<b>KWH</b> kWh <b>MWH</b> MWh
Currency	[1]	Currency	ISO three digit currency code, e.g.: <b>DKK</b> Denmark, krone <b>EUR</b> European Union, Euro <b>NOK</b> Norway, krone

NEG ERRP Reserve Allocation Result Document Attribute	Cl.	Content	Descriptions and comments
			<b>SEK</b> Sweden, krona
Reserve Object	[0..1]	RO ID	See dependency matrix below
Direction	[1]	Direction	<b>A01</b> Up <b>A02</b> Down  For supportive power (incl. transit) the Direction is related to Up- or Down-regulation in the Connecting Area
Reason (Allocation Result Time Series Level)	[0..1]		
Reason Code	[1]	Reason Code	<b>Z22</b> Supportive power <b>Z26</b> Transit triangle <b>Z27</b> Transit redispatch <b>Z28</b> Transit SB Loop Long <b>Z29</b> FCR (Frequency Containment Reserve (FCR) is an automatic and momentarily regulation, to adjust the physical balance in the power system) <b>Z30</b> FRR-A (Frequency Restoration Reserve - Automatic (FRR-A) is an automatic reserve, activated continuously by the frequency) <b>Z31</b> FRR-M, Balancing Power (Frequency Restoration Reserve - Manual activated reserves (FRR-M), Balancing Power) <b>Z34</b> FRR-M, Quarter regulation (Frequency Restoration Reserve - Manual activated reserves (FRR-M), Quarter regulation when TSO need transfer of production (usually start 15 min earlier)) <b>Z35</b> FRR-M, Special Regulation (Frequency Restoration Reserve - Manual activated reserves (FRR-M), Special Regulation where regulation does not affect the regulation price) <b>Z36</b> Hour Change Regulation (In order to reduce problems encountered at the turn of the hour in the Nordic countries or in Finland, Fingrid reserves the right to transfer the planned changes to begin 15 minutes before or after the planned moment) <b>Z37</b> Power Transaction (Fixed price transaction used for specific purposes outside of ordinary regulation) <b>Z38</b> TSO Internal Countertrades (The time series concern TSO Internal Countertrades) <b>Z39</b> Day Ahead Production Adjustment (Energy (production) moved from one hour to another to avoid major changes between hours)
Period	[1..*]		
Time Interval	[1]	Start and end date time	The start and end date and time of the time interval of the period in question.
Resolution	[1]	Resolution	The resolution is expressed in compliance with ISO 8601 in the following format:  PnYnMnDTnHnMnS.  Where nY expresses a number of years, nM a number of months, nD a number of days.

NEG ERRP Reserve Allocation Result Document Attribute	Cl.	Content	Descriptions and comments															
			<p>The letter “T” separates the date expression from the time expression and after it nH identifies a number of hours, nM a number of minutes and nS a number of seconds.</p> <p>In NBS hourly resolution is used, i.e. <b>PT1H</b> or <b>PT60M</b></p>															
Interval	[1..*]																	
Pos	[1]	Position	Position															
Qty	[1]	Quantity	Quantity															
			The resolution is maximum in Watt, i.e. max 3 decimals for kWh and max 6 decimals for MWh															
Settlement Amount	[1]	Amount	<p>Rules for the supportive power (incl. transit) – Reason Codes Z22, Z26, Z27 and Z28</p> <ul style="list-style-type: none"><li>The Acquiring Area is always related to the Buyer and the Connecting Area is always related to the Seller</li><li>Positive values is used when the energy direction is from the Connecting Area to the Acquiring Area, i.e. up-regulation</li><li>Negative values is used when the energy direction is from the Acquiring Area to the Connecting Area, i.e. down-regulation</li></ul> <p>Rules for other Reason Codes:</p> <ul style="list-style-type: none"><li>Settlement Amount is always Quantity multiplied with price</li><li>The table below shows the sign convention to be used</li></ul> <table><tr><td></td><td>Price</td><td>Sign when sending from TSO to eSett</td></tr><tr><td>Up regulation (A01)</td><td>Positive</td><td>Negative</td></tr><tr><td>Up regulation (A01)</td><td>Negative</td><td>Positive</td></tr><tr><td>Down regulation (A02)</td><td>Positive</td><td>Positive</td></tr><tr><td>Down regulation (A02)</td><td>Negative</td><td>Negative</td></tr></table> <ul style="list-style-type: none"><li>When positive prices, up-regulation means negative Settlement Amount while down-regulation means positive Settlement Amount. Opposite sign occur when prices are negative.</li></ul>		Price	Sign when sending from TSO to eSett	Up regulation (A01)	Positive	Negative	Up regulation (A01)	Negative	Positive	Down regulation (A02)	Positive	Positive	Down regulation (A02)	Negative	Negative
	Price	Sign when sending from TSO to eSett																
Up regulation (A01)	Positive	Negative																
Up regulation (A01)	Negative	Positive																
Down regulation (A02)	Positive	Positive																
Down regulation (A02)	Negative	Negative																

