

BRS **(Business Requirement Specification)**

Nordic Balance Settlement

A market model for data exchange

Business process: Nordic Balance Settlement
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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. The company eSett Oy has been established to carry out the Nordic Balance Settlement.

As part of preparation for implementation, NBS asked in spring 2013 the Nordic Ediel Group (NEG) to come up with a detailed Business Requirement Specification (BRS) for the NBS processes. This led to a common NEG/NBS project, which drafted the NBS BRSs during summer and autumn 2013. The NEG/NBS project distributed the BRS to the Finnish, Norwegian and Swedish national Ediel organisations in the autumn of 2013, who each pointed out two representatives for a NBS Messaging Forum. The NBS Messaging Forum has during winter 2013/2014 had two meetings where details of the NBS message exchange have been discussed and agreed. Discussions and decisions in the NBS Messaging Forum are based on comments and answers to questions from the NEG/NBS project, discussed in national Ediel groups before each meeting in the NBS Messaging Forum.

Until today, the balance settlement data exchanges in all the Nordic countries have been based on EDIFACT syntax, specified by Ediel and ebIX® framework (Ediel Nordic Forum was renamed ebIX® in 2002, to make it clear that the organisation had gone from a Nordic organisation to an European organisation). In 2001, ENTSO-E (at that time called ETSO) established Work Group EDI, whose task was to standardise message exchanges in the European wholesale market. Ediel, who up to 2001 had worked with standardisation of all document exchanges in the Nordic countries, agreed with WG-EDI that the two bodies split the European data exchange standardisation between them. I.e. ENTSO have the responsibility for the upstream market (communications towards the TSOs), while ebIX® (Ediel before 2002) should have the responsibility for the downstream (retail) market.

ebIX® has during the last decade migrated from EDIFACT to XML as the leading syntax for their documents, while ENTSO-E/WG-EDI has had XML as the one and only choice of syntax from the beginning in 2001. Since the migration to a common Nordic Balance Settlement implies changes to all data systems used by all actors involved in the Nordic Balance Settlement, this is regarded as a good time for migration to XML, also in the Nordic countries. The main arguments are:

- There are no other organisations than ebIX® and ENTSO-E that has standardised documents that can be used for NBS
- The NBS processes covers both downstream documents from ebIX®, such as metered data from the DSOs, and upstream documents from ENTSO-E, such as result of the balance settlement
- ENTSO-E has no alternative to XML as syntax
- ebIX® ebIX® is focusing on XML as the primary syntax and new European implementations (e.g. in Belgium and the Netherlands) have been based on the XML version of the ebIX® framework
- The NordREG and NEG project for a Harmonised Nordic Retail Market will probably suggest a similar migration to XML documents for the other documents exchanged in the downstream Nordic electricity market

1.2 Summary

This document is a Business Requirement Specification (BRS) for the Nordic Balancing System, made by a project group with participants from NBS and NTC (NEG Technical Committee). The project is run as a Nordic project with the Nordic Ediel Group (NEG) as the steering group.

The BRS is detailing the document exchanges needed to perform a Nordic Balance Settlement, seen from the actors in the Nordic downstream energy market. The focus of the document is the technical aspects of the document exchanges and the basis for the documents to be exchanged are the ENTSO-E and ebIX® Implementation Guides and BRSs, see [1] and [2]. In addition the Harmonised Electricity Market Role Model from ENTSO-E, ebIX® and EFET, see [3], is used for identifying the relevant roles used in the BRS.

There is a separate BRS for data exchanges between NBS, and the Nordic TSOs and Market Operators, see [9].

The first part of the document, chapter 2, 3 and 4, describes the business processes relevant for data exchange within the Nordic Balance Settlement (NBS) process area. In chapter 5, Business Data View, the documents that will be exchanged between NBS and the market actors are described in detail.

1.3 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].

1.4 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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1.5 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.

1.6 References

- [1] ENTSO-E implementation guides, see <https://www.entsoe.eu/publications/electronic-data-interchange-edi-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 Capacity Allocation and Nomination System, ECAN
 - 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 Settlement System, documents between eSett, TSOs and Market operator, 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/>
- [14] eSett, Basse Connection Guideline (documentation of eSett Messaging Service and Information Service), see <http://www.esett.com/materials/>

1.7 Change log

Ver/rel/rev	Changed by	Date	Changes
2.0.C	Ove Nesvik	20170505	Textual corrections: <ul style="list-style-type: none"> • Removed Nord Pool logo on the front page • Update of sequence diagram in Figure 4, including: <ul style="list-style-type: none"> ○ Removal of arrow 7, 8 and 9; Documented in BRS for Schedules ○ Removal of arrow 10 (not used) ○ Removal of arrow 4 and 5; documented in BRS for Trade ○ Removal of arrow 7, 8 and 9; documented in BRS for Schedules • Update of Figure 11: <ul style="list-style-type: none"> ○ Removal of "Flow [In Sweden]" • Update of Figure 13: • Removal of "Flow [Only in Sweden]"
2.0.B	Ove Nesvik	20170213	Textual corrections: <ul style="list-style-type: none"> • Updated logos on the front page • Replaced Nord Pool and NPS with Market Operator • Replaced Elspot with Day-ahead • Replaced Elbas with Intraday • Updated NTC and NEG member list
2.0.A	Ove Nesvik	20161121	The status of the document is changed from "For test implementation" to "For implementation".
1.8.F	Ove Nesvik	20160309	<ul style="list-style-type: none"> • Error correction: Changed Business Type A02 to A08 in the content column in the ESS Schedule document and in the ESS Confirmation Report Imposed Time Series
1.8.E	Ove Nesvik	20160309	<ul style="list-style-type: none"> • Error correction: The explanatory text related to quantity in the ESS Confirmation Report (Bilateral trade) is

			corrected. I.e. the quantity is using sign to give the direction.
1.8.D	Ove Nesvik	20160201	<ul style="list-style-type: none"> • Addition of clarifying text for the Capacity Agreement Identification in the ENTSO-E ESS Schedule Document and ENTSO-E ESS Confirmation Report. • Addition of a new chapter 8.2 Usage of Resolution and Position
1.8.C	Ove Nesvik	20151027	<ul style="list-style-type: none"> • Rename of Business Type “Z68, Production Units own consumption (Only used in Finland)” to B36 • Delta values can be signed (be negative) in ENTSO-E ESS Confirmation Report
1.8.B	Ove Nesvik	20151001	<ul style="list-style-type: none"> • Correction of spelling errors, such as: <ul style="list-style-type: none"> ○ Correction to “2-13 calendar days” in Figure 5
1.8.A	Ove Nesvik	20150910	<ul style="list-style-type: none"> • Addition of a new chapter “7, eSett Information Service” • Addition of Metered Data Aggregator (DSO) in figure 20 and 21 (MGA imbalance from eSett to DSO). • Addition of clarifying text • The ENTSO-E ESP Energy Account Report Document (EAR) is renamed to NEG ESP Energy Account Report Document (EAR), since a “namespaced version” is used in NBS • Correction of code list responsible in Appendix B • Addition of Business Type “Z68 Production Units own consumption” in NEG (ebIX® based) Aggregated Data per MGA (E31, E44)
1.7.A	Ove Nesvik	20150421	<ul style="list-style-type: none"> • Changed cardinality for “Currency” from [1] to [0..1] in EAR • Changed cardinality for “Settlement amount” from [1] to [0..1] in EAR. • Addition of chapter 5.5.3 Dependency matrix: Result of the balance settlement • Addition of notes that the maximum length of IDs are 35 characters • Correction of spelling errors
1.6.A	Ove Nesvik	20150123	<ul style="list-style-type: none"> • Addition of a comment below table 13 (Appendix B), that for parties active in more than one country only one id, GS1 or EIC, shall be used when communicating with eSett. • Addition of MGA to ENTSO-E ESP Energy Account Report Document • The BS is made dependent in NEG Aggregated Data per MGA, chapter 5.2 • The term “master data” is used instead of “structure information” where applicable. • NBS is renamed to Imbalance Settlement Responsible (ISR) or eSett, when used as a role. • Update of references
1.5.B	Ove Nesvik	20141205	<ul style="list-style-type: none"> • Update the harmonised roles in chapter 3, i.e. addition of Metering Point Administrator • Textual error corrections
1.5.A	Ove Nesvik	20141017	<ul style="list-style-type: none"> • Document status is changed to “For test implementation” • The time series level in the ebIX® based documents have been made repeatable [1..*]

			<ul style="list-style-type: none"> Chapter “2.4, Overview of information exchange for the NBS metering and settlement phase” is extended with a document for “MGA Imbalance” to the DSO Addition of “A09, Metered Data Aggregator” to the ESP Energy Account Report Document” Correction of spelling errors Restructuring of ESS Schedule Document for Bilateral Trade: <ul style="list-style-type: none"> Reporting on MBA level instead of MGA level Addition of a Bilateral Trade ID (Capacity Agreement Identification) Change of Document Type Code for NEG Confirmation of Aggregated Data per Neighbouring Grid from Z08/Z09 to A07/A08 Addition of version number to use for the ENTSO-E acknowledgement document, i.e. version 5.0. Addition of clarifying text in related to ENTSO-E ESS Confirmation Report (5.7.2) Correction of spelling errors Update of Business Types <ul style="list-style-type: none"> Z53 (B14) Production deviation Z54 (B15) Consumption deviation Z62 (B27) Pumped Z63 (B28) Large installation consumption Z65 (B29) MGA imbalance Update of “Usage of Coding Schemes” in Appendix B
1.4.C	Ove Nesvik	20140422	<ul style="list-style-type: none"> The Business Type Code Z63 <i>Last Resort</i> is renamed to Z63 <i>Large installation consumption</i> in the NEG (ebIX® based) Aggregated Data per MGA (E31, E44) The Business Type Code Z65 <i>MGA imbalance</i> is added to the Energy Account Report document (EAR)
1.4.B	Ove Nesvik	20140418	<ul style="list-style-type: none"> Textual corrections
1.4.A	Ove Nesvik	20140411	<ul style="list-style-type: none"> Addition of a new element <i>Business Type</i> in “ebIX® Aggregated Data per MGA (E31, E44)” and related codes: <ul style="list-style-type: none"> A04 Consumption A07 Net production/consumption A15 Losses A72 Interruptible Consumption Z62 Pumped Z63 Last resort Addition of <i>Quantity</i> in “NEG Confirmation of Aggregated Data Per Neighbouring Grid From Settlement Responsible” Addition of <i>Quantity Missing</i> indicator in “ebIX® Validated Data for Settlement for Aggregator (E66, E44)” Correction of relations in “Figure 7: Outline of the Harmonised role model within the scope of NBS settlement system” Addition of NBS acknowledgement principles Restriction of <i>Resolution Duration</i> to always cover one hour Addition of <i>Unit type</i> MWh Restriction of <i>Energy Quantity</i> to max Watt resolution

			<ul style="list-style-type: none"> The Document type A18 is replaced by A07 / A08 for <i>Bilateral trade confirmation report</i> <i>Reason code A20</i> is removed for the ESS confirmation report on Time Series level
1.3.A	Ove Nesvik	20140117	<ul style="list-style-type: none"> Addition of Business types in EAR <ul style="list-style-type: none"> Z53 Production deviation Z54 Consumption deviation The Balance Responsible Party is required for Swedish MPs and not used for Finnish and Norwegian MPs in <i>ebIX® Aggregated Data per MGA (E31, E44)</i>, see chapter 5.2 Energy Business Process Role is changed to DEA (Metered Data Aggregator) in <i>NEG Confirmation of Aggregated Data Per Neighbouring Grid From Settlement Responsible (Z08, E44)</i>, see chapter 5.4 Addition of Registration Date Time in all <i>ebIX®</i> and NEG documents, see chapter 5.1, 5.2, 5.3 and 5.4 Addition of Quantity Quality “46 Does not exist” for time series on a MP level Addition of clarifying text
1.2.C	Ove Nesvik	20131201	<ul style="list-style-type: none"> Time frame for exchange of data for imbalance settlement will is corrected to 2 - 13 days Addition of a new arrow 23, Confirmation of production plans, in the sequence diagram for the Scheduling phase Addition of a column in the tables describing <i>ebIX®</i> documents, mapping the class diagram attributes to the names used in in XML schemas Addition of clarifying text and corrections of spelling errors
1.2.B	Ove Nesvik	20131115	<ul style="list-style-type: none"> Corrections of spelling errors
1.2.A	Ove Nesvik	20131108	<ul style="list-style-type: none"> Addition of <i>Document Status</i> in the EAR document Update of ESS document class diagram, to be in line with ENTSO-E Update of links to other documents in the sequence diagrams Error corrections, such as: <ul style="list-style-type: none"> Rename of <i>ebIX®, Confirmation of Aggregated Data per Neighbouring Grid For Settlement Responsible</i> to <i>NEG, Confirmation of Aggregated Data per Neighbouring Grid For Settlement Responsible</i> Rename of code E?? to Z08 Addition of Appendix B, Usage of Coding Schemes
1.1.A	Ove Nesvik	20130906	<p>Addition of the following documents (Metering and Settlement phase):</p> <p>Arrow 4, Hourly metered data per Metering Point on production, consumption and exchange</p> <p>Arrow 6, Aggregated hourly metered data per MGA on consumption per BS (RE)/BRP, Settlement method: E02=Non profiled, to Balance Supplier</p> <p>Arrow 7, Aggregated hourly metered data per MGA on consumption per BS (RE)/BRP, Settlement</p>

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			<p>method: E02=Non profiled, to Balance Responsible Party</p> <p>Arrow 9, Aggregated profiled consumption per BS (RE) / BRP and MGA, Settlement method: E01=Profiled, to Balance Supplier</p> <p>Arrow 10, Aggregated profiled consumption per BS (RE) / BRP and MGA, Settlement method: E01=Profiled, to Balance Responsible Party</p>
1.0.A	Ove Nesvik	20130704	First approved version for review and comments

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.

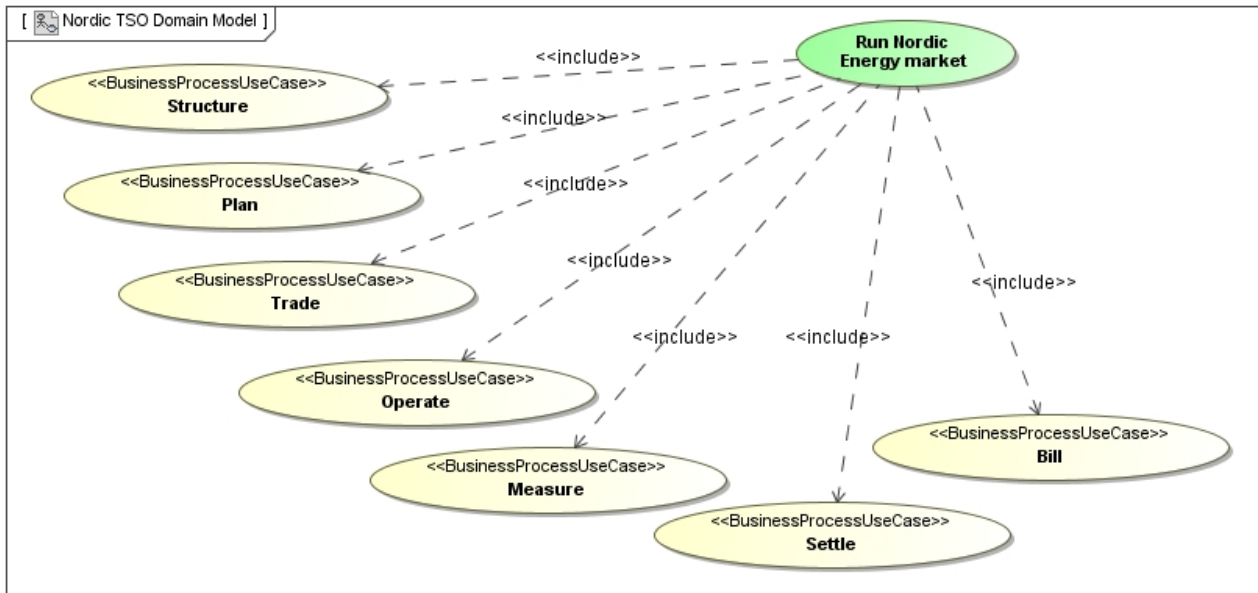


Figure 1: UseCase diagram: ebIX® Energy Market Domain Model

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, Plan and Measure.

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.

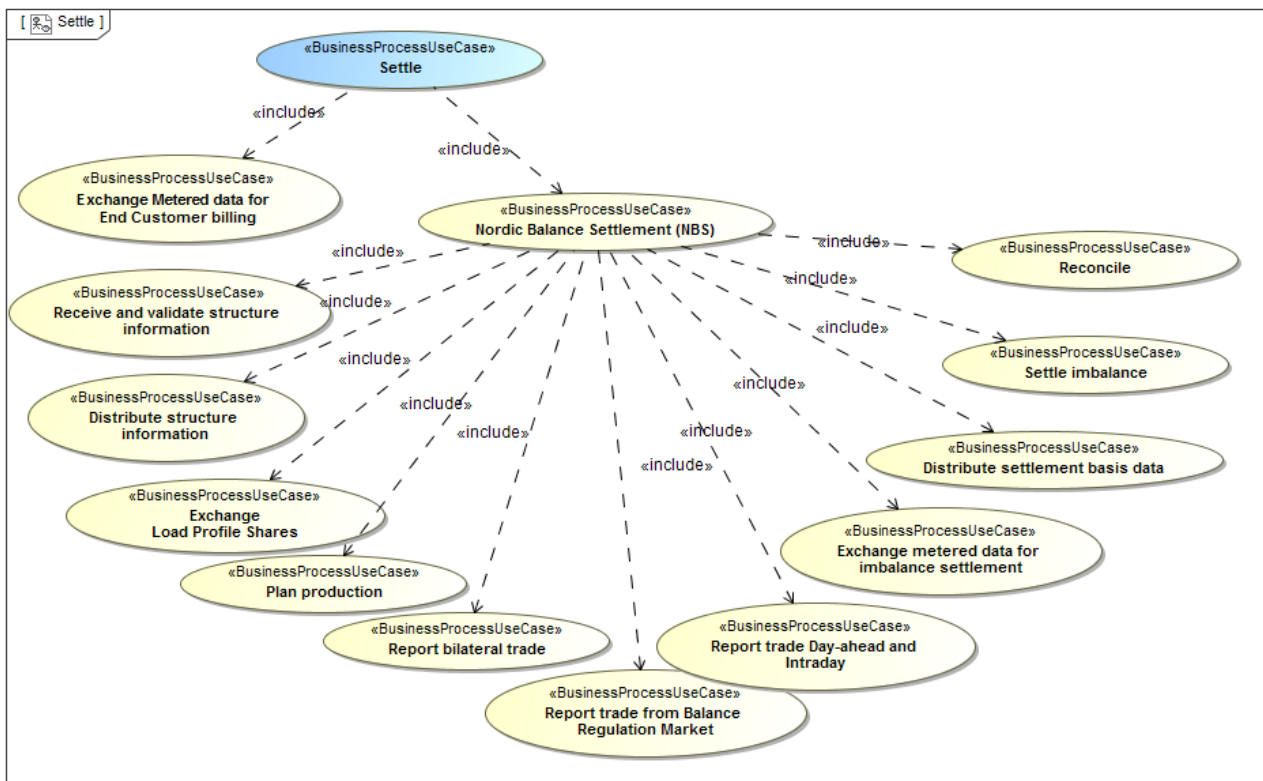


Figure 2: UseCase diagram: Breakdown of the settlement phase

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 (see also chapter 3):

- *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*, who supplies the Imbalance Settlement Responsible with the result of the trade on the day-ahead and intraday markets.

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- *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, 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.

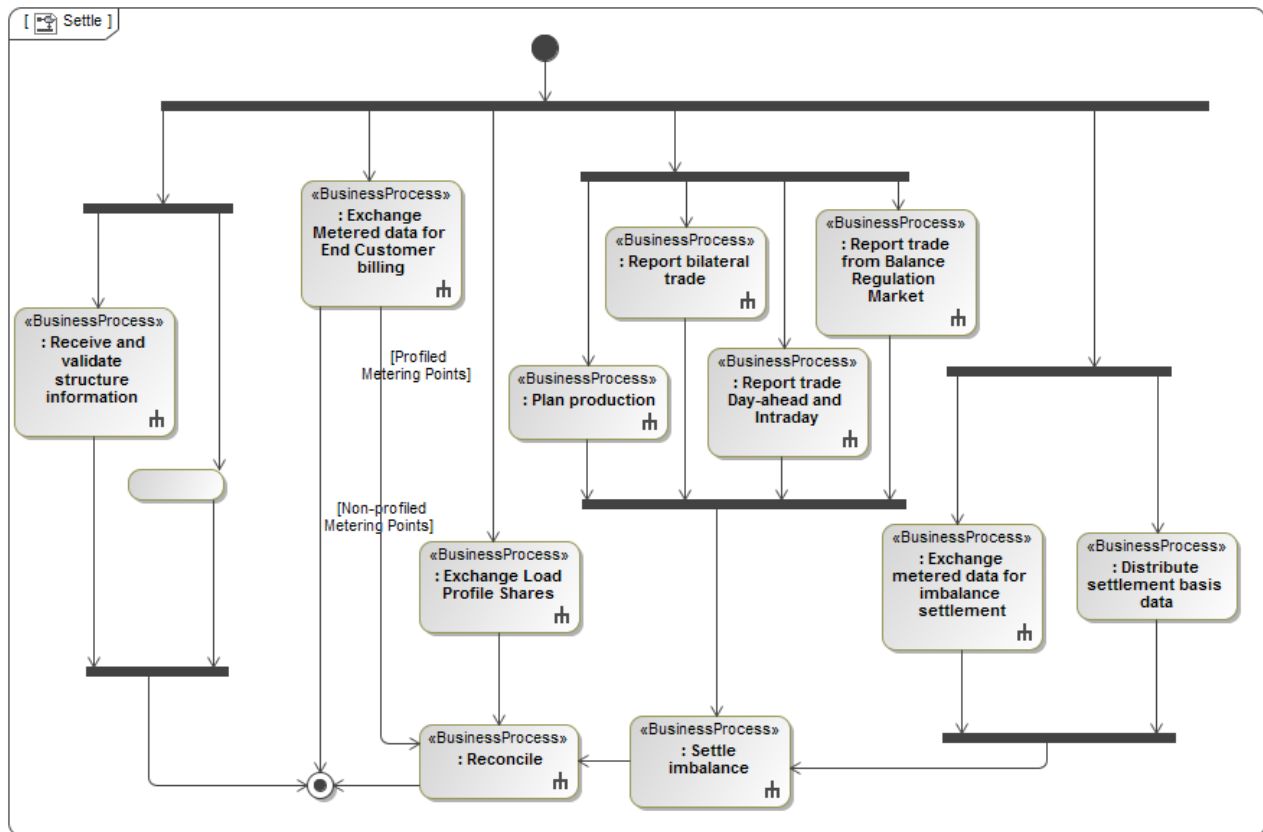


Figure 3 Activity diagram: The Nordic Settlement process

2.3 Overview of information exchange for the NBS scheduling phase

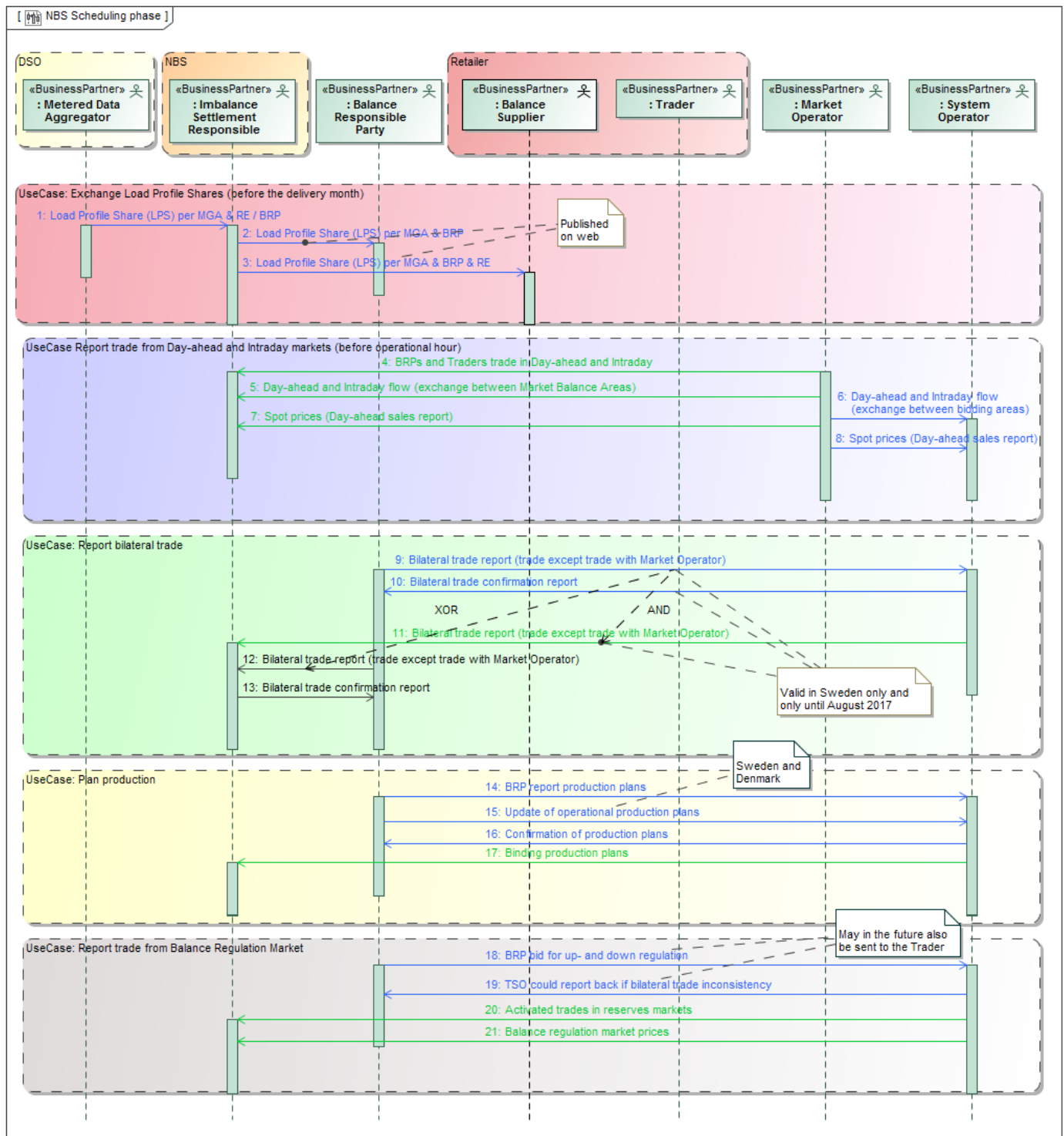


Figure 4 Sequence diagram: The NBS scheduling phase

Comments to the diagram:

- Only documents exchanged between eSett and the Market-players are elaborated in detail in this BRS, i.e. documents (arrows) with black colour. Documents (arrows) with green colour are documented in a separate document [9], while documents (arrows) with blue colour are or will be documented in other BRSs from NEG [7] and [8].
- There is a *first gate closure* for sending in bilateral trade 45 minutes before the operational hour. Thereafter, if there is a mismatch in what the two parties have sent in, there is a *second gate*

closure the next day. Before the *second gate closure*, the parties may choose which bilateral trade to use.

- An Intermediate Confirmation Report is sent every time eSett receives a schedule with bilateral trade (**A07**)
- If changes to the bilateral trade between the two gate closures (on web), an Intermediate Confirmation Report will be sent (**A07**)
- A Final Confirmation Report will be sent after the *second gate closure* (**A08**)

NBS document	Roles	Identified object(s)	Documentation
Before the delivery month			
1. Load Profile Share (LPS) per MGA & RE / BRP			Not handled in the first version of the BRS.
2. Load Profile Share (LPS) per MGA & BRP			Only published on web
3. Load Profile Share (LPS) per MGA & BRP RE			Only published on web
Before gate closure			
4. BRPs and Traders trade in Day-ahead and Intraday	MO → ISR	MBA, BRP or Trader (RE)	ENTSO-E ESS Schedule Document [1] For details see: BRS for NBS, documents between eSett, TSOs and Market operator [9]
5. Day-ahead and Intraday flow (exchange between Market Balance Areas)	MO → ISR	MBA 1, MBA 2	ENTSO-E ESS Schedule Document [1] For details see: BRS for NBS, documents between eSett, TSOs and Market operator [9]
6. Day-ahead and Intraday flow (exchange between Market Balance Areas)			ENTSO-E ESS Schedule Document [1] For details see: BRS for Nordic Scheduling Process [8]
7. Spot prices (Day-ahead sales report)	MO → ISR	MBA	ENTSO-E ECAN Publication Document [1] For details see: BRS for NBS, documents between eSett, TSOs and Market operator [9]
8. Spot prices (Day-ahead sales report)			ENTSO-E ECAN Publication Document [1] For details see: BRS for Nordic Trading System [7]
9. Bilateral trade report (trade except Market Operator trade)			ENTSO-E ESS Schedule Document [1] For details see: BRS for Nordic Scheduling Process [8]
10. Bilateral trade confirmation report			ENTSO-E ESS Confirmation Report [1] For details see: BRS for Nordic Scheduling Process [8]
11. Bilateral trade report (trade except Market Operator trade)	SO → ISR	MBA, Trader 1, Trader 2	ENTSO-E ESS Schedule Document [1] For details see: BRS for NBS, documents between eSett, TSOs and Market operator [9]
12. Bilateral trade report (trade except Market Operator trade)	BRP → ISR	MBA, Trader 1, Trader 2	ENTSO-E ESS Schedule Document [1] For details see: 5.6

NBS document	Roles	Identified object(s)	Documentation
13. Bilateral trade confirmation report	ISR → BRP	MBA, Trader 1, Trader 2	ENTSO-E ESS Confirmation Report [1] For details see: 5.7
14. BRP report production plans			ENTSO-E ERRP Planned Resource schedule [1] For details see: BRS for Nordic Scheduling Process [8]
15. Update of operational production plans			ENTSO-E ERRP Planned Resource schedule [1] For details see: BRS for Nordic Scheduling Process [8]
16. Confirmation of production plans			ENTSO-E ERRP Resource schedule confirmation report [1] For details see: BRS for Nordic Scheduling Process [8]
17. Binding production plans	SO → ISR	MBA, RO, BRP, RE	ENTSO-E ERRP Planned resource schedule [1] For details see: BRS for NBS, documents between eSett, TSOs and Market operator [9]
18. BRP bid for up- and down regulation			ENTSO-E ERRP Reserve Bid Document for Reserve Tenders [1] For details see: BRS for Nordic Trading System [7]
19. TSO could report back if bilateral trade inconsistency			ENTSO-E ESS Confirmation Report [1] For details see: BRS for Nordic Scheduling Process [8]
Short time after gate closure			
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	ENTSO-E ERRP Reserve allocation result document [1] For details see: BRS for NBS, documents between eSett, TSOs and Market operator [9]
21. Balance regulation market prices	SO → ISR	MBA	ENTSO-E ECAN Publication Document [1] For details see: BRS for NBS, documents between eSett, TSOs and Market operator [9]

Table 1: NBS scheduling phase documents

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

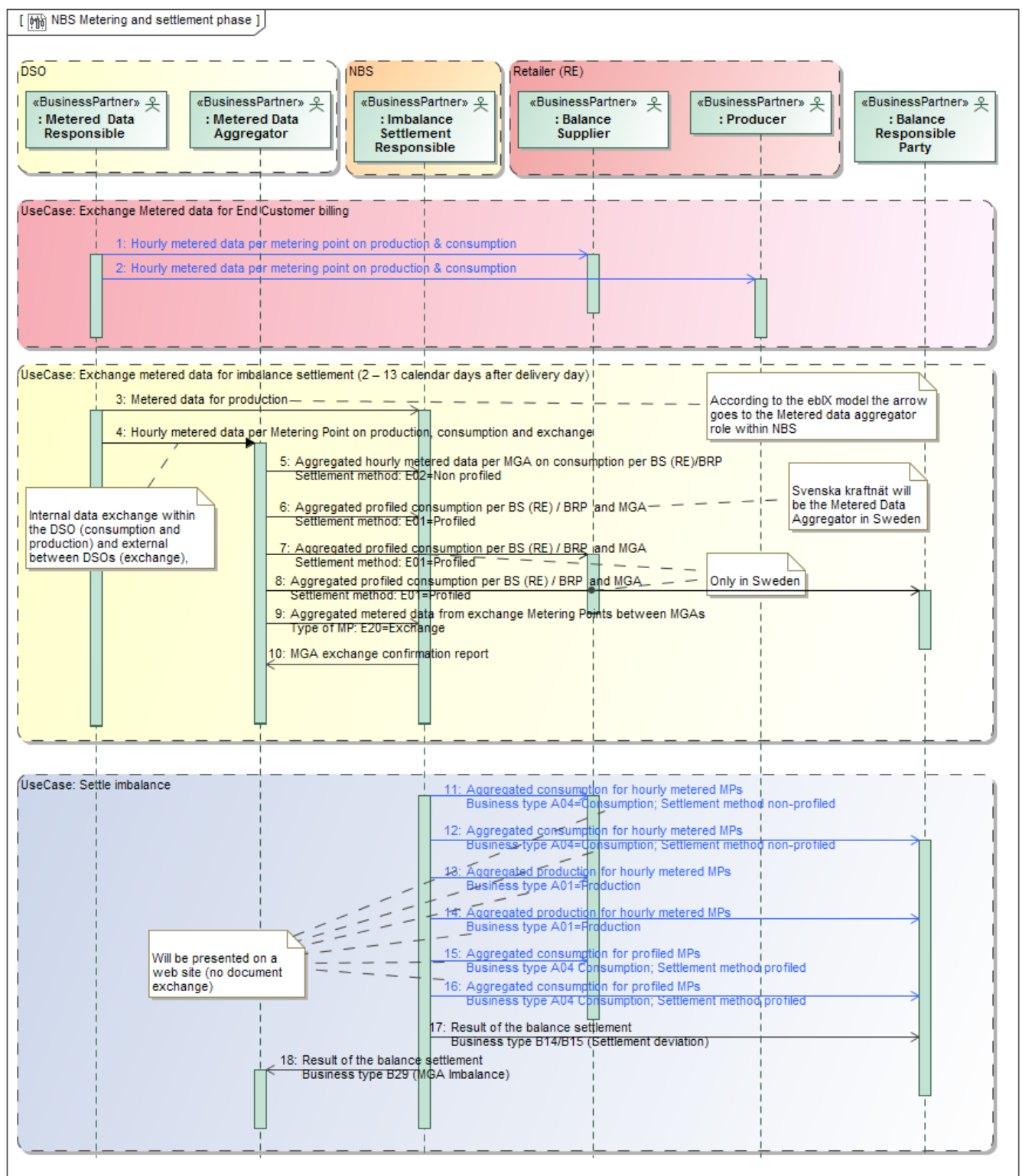


Figure 5 Sequence diagram: The NBS metering and settlement phase

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.
- Only documents exchanged between eSett and the Market-players are elaborated in detail in this BRS, i.e. documents (arrows) with black colour. Documents (arrows) with blue colour are or will be documented in other BRSs from NEG [7] and [8].
- The documents (arrow) **13** to **18** will be published on a web-site, i.e. not further elaborated in this document.

NBS document	Roles	Identified object(s)	Documentation
Reporting metered data 2 - 13 days after delivery day			
1. Hourly metered data per metering point on production & consumption			ebIX® EMD model measure for billing, Validated Data for Billing Energy (E66, E88) [2] Will be detailed in project for Harmonised Nordic Retail Market
2. Hourly metered data per metering point on production & consumption			ebIX® EMD model measure for billing, Validated Data for Billing Energy (E66, E88) [2] Will be detailed in project for Harmonised Nordic Retail Market
3. Metered data for production	DSO → ISR	MP (RO)	NEG Validated Data for Settlement for Aggregator (E66, E44 (Settlement)), based on ebIX® EMD model measure for Imbalance Settlement [2] For details see: 5.1.2
4. Hourly metered data per metering point on production, consumption and exchange	DSO → DSO	MGA1 and MGA2	NEG Validated Data for Settlement for Aggregator (E66, E44 (Settlement)), based on ebIX® EMD model measure for Imbalance Settlement [2] For details regarding internal data exchange within the DSO (consumption and production) see: 5.1.2. For details regarding MGA exchange see: 5.1.3 Note: This message is not within the scope of eSett
5. Aggregated BS (RE) / BPR hourly metered data per MGA on consumption Settlement method: E02=Non profiled	DSO → ISR	MGA, BRP, BS	NEG Aggregated Data per MGA for Imbalance Settlement to Settlement Responsible (E31, E44), based on ebIX® EMD model measure for Imbalance Settlement [2] For details see: 5.2
6. Profiled consumption per BS (RE) / BPR per MGA Settlement method: E01=Profiled	DSO → ISR	MGA, BRP, BS	NEG Aggregated Data per MGA for Imbalance Settlement to Settlement Responsible (E31, E44), based on ebIX® EMD model measure for Imbalance Settlement [2] For details see: 5.2

NBS document	Roles	Identified object(s)	Documentation
7. Profiled consumption per BS (RE) / BPR per MGA Settlement method: E01=Profiled	DSO → BS	MGA, BRP, BS	NEG Aggregated Data per MGA for Imbalance Settlement to Settlement Responsible (E31, E44), based on ebIX® EMD model measure for Imbalance Settlement [2] For details see: 5.2 Note: This message is not within the scope of eSett and is only used in Sweden
8. Profiled consumption per BS (RE) / BPR per MGA Settlement method: E01=Profiled	DSO → BRP	MGA, BRP, BS	NEG Aggregated Data per MGA for Imbalance Settlement to Settlement Responsible (E31, E44), based on ebIX® EMD model measure for Imbalance Settlement [2] For details see: 5.2 Note: This message is not within the scope of eSett and is proposed removed by the NBS messaging forum
9. Aggregated metered data from exchange Metering Points between MGAs Type of MP: E20=Exchange	DSO → ISR	MGA 1, MGA 2, Responsible MGA	NEG Aggregated Data per Neighbouring Grid For Settlement Responsible (E31, E44), based on ebIX® EMD model measure for Imbalance Settlement [2] For details see: 5.3
10. MGA exchange confirmation report	ISR → DSO	MGA 1, MGA 2, Responsible MGA	NEG Confirmation of Aggregated Data per Neighbouring Grid For Settlement Responsible (A07/A08, E44) [2] For details see: 5.4
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)
After the Balance settlement			
17. Result of the balance settlement Business type B14/B15 (Settlement deviation)	ISR → BRP	MBA, BRP	NEG ESP Energy account report (EAR) For details see: 5.5

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NBS document	Roles	Identified object(s)	Documentation
18. Result of the balance settlement – MGA Imbalance Business type B29 (MGA Imbalance)	ISR → MDA	MGA, BRP	NEG ESP Energy account report (EAR) For details see: 5.5

Table 2: NBS metering and settlement phase documents

2.5 Overview of information exchange for the NBS reconciliation phase

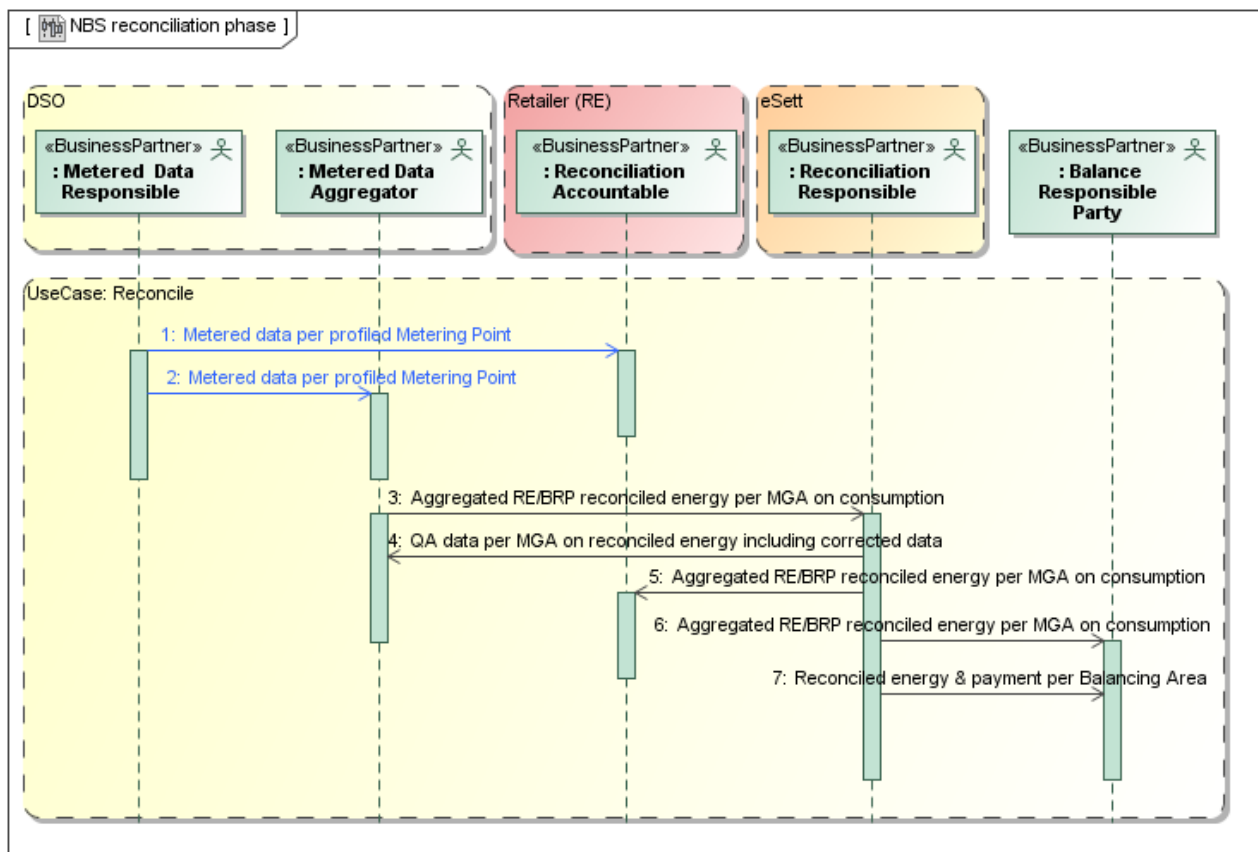


Figure 6 Sequence diagram: The NBS reconciliation phase

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 system, i.e. currently not further elaborated in this document

NBS document		IG and document	
Reporting of metered data of Profiled Metering Points			
1.	Metered data per profiled Metering Point	ebIX® EMD Validated Data For Reconciliation (E66 / E43 (Reconciliation)) [2]	
		Will be detailed in project for Harmonised Nordic Retail Market	
2.	Metered data per profiled Metering Point	Internal dataflow within the DSO. Not documented.	
Reporting reconciliation settlement			
3.	Aggregated RE/BRP reconciled energy per MGA on consumption	Not handled in the first version of a common NBS.	
4.	QA data per MGA on reconciled energy including corrected data	Not handled in the first version of a common NBS.	
5.	Aggregated RE/BRP reconciled energy per MGA on consumption	Not handled in the first version of a common NBS.	
6.	Aggregated RE/BRP reconciled energy per MGA on consumption	Not handled in the first version of a common NBS.	
7.	Reconciled energy & payment per Balancing Area	Not handled in the first version of a common NBS.	

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.

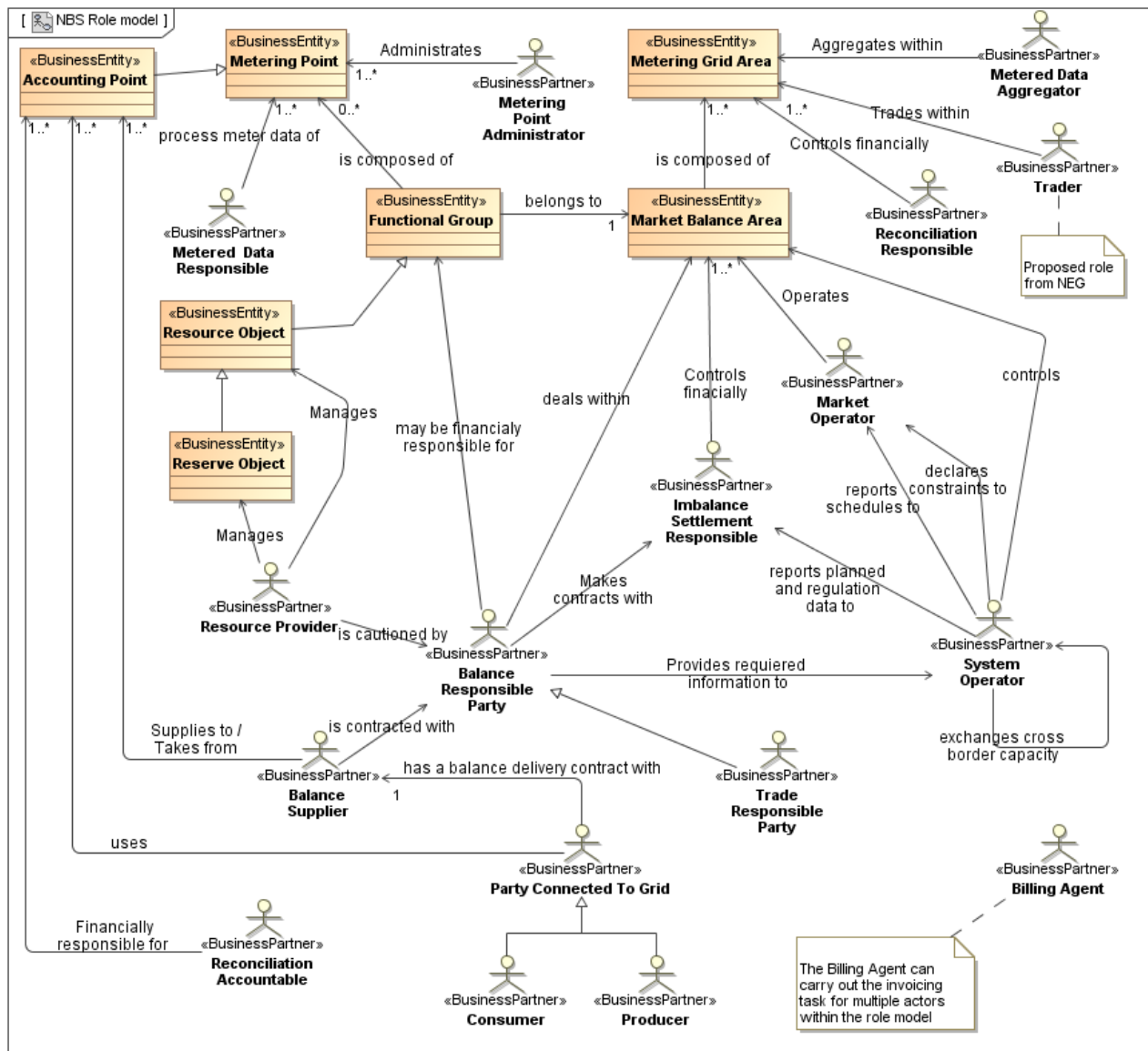


Figure 7: Outline of the Harmonised role model within the scope of NBS system

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.

Balance Supplier: 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.

Additional information:

There is only one Balance Supplier for each Accounting Point.

Billing Agent: The party responsible for invoicing a concerned party.

Consumer: A party that consumes electricity.

Additional information:

This is a Type of Party Connected to the Grid.

Imbalance Settlement Responsible: 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.

Note:

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.

Market Operator: 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.

Metered Data Aggregator: 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.

Metered Data Responsible: 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

Metering Point Administrator: 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.

Party Connected To Grid: A party that contracts for the right to consume or produce electricity at an Accounting Point.

Producer: A party that produces electricity.

Additional information:

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.

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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

Accounting Point:	<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>
Functional Group:	<p>A collection of Metering Points for consumption and generation within a Market Balance Area.</p>
Market Balance Area:	<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>
Metering Grid Area:	<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>
Metering Point:	<p>An entity where energy products are measured or computed.</p>
Reserve Object:	<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>
Resource Object:	<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

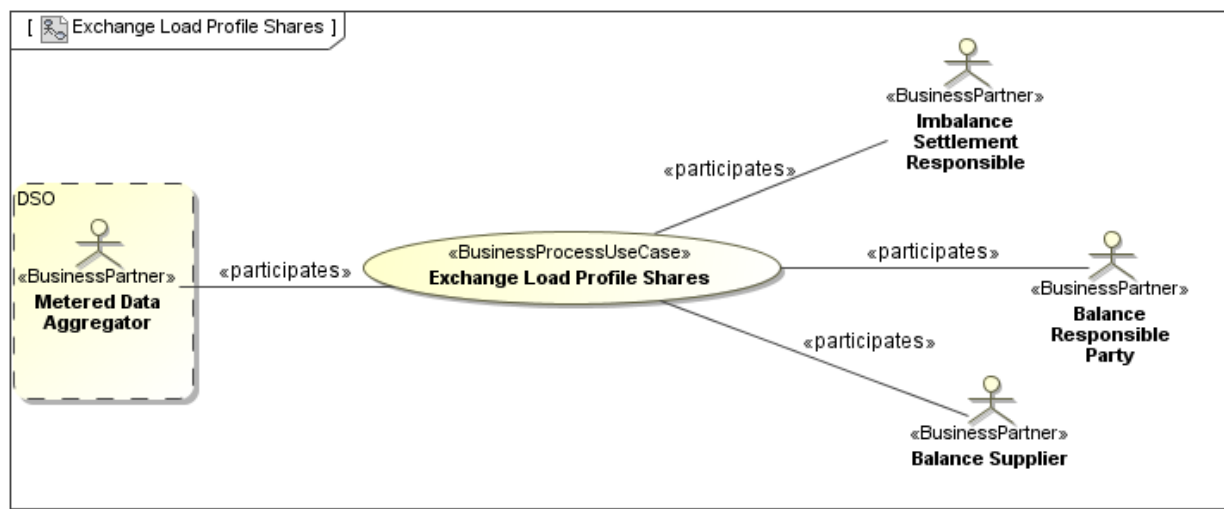


Figure 8: UseCase: Exchange Load Profile Shares

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.

This process is not a part of the first version of a common Nordic Balance Settlement.

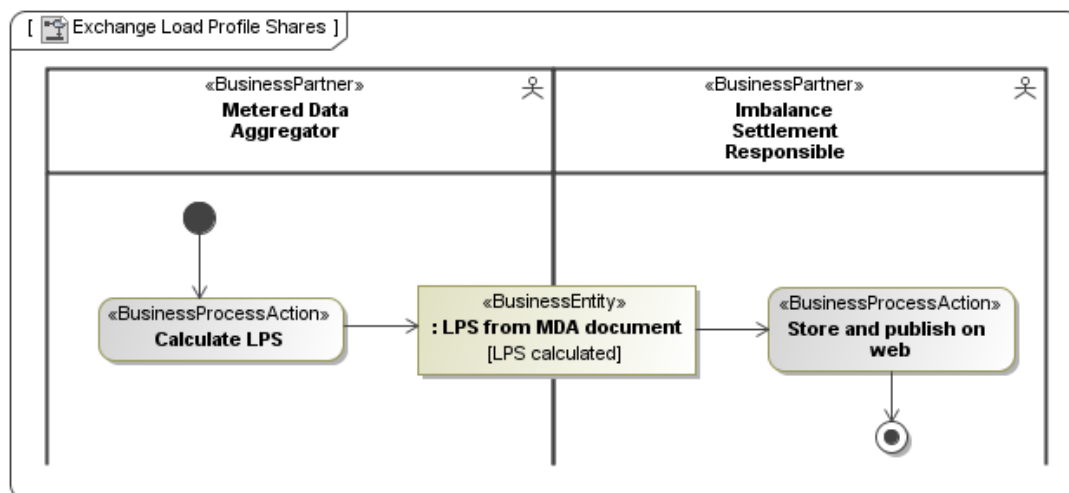


Figure 9: Activity diagram: Exchange Load Profile Shares

4.4 Process area: Report trade from Day-ahead and Intraday

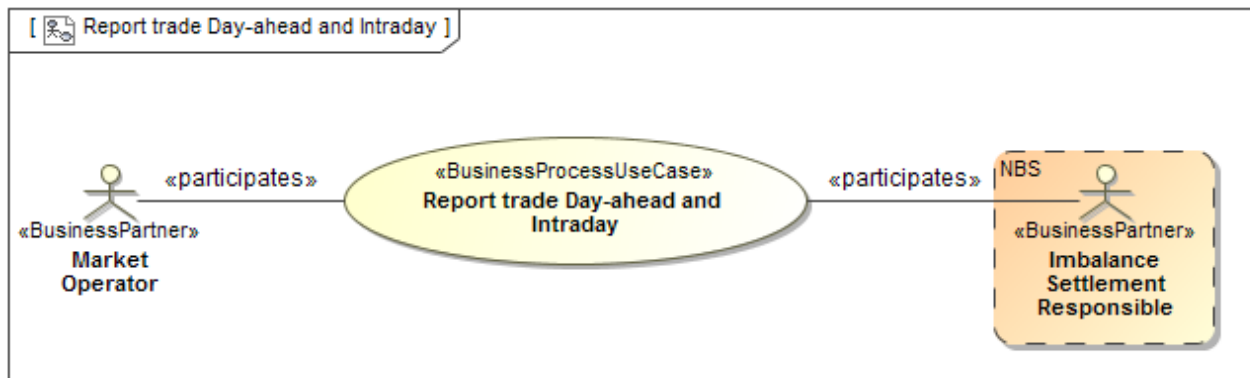


Figure 10: UseCase: Report trade from Day-ahead and Intraday

On the *day-ahead 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 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 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 Market Operator are given access to the *day-ahead market*. However, day-ahead market participants must have a balancing agreement with the respective Transmission System Operator or through a third party.

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

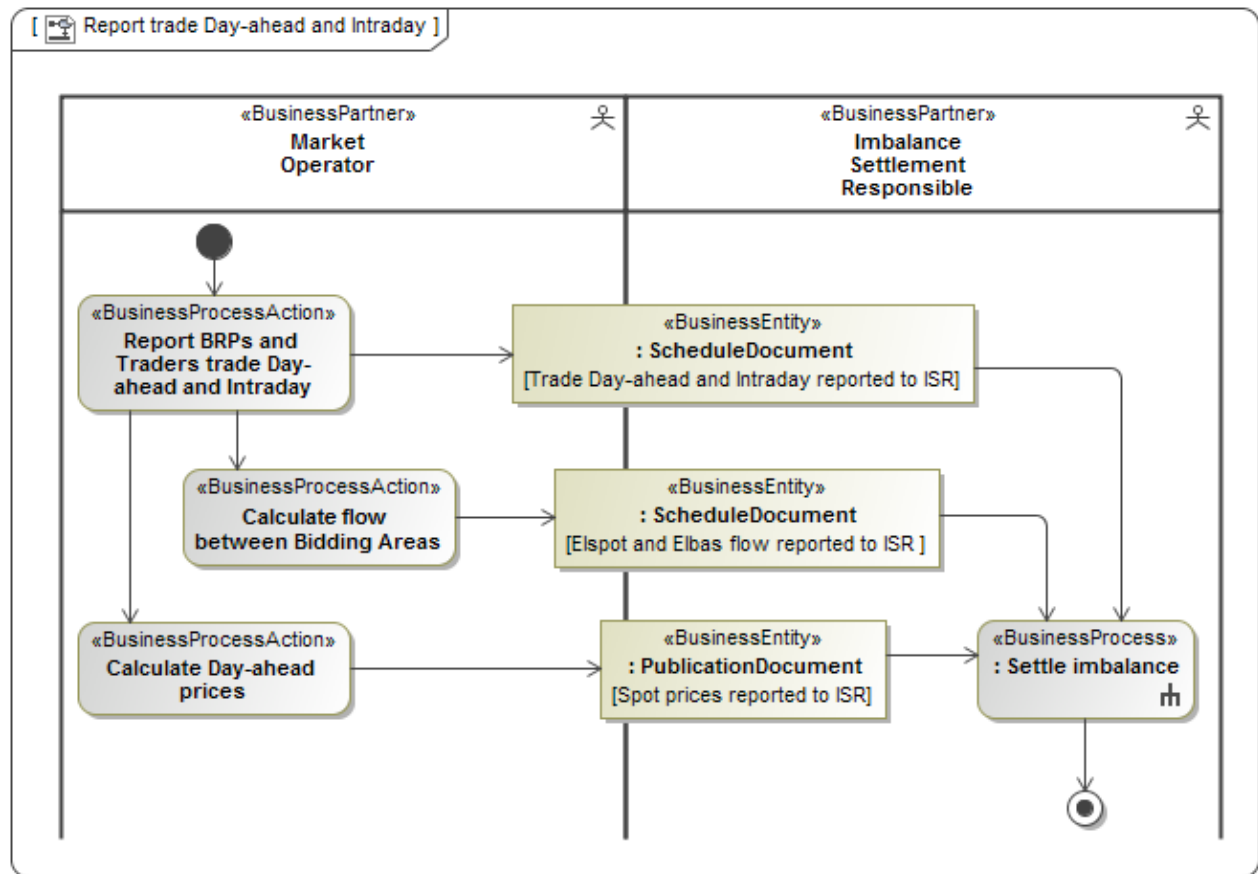


Figure 11: Activity diagram: Report trade from Day-ahead and Intraday

Comment to the diagram:

- Only actions and documents related to NBS is shown

4.5 Process area: Report bilateral trade

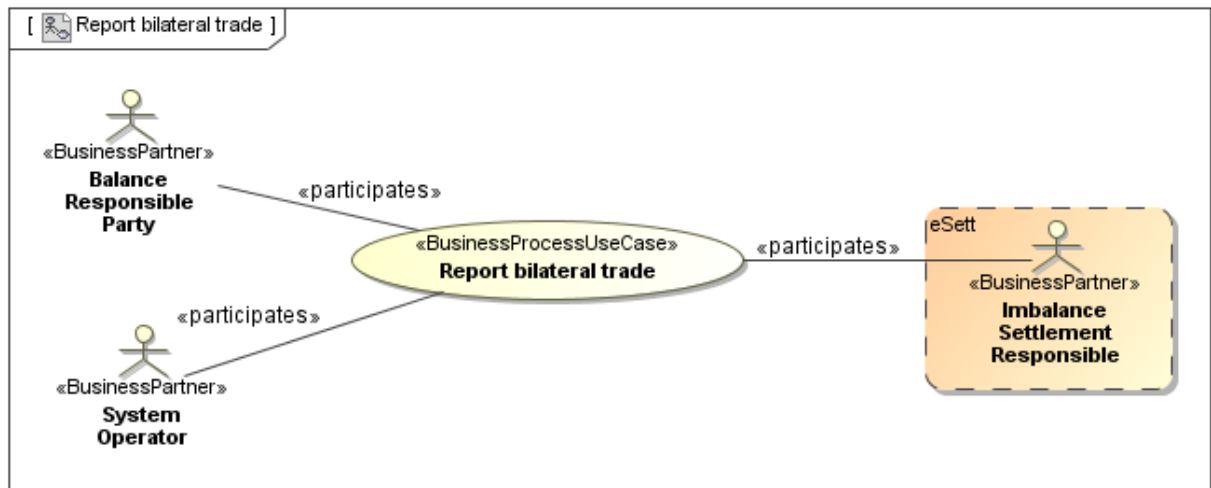


Figure 12: UseCase: Report bilateral trade

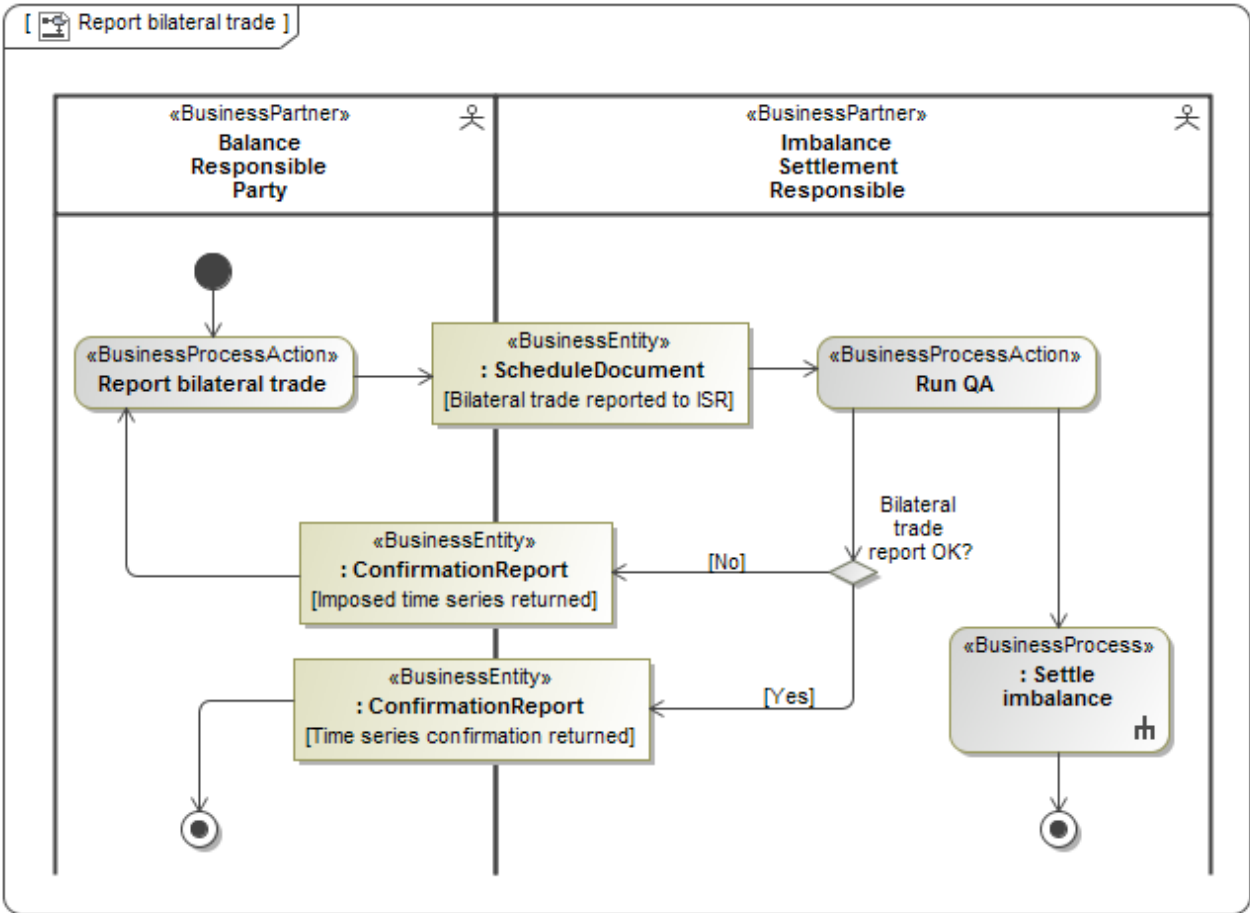


Figure 13: Activity diagram: Report bilateral trade

Nordic Balance Settlement

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:

- The BRPs are responsible for submitting time series for bilateral trade
- One or both BRPs can submit data.
- Before 1st gate closure; 45 minutes before the delivery hour
 - Matching will be performed every time a bilateral trade is received
 - An iCNF (intermediate confirmation report) will be sent to both BRPs. The iCNF will include the delta and the matched value
- Between 1st and 2nd gate closure (2nd gate closure is 12:00 the day after the delivery day).
 - Hours where match is achieved by acceptance of the counterparts values
 - The BRPs have the possibility to manually accept to use the counterparts' values in hours where there is no match. The BRP may do this hour by hour or for a longer time period in the same operation.
 - Both BRPs have equal rights to accept to use the counterparts' values. This is based on the "first come first serve" principle. The values can only be corrected once between 1st and 2nd gate closure.
 - For hours where one of the BRPs have chosen to accept the counterparts values a fCNF will be sent short time after (Allow some time to incorporate more than one hour in the fCNF)
- After 2nd gate closure (2nd gate closure is 12:00 the day after the delivery day).
 - fCNF will be sent for all hours of the previous day

4.6 Process area: Plan production

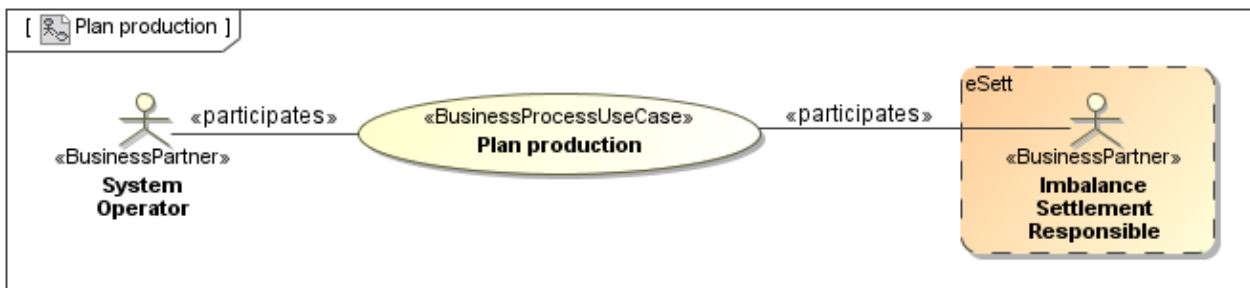


Figure 14: UseCase: Plan production

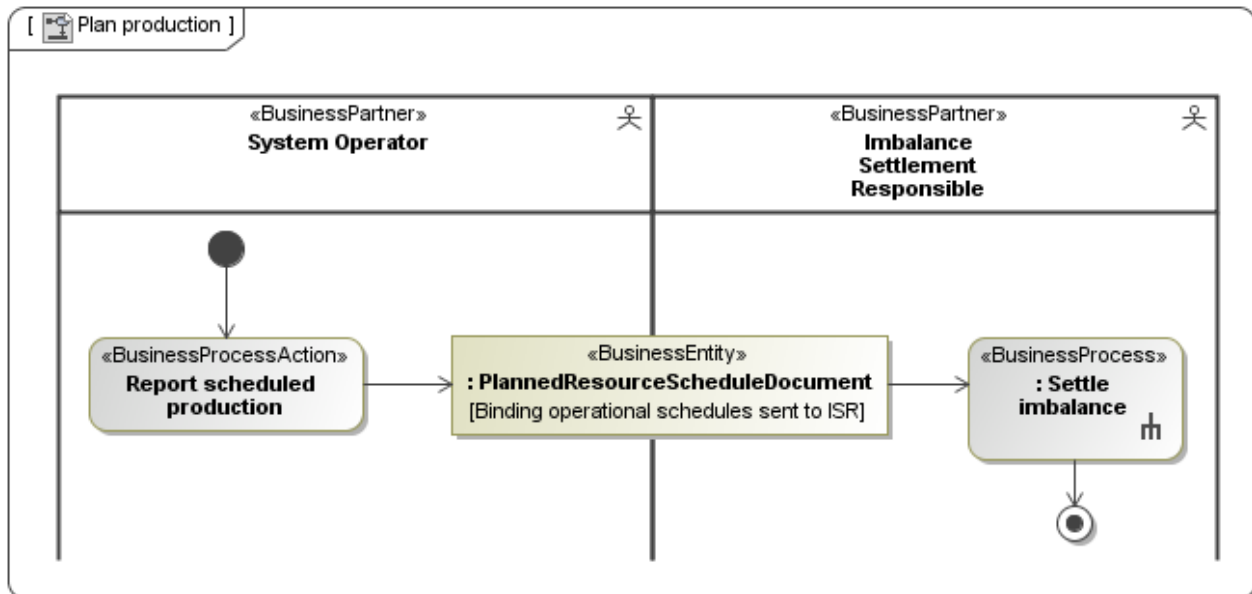


Figure 15: Activity diagram: Plan production

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*.

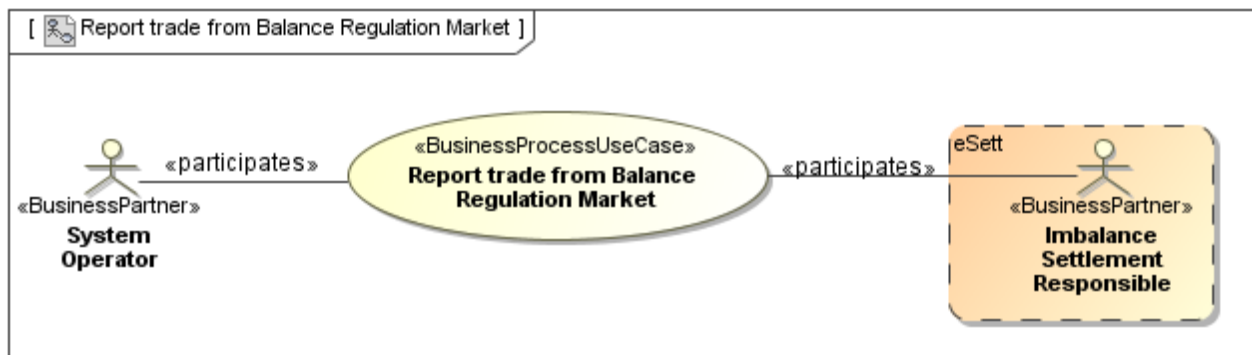


Figure 16: UseCase: Report trade from Balance Regulation Market

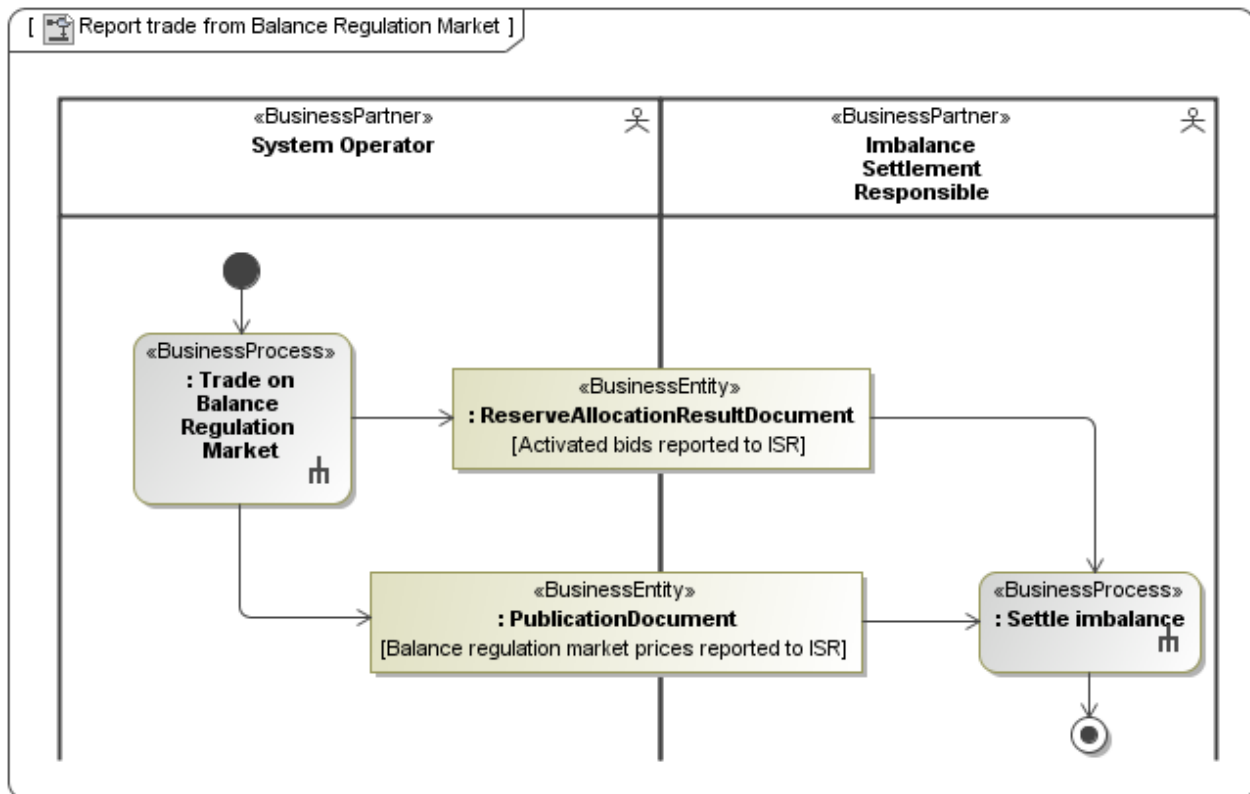


Figure 17: Activity diagram: Report trade from Balance Regulation Market

4.8 Process area: Exchange metered data for imbalance settlement

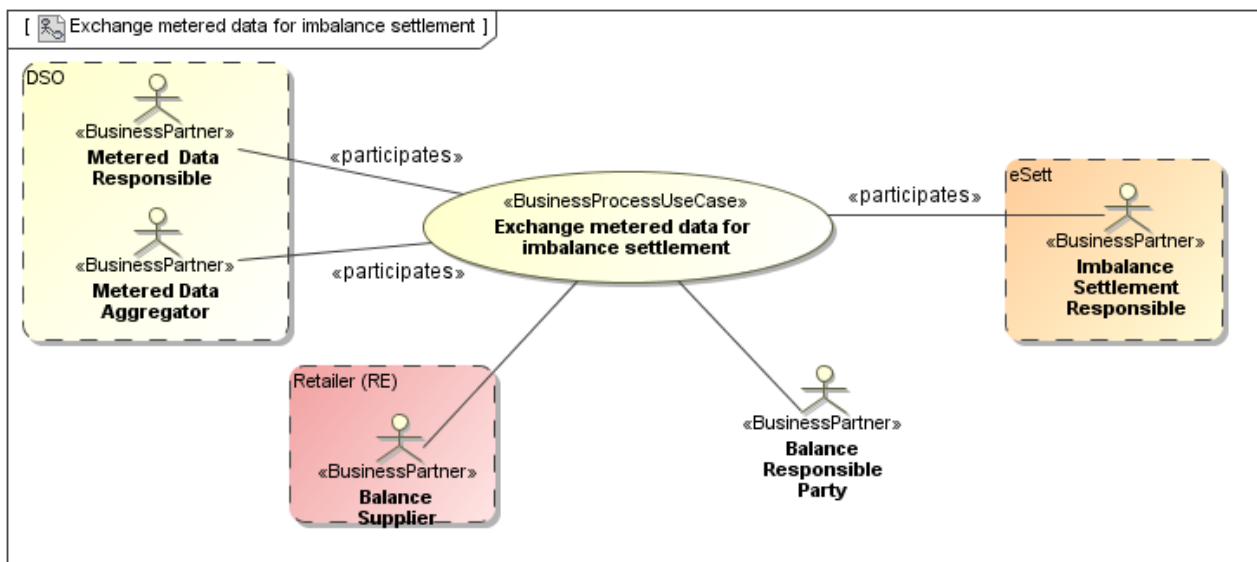


Figure 18: UseCase: Exchange metered data for imbalance settlement

The Metered Data Aggregator (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

Nordic Balance Settlement

- 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

In addition, it is proposed that the Metered Data Aggregator (DSO) shall report aggregated metered data to the Balance Suppliers and Balance Responsible Parties (**Note:** These messages is not within the scope of eSett and is proposed removed by the NBS messaging forum):

- Aggregated hourly metered consumption per Balance Supplier, 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. Rules for how and when to estimate will be stated in the NBS handbook [12].

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).

|

For MGA-MGA exchanges the following rules apply:

- The DSOs are responsible for submitting time series for exchange between MGAs
- One or both DSOs can submit data.
- Before gate closure
 - Matching will be performed every time MGA-MGA exchanges is received
 - An iCNF (intermediate confirmation report) will be sent to both DSOs. The iCNF will include the delta and the matched value
- After gate closure a fCNF (final confirmation report) will be sent for all hours of the relevant period

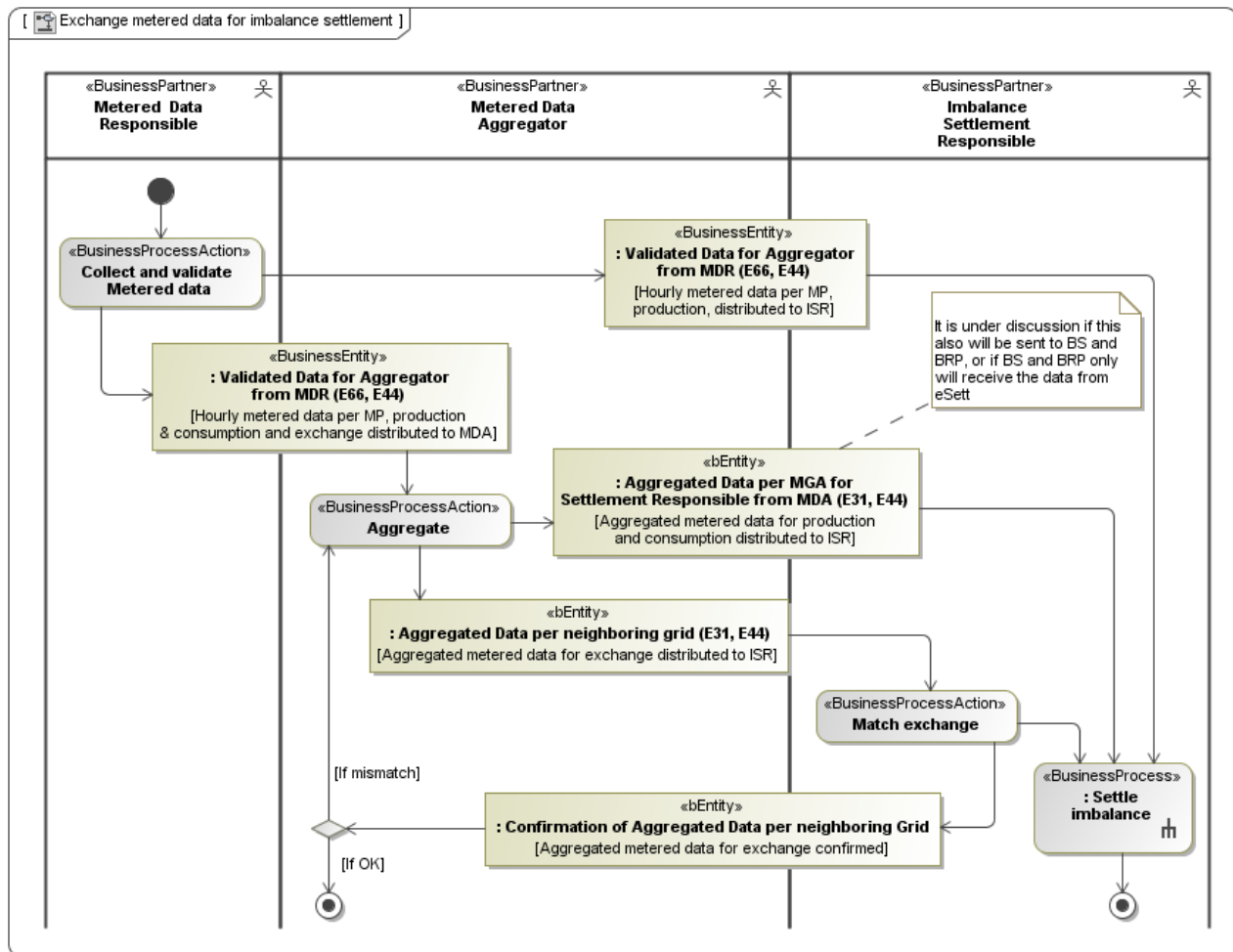


Figure 19: Activity diagram: Exchange metered data for imbalance settlement

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

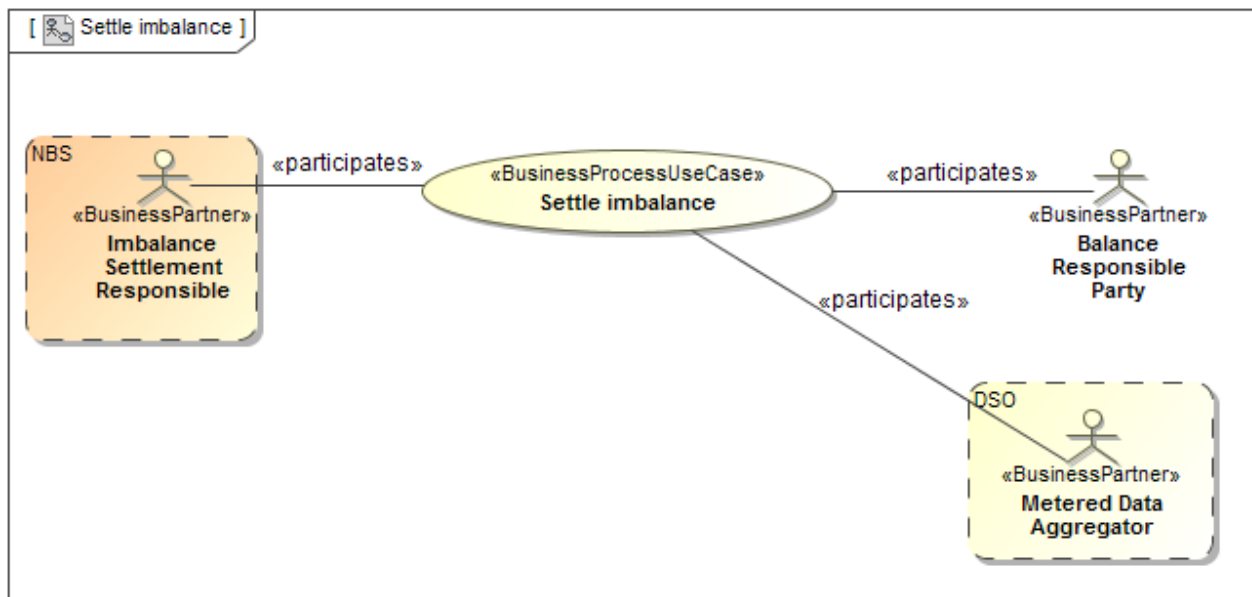


Figure 20: UseCase: Settle imbalance

The Imbalance Settlement Responsible provides the result of the imbalance settlement to the Balance Responsible Parties. In addition, the MGA imbalance is sent to the Metered Data Aggregator (DSO).

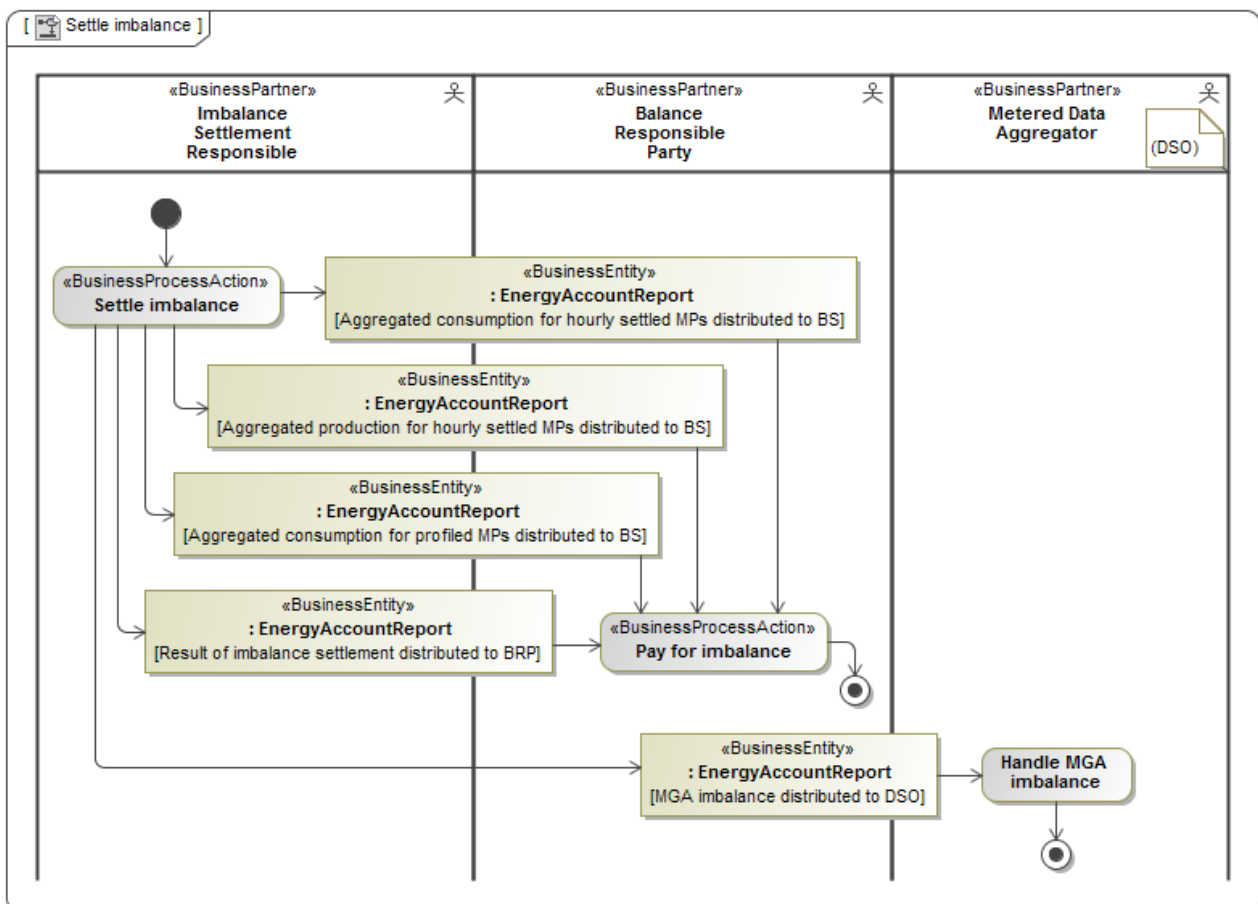


Figure 21: Activity diagram: Settle imbalance

4.11 Process area: Reconcile

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

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 NEG (ebIX® based) Validated Data for Settlement for Aggregator (E66, E44)

The NEG (ebIX® based) document *Validated Data for Settlement for Aggregator* is used for sending metered data per metering point from a Metered Data Responsible (e.g. DSO) to:

- The Imbalance settlement Responsible for production metering points
- Other DSOs for exchange between Metering Grid Areas
- Metered data Aggregator (MDA). The MDA can be an internal role within the DSO or a datahub

The NEG (ebIX® based) Validated Data for Settlement for Aggregator (E66, E44) is documented in the ebIX® Business information model for Measure Exchange metered data for Billing, see [2].

5.1.1 Class diagram: NEG (ebIX® based) Validated Data for Settlement for Aggregator (E66, E44)

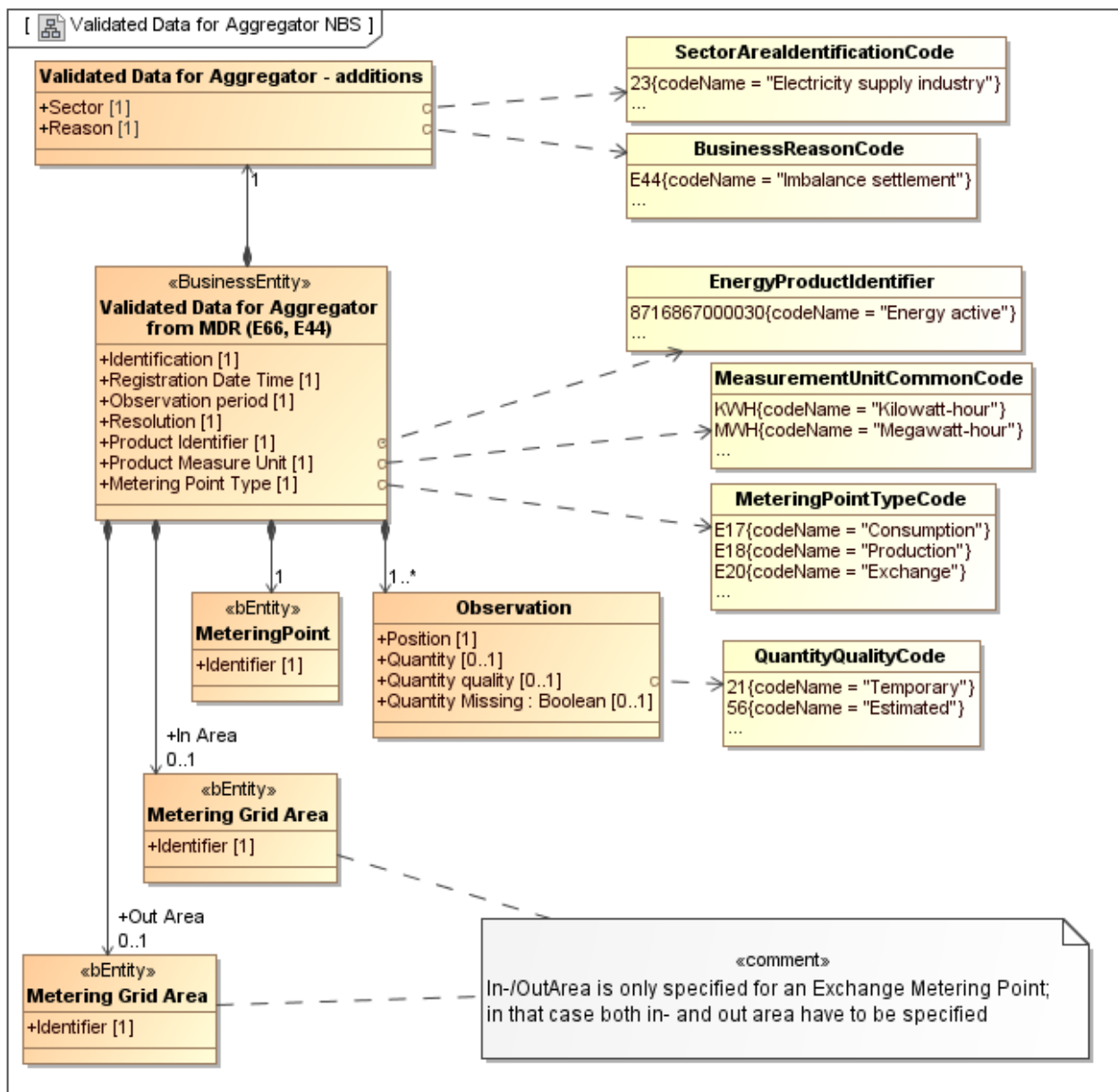


Figure 22: Class diagram: NEG (ebIX® based) Validated Data for Settlement for Aggregator (E66, E44)

The document is used in the following exchanges:

- **Table 2:** NBS metering and settlement phase documents:
 - 3, Metered data for production
 - 4, Hourly metered data per metering point on production, consumption and exchange

5.1.2 Attribute usage: NEG (ebIX® based) Validated Data for Settlement for Aggregator, Production (E66, E44)

Attribute (class diagram)	Attribute (XML schema)	Cl.	Content	Descriptions and comments
	Header	[1]		
	Identification	[1]	Business Document ID	Unique identification of the business document Note: The maximum length of the ID is 35 characters.
	Document Type	[1]	Document type	E66 Validated metered data, time series
	Creation	[1]	Creation date/time	Date and time of creation of the business document
	Sender Energy Party	[1]	Sender ID	Unique identification of the sender of the document
	Recipient Energy Party	[1]	Recipient ID	Unique identification of the recipient of the document
Validated data for Aggregator - additions	Process Energy Content	[1]		
Reason	Energy Business Process	[1]	Process type	E44 Imbalance Settlement
	Energy Business Process Role	[1]	Process role	DEA Metered data aggregator
Sector	Energy Industry Classification	[1]	Industry	23 Electricity supply industry
	Payload Energy Time Series	[1..*]		
Identification	Identification	[1]	Time series ID	Unique ID of the Time Series (unique over time for the sender in question) Note: The maximum length of the ID is 35 characters.
Registration Date Time	Registration Date Time	[1]	Registration Date Time	As an intermediate solution, the Document Date (Creation) may be mapped to the Registration Date Time
Validated data for Aggregator from MDR	Observation Period time Series Period	[1]		
Resolution	Resolution Duration	[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. PT1H or PT60M

Attribute (class diagram)	Attribute (XML schema)	Cl.	Content	Descriptions and comments
Observation period	Start	[1]	Start date/time	Date and time for the start of the time series
	End	[1]	End date/time	Date and time for the end of the time series
	Product Included Product Characteristics	[1]		
Product Identifier	Identification	[1]	Product	8716867000030 Energy active
Product Measure Unit	Unit Type	[1]	KWH or MWH	KWH kWh MWH MWh
	MP Detail Measurement Metering Point Characteristics	[1]		
Metering Point Type	Metering Point Type	[1]	MP type	E17 Consumption (Only used internally within the DSO, see arrow 4, Hourly metered data per metering point on production, consumption and exchange in chapter 2.4, Overview of information exchange for the NBS metering and settlement phase) E18 Production
Metering Point	Metering Point Used Domain Location	[1]		
Identifier	Identification	[1]	MP ID	Unique identification of the Metering Point
Observation	Observation Interval Observation Period	[1..*]		
Position	Sequence	[1]	Sequence number	Sequence number of the observation in the time series
	Observation Detail Energy Observation	[1]		
Quantity	Energy Quantity	[0..1]	Quantity	The quantity in question The resolution is maximum in Watt, i.e. max 3 decimals for kWh and max 6 decimals for MWh Quantity is not used if Quantity Missing Indicator = True
Quantity Quality	Quantity Quality	[0..1]	Quality	21 Temporary 56 Estimated, approved for billing <ul style="list-style-type: none"> The default Quantity Quality is "Metered", i.e. Quantity Quality is only used if ≠ "Metered" Quantity Quality is not used if Quantity Missing Indicator = True
Quantity Missing	Quantity Missing	[0..1]	True	True (Used for missing quantity)

Attribute (class diagram)	Attribute (XML schema)	Cl.	Content	Descriptions and comments
				The Quantity Missing Indicator (True) is required for observations with missing values (quantities), else not used

Table 4: Attribute usage: NEG (ebIX® based) Validated Data for Settlement for Aggregator (E66, E44)

Comments to the table:

- The Balance Supplier (RE), Balance Responsible Party (BRP), Metering Grid Area (MGA), Resource Object (RO) and Production Unit (PU) are master data for the Metering Point, hence not sent.
- In- and Out Areas are not used

5.1.3 Attribute usage: NEG (ebIX® based) Validated Data for Settlement for Aggregator, MGA exchange (E66, E44)

Attribute (class diagram)	Attribute (XML schema)	Cl.	Content	Descriptions and comments
	Header	[1]		
	Identification	[1]	Business Document ID	Unique identification of the business document Note: The maximum length of the ID is 35 characters.
	Document Type	[1]	Document type	E66 Validated metered data, time series
	Creation	[1]	Creation date/time	Date and time of creation of the business document
	Sender Energy Party	[1]	Sender ID	Unique identification of the sender of the document
	Recipient Energy Party	[1]	Recipient ID	Unique identification of the recipient of the document
Validated data for Aggregator - additions	Process Energy Content	[1]		
Reason	Energy Business Process	[1]	Process type	E44 Imbalance Settlement
	Energy Business Process Role	[1]	Process role	DEA Metered data aggregator
Sector	Energy Industry Classification	[1]	Industry	23 Electricity supply industry
	Payload Energy Time Series	[1..*]		
Identification	Identification	[1]	Time series ID	Unique ID of the Time Series (unique over time for the sender in question) Note: The maximum length of the ID is 35 characters.
Registration Date Time	Registration Date Time	[1]	Registration Date Time	As an intermediate solution, the Document Date (Creation) may be mapped to the Registration Date Time
Validated data for Aggregator from MDR	Observation Period time Series Period	[1]		
Resolution	Resolution Duration	[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.

Attribute (class diagram)	Attribute (XML schema)	Cl.	Content	Descriptions and comments
				In NBS hourly resolution is used, i.e. PT1H or PT60M
Observation period	Start	[1]	Start date/time	Date and time for the start of the time series
	End	[1]	End date/time	Date and time for the end of the time series
	Product Included Product Characteristics	[1]		
Product Identifier	Identification	[1]	Product	8716867000030 Energy active
Product Measure Unit	Unit Type	[1]	KWH or MWH	KWH kWh MWH MWh
	MP Detail Measurement Metering Point Characteristics	[1]		
Metering Point Type	Metering Point Type	[1]	MP type	E20 Exchange
In Area / Metering Grid Area	In Area Used Domain location	[1]		
Identifier	Identification	[1]	MGA ID	One MGA in the MGA exchanges
Out Area / Metering Grid Area	Out Area Used Domain location	[1]		
Identifier	Identification	[1]	MGA ID	The other MGA in the MGA exchanges
Metering Point	Metering Point Used Domain Location	[1]		
Identifier	Identification	[1]	MP ID	Unique identification of the Metering Point
Observation	Observation Detail Energy Observation	[1..*]		
Position	Sequence	[1]	Sequence number	Sequence number of the observation in the time series
	Observation Detail Energy Observation	[1]		
Quantity	Energy Quantity	[0..1]	Quantity	The quantity in question The resolution is maximum in Watt, i.e. max 3 decimals for kWh and max 6 decimals for MWh Quantity is not used if Quantity Missing Indicator = True
Quantity Quality	Quantity Quality	[0..1]	Quality	21 Temporary 56 Estimated, approved for billing <ul style="list-style-type: none"> The default Quantity Quality is "Metered", i.e. Quantity Quality is only used if ≠ "Metered" Quantity Quality is not used if Quantity Missing Indicator = True
Quantity Missing	Quantity Missing	[0..1]	True	True (Used for missing quantity)

Nordic Balance Settlement

Attribute (class diagram)	Attribute (XML schema)	Cl.	Content	Descriptions and comments
				The Quantity Missing Indicator (True) is required for observations with missing values (quantities), else not used

Table 5: Attribute usage: NEG (ebIX® based) Validated Data for Settlement for Aggregator (E66, E44)

5.2 NEG (ebIX® based) Aggregated Data per MGA (E31, E44)

The NEG (ebIX® based) document *Aggregated Data per MGA (Metering Grid Area)* is used for sending aggregated metered data from the Metered Data Aggregator to Balance Suppliers, Balance Responsible Parties and the Imbalance settlement Responsible. The time series are aggregated per MGA, Balance Supplier and Balance Responsible Party.

The NEG (ebIX® based) Aggregated Data per MGA (E31, E44) is documented in the ebIX® Business information model for Measure for Imbalance Settlement, see [2].

5.2.1 Class diagram: NEG (ebIX® based) Aggregated Data per MGA (E31, E44)

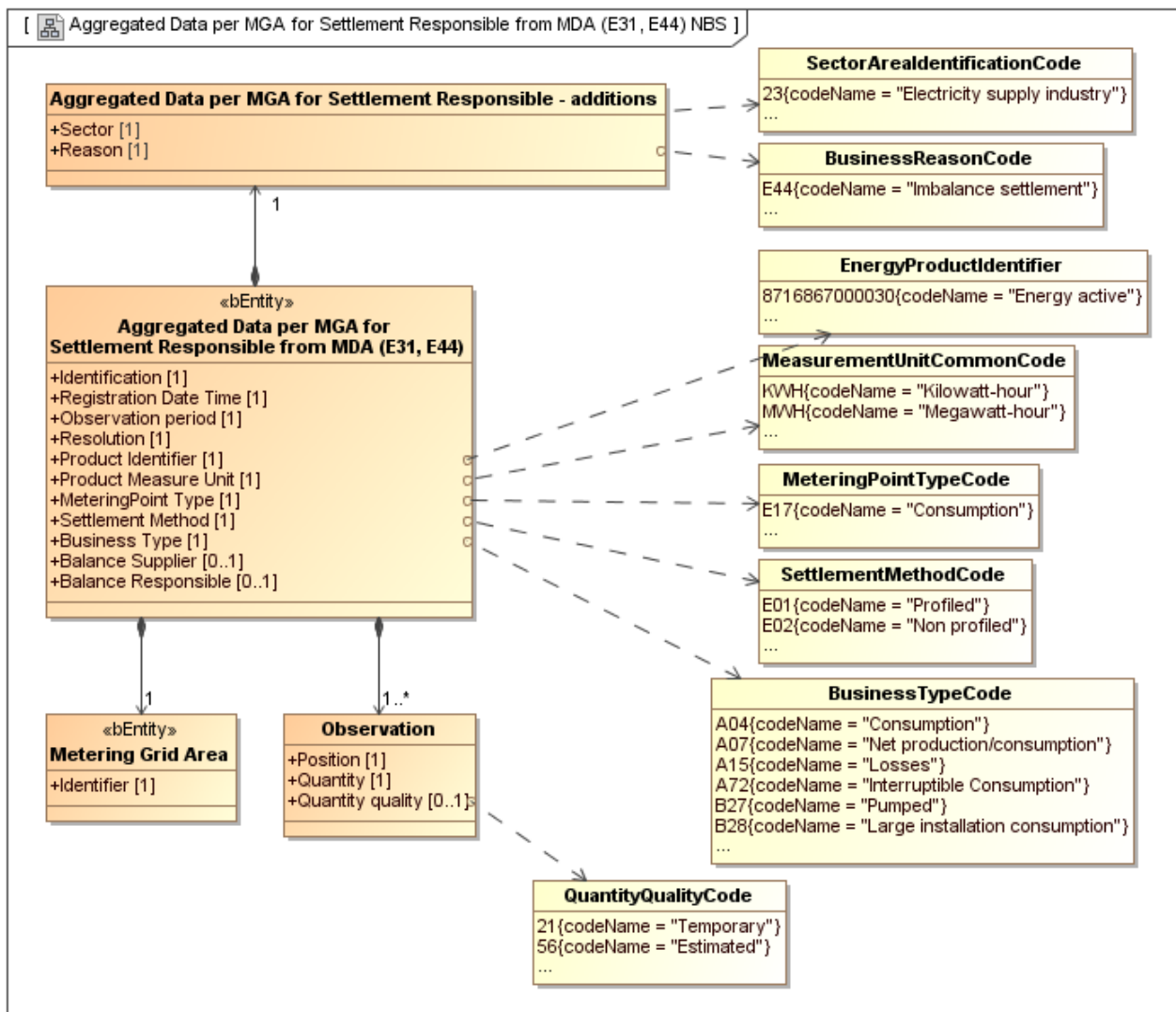


Figure 23: Class diagram: NEG (ebIX® based) Aggregated Data per MGA (E31, E44)

Comments to the diagram:

- A Balance Supplier and a Business Type are added for the Nordic Balance Settlement.
- Quantities shall always be positive

The document is used in the following exchanges:

- **Table 2:** NBS metering and settlement phase documents:
 - 5, Aggregated BS (RE) / BPR hourly metered data per MGA on consumption
 - 6, Profiled consumption per BS (RE) / BPR per MGA
 - 7, Profiled consumption per BS (RE) / BPR per MGA
 - 8, Profiled consumption per BS (RE) / BPR per MGA

5.2.2 Attribute usage: NEG (ebIX® based) Aggregated Data per MGA (E31, E44)

Attribute (class diagram)	Attribute (XML schema)	Cl.	Content	Descriptions and comments
	Header	[1]		
	Identification	[1]	Document ID	Unique identification of the business document Note: The maximum length of the ID is 35 characters.
	Document Type	[1]	Document type	E31 Aggregate metered data from the Metered data aggregator, local
	Creation	[1]	Creation date/time	Date and time of creation of the business document
	Sender Energy Party	[1]	Sender ID	Unique identification of the sender of the document
	Recipient Energy Party	[1]	Recipient ID	Unique identification of the recipient of the document
Aggregated Data per MGA for Settlement Responsible - additions	Process Energy Content	[1]		
Reason	Energy Business Process	[1]	Process	E44 Imbalance Settlement
	Energy Business Process Role	[1]	Process Role	DDX Imbalance settlement responsible DDK Balance responsible party DDQ Balance power supplier
Sector	Energy Industry Classification	[1]	Industry	23 Electricity supply industry
Aggregated Data per MGA for Settlement Responsible	Payload Energy Time Series	[1..*]		
Identification	Identification	[1]	Time series ID	Unique ID of the Time Series (unique over time for the sender in question) Note: The maximum length of the ID is 35 characters.
Registration Date Time	Registration Date Time	[1]	Registration Date Time	As an intermediate solution, the Document Date (Creation) may be mapped to the Registration Date Time
	Observation Period time Series Period	[1]		
Resolution	Resolution Duration	[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

Attribute (class diagram)	Attribute (XML schema)	Cl.	Content	Descriptions and comments
				identifies a number of hours, nM a number of minutes and nS a number of seconds. In NBS hourly resolution is used, i.e. PT1H or PT60M
Observation period	Start	[1]	Start date/time	Date and time for the start of the time series
	End	[1]	End date/time	Date and time for the end of the time series
	Balance Responsible Involved Energy Party	[0..1]		Dependent: The Balance Responsible Party is required for Swedish MPs and not used for Finnish and Norwegian MPs
Balance Responsible Party	Identification	[1]	BRP ID	Unique identification of the Balance Responsible Party
	Balance Supplier Involved Energy Party	[0..1]		Note: This element is an extension to the ebIX® specifications Dependent: The Balance Supplier is required for Finnish and Norwegian MPs and not used for Swedish profiled settled MPs
Balance Supplier	Identification	[1]	BS ID	Unique identification of the Balance Supplier
	Product Included Product Characteristics	[1]		
Product Identifier	Identification	[1]	Product	8716867000030 Energy active
Product Measure Unit	Unit Type	[1]	KWH or MWH	KWH kWh MWH MWh
	MP Detail Measurement Metering Point Characteristics	[1]		
Metering Point Type	Metering Point Type	[1]	MP type	E17 Consumption
Settlement Method	Settlement Method Type	[1]	Settlement Method	E01 Profiled E02 Non Profiled
Business Type	Business Type	[1]	Business Type code	A04 Consumption (general consumption) A07 Net production/consumption A15 Losses A72 Interruptible Consumption B27 Pumped B28 Large installation consumption B36 Production Units own consumption (Only used in Finland)
Metering Grid Area	Metering Grid Area Used Domain Location	[1]		
Identifier	Identification	[1]	MGA ID	Unique identification of the Metering Grid Area
Observation	Observation Interval	[1..*]		

Attribute (class diagram)	Attribute (XML schema)	Cl.	Content	Descriptions and comments
	Observation Period			
Position	Sequence	[1]	Sequence number	Sequence number of the observation in the time series
	Observation Detail Energy Observation	[1]		
Quantity	Energy Quantity	[1]	Quantity	The quantity in question The resolution is maximum in Watt, i.e. max 3 decimals for kWh and max 6 decimals for MWh
Quantity Quality	Quantity Quality	[0..1]	Quality	21 Temporary 56 Estimated, approved for billing <ul style="list-style-type: none"> The default Quantity Quality is “Metered”, i.e. Quantity Quality is only used if ≠ “Metered”. A time series with aggregated values based on time series on a MP level where one or more observations has a “Quantity Missing Indicator = True” (Does not exist) shall use the quantity quality 21 (Temporary)

Table 6: Attribute usage: NEG (ebIX® based) Aggregated Data per MGA for Settlement Responsible (E31, E44)

5.2.3 Dependency matrix: Types of aggregated metered data for Consumption metering points

		Settlement method	Business type
Hourly metered consumption in a MGA	Total hourly metered consumption	E02 Non Profiled	A04 Consumption (general consumption)
	Large installation consumption	E02 Non Profiled	B28 Large installation consumption
	Pumped (only in Norway)	E02 Non Profiled	B27 Pumped
	Pumped storage (from combined generator/pump) (only in Norway)	E02 Non Profiled	A07 Net production/ consumption
	Interruptible (only in Sweden)	E02 Non Profiled	A72 Interruptible Consumption
	Production Units own consumption (Only used in Finland)	E02 Non Profiled	B36 Production Units own consumption
Hourly profiled consumption in a MGA	Total profiled consumption	E01 Profiled	A04 Consumption (general consumption)
	Pumped (only in Norway)	E01 Profiled	B27 Pumped
Hourly losses in a MGA	Metered grid losses	E02 Non Profiled	A15 Losses
	Profiled grid losses	E01 Profiled	A15 Losses

Table 7: Dependency matrix: Types of aggregated metered data for Consumption metering points

5.3 NEG (ebIX® based) Aggregated Data Per Neighbouring Grid For Settlement Responsible (E31, E44)

The NEG (ebIX® based) document *Aggregated Data Per Neighbouring Grid* is used for sending aggregated metered data from exchange Metering Points to the Imbalance settlement Responsible. The time series are aggregated for each combination of two Metering Grid Areas where there can be exchanges.

The NEG (ebIX® based) Aggregated Data per Neighbouring Grid for Settlement Responsible (E31, E44) is documented in the ebIX® Business information model for Measure for Imbalance Settlement, see [2].

5.3.1 Class diagram: NEG (ebIX® based) Aggregated Data per Neighbouring Grid for Settlement Responsible (E31, E44)

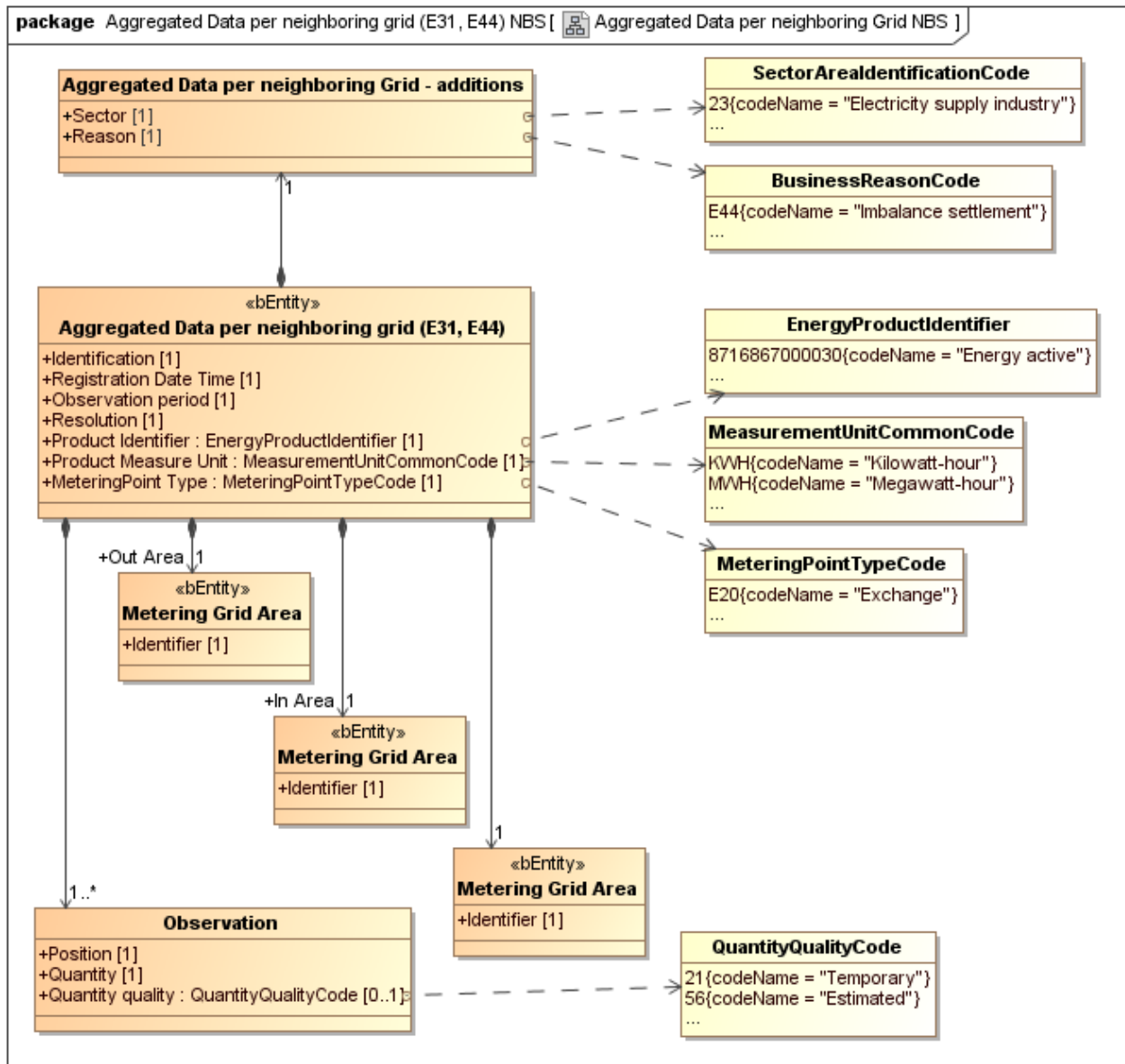


Figure 24: Class diagram: NEG (ebIX® based) Aggregated Data per Neighbouring Grid for Settlement Responsible (E31, E44)

Comments to the diagram:

- The document has an *In Area* (Metering Grid Area) and an *Out Area* (Metering Grid Area) defining the direction of the flow. In addition there is a *Metering Grid Area*, identifying the responsible DSO.
- There is only one time series for each exchange, i.e. netted values are exchanged.

The document is used in the following exchanges:

- **Table 2:** NBS metering and settlement phase documents:
 - 9, Aggregated metered data from exchange Metering Points between MGAs

5.3.2 Attribute usage: NEG (ebIX® based) Aggregated Data per Neighbouring Grid for Settlement Responsible (E31, E44)

Attribute (class diagram)	Attribute (XML schema)	Cl.	Content	Descriptions and comments
	Header	[1]		
	Identification	[1]	Document ID	Unique identification of the business document Note: The maximum length of the ID is 35 characters.
	Document Type	[1]	Document type	E31 Aggregate metered data from the Metered Data Aggregator, Local
	Creation	[1]	Creation date/time	Date and time of creation of the business document
	Sender Energy Party	[1]	Sender ID	Unique identification of the sender of the document
	Recipient Energy Party	[1]	Recipient ID	Unique identification of the recipient of the document
Aggregated Data per Neighbouring Grid - additions	Process Energy Content	[1]		
Reason	Energy Business Process	[1]	Process type	E44 Imbalance Settlement
	Energy Business Process Role	[1]	Process role	DDX Imbalance Settlement Responsible
Sector	Energy Industry Classification	[1]	Industry	23 Electricity supply industry
	Payload Energy Time Series	[1..*]		
Identification	Identification	[1]	Time series ID	Unique ID of the Time Series (unique over time for the sender in question) Note: The maximum length of the ID is 35 characters.
Registration Date Time	Registration Date Time	[1]	Registration Date Time	As an intermediate solution, the Document Date (Creation) may be mapped to the Registration Date Time
Aggregated Data per Neighbouring Grid	Observation Period time Series Period	[1]		

Attribute (class diagram)	Attribute (XML schema)	Cl.	Content	Descriptions and comments
Resolution	Resolution Duration	[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. PT1H or PT60M</p>
Observation period	Start	[1]	Start date/time	Date and time for the start of the time series
	End	[1]	End date/time	Date and time for the end of the time series
	Product Included Product Characteristics	[1]		
Product Identifier	Identification	[1]	Product	8716867000030 Energy active
Product Measure Unit	Unit Type	[1]	KWH or MWH	KWH kWh MWH MWh
	MP Detail Measurement Metering Point Characteristics	[1]		
Metering Point Type	Metering Point Type	[1]	MP type	E20 Exchange
Metering Grid Area	Metering Grid Area Used Domain Location	[1]		
Identifier	Identification	[1]	MGA ID	<p>Unique identification of the Metering Grid Area</p> <p>The ID of the MGA responsible for metering the exchange</p>
In Area / Metering Grid Area on	In Area Used Domain location	[1]		
Identifier	Identification	[1]	MGA ID	One MGA in the MGA exchanges
Out Area / Metering Grid Area	Out Area Used Domain location	[1]		
Identifier	Identification	[1]	MGA ID	The other MGA in the MGA exchanges
Observation	Observation Interval Observation Period	[1..*]		
Position	Sequence	[1]	Sequence number	Sequence number of the observation in the time series

Attribute (class diagram)	Attribute (XML schema)	Cl.	Content	Descriptions and comments
	Observation Detail Energy Observation	[1]		
Quantity	Energy Quantity	[1]	Quantity	<p>The quantity in question</p> <p>Netted values are exchanged. The flow from Out Area to In Area will be reported as positive quantities, while the opposite direction will be reported as negative quantities (with a leading minus sign).</p> <p>The resolution is maximum in Watt, i.e. max 3 decimals for kWh and max 6 decimals for MWh</p>
Quantity Quality	Quantity Quality	[0..1]	Quality	<p>21 Temporary 56 Estimated, approved for billing</p> <ul style="list-style-type: none"> The default Quantity Quality is “Metered”, i.e. Quantity Quality is only used if ≠ “Metered”. A time series with aggregated values based on time series on a MP level where one or more observations has a “Quantity Missing Indicator = True” (Does not exist) shall use the quantity quality 21 (Temporary)

Table 8: NEG (ebIX® based) Aggregated Data per Neighbouring Grid for Settlement Responsible (E31, E44)

5.4 NEG Confirmation of Aggregated Data Per Neighbouring Grid From Settlement Responsible (A07/A08, Z44)

The Imbalance settlement Responsible will send the NEG document *Confirmation of Aggregated Data Per Neighbouring Grid* as confirmation of received *NEG (eBIX® based) Aggregated Data per Neighbouring Grid* from the DSOs (see chapter 5.3).

The NEG Confirmation of Aggregated Data per Neighbouring Grid for Settlement Responsible (A07/A08, E44) is a Nordic document described by NEG (Nordic Ediel Group).

5.4.1 Class diagram: NEG Confirmation of Aggregated Data per Neighbouring Grid for Settlement Responsible (A07/A08, E44)

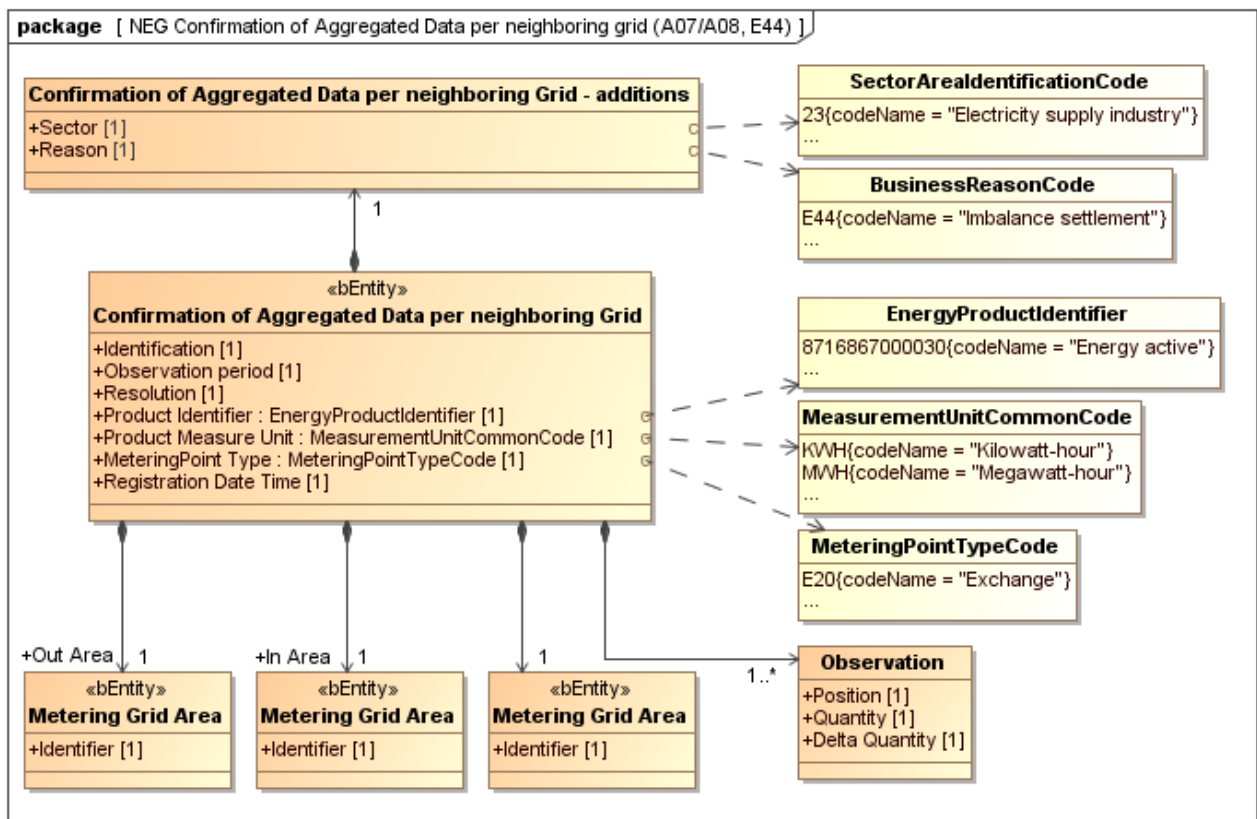


Figure 25: Class diagram: NEG Confirmation of Aggregated Data per Neighbouring Grid for Settlement Responsible (A07/A08, E44)

Comments to the diagram:

- The document has an *In Area* (Metering Grid Area) and an *Out Area* (Metering Grid Area) defining the direction of the flow. In addition there is a *Metering Grid Area*, identifying the responsible DSO.
- There is only one time series for each exchange, with two elements for each observation, i.e. a Quantity and a Delta quantity

The document is used in the following exchanges:

- **Table 2:** NBS metering and settlement phase documents:
 - 10, MGA exchange confirmation report

5.4.2 Attribute usage: NEG Confirmation of Aggregated Data per Neighbouring Grid for Settlement Responsible (A07/A08, E44)

Attribute (class diagram)	Attribute (XML schema)	Cl.	Content	Descriptions and comments
	Header	[1]		
	Identification	[1]	Document ID	Unique identification of the business document Note: The maximum length of the ID is 35 characters.
	Document Type	[1]	Document type	A07 Intermediate confirmation report A08 Final confirmation report
	Creation	[1]	Creation date/time	Date and time of creation of the business document
	Sender Energy Party	[1]	Sender ID	Unique identification of the sender of the document
	Recipient Energy Party	[1]	Recipient ID	Unique identification of the recipient of the document
Confirmation of Aggregated Data per Neighbouring Grid - additions	Process Energy Content	[1]		
Reason	Energy Business Process	[1]	Process type	E44 Imbalance Settlement
	Energy Business Process Role	[1]	Process role	DEA Metered Data Aggregator
Sector	Energy Industry Classification	[1]	Industry	23 Electricity supply industry
	Payload Energy Time Series	[1..*]		
Identifier	Identification	[1]	Time series ID	Unique ID of the Time Series (unique over time for the sender in question) Note: The maximum length of the ID is 35 characters.
Registration Date Time	Registration Date Time	[1]	Registration Date Time	As an intermediate solution, the Document Date (Creation) may be mapped to the Registration Date Time
Confirmation of Aggregated Data per Neighbouring Grid	Observation Period time Series Period	[1]		

Attribute (class diagram)	Attribute (XML schema)	Cl.	Content	Descriptions and comments
Resolution	Resolution Duration	[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. PT1H or PT60M</p>
Observation period	Start	[1]	Start date/time	Date and time for the start of the time series
	End	[1]	End date/time	Date and time for the end of the time series
	Product Included Product Characteristics	[1]		
Product Identifier	Identification	[1]	Product	8716867000030 Energy active
Product Measure Unit	Unit Type	[1]	KWH or MWH	KWH kWh MWH MWh
	MP Detail Measurement Metering Point Characteristics	[1]		
Metering Point Type	Metering Point Type	[1]	MP type	E20 Exchange
Metering Grid Area	Metering Grid Area Used Domain Location	[1]		
Identifier	Identification	[1]	MGA ID	Unique identification of the Metering Grid Area responsible for metering the exchange
In Area / Metering Grid Area	In Area Used Domain location	[1]		
Identifier	Identification	[1]	MGA ID	One MGA in the MGA exchanges
Out Area / Metering Grid Area	Out Area Used Domain location	[1]		
Identifier	Identification	[1]	MGA ID	The other MGA in the MGA exchanges
Observation	Observation Interval Observation Period	[1..*]		
Position	Sequence	[1]	Sequence number	Sequence number of the observation in the time series
	Observation Detail Energy Observation	[1]		

Attribute (class diagram)	Attribute (XML schema)	Cl.	Content	Descriptions and comments
Quantity	Energy Quantity	[1]	Quantity	<p>The result from the matching process.</p> <p>The resolution is maximum in Watt, i.e. max 3 decimals for kWh and max 6 decimals for MWh</p>
Delta Quantity	Delta Quantity	[1]	Quantity	<p>The delta quantity in question. The delta quantity is the difference between the quantities reported from the two DSOs where an energy exchange has taken place. Unless there are errors in the original reported exchanged quantities from the two DSOs, the delta quantity will be zero.</p> <p>Netted values are exchanged. The flow from Out Area to In Area will be reported as positive quantities, while the opposite direction will be reported as negative quantities (with a leading minus sign).</p> <p>The resolution is maximum in Watt, i.e. max 3 decimals for kWh and max 6 decimals for MWh</p>

Table 9: NEG Confirmation of Aggregated Data per Neighbouring Grid for Settlement Responsible (A07/A08, E44)

5.5 NEG ESP Energy Account Report Document (EAR)

The *NEG ESP Energy Account Report Document (EAR)* is sent from the Imbalance settlement Responsible to the Balance Responsible Parties (BRP) to inform the BRPs of the result of the imbalance settlement. It is also sent from the Imbalance settlement Responsible to the Metered Data Aggregator (DSO) to give the quality assurance of area balance (MGA imbalance) per MGA.

The *NEG ESP Energy Account Report Document (EAR)* is a “namespaced version” of the *ENTSO-E ESP Energy Account Report Document version 1-2 (EAR)* documented in the ENTSO-E Settlement Process (ESP) Implementation Guide, see [1].

5.5.1 Class diagram: NEG ESP Energy Account Report Document (EAR)

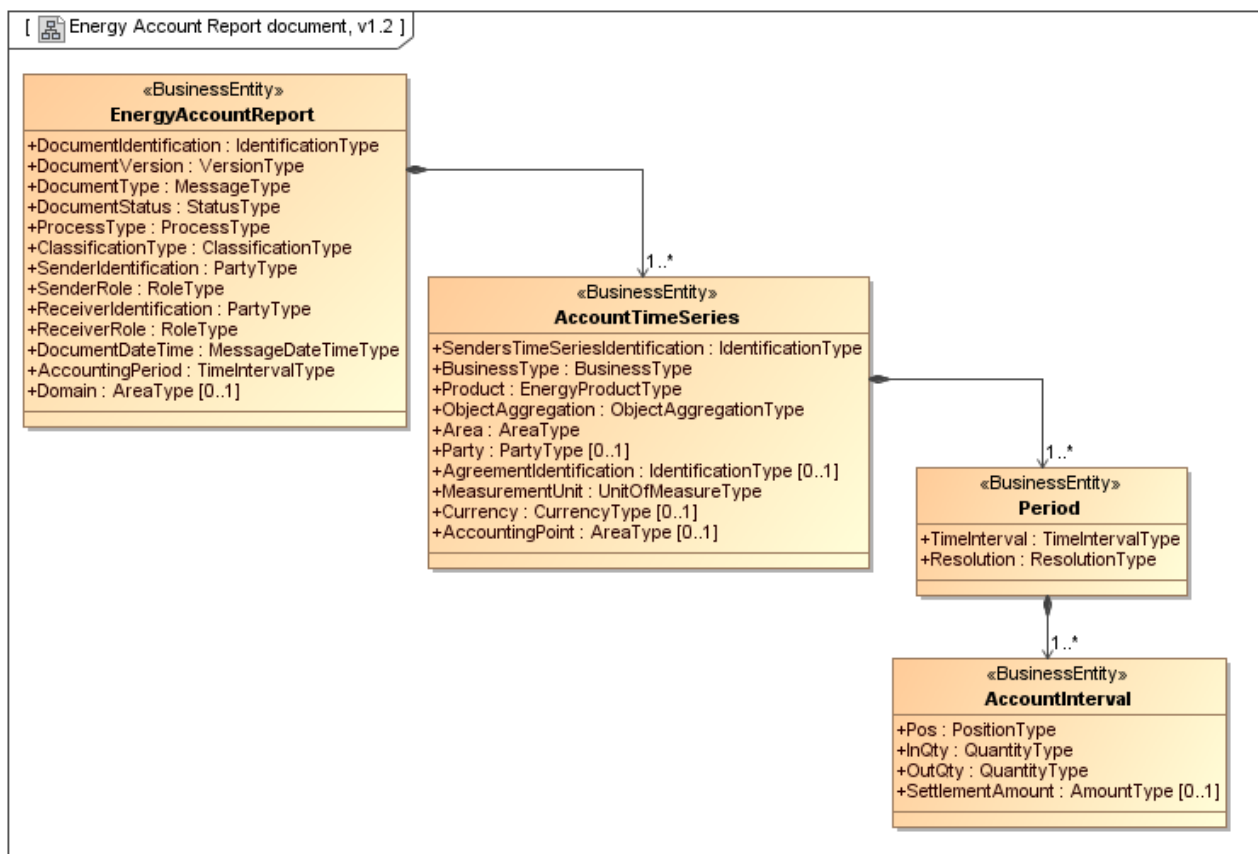


Figure 26: Class diagram: NEG ESP Energy Account Report Document (EAR)

The document is used in the following exchanges:

- **Table 2:** NBS metering and settlement phase documents:
 - 17, Result of the balance settlement (Business Type B14 and B15)
 - 18, Result of the balance settlement – MGA Imbalance (Business Type B29)

5.5.2 Attribute usage: NEG ESP Energy Account Report Document (EAR)

EAR Attribute	Cl.	Content	Descriptions and comments
Energy Account Report Document			
Document Identification	[1]	Document ID	Unique identification of the document Note: The maximum length of the ID is 35 characters.
Document Version	[1]	Version	Fixed 1
Document Type	[1]	Document Type	A12 Imbalance report
Document Status	[1]	Document Status	A01 Intermediate A02 Final
Process Type	[1]	Process Type	A06 Imbalance settlement
Classification Type	[1]	Classification Type	A02 Summary type
Sender Identification	[1]	SO or MO ID	Unique identification of the sender
Sender role	[1]	Sender role	A05 Imbalance Settlement Responsible
Receiver Identification	[1]	ISR ID	Unique identification of the Receiver
Receiver role	[1]	Receiver role	A08 Balance Responsible Party A09 Metered Data Aggregator
Document date and time	[1]	Creation date time	The time stamp of the calculation
Accounting period	[1]	Start and end date of the time series	The beginning and ending date and time of the period covered
Domain	[1]	Nordic Market Area ID	Identification of the area covered by the document, i.e. 10Y1001A1001A91G (Nordic market area)
Account Time Series	[1..*]		
Senders Time Series Identification	[1]	Time Series ID	Unique identification of the Time Series (unique over time for the sender in question) Note: The maximum length of the ID is 35 characters.
Business Type	[1]	Business Type	B14 Production deviation B15 Consumption deviation B29 MGA imbalance All Business types are sent to the BRPs (if relevant). B29 MGA imbalance is in addition sent to the DSO (Metered Data Aggregator) in question.
Product	[1]	Product	8716867000030 Active energy
Object Aggregation	[1]	Aggregation	A01 Area
Area	[1]	MBA or MGA ID	The Market Balance Area or Metering Grid Area to which the settlement result belongs
Party	[1]	BRP ID	The Balance Responsible Party for which the imbalance settlement is calculated
Measurement Unit	[1]	KWH or MWH	KWH kWh MWH MWh
Currency	[0..1]	Currency	ISO three digit currency code, e.g.: DKK Denmark, krone EUR European Union, Euro NOK Norway, krone SEK Sweden, krona Not used for Business type " B29 = MGA imbalance"

EAR Attribute	Cl.	Content	Descriptions and comments
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	<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. PT1H or PT60M</p>
Interval	[1..*]		
Pos	[1]	Position	Position
In Qty	[1]	In Quantity	<p>The quantity of the product that enters the area for the position within the account interval in question</p> <p>The resolution is maximum in Watt, i.e. max 3 decimals for kWh and max 6 decimals for MWh</p> <p>NBS: BRP selling quantity.</p>
Out Qty	[1]	Out Quantity	<p>The quantity of the product that leaves the area. For the position within the account interval in question</p> <p>The resolution is maximum in Watt, i.e. max 3 decimals for kWh and max 6 decimals for MWh</p> <p>NBS: BRP buying quantity.</p>
Settlement Amount	[0..1]	Amount	<p>The amount due for the account interval in question.</p> <p>This information defines the settlement amount taking into consideration the in and out quantities and the pricing scheme based on local market rules.</p> <p>A negative value indicates that the settlement amount is due by the party in question (party to be debited). If the amount is positive it is due by the imbalance settlement responsible (party to be credited).</p> <p>Not used for Business type "B29 = MGA imbalance"</p>

Table 10: Attribute usage: NEG ESP Energy Account Report Document (EAR)

Nordic Balance Settlement

5.5.3 Dependency matrix: Result of the balance settlement

Receiver role	Business Type	Currency	Settlement Amount
A08 Balance Responsible Party	B14 Production deviation	✓	✓
	B15 Consumption deviation	✓	✓
A09 Metered Data Aggregator	B29 MGA imbalance	Not used	Not used

Table 11: Dependency matrix: Result of the balance settlement

5.6 ENTSO-E ESS Schedule Document

The ENTSO-E *ESS Schedule Document* is used for market schedules. The document is used to send Bilateral trade reports from the Balance Responsible Parties to the Imbalance settlement Responsible.

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

5.6.1 Class diagram: ENTSO-E ESS Schedule Document

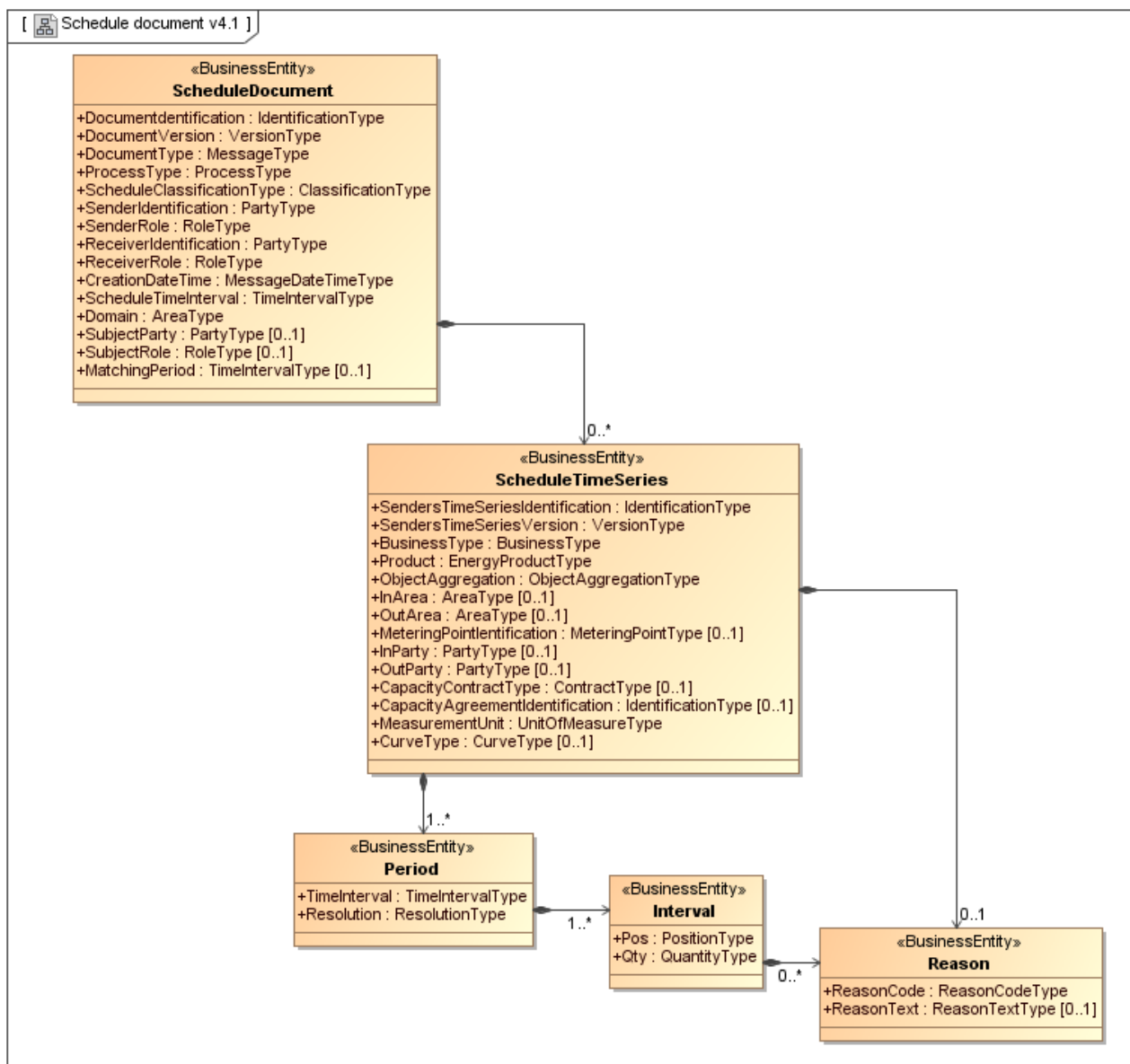


Figure 27: Class diagram: ENTSO-E ESS Schedule Document

The document is used in the following exchanges:

- Table 1: NBS scheduling phase documents:
 - 12, Bilateral trade report (trade except Market Operator trade)

5.6.2 Attribute usage: ENTSO-E ESS Schedule Document, Bilateral Trade

ESS Schedule Document Attribute	Cl.	Content	Descriptions and comments
Schedule Document	[1]		
Document Identification	[1]	Document ID	Unique identification of the document Note: The maximum length of the ID is 35 characters.
Document Version	[1]	Version	Fixed 1
Document Type	[1]	A01	A01 Balance responsible schedule
Process Type	[1]	Z05	Z05 Bilateral trade
Schedule Classification Type	[1]	A02	A02 Summary type
Sender Identification	[1]	SO or BRP ID	Unique identification of the sender
Sender role	[1]	A04 or A08	A04 System Operator A08 Balance Responsible Party
Receiver Identification	[1]	ISR ID	Unique identification of the Receiver
Receiver role	[1]	A05	A05 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. 10Y1001A1001A91G (Nordic market area)
Schedule Time Series	[1..*]		
Senders Time Series Identification	[1]	Time series ID	Unique identification of the Time Series (unique over time for the sender in question) Note: The maximum length of the ID is 35 characters.
Senders Time Series Version	[1]	Version	Fixed 1
Business Type	[1]	A08	A08 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]	8716867000030	8716867000030 Active energy
Object Aggregation	[1]	A01	A01 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.
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.
Measurement Unit	[1]	KWH or MWH	KWH kWh MWH MWh
Period	[1..*]		

ESS Schedule Document Attribute	Cl.	Content	Descriptions and comments
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. PT1H or PT60M</p>
Interval	[1..*]		
Pos	[1]	Position	Position
Qty	[1]	Quantity	<p>Quantity</p> <p>The direction from out party (seller) to in party (buyer) is positive, while the opposite direction is negative (with minus signs))</p> <p>The resolution is maximum in Watt, i.e. max 3 decimals for kWh and max 6 decimals for MWh</p>

Table 12: Attribute usage: ENTSO-E ESS Schedule Document, Bilateral Trade

5.7 ENTSO-E ESS Confirmation Report

The ENTSO-E *ESS Confirmation Report document* is used for confirmation of market schedules. The Imbalance settlement Responsible use the document to confirm Bilateral trade reports from the Balance Responsible Parties. The *ENTSO-E ESS Confirmation Report* is documented in the *ENTSO-E Scheduling System (ESS) Implementation Guide*, see [1].

5.7.1 Class diagram: ENTSO-E ESS Confirmation Report

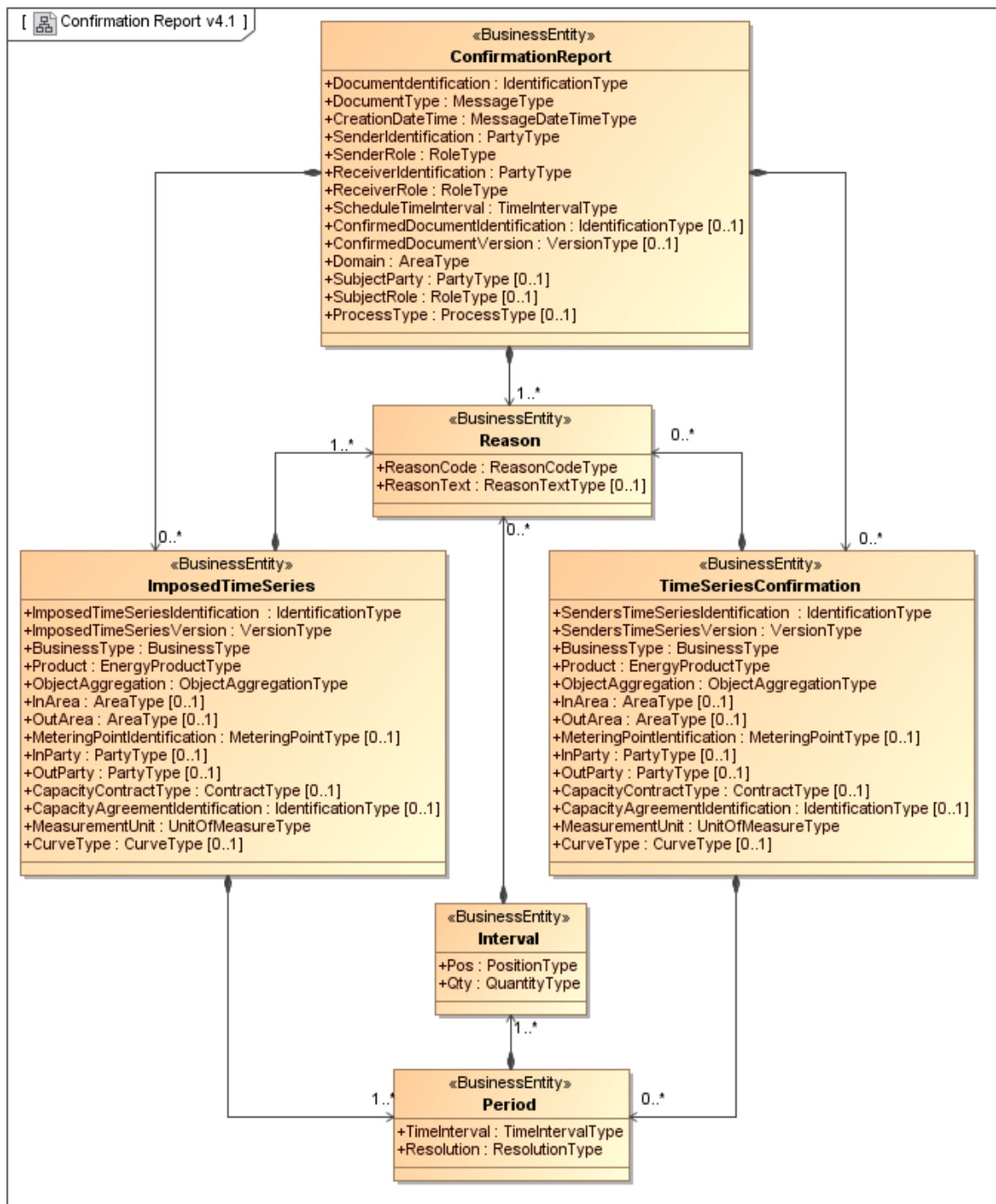


Figure 28: Class diagram: ENTSO-E ESS Confirmation Report

The document is used in the following exchanges (see Table 1: NBS scheduling phase documents):

- 13, Bilateral trade confirmation report

5.7.2 Rules for usage of: ENTSO-E ESS Confirmation Report

5.7.2.1 *Link between ESS Schedule Time Series and ESS Confirmation Reports Time Series*

When eSett is returning ESS Confirmation Reports, which require a reference to one unique ESS Schedules Time Series ID, there will be separate ESS Confirmation Reports Time Series for each received ESS Schedule Time Series. This may in worst cases result in a separate ESS Confirmation Report for each hour of the day. Note that this only is an issue for the ESS Time Series Confirmation, where a reference to the ESS Schedule Time Series is required. The ESS Imposed Time Series in the ESS Confirmation Report is not referencing any received ESS Schedule Time Series and can contain all 24 hours of the day.

The settlement structure management (e.g. retailer balance responsibility) will be complied with national legislations. The settlement structures will be managed in:

- Eastern European Time (EET)/Eastern European Summer Time (EEST) in Finland
- Central European Time (CET) the whole year in Sweden
- Central European Time (CET)/Central European Summer Time (CEST) in Norway

5.7.2.2 *Time Series Confirmation vs Imposed Time series*

eSett will always return a Time Series Confirmation to the party that has sent an ESS schedule document and an imposed time series to the counterpart.

5.7.2.3 *Time Series Identification*

The Time Series Identification shall be unique over time for the sender in question. Note that this is a Nordic rule that is stricter than what is stated in the ESS implementation guide from ENTSO-E [1], which only requires the Time Series Identification to be unique within the document.

5.7.3 Attribute usage: ENTSO-E ESS Confirmation Report

ESS Confirmation Report Attribute	Cl.	Content	Descriptions and comments
ESS Confirmation Report	[1]		
Document Identification	[1]	Document ID	Unique identification of the document Note: The maximum length of the ID is 35 characters.
Document Type	[1]	A07 or A08	A07 Intermediate confirmation report A08 Final confirmation report
Creation Date Time	[1]	Creation date/time	Date and time for creation of the document
Sender Identification	[1]	ISR ID	The unique identification of the Imbalance Settlement Responsible, who is sending the document
Sender Role	[1]	A05	A05 Imbalance Settlement Responsible
Receiver Identification	[1]	BRP ID	The unique identification of the Balance Responsible Party who is receiving the document
Receiver Role	[1]	A08	A08 Balance responsible party
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 document containing the schedule
Domain	[1]	Nordic Market Area ID	Identification of the area covered by the document, i.e. 10Y1001A1001A91G (Nordic market area)
Process Type	[1]	Z05	Z05 Bilateral trade
Reason (Confirmation Report level)	[1]		
Reason Code	[1]	Reason Code	A06 Schedule accepted A07 Schedule partially accepted A06 is used when there are no changes to a received time series, while A07 is used when there are changes to a received schedule or when sending imposed time series to the counterparty
Time Series Confirmation	[0..*]		At least one Time Series Confirmation or one Imposed time series must be present in the ESS confirmation report.
Senders Time Series Identification	[1]	Original Time Series ID	Sender's identification of the time series instance (the same as in the referenced ESS Schedule Document) Note: The maximum length of the ID is 35 characters. Note: The confirmation report contains two time series for each trade (one with the quantity to be used in the settlement, and another with the delta value). Both time series reference the same time series from the ESS schedule document, hence the Original Time Series ID (Senders Time Series Identification) will be the same.
Senders Time Series Version	[1]	Version	Fixed 1
Business Type	[1]	A08 or Z64	A08 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)). Z64 Internal trade difference, within a Market balance area, i.e. the difference between trades reported from

ESS Confirmation Report Attribute	Cl.	Content	Descriptions and comments
			an out party (seller) and an in party (buyer). The internal trade difference is the delta value between what is reported by the two Balance Responsible Parties.
Product	[1]	8716867000030	8716867000030 Active energy
Object Aggregation	[1]	A01	A01 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.
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.
Measurement Unit	[1]	KWH or MWH	KWH kWh MWH MWh
Reason (Time Series Confirmation level)	[1]		
Reason Code	[1]	Reason Code	A85 Confirmation without adjustment (time series have been matched without change) A86 Confirmation with adjustment (time series have been modified)
Imposed time series	[0..*]		At least one Time Series Confirmation or one Imposed time series must be present in the ESS confirmation report.
Imposed Time Series Identification	[1]	Original Time Series ID	Unique identification of the Time Series (unique over time for the sender in question (eSett)) Note: The maximum length of the ID is 35 characters.
Imposed Time Series Version	[1]	Version	Fixed 1
Business Type	[1]	A08 or Z64	A08 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)). Z64 Internal trade difference, within a Market balance area, i.e. the difference between trades reported from an out party (seller) and an in party (buyer). The internal trade difference is the delta value between what is reported by the two Balance Responsible Parties.
Product	[1]	8716867000030	8716867000030 Active energy
Object Aggregation	[1]	A01	A01 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]		For Business type A08 : <ul style="list-style-type: none"> The Balance Responsible Party acting as the buyer in the bilateral trade. For business type Z64 (delta value):

ESS Confirmation Report Attribute	Cl.	Content	Descriptions and comments
			<ul style="list-style-type: none"> The Balance Responsible Party having to buy energy to get the trade in balance
Out Party	[1]	BRP 2	<p>For Business type A08:</p> <ul style="list-style-type: none"> The Balance Responsible Party acting as the seller in the bilateral trade. <p>For business type Z64 (delta value):</p> <ul style="list-style-type: none"> The Balance Responsible Party having to sell energy to get the trade in balance
Capacity Agreement Identification	[0..1]	Bilateral Trade ID	<p>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.</p> <p>The Bilateral Trade ID (Capacity Agreement Identification) is metadata for trade on supplier level. The BRP sends bilateral trade with InParty = BRP1 and OutParty = BRP2. If the trade is between two suppliers, then the Bilateral Trade ID is added to the message. The Bilateral Trade ID is generated by eSett when the BRP enters (structures) which trade relations (on a supplier level) this has balance responsibility for. The suppliers can then be identified by the Bilateral Trade ID.</p>
Measurement Unit	[1]	KWH or MWH	<p>KWH kWh MWH MWh</p>
Reason (Imposed time series level)	[1]		
Reason Code	[1]	Reason Code	A30 Imposed Time series from nominated party's time series
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	<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. PT1H or PT60M</p>
Interval	[1..*]		
Pos	[1]	Position	<p>The relative position of a period within a time interval</p> <p>Note: There can be gaps in the sequence of the Position element, i.e. to be able to confirm only single hours of a day.</p>
Qty	[1]	Quantity	The quantity of the product for the position within the time interval in question.

ESS Confirmation Report Attribute	Cl.	Content	Descriptions and comments
			<p>The direction from out party (seller) to in party (buyer) is positive, while the opposite direction is negative (with minus signs))</p> <p>Rules regarding the delta value:</p> <ul style="list-style-type: none"> The delta value is defined as: $\Delta = \text{Value}_{\text{BRP sale}} - \text{Value}_{\text{BRP purchase}}$ The latest received value from a party is used in the calculation of the delta value. If a value is received from only one of the parties in a trade, the delta value is zero. There are no delta values in the final confirmation report <p>The resolution is maximum in Watt, i.e. max 3 decimals for kWh and max 6 decimals for MWh</p>
Reason (Interval level)	[0..1]		
Reason Code	[1]	Reason Code	<p>A43 Quantity increased A44 Quantity decreased</p> <p>Only used for Reason Code "A86 Confirmation with adjustment (time series have been modified)" in Reason at Time Series Confirmation level. I.e. Not used for Imposed Time Series.</p>

Table 13: Attribute usage: ENTSO-E ESS Confirmation Report

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

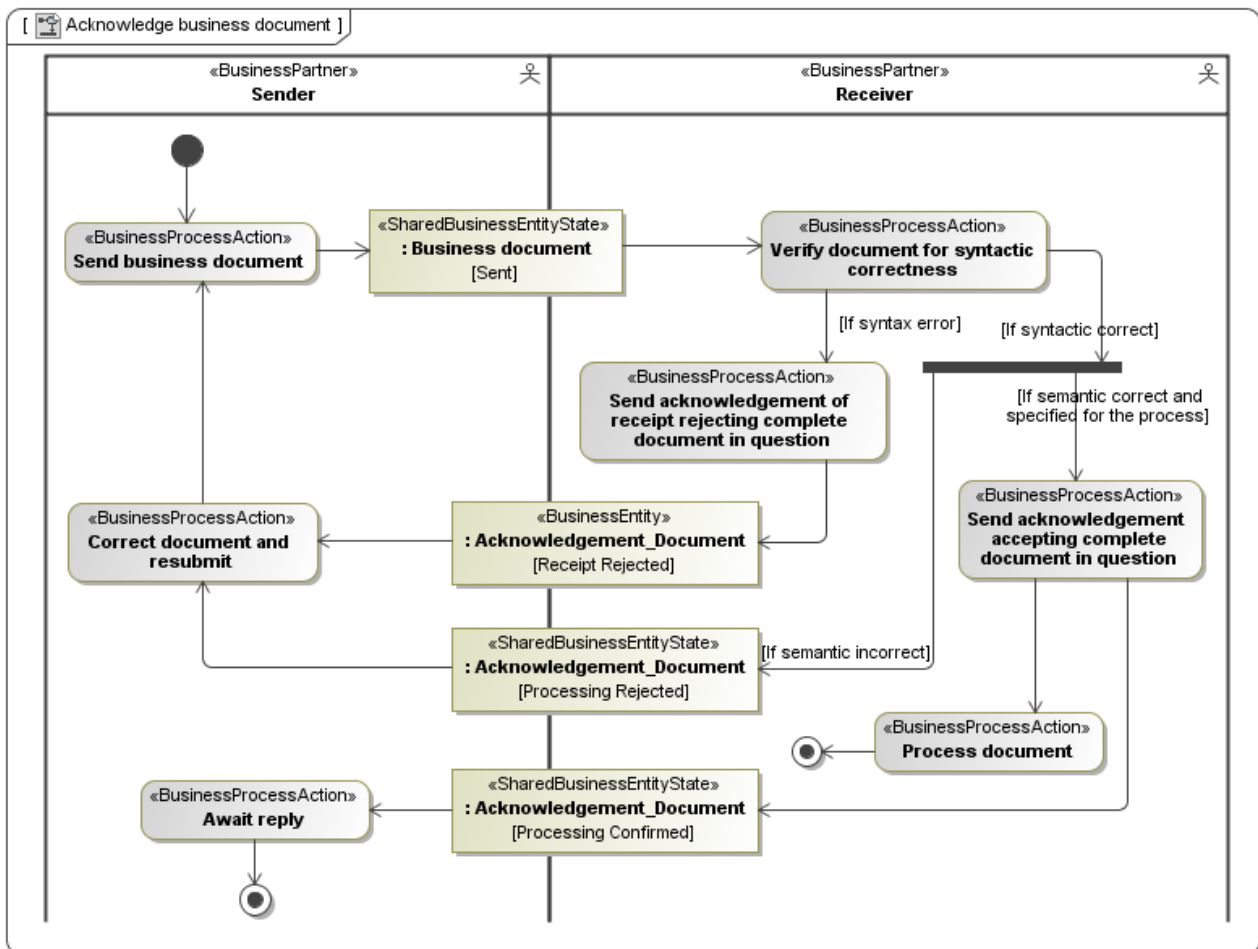


Figure 29: Activity diagram: ENTSO-E Acknowledgement process

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).

Nordic Balance Settlement

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 Basse Information Service

The *Basse Information Service* from eSett enables Market Parties to retrieve information related to the Settlement process, such as Settlement Structure. The *Basse Information Service Interface* allows market participants to request data from Basse. The request is represented by an ENTSO-E Status Request Document (ESRD). Based on the request, Basse creates a response, consisting of according business document (one of the supported ENTSO-E or ebIX® formats) and passes it back to the market participant as a Message. Using this interface, the market participant can retrieve information related to the Settlement process.

The Basse Information Service implementation of the ENTSO-E Status Request Document (ESRD) and the Web Service interface are documented in the document “Basse Connection Guideline”, see [14].

8 Technical business rules

8.1 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.

8.2 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.

Appendix B Usage of Coding Schemes

	Denmark		Finland		Norway		Sweden	
	ebIX®	ENTSO-E	ebIX®	ENTSO-E	ebIX®	ENTSO-E	ebIX®	ENTSO-E
Parties	9 or 305	A10 or A01	260/SLY ¹⁾	NFI ¹⁾	9	A10	260/SVK ¹⁾	NSE ¹⁾
MGA	260/DK	NDK	260/SLY	NFI	305	A01	260/SVK	NSE
MBA	305	A01	305	A01	305	A01	305	A01
MP	9	A10	260/SLY	NFI	9	A10	9 or 89	A10 or NSE
RO	9	A10	260/SLY	NFI	260/SM	NNO	260/SVK	NSE

Table 14: Usage of Coding Schemes in the Nordic countries

- 1) For parties active in more than one country only one id, GS1 (9 or A10) or EIC (305 or A01), shall be used when communicating with eSett.

Abbreviations:

MGA	Metering Grid Area
MBA	Market Balance Area
MP	Metering point
RO	Resource objects
EIC	European Identification Code, issued by ENTSO-E

In ebIX® document the *list- or scheme Agency Identifier* can be:

9	GS1
305	ENTSO-E
260	ebIX®
89	DSOs own Metering Point ID in Sweden

For national *code Lists or identification Schemes* the *list- or scheme Agency Identifier* will be ebIX® (code 260) and, in addition, a *list- or scheme Identifier* will identify the country:

DK	Danish Ediel group
SLY	Finnish Electricity Association
SM	Norwegian code list
SVK	Svenska kraftnät

In ENTSO-E documents the *list- or scheme Agency Identifier* can be:

GS1	A10
EIC	A01
Denmark	NDK
Finland	NFI
Norway	NNO
Sweden	NSE