

BRS

(Business Requirement Specification)

Nordic operational system

A market model for data exchange

Business process: Nordic operational system

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1 Introduction

1.1 Background

Today the Nordic TSOs exchange documents based on several different formats and standards, such as Ediel (DELFOR/MSCONS), NOIS XML documents based on ETSO IGs, CIM IGs and Excel documents. In addition, the Nordic TSOs have communications towards other European countries, such as Germany, the Netherlands and Poland, using even more standards, such as NorNed xml and ENTSO-E standards.

For efficiency reasons the four Nordic TSOs have set up the NMEG (Nordic Market Expert Group) for migration of the document exchanges towards one common document standard, and later maintenance of the Nordic document exchanges. The aim is to define document exchange models that can be used for all document exchanges between the actors in the Nordic energy market, Nordic TSOs and Market Operators.

This document is a *Business Requirement Specification* (BRS) detailing the document exchanges related to operation of the Nordic energy market. The focus of the document is the business aspects of the document exchanges and the basis for the document is the ENTSO-E ERRP Implementation Guide [1], together with the ebIX®, EFET and ENTSO-E Harmonised role model [2].

1.2 Nordic Energy Domain Model

A Nordic Energy Market Domain model, giving an overall overview of the structure and processes used in the Nordic Energy market, can be found at [12].

1.3 Project organisation

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

1.4 References

- [1] [ENTSO-E Electronic Data Interchange \(EDI\) Library](#)
 - Implementation Guides
 - CIM XML schemas
 - MADES specifications
 - Etc.
- [2] [The Harmonised Role Model, ENTSO-E, ebIX® and EFET](#)
- [3] [UN/CEFACT Unified Modelling Methodology \(UMM\)](#)
- [4] [UN/CEFACT XML Naming and Design Rules \(NDR\)](#)
- [5] ebIX Modelling methodology and process models (EMD), see <http://www.ebix.org/>
- [6] Ediel Implementation guides, see <http://www.ediel.org/>
- [7] Ediel Common Nordic XML rules and recommendations, see <http://www.ediel.org/>
- [8] Ediel BRS for the Nordic TSO Determine transfer capacity model, see <http://www.ediel.org/>
- [9] Ediel BRS for the Nordic TSO Scheduling and Ancillary Services Process, see <http://www.ediel.org/>
- [10] Ediel BRS for the Nordic Trading System, see <http://www.ediel.org/>
- [11] Ediel BRS for the Nordic Balance Settlement and BRS for the Nordic Balance Settlement between NBS and TSOs/Market Operators, see <http://www.ediel.org/>
- [12] Nordic Energy Market Domain Model, see <http://www.ediel.org/>
- [13] Agreement regarding operation of the interconnected Nordic power system (System Operation Agreement)
http://www.entsoe.eu/fileadmin/user_upload/library/publications/nordic/operations/060613_entsoe_nordic_SystemOperationAgreement_EN.pdf

1.5 Terms and notations

The term *document* is used instead of *message* when this is applicable. However, when referencing ENTSO-E document names, the ENTSO-E name will be used, e.g., message, report, or document.

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.

Some abbreviations used:

ACE OL	Area Control Error Open Loop
aFRR	Automatic frequency restoration reserve
BRP	Balance Responsible Party
BSP	Balancing Service Provider
DATCR	Direct Activated Tertiary Control Reserve
FCR-D	Frequency Containment Reserves for Disturbances
FCR-N	Frequency Containment Reserves for Normal operation
FRR	Frequency Restoration Reserve
mFRR	Manual Frequency Restoration Reserve
MOL	Merit Order List
NBM	Nordic Balancing Model
SATCR	Schedule Activated Tertiary Control Reserve

1.6 Change log

Ver/rel/rev	Changed by	Date	Changes
1.6.A	Ove Nesvik	20220628	<ul style="list-style-type: none"> • Addition of the new UseCase “Situational awareness” as part of the UseCase Operate. • Addition of “Merit Order List”, “ESS Schedule (ACE OL Limits)” and “ACE OL Point value” documents, including update of Attribute usage. • Replaced Resource Provider by Balancing Service Provider. • Removed the role Market Operator from the Activate UseCase. • Correction of spelling and addition of clarifying text, such as: <ul style="list-style-type: none"> ○ Update of references and related links. ○ Addition of abbreviations in chapter “1.5 Terms and notations”.
1.5.A	Ove Nesvik	20210702	<ul style="list-style-type: none"> • Replace the code “Z69 Metered frequency” with “C57 Metered frequency” • Added reporting of FCR and FRR. • Using Enterprise Architect instead of MagicDraw artefacts.

			<ul style="list-style-type: none"> • Update to latest Harmonised Role Model
1.4.A	Ove Nesvik	20200831	<ul style="list-style-type: none"> • Removal of Document Type Z15 • Removal of Process Type code A29 and A30 • Addition of role code “A46 Balancing Service Provider” in all documents
1.3.A	Ove Nesvik	20200604	<ul style="list-style-type: none"> • Replaced Process Type A30 with A47 in Balancing Market Document • Addition of A46 Balancing Service Provider in all documents • Addition of new Process Type Codes for ERRP Activation document (CIM version): <ul style="list-style-type: none"> • A47 Manual frequency restoration reserve (to replace A30) • A51 Automatic frequency restoration reserve (to replace A29) • The following Process Type Codes for ERRP Activation document (CIM version) are marked for deprecation: A29, A30. • Correction of spelling errors. • Addition of Balancing Market Document (IEC/CIM 62325-451-6 Balancing Market Document Ed. 2.1), see chapter 5.2.1. • Added Price Report to the MOL Responsible in the sequence diagram in chapter 2.3 (new arrow 29) • Added MOL Responsible to the UseCase diagram and the activity diagram in chapter 3.2. • Addition of clarifying text and correction of spelling errors. • Updated roles and domains to version 2019-01 of the HRM [2].
1.2.A	Ove Nesvik	20180618	<ul style="list-style-type: none"> • Update of cardinalities for ERRP Activation Document (ENTSO-E version). • Addition of ERRP Activation Document (CIM version). • Addition of process area “Report”. • Addition of Metered frequency (Z69) and Hz in the Publication Document. • Addition of clarifying text and correction of spelling errors.
1.1.D	Ove Nesvik	20170704	Addition of cardinalities in the attribute tables.
1.1.C	Ove Nesvik	20170704	<ul style="list-style-type: none"> • Textual corrections: removed Nord Pool and eSett logos on the front page. • Addition of Reason code “A95 Complementary information” together with Reason Text.
1.1.B	Ove Nesvik	20170213	<ul style="list-style-type: none"> • 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.

			<ul style="list-style-type: none"> • 2.3 Overview of information exchange between market actors (sequence diagram): <ul style="list-style-type: none"> ○ Addition of “Price report” from Market Operator to Reconciliation Responsible. • NEG ECAN Publication Document: <ul style="list-style-type: none"> ○ Addition of “A38 Reconciliation Responsible” as Receiver Role.
1.1.A	Ove Nesvik	20161018	<ul style="list-style-type: none"> • NEG ECAN Publication Document: <ul style="list-style-type: none"> ○ Addition of Business Type “B23 Consumption imbalance price”. • ERRP Activation Document: <ul style="list-style-type: none"> ○ Addition of Document Type “A36, Deactivation document”. ○ Addition of Business Type “A12 Secondary control”. ○ Update related dependency matrix. • Textual corrections.
1.0.A	Ove Nesvik	20151118	First official version.

2 Overview of the Nordic energy market domain

2.1 Operate in the overall context (Domain model)

The *Domain model* describes the core 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.

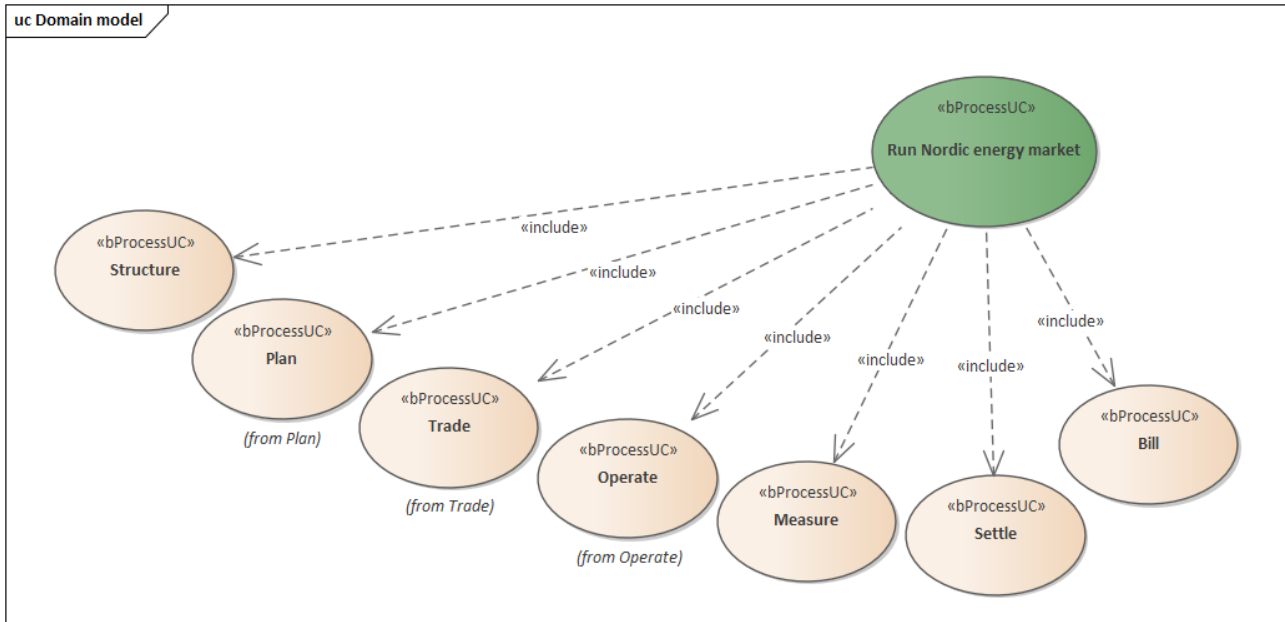


Figure 1: UseCase diagram: Domain model

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:

- **Structure:** Exchange of master data including the Change of Supplier processes
- **Plan:** Planning of production, consumption, exchange, and transport
- **Trade:** Trade on different markets, including ancillary services, bilateral trade, etc.
- **Operate:** Operation
- **Measure:** Measuring of production, consumption, exchange, and transport
- **Settle:** Settlement
- **Bill:** Billing

The *Nordic operational system process* is a part of the process area *Operate*.

For a more elaborated description of the processes include in the domain model, see [9].

2.2 Breakdown of the operational phase

In the rest of this document the *Business area* (UseCase) *Operate* is further elaborated.

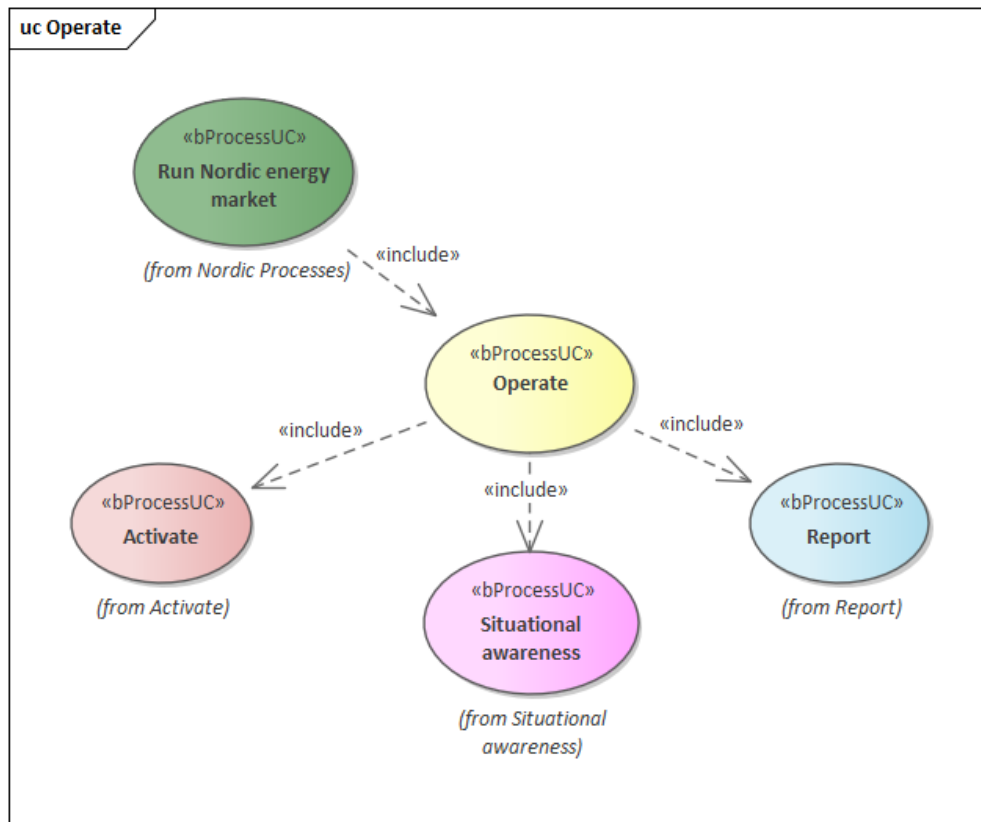


Figure 2: UseCase diagram: The Nordic operational system process

The *Business Area Operate* outlined in *Figure 2*, concerns principally the activation, situational awareness and reporting processes.

In the rest of this document the red, purple and blue UseCases, i.e., *Activate Situational awareness* and *Report* are further elaborated.

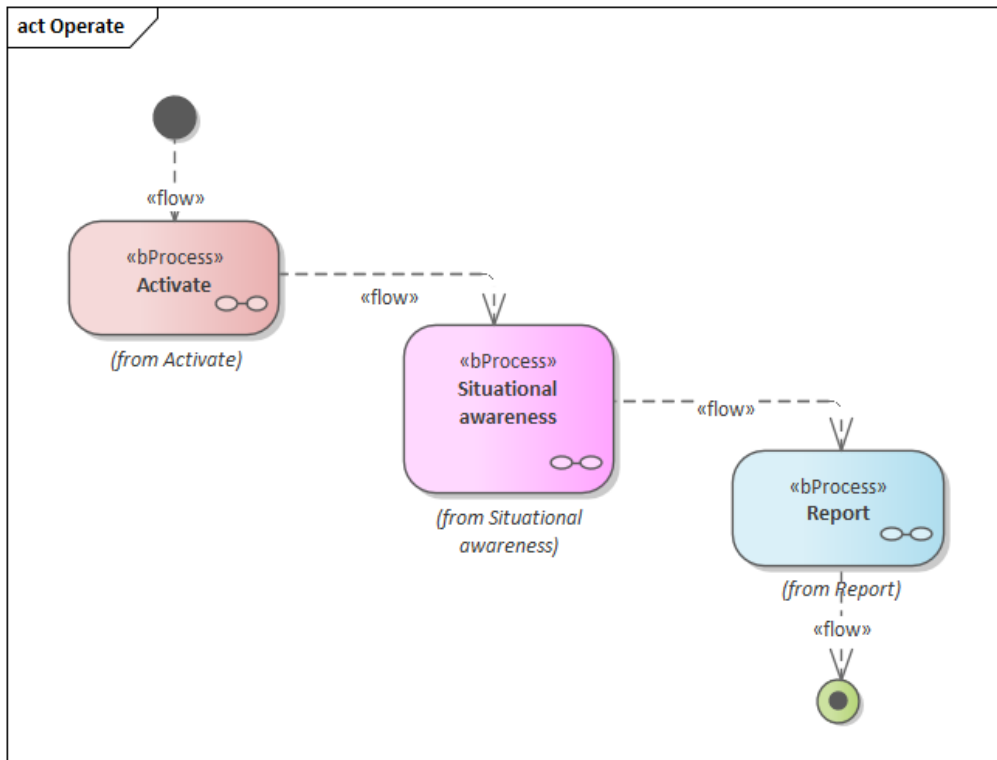


Figure 3: Activity diagram: The Nordic operational system process

The activation, situational awareness and report processes are parts of the *Balance Regulation Market*. An activation is always within a *Bidding Zone*.

2.3 Overview of information exchange between market actors

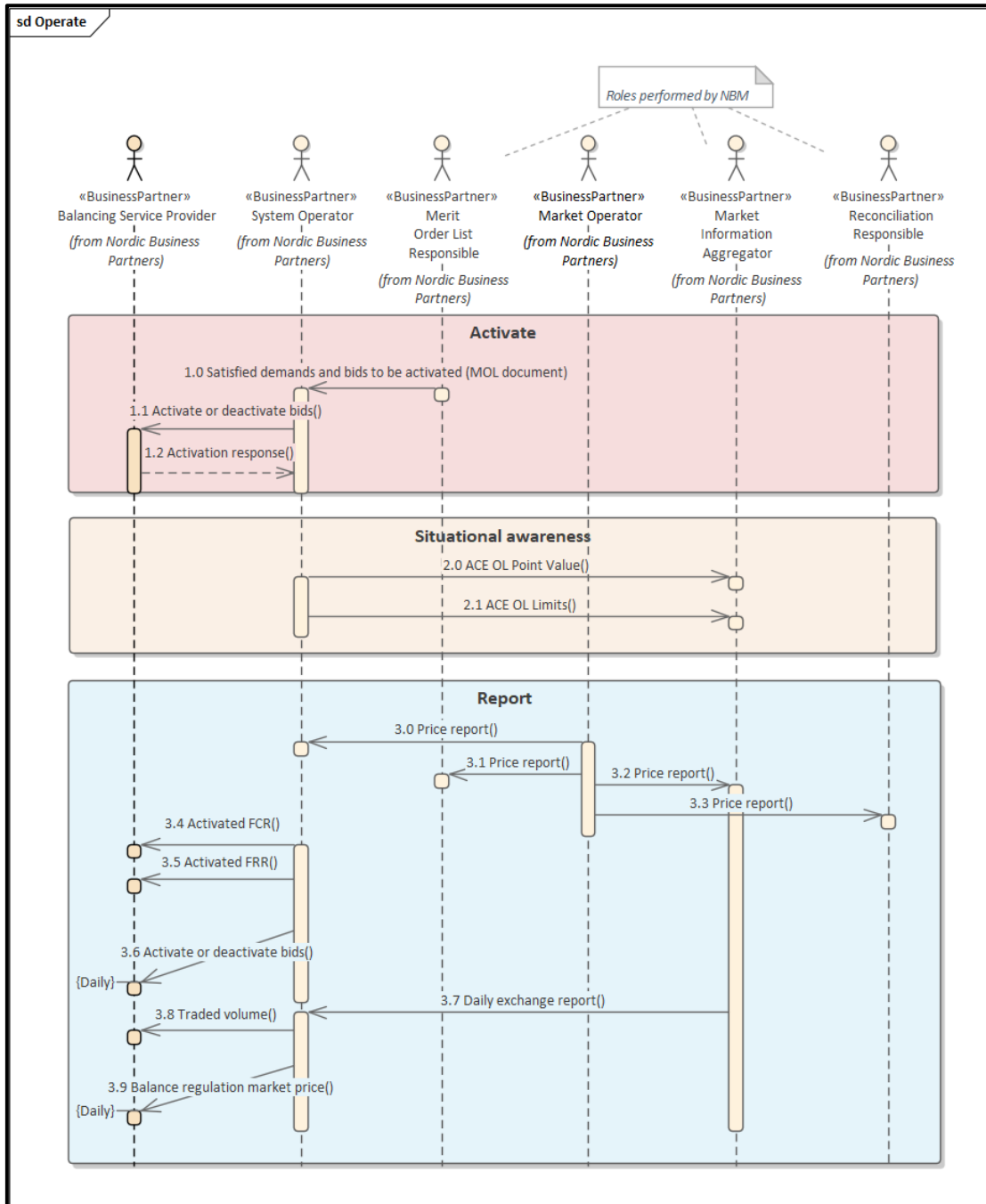


Figure 4: Sequence diagram: Information exchange overview for “operational markets”¹

¹ The report part will be updated when the process is finally agreed by NBM.

Process area	Arrow	Content	Where to find detailed description
Activation	1.0	Satisfied demands and bids to be activated (MOL document)	Merit Order List Document (IEC/CIM 62325-451-7, Ed. 1), see 5.1
	1.1	Activate or deactivate bids (Status = A10, Ordered)	ERRP Activation Document (IEC/CIM 62325-451-7 Activation Document version 6.0), see 5.2
	1.2	Activation response (Status = A07, Activated or A09, cancelled)	or ERRP Activation Document (ENTSO-E version), see 5.3
Situational awareness	2.0	ACE OL Point Value	ACE OL Point Value Document (IEC/CIM), see 5.5
	2.1	ACE OL Limits	ESS Schedule Document from IEC62325-451-2 Ed.2 (ACE OL Limits), See 5.6
Reporting	3.0	Price report	Balancing Market Document (IEC/CIM 62325-451-6, Ed. 2.1), see 5.7
	3.1	Price report	
	3.2	Price report	
	3.3	Price report	ERRP Activation Document (IEC/CIM 62325-451-7 Activation Document version 6.0), see 5.2 or ERRP Activation Document (ENTSO-E version), see 5.3
	3.4	Activated FCR	
	3.5	Activated FRR	
	3.6	Activated or deactivated bids	
	3.7	Daily exchange report	Balancing Market Document (IEC/CIM 62325-451-6, Ed. 2.1), see 5.7
	3.8	Traded volume	
3.9	Balance regulation market price		

Table 1: ENTSO-E documents used in the Nordic operational system

Figure 4 shows the main electronic documents exchanged between the *Balancing Service Providers* (market participants), *TSOs*, *Market information aggregator*, *MOL Responsible* and the *Market operator*. Reporting to the Imbalance settlement responsible is shown in separate BRSS [11].

As seen from the diagram the basic information exchange is similar for the *Trade on FRR-A market*, the *Reserve options market* and the *Frequency activated reserves market*. First an *Auction specification document* is sent from the *TSO* to the *Balancing Service Providers* (market participants), then the *Balancing Service Providers* send in their bids to the *TSO* and finally the resulting contracts are sent to the *Balancing Service Providers*. The *Auction specification document* contains information about the available auctions, products, areas, and cut-off times.

Trade in the *Frequency activated reserves market* can in addition be executed between the *TSOs*. Summary of the trade on the *Frequency activated reserves market* is sent to the *Market information aggregator*.

For the *Balance regulation market*, the *Auction specification* is not sent explicitly, but follows the area definitions from the day-ahead market. In addition to the bids, the *Balancing Service Providers* must send *Production schedules* and *Ancillary services schedules*; including the result from the *Frequency activated reserves market* see [7]. The *Balance regulation bids* are sent from the *TSOs* to the *MOL Responsible* and made available for the *TSOs* as a sorted list of bids.

When needed the *TSOs* may, in addition to the trade on the *Balance regulation market*, trade bilaterally. Today this trade is executed using telephone.

After the bids have been received the bids may be activated. Each activated bid is reported back to the *Balancing Service Provider in question* and reported to the *Market information aggregator*. Daily, after the operational phase, the activated and deactivated bids, and Balance regulation market prices are distributed to the *Balancing Service Providers*.

Summaries of traded volumes for consumption and production per Bidding area may be sent from the *TSO* to the *Balancing Service Provider*.

In addition to the information exchange shown in the diagram above, the *marginal prices* and *total quantity* bought are made available on a webserver for the different markets.

The *Balancing Service Providers* must be, or be contracted with, a *Balance Responsible Party*, which is responsible for consumption, production, or both.

3 Process areas within Nordic operational system

3.1 Process area: Operate

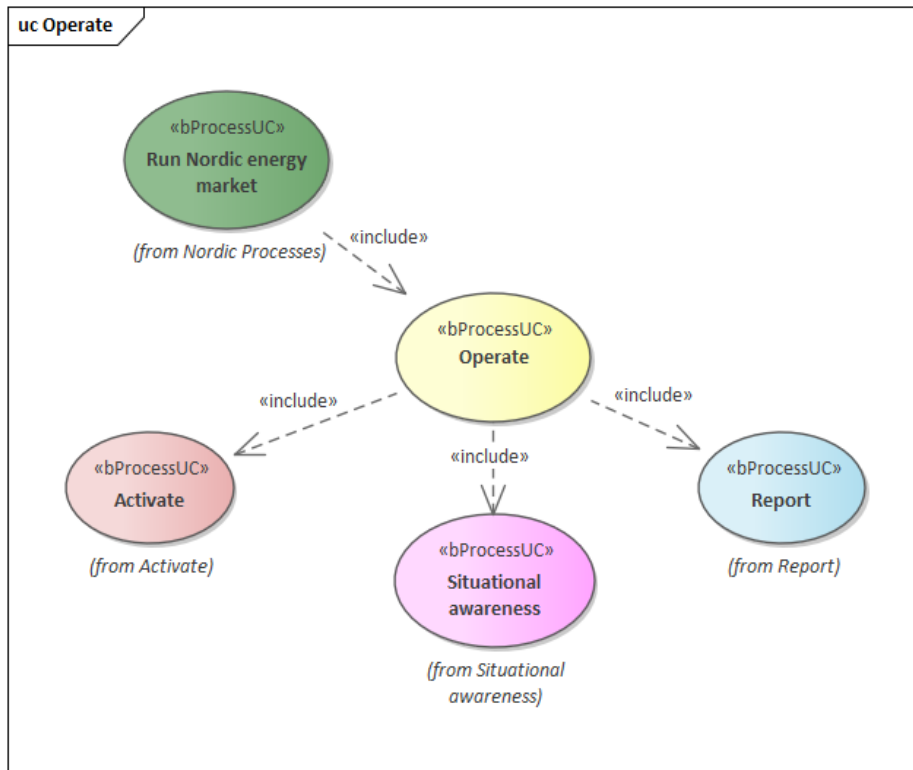


Figure 5: UseCase diagram: Operate

3.1.1 Process area: Activate

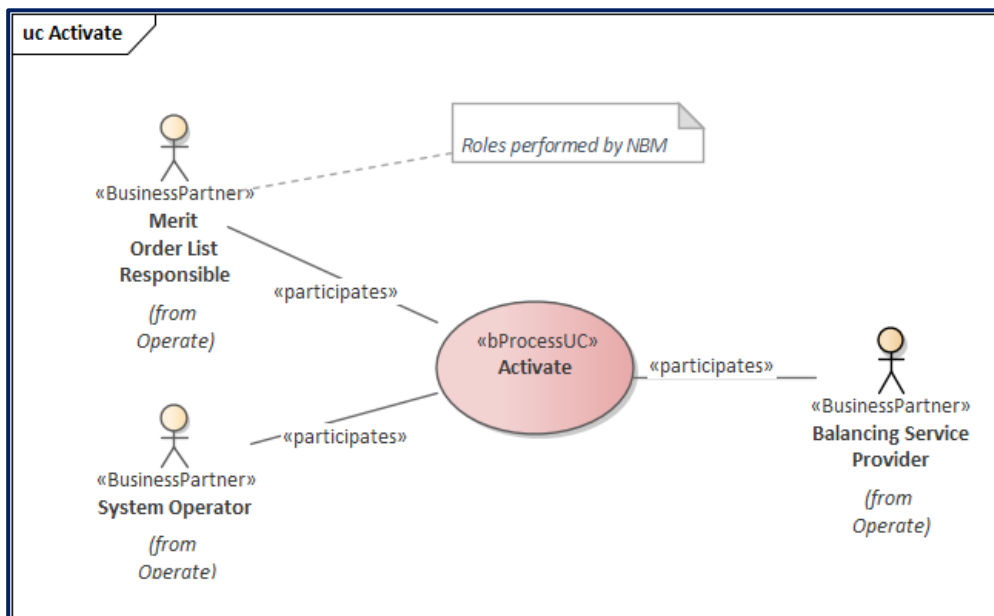


Figure 6: UseCase diagram: Activate

Figure 6 shows the process *Activate* and the participating actors. The *Business process* is further described below.

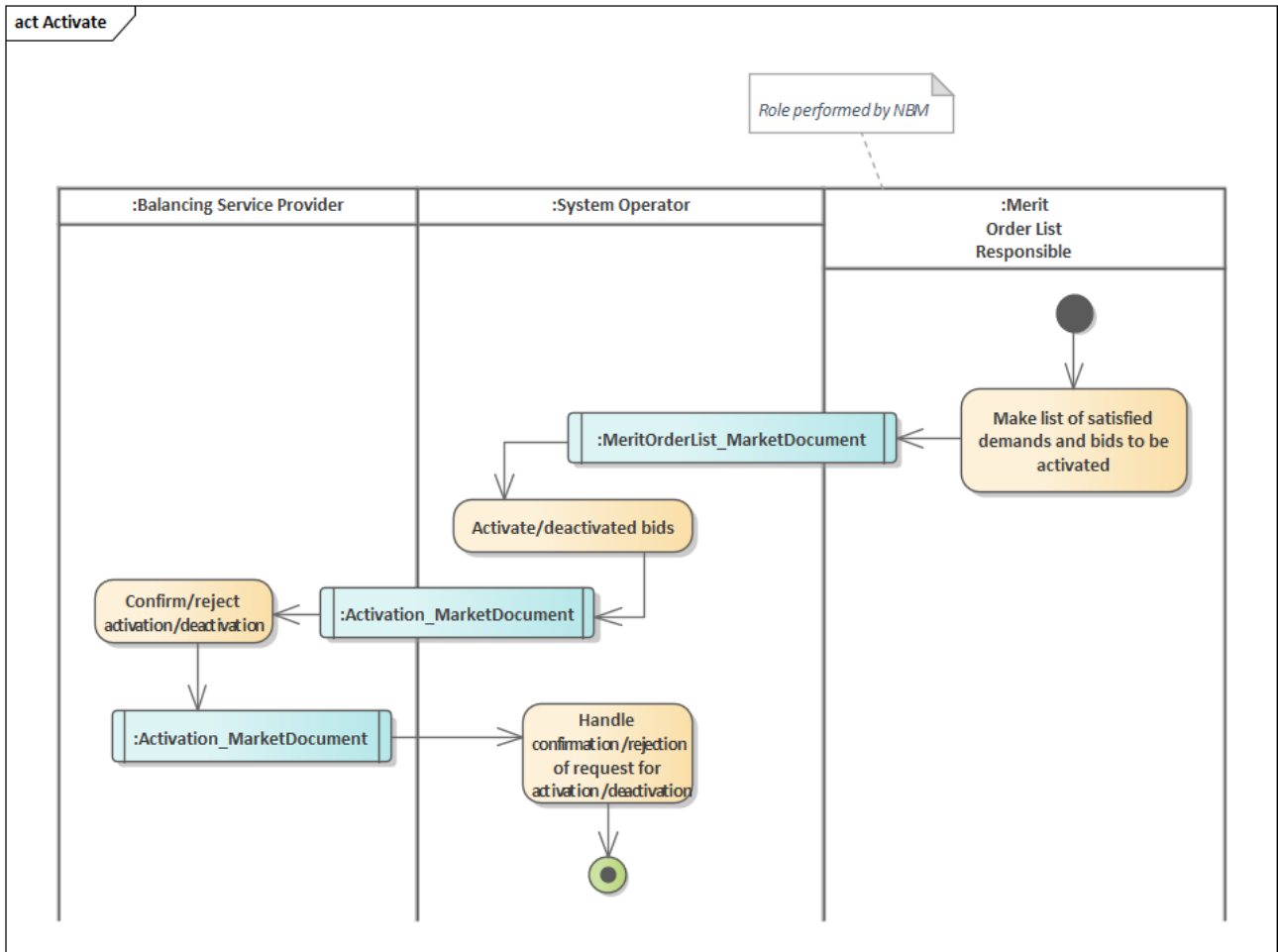


Figure 7: Activity diagram: The Nordic activation process

The Balance regulation market is a tool for the TSOs and must be able to manage unpredictable differences between planned and actual exchange in the delivery phase on short notice. Active bidders on the Balance regulation market must be able to regulate their delivery and usage within a given time defined by the market rules. In practice, this means that only producers and large consumers are bidding actively. All other participants remain passive. An overview of how the trading of balancing services across borders is facilitated within Nordic countries can be found in [10].

Before the activities in

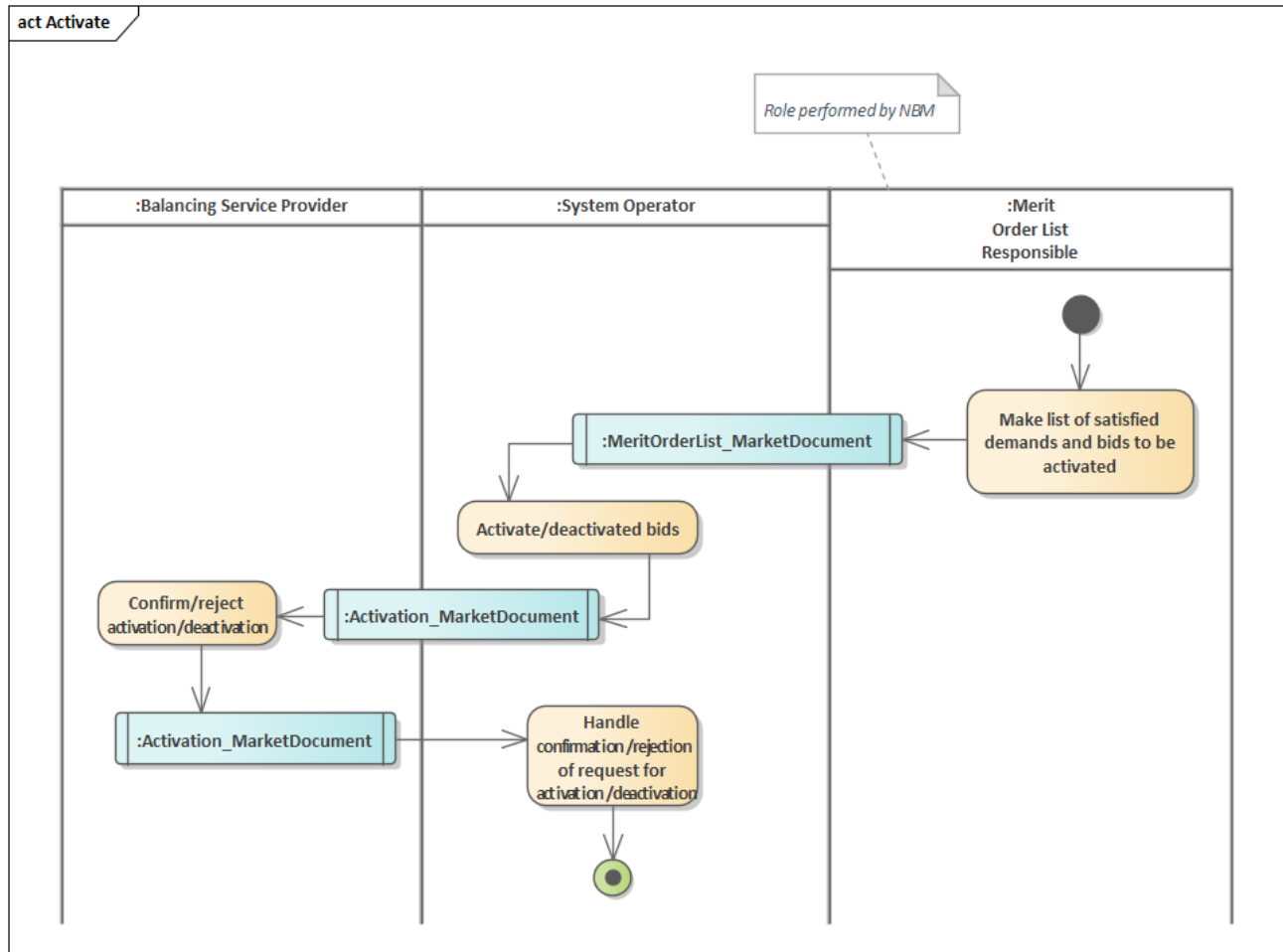


Figure 7, bids are collected, accumulated, and presented for the TSO by the MOL Responsible (NBM), as a sorted list of bids.

The Nordic Balance regulation market document transmission cycle is composed of the following phases:

1. In the national Balance regulation market, *Balance responsible parties* sends bids to the TSOs on a day-ahead basis. Bids may be for both up and down regulation and be corrected during the operational phase (e.g., within 45 minutes before operation). The TSO activates up or down regulation according to the lowest bids.
2. The national TSO forwards all the bids to the *MOL Responsible*.
3. When there is a need to perform balance regulation, and provided there are no network restrictions, the operator checks with the *MOL Responsible* list of sorted bids (e.g., NBM) to find the cheapest unused bid. If it is within the operator's area, he or she activates the bid, otherwise he or she calls the TSO with the cheapest unused bid

Related documents are defined, according to the UMM [3], in chapter 5, Business Entity View (Business Data View), Nordic operational system.

In the Nordic market NBM act as *MOL responsible*. In fallback scenarios, the TSO has a Market Operator role for their own area. The latter is however not reflected in the sequence and activity diagrams in this BRS.

Tertiary reserve is a rescheduling action used for the restoration of Primary and Secondary reserve and to cater for a high rate of change of demand or generation, demand forecast errors or short-term plant losses.

Two types of Tertiary reserve activation are possible:

- Schedule Activated Tertiary Control Reserve (SATCR): is activated with relation to the predefined timeframe of exchange schedules, e.g., 15 minutes. A special exchange scheduling procedure is

used. It may include exchange rescheduling between TSOs, a special kind of exchange schedule is used.

- Directly Activated Tertiary Control Reserve (DATCR): can be activated at any time, independent from a timeframe of exchange schedules. It is activated by manual action at any time and may also include call-up reserve contracts between TSOs. In this case, the activation procedure results in a dynamically changing exchange pattern.

In Denmark (for emergency in DK2), Finland, Norway, and Sweden the DATCR type is used for activations in the *Balance regulation market*. Except for emergency in DK2, Denmark uses SATCR.

3.1.1.1 [Process for activations](#)

1. The TSO orders an activation by sending an activation request to a Balancing Service Provider
2. The Balancing Service Provider sends an acknowledgement that the activation request was received
3. The Balancing Service Provider sends an activation response to confirm that the activation order has been noted
4. The TSO sends an acknowledgement that the activation response was received
5. The Balancing Service Provider activates the requested resource according to the confirmed order
6. Optionally the Balancing Service Provider may send an updated activation response in case there is a deviation between the actual activation and the activation request
7. Optionally the TSO sends an acknowledgement that the updated activation response was received and approved

3.1.1.2 [Handling of activations](#)

Balance regulation market activations are ordered for up to one hour at a time but may be recurring. Continuation of recurring activations may be sent as an activation order prior to each new hour.

3.1.1.2.1 Handle new activations and stopped activations

An activation is new if:

- the activation document refers to a bid that is currently not in an activated state

An activation is stopped if:

- the activation document refers to a bid that is currently in an activated state
- end time is less than a given time according to local market rules

New and stopped activations must be presented to the Balancing Service Provider for confirmation before the activation response is sent to the TSO.

3.1.1.2.2 Handle recurring activations

To avoid unnecessary interruptions for the Balancing Service Provider because of hourly recurring activations, an automatic process can take care of these activations. The alternative to such a process is a manual intervention from the Balancing Service Provider every hour to confirm activation response.

An activation is "recurring" if all the following holds true:

- the activation document has the same order ID as a previous activation, but an updated version number
- the activation document refers to a bid that is currently in an activated state
- start time is equal to the end time of the current bid activation
- end time is increased from the last activation document
- end time is further ahead than a given time according to local market rules

If a recurring activation has not been received 15 minutes before the current end time of the activation, e.g., 15 minutes before the new hour, the activation should be stopped at the current end time.

3.1.1.3 Business rules – Activation Response

- The activation response must refer to a specific activation request (by ID and version)
- The Activation Time Series Class must be equal to the activation request except for Status (Balancing Service Provider, Business Type, Acquiring Area, Connecting Area, Measure Unit, Direction, Resource Object must be the same as requested)
- Quantity of the power block cannot be changed
- Start time (ST) may be adjusted if the start time is closer than a given time according to local market rules from the ordering time (OT, the time the order was sent).
- End time (ST) may be adjusted if the start time is closer than a given time according to local market rules from the ordering time.

3.1.2 Process area: Situational awareness

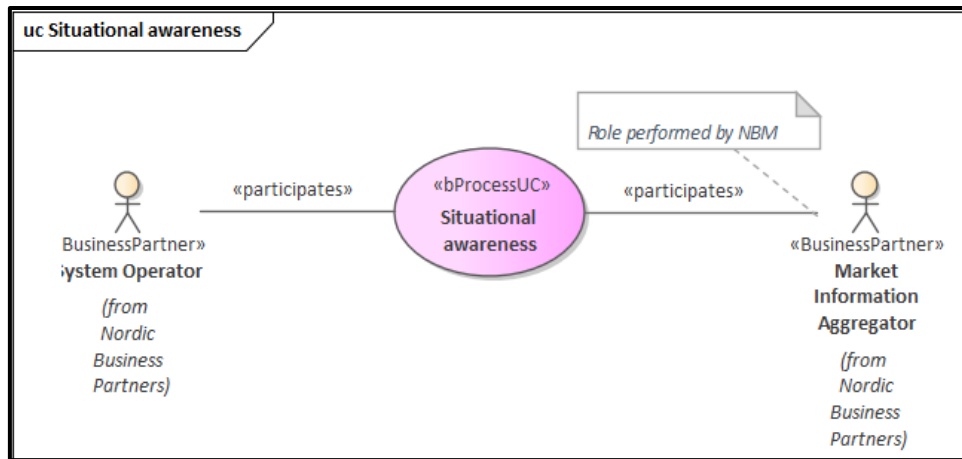


Figure 8: UseCase diagram: Situational awareness

Figure 8 shows the process *Situational awareness* and the participating actors. The *Business process* is further described below.

In the *Situational awareness* process, the System Operator informs the Market Information Aggregator (NBM) of real-time Area Control Error Open Loop (ACE OL) Point Values. The ACE OL Point values is sent by a 10-second resolution per Bidding Zone and represents the imbalance of a Bidding Zone in the power system without automatic Frequency Restoration Reserve (aFRR) and manual Frequency Restoration Reserves (mFRR). ACE OL is the imbalance before any operator balancing actions.

Further the ACEOL Limits document is sent whenever the limit for warnings and alarms change. The ACE OL limits is used for visualisation when ACE OL exceed or goes below certain values within a bidding zone. The ACE OL limits is sent infrequent, i.e. the distribution may range from e.g. 3 months down to every 15 minutes. ACE OL Limits are given by Time Series for each Bidding Zone within a TSO area of responsibility.

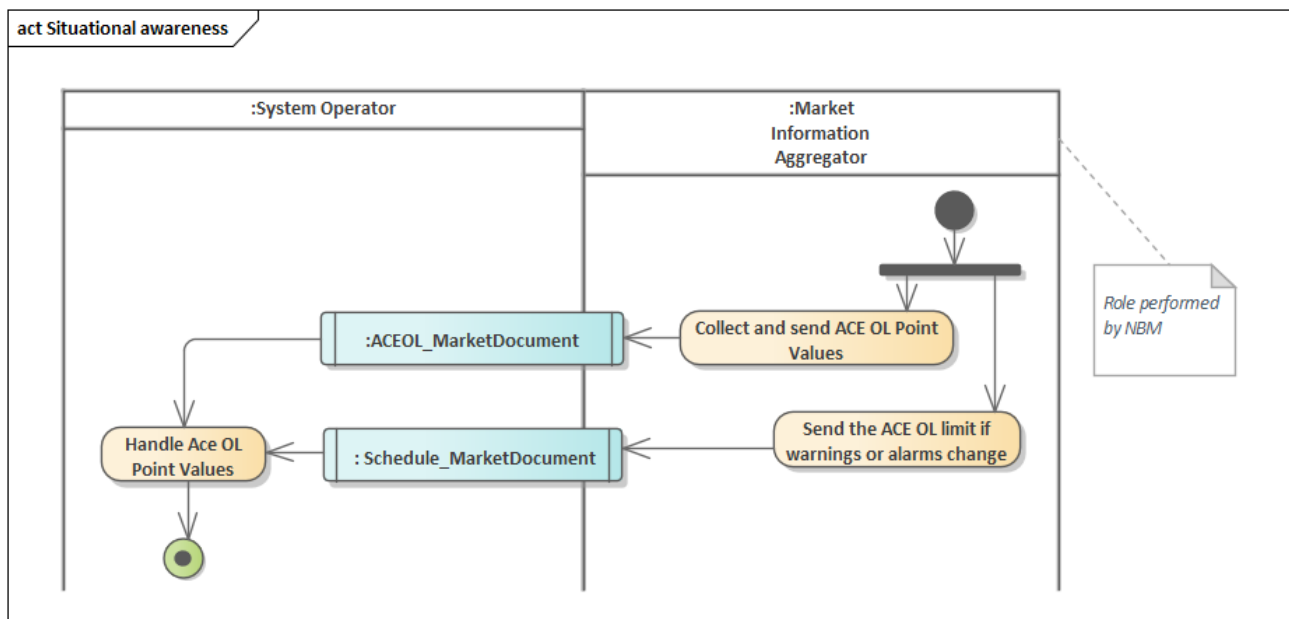


Figure 9: Activity diagram: Situational awareness

3.1.3 Process area: Report

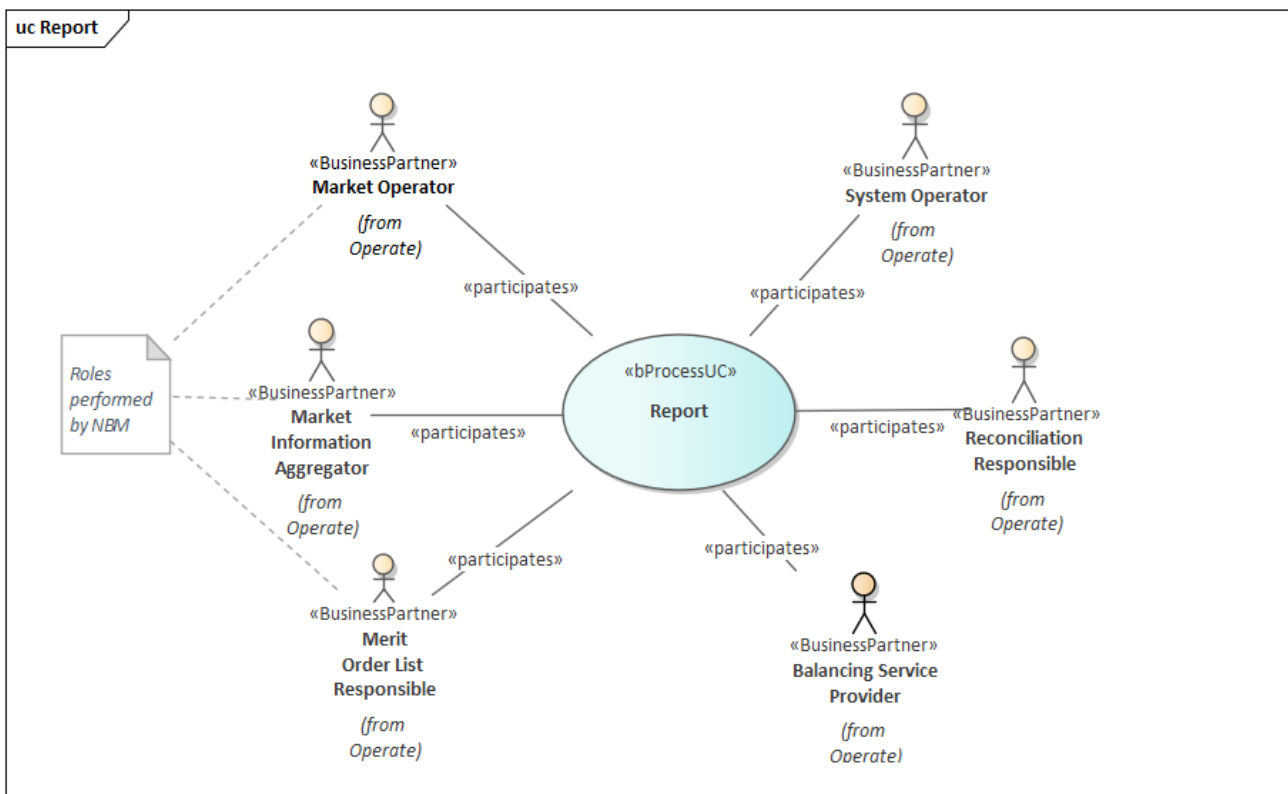


Figure 10: UseCase diagram: Report

Figure 10 shows the process *Activate* and the participating actors. The *Business process* is further described below.

After the operational day, the following are reported for FCR:

- The System Operator shall report to the BRP, which supplies FCR involved in the balancing capacity trade for FCR-N after the end of the delivery day:
 - Average frequency per quarter (Hz).
 - Activated FCR-N balance energy (amount in EUR and net energy per hour and Scheduling Area, separately for production and consumption).
 - Binding procured FCR-N balance capacity (power per Scheduling Area, separate for production and consumption).
- The System Operator shall report to the BRP, which delivers FCR involved in the trade in FCR-D after the end of the delivery day:
 - Average frequency per quarter (Hz).
 - Activated FCR-D balance energy (net energy per hour and Scheduling Area, separate for production and consumption).
 - Binding planned FCR-D balance capacity (power per Scheduling Area, separate for production and consumption).

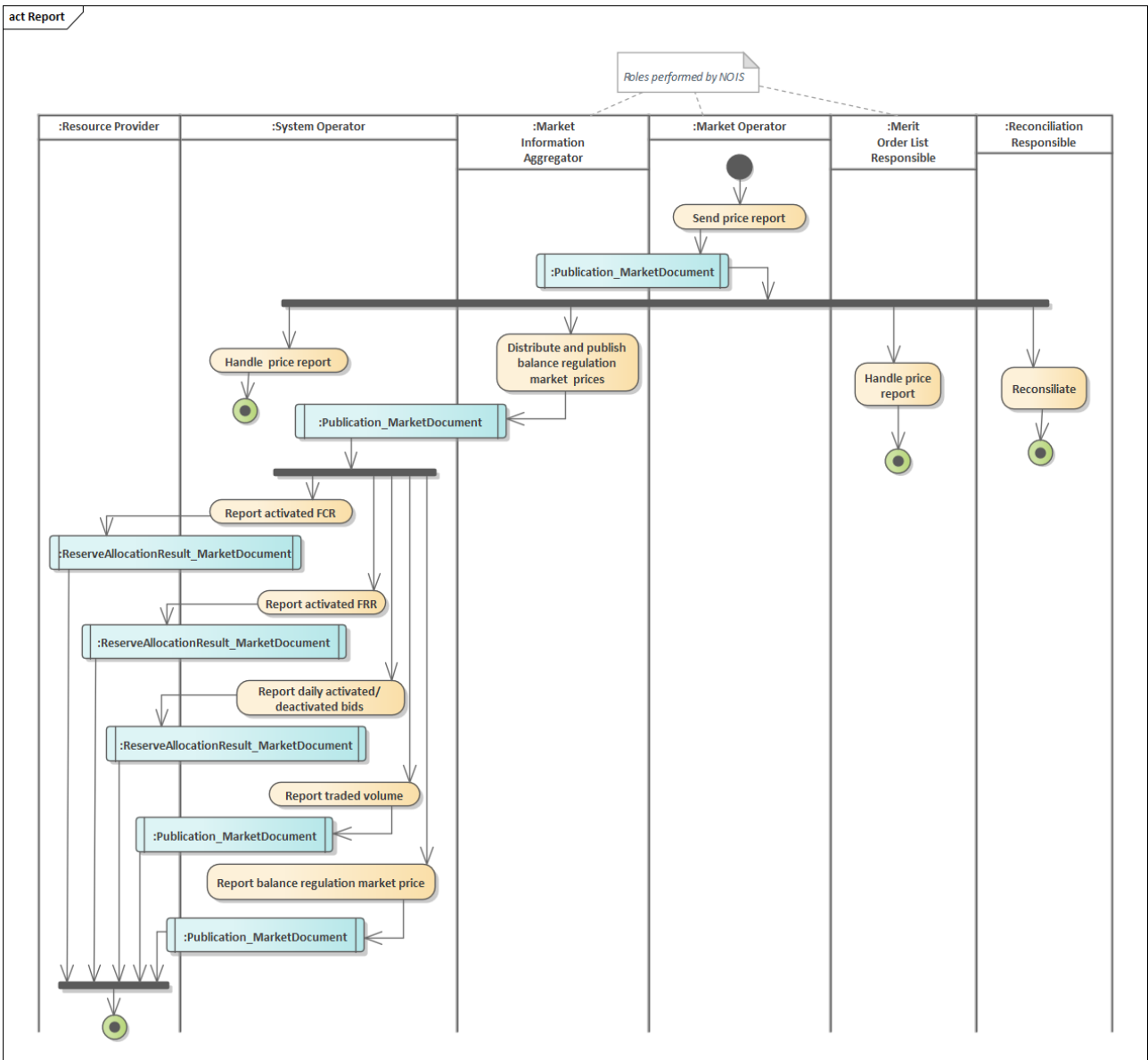


Figure 11: Activity diagram: Report

4 Harmonised roles and domains used in Nordic operational system

In Figure 12 and in definitions below the relevant parts of the ebIX®, EFET and ENTSO-E Harmonised role model are outlined.

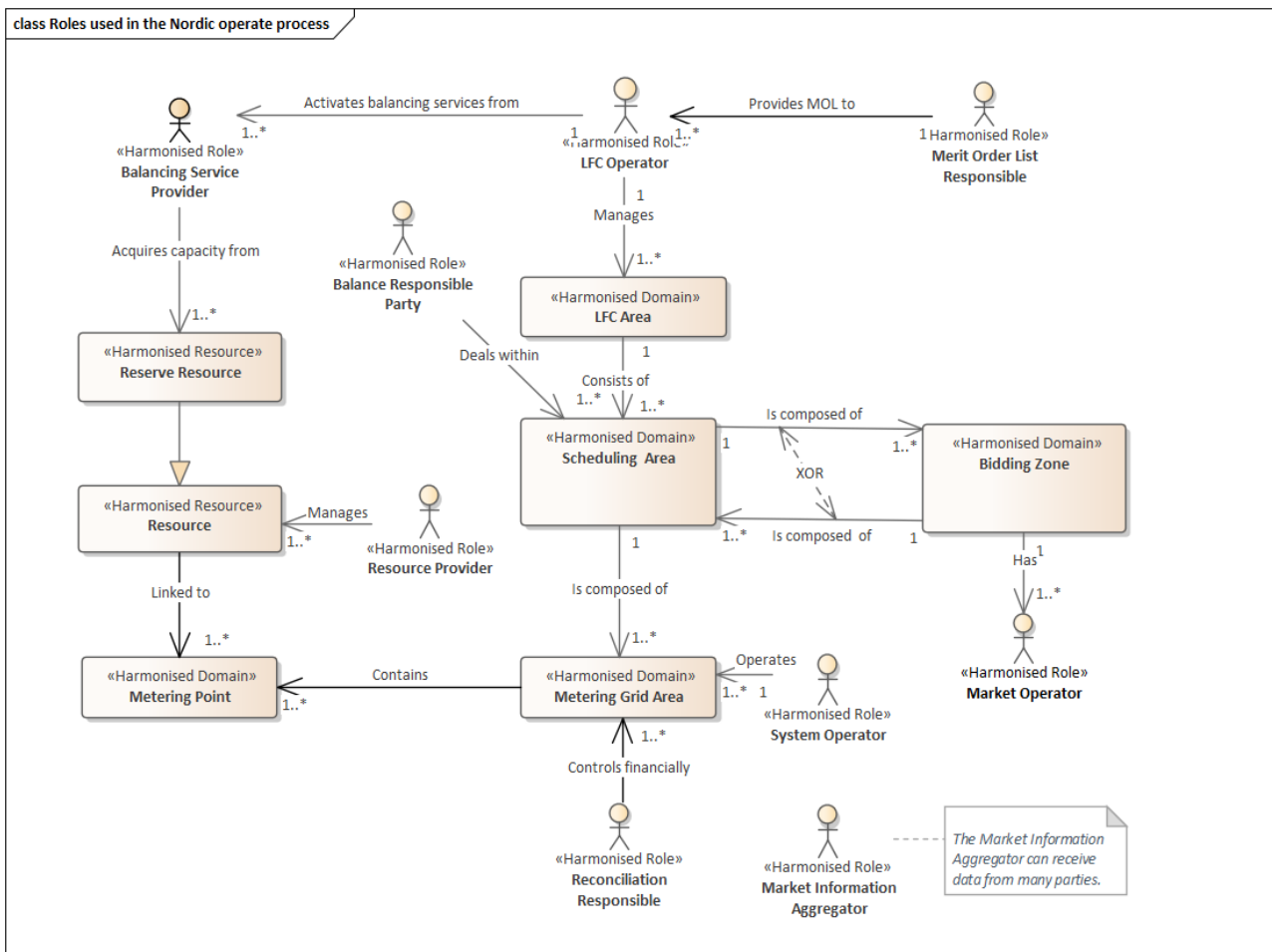


Figure 12: Outline of the Harmonised role model within the scope of the Nordic operational system

4.1 Roles from the ebIX®, EFET and ENTSO-E Harmonised role model HRM)

4.1.1 Balance Responsible Party

A Balance Responsible Party is responsible for its imbalances, meaning the difference between the energy volume physically injected to or withdrawn from the system and the final nominated energy volume, including any imbalance adjustment within a given imbalance settlement period.

Note:

Based on [Electricity Balancing - Art.2 Definitions](#).

Additional information:

Responsibility for imbalances (Balance responsibility) requires a contract proving financial security with the Imbalance Settlement Responsible of the Scheduling Area entitling the party to operate in the market.

4.1.2 *Balancing Service Provider*

A party with reserve-providing units or reserve-providing groups able to provide balancing services to one or more LFC Operators.

Additional information:

Based on [Electricity Balancing - Art.2 Definitions](#).

4.1.3 *LFC Operator*

Responsible for the load frequency control for its LFC Area or LFC Block.

Additional information:

This role is typically performed by a TSO.

4.1.4 *Market information aggregator*

A party that provides market related information that has been compiled from the figures supplied by different actors in the market. This information may also be published or distributed for general use.

Note:

The Market Information Aggregator may receive information from any market participant that is relevant for publication or distribution.

4.1.5 *Market operator*

A market operator is a party that provides a service whereby the offers to sell electricity are matched with bids to buy electricity.

Additional Information:

This usually is an energy/power exchange or platform.

The definition is based on [Regulation on the internal market for electricity \(EU\) 2019/943](#).

4.1.6 *Merit Order List (MOL) Responsible*

Responsible for the management of the available tenders for all Acquiring LFC Operators to establish the order of the reserve capacity that can be activated.

4.1.7 *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 measured quantities.

Note:

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

4.1.8 Resource Provider

A role that manages a resource and provides production/consumption schedules for it, if required.

4.1.9 System Operator

A party responsible for operating, ensuring the maintenance of and, if necessary, developing the system in a given area and, where applicable, its interconnections with other systems, and for ensuring the long-term ability of the system to meet reasonable demands for the distribution or transmission of electricity.

Additional information:

The definition is based on [DIRECTIVE 2009/72/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 13 July 2009 concerning common rules for the internal market in electricity and repealing Directive 2003/54/EC, Article 2 \(Definitions\)](#).

4.2 Domains from the eBIX[®], EFET and ENTSO-E Harmonised role model HRM)

4.2.1 Bidding Zone²

The largest geographical area within which market participants are able to exchange energy without capacity allocation.

Source: [Commission Regulation \(EU\) 543/2013](#).

4.2.2 LFC Area

A part of a synchronous area or an entire synchronous area, physically demarcated by points of measurement at interconnectors to other LFC Areas, operated by one or more TSOs fulfilling the obligations of load-frequency control.

Source: [System Operation Guideline, Commission Regulation \(EU\) 2017/1485](#).

4.2.3 Metering Grid Area

A Metering Grid Area is a physical area where consumption, production and exchange can be measured. It is delimited by the placement of meters for continuous measurement for input to, and withdrawal from the area.

Additional information:

It can be used to establish volumes that cannot be measured such as network losses.

4.2.4 Metering Point

An entity where energy products are measured or computed.

² In the Nordic countries the Bidding Zone and the Scheduling Area will be the same

4.2.5 Reserve Resource

A resource technically pre-qualified using a uniform set of standards to supply reserve capabilities to a System Operator and is associated with one or more tele-measuring devices.

Additional information:

This is a type of Resource.

4.2.6 Resource

A market representation of an asset or a group of assets related to the energy industry.

Additional information:

A Resource represents for example grid assets, consumption assets or production assets, such as generating units, consumption units, energy storage units or virtual power plants.

4.2.7 Scheduling Area³

An area within which the TSOs' obligations regarding scheduling apply due to operational or organisational needs.

This area consists of one or more Metering Grid Areas with common market rules for which the settlement responsible party carries out an imbalance settlement and which has the same price for imbalance.

Source: [System Operation Guideline, Commission Regulation \(EU\) 2017/1485](#).

Additional information:

This covers both Imbalance Area and Imbalance Price Area from the [Electricity Balancing Guideline \(2017/2195\)](#).

³ In the Nordic countries the Bidding Zone and the Scheduling Area will be the same

5 Business Entity View (Business Data View), Nordic operational system

5.1 Merit Order List Document (IEC/CIM 62325-451-7, Ed. 1)

The Merit Order List Document (*CIM version*) is developed by ENTSO-E/WG-EDI, see [1].

5.1.1 Class diagram: Merit Order List Document contextual model (CIM version)

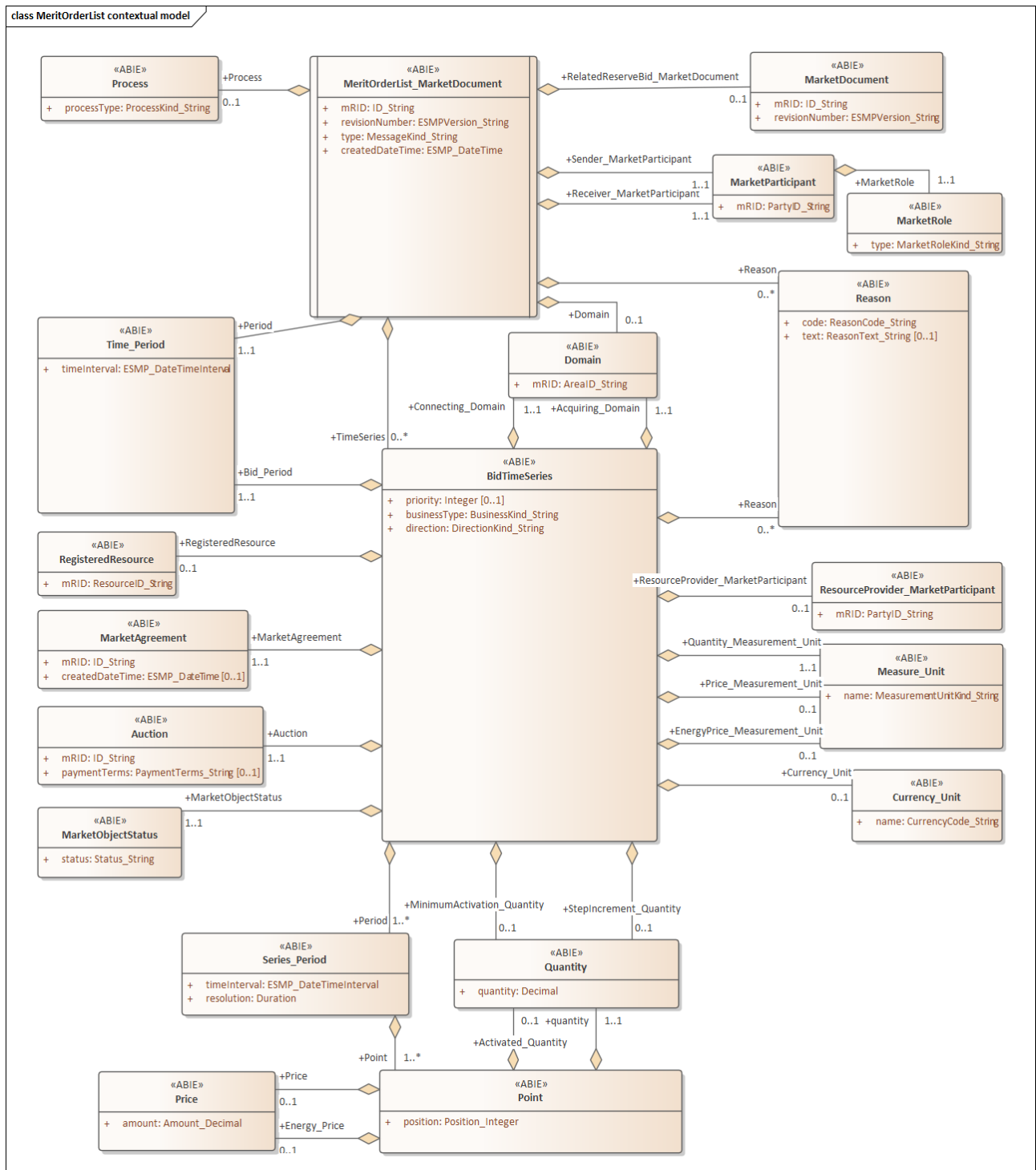


Figure 13: Class diagram: Merit Order List Document contextual model (CIM version)

5.1.2 Class diagram: Merit Order List Document assembly model (CIM version)

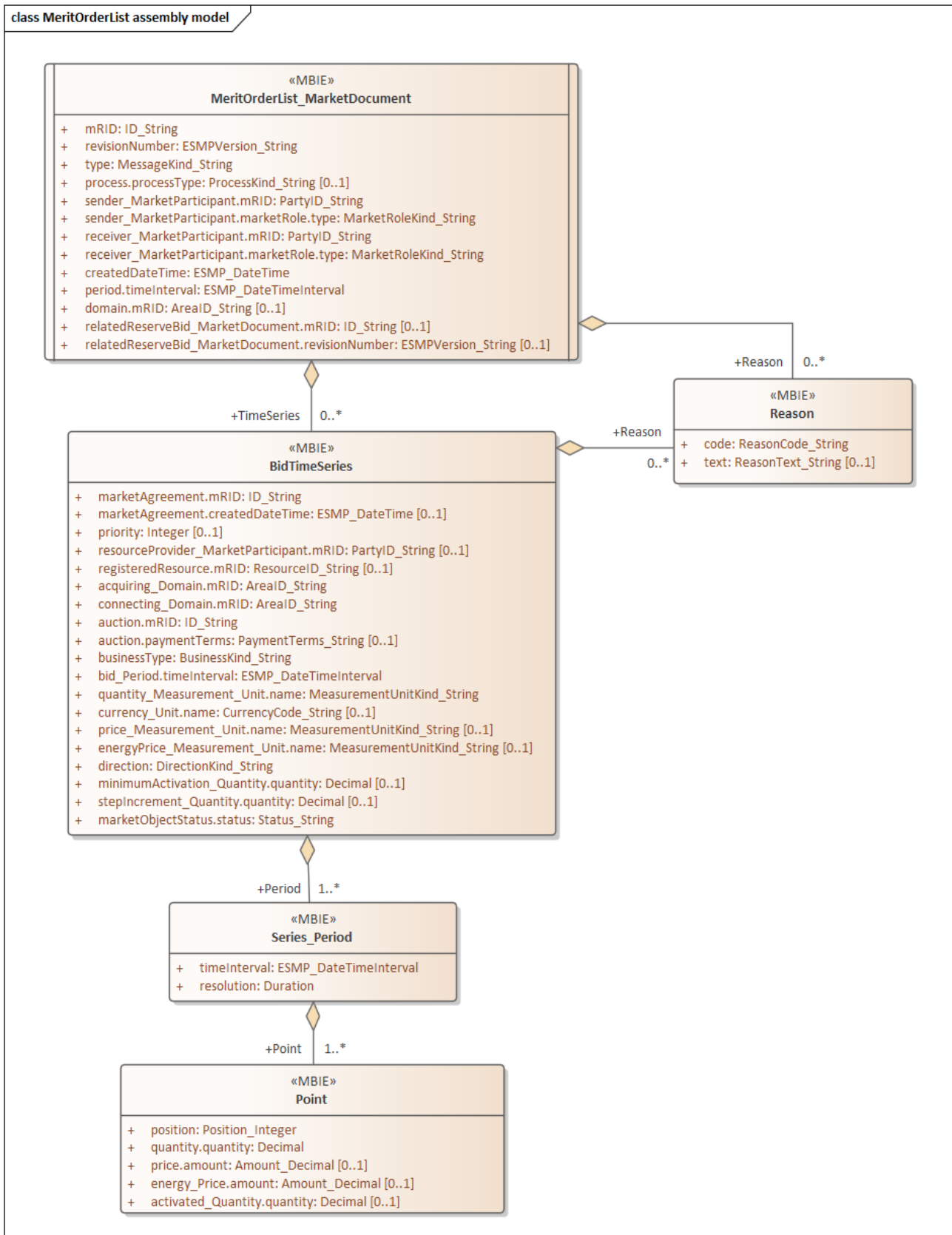


Figure 14: Class diagram: Merit Order List Document assembly model (CIM version)

5.1.3 Attribute usage: Merit Order List Document (CIM version)

Attribute	Cl.	Code and description
MeritOrderList_MarketDocument		
mRID	[1]	Unique identification of the document. Global uniqueness is easily achieved by using a UUID for the mRID. It is strongly recommended to do this.
revisionNumber	[1]	The identification of the version that distinguishes one evolution of a document from another.
type	[1]	A66 Final MOL
process.processType	[1]	A60 mFRR with scheduled activation
sender_MarketParticipant.mRID	[1]	Identification of the party who is sending the document.
sender_MarketParticipant.marketRole.type	[1]	A35 MOL responsible
receiver_MarketParticipant.mRID	[1]	Identification of the party who is receiving the schedules.
receiver_MarketParticipant.marketRole.type	[1]	A04 System Operator
createdDateTime	[1]	Date and time for creation of the document.
period.timeInterval	[1]	This information provides the start and end date and time of the time interval covered in this document.
domain.mRID	[1]	The EIC identification of the Control Area 10Y1001A1001A796 (Denmark) 10YFI-1-----U (Finland) 10YNO-0-----C (Norway) 10YSE-1-----K (Sweden)
	[1..*]	BidTimeSeries
marketAgreement.mRID	[1]	The unique identification of the bid.
resourceProvider_MarketParticipant.mRID	[0..1]	The identification of the Balancing Service Provider.
registeredResource.mRID	[0..1]	The unique identification of a resource.
acquiring_Domain.mRID	[1]	The unique identification of the Bidding Zone where the product is being delivered.
connecting_Domain.mRID	[1]	The unique identification of the Bidding Zone where the Resource is located.
auction.mRID	[1]	A fixed value identifying the auction: MFRR_ENERGY_ACTIVATION_MARKET
businessType	[1]	B74 Offer B75 Need
bid_Period.timeInterval	[1]	The beginning and ending date and time of the period covered by the tender.
quantity_Measurement_Unit.name	[1]	MAW Megawatt
currency_Unit.name	[1]	EUR Euro
price_Measurement_Unit.name	[1]	MWH Megawatt hour
energyPrice_Measurement_Unit.name	[0..1]	MWH Megawatt hour

Attribute	Cl.	Code and description
direction	[1]	A01 UP A02 DOWN
marketObjectStatus.status	[1]	A06 Available (the offer has not been activated) A10 Ordered (the offer has been activated) A33 Not satisfied (i.e. The need cannot be satisfied by the common platform)