**Table 8:** Attribute usage: NEG ERRP Reserve Allocation Result Document

5.3.3 [Dependency matrix: NEG ERRP Reserve Allocation Result Document](#)

Process type	Business type	Reason Code	Tendering Party	Reserve Object	Used in		
					FI	NO	SE
<b>A30</b> Tertiary reserve process	<b>A10</b> Tertiary control	<b>Z22</b> Supportive power	TSO	N/A	✓		
		<b>Z26</b> Transit triangle	TSO	N/A		✓	
		<b>Z27</b> Transit redispatch	TSO	N/A		✓	
		<b>Z28</b> Transit SB Loop Long	TSO	N/A		✓	
		<b>Z31</b> FRR-M, Balancing Power ( <b>NO</b> : Ordinary regulation)	BRP	✓	✓	✓	✓
		<b>Z34</b> FRR-M, Quarter regulation	BRP	✓		✓	
		<b>Z35</b> FRR-M, Special Regulation ( <b>NO</b> : Specially regulation)	BRP	✓	✓	✓	
		<b>Z36</b> Hour Change Regulation ( <b>NO</b> : Move of production)	BRP	✓	✓	✓	
		<b>Z37</b> Power Transaction	BRP	✓	✓		
		<b>Z38</b> TSO Internal Countertrades (Only used in Finland)	BRP	✓	✓		
		<b>Z39</b> Day Ahead Production Adjustment ( <b>NO</b> : Production smoothing)	BRP	✓		✓	✓
<b>A28</b> Primary reserve process	<b>A11</b> Primary control	<b>Z29</b> FCR	BRP	✓	✓	✓	✓
<b>A29</b> Secondary reserve process	<b>A12</b> Secondary control	<b>Z30</b> FRR-A	BRP	✓	✓	✓	✓

**Table 9:** Dependency matrix: NEG ERRP Reserve Allocation Result Document



## 5.4 NEG ECAN Publication Document

The *Publication document* is used for summaries from all markets within the Nordic trading system. The document is based on the *Publication Document* from the ENTSO-E ECAN IG, see [1].

### 5.4.1 Class diagram: NEG ECAN Publication document

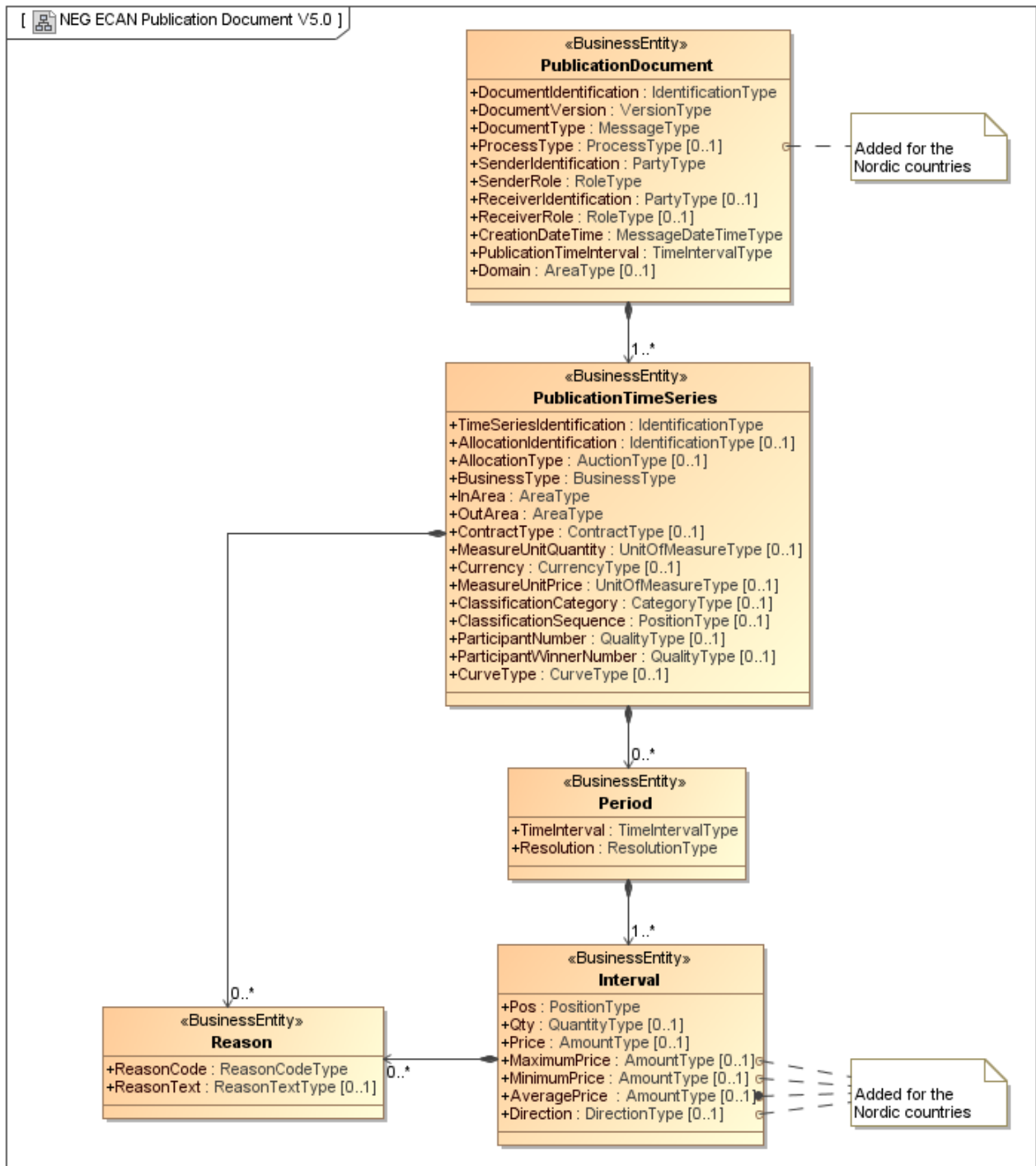


Figure 25: Class diagram: NEG ECAN Publication Document

*The document is used in the following exchanges:*

- **Table 1:** NBS scheduling phase documents:
  - 7, Spot prices (Day-ahead sales report)
  - 21, Balance regulation market prices

5.4.2 Attribute usage: NEG ECAN Publication Document

NEG ECAN Publication Document Attribute	Cl.	Content	Descriptions and comments
<b>Allocation Result Document</b>	[1]		
Document Identification	[1]	Document ID	Unique identification of the document
Document Version	[1]	"1"	Fixed 1
Document Type	[1]	<b>A44</b>	<b>A44</b> Price document
Process Type	[1]	Process Type	<b>A01</b> Day-ahead (Elspot) <b>A30</b> Tertiary reserves process
Sender Identification	[1]	SO or MO ID	Identification of the party who is sending the document
Sender role	[1]	Sender Role	<b>A04</b> System Operator <b>A11</b> Market Operator
Receiver Identification	[1]	ISR ID	Identification of the Imbalance Settlement Responsible, who is receiving the document
Receiver role	[1]	<b>A05</b>	<b>A05</b> Imbalance Settlement Responsible
Creation Date Time	[1]	Creation date/time	The date and time that the message was prepared for transmission by the application of the sender.
Publication Time Interval	[1]	Start and end date of the time series	The beginning and ending date and time of the period covered by the document.
Domain	[1]	Nordic Market Area ID	Identification of the area covered by the document, i.e. <b>10Y1001A1001A91G</b> (Nordic market area)
<b>Publication Time Series</b>	[1..*]		
Time Series Identification	[1]	Time series ID	Unique identification of the Time Series (unique over time for the sender in question)
Business Type	[1]	Business Type	<b>A62</b> Spot price <b>B20</b> Balance up regulation price <b>B21</b> Balance down regulation price <b>B22</b> Main direction (no price) <b>B23</b> Consumption imbalance price <b>B24</b> Production sales imbalance price <b>B25</b> Production purchase imbalance price <b>B26</b> MBAs prices between Market Balance Areas (inter-TSO exchange)  <b>Note regarding Business Type B24 and B25:</b> The view for reporting of sales and purchases is seen from the Imbalance Settlement Responsible (not the BRP).
In Area	[1]	MBA ID	Relevant Market Balance Area (MBA) for the market
Out Area	[1]	MBA ID	Same as In Area for all Business Types, except " <b>B26</b> MBAs prices between Market Balance Areas", where the second border-MBA is used
Currency	[1]	Currency	ISO three digit currency code, e.g.: <b>DKK</b> Denmark, krone <b>EUR</b> European Union, Euro <b>NOK</b> Norway, krone <b>SEK</b> Sweden, krona
Measurement Unit Price	[1]	<b>MWH</b>	<b>MWH</b> MWh

NEG ECAN Publication Document Attribute	Cl.	Content	Descriptions and comments
<b>Period</b>	[1..*]		
Time Interval	[1]	Start and end date time	The start and end date and time of the time interval of the period in question.
Resolution	[1]	Resolution	<p>The resolution is expressed in compliance with ISO 8601 in the following format:</p> <p style="text-align: center;">PnYnMnDTnHnMnS.</p> <p>Where nY expresses a number of years, nM a number of months, nD a number of days. The letter "T" separates the date expression from the time expression and after it nH identifies a number of hours, nM a number of minutes and nS a number of seconds.</p> <p>In NBS hourly resolution is used, i.e. <b>PT1H</b> or <b>PT60M</b></p>
<b>Interval</b>	[1..*]		
Pos	[1]	Position	Position
Price	[0..1]	Price	Price
Direction	[0..1]	Direction	<p><b>A01</b> Up  <b>A02</b> Down  <b>A04</b> Stable</p> <p>Only used if Business Type is <b>B22</b> <i>Main direction</i></p>

**Table 10:** Attribute usage: NEG ECAN Publication Document

## 6 Acknowledgements

NBS will follow the ENTSO-E acknowledgment process [1]:

- A document is controlled within the system environment at two levels:
  1. It is first controlled at system level to detect syntax errors (XML parsing errors, file-processing errors, etc.);
  2. It is then controlled at the application level to detect any semantic errors (invalid data, wrong process, etc.).
- If there is a problem encountered at the first level then a technical acknowledgement will be sent to inform the originator of the problem.
- If errors are encountered at the second level, a negative application acknowledgement will be sent to inform the originator of the problem.
- If the application can successfully process the information then a positive application acknowledgement will be sent to inform the originator that the original document is accepted

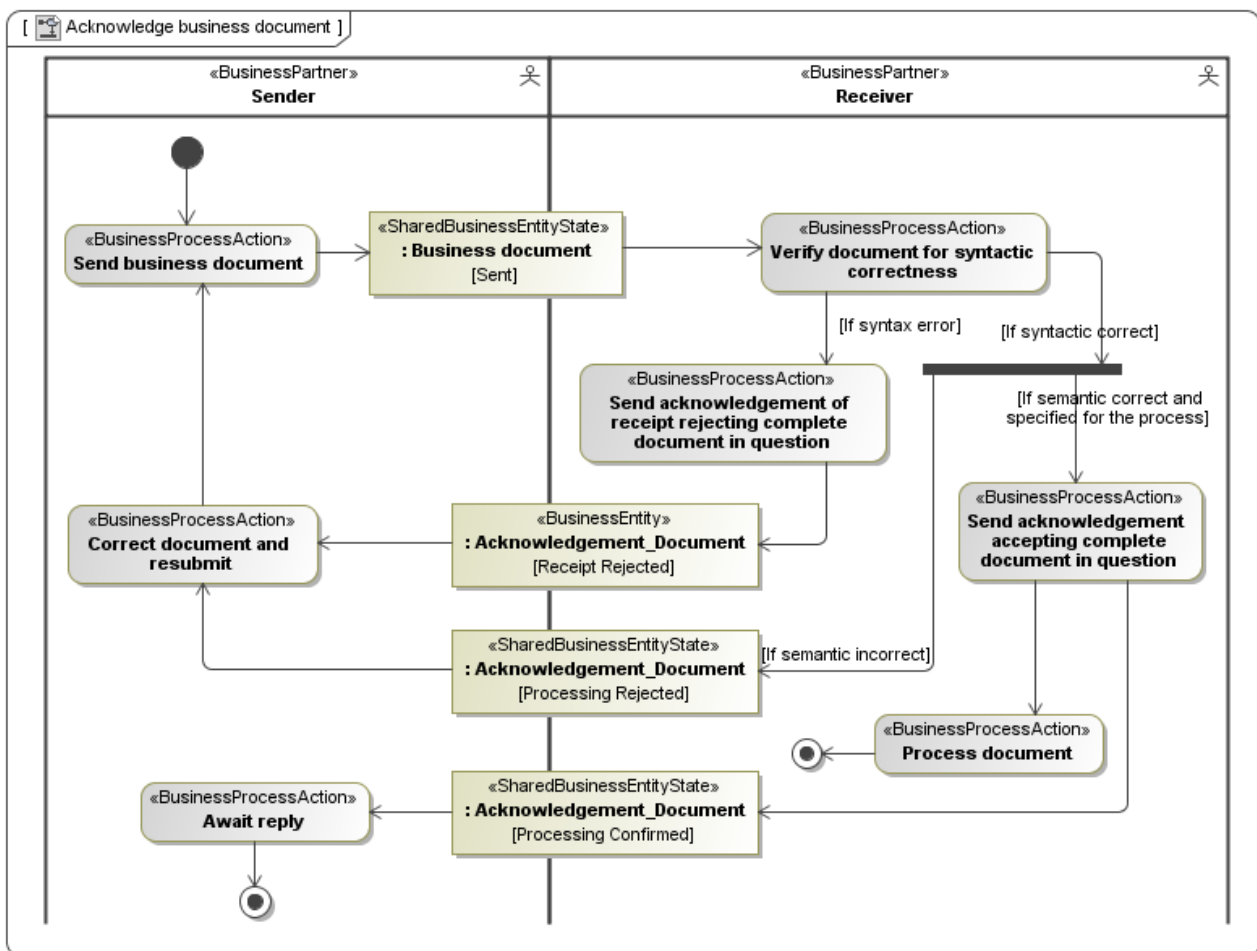


Figure 26: Activity diagram: ENTSO-E Acknowledgement process

Details of the acknowledgment document are found in *Common Nordic XML rules and recommendations* [10].

## 6.1 NBS requirements for acknowledgements

### 6.1.1 All or Nothing Principle

The all-or-nothing principle will be used for acknowledgements from eSett. This means that documents are accepted only if the documents contain no errors. If a document contain at least one error, it will be fully rejected and no partial acceptance will be applied. However, if errors are found in a document, the rest of the document will be gone through and all errors found will be added in the response (if possible).

### 6.1.2 Positive acknowledgements

eSett will send positive acknowledgements on all received documents. Similarly, eSett require acknowledgements in return for all documents sent to the actors.

## 7 Technical business rules

### 7.1 Time Series Identification (Time Series ID)

The *Time Series Identification* shall be an unique ID over time for the originator (sender) of a time series. I.e. every time a time series changed, the originator shall issue a new *Time Series ID*.

Note that this is a Nordic rule that is stricter than what is stated in the ENTSO-E implementation guides, which only requires the Time Series Identification to be unique within the document.

### 7.2 Usage of Resolution and Position

The resolution of a time series period shall always be one hour, expressed according to ISO 8601, i.e. **PT1H** or **PT60M**.

The time interval defined in the period class shall always be a multiple of its resolution.

The position (ebIX® term: Sequence) must begin with 1 and increment by 1 for each subsequent position forming a series of contiguous numbers covering the complete range of the Period.

## **Appendix A Identifying sender and recipient in communication headers**

It is assumed that there will be a SOAP envelope or similar that will contain the physical sender ID and recipient ID of an information exchange. The parties identified in this envelope will be the same parties as today are transmitted in the EDIFACT UNB segment. These parties may be the “juridical parties”, i.e. the parties responsible for the content of the document, or third-parties acting on behalf of the parties responsible for the content of the document.

The document header will contain the “juridical parties”, i.e. the parties responsible for the content of the document. For instance the responsible DSO or Balance Responsible Parties will be explicitly identified in the document header. The parties identified in this document header will be the same parties as today are transmitted in the EDIFACT NAD segments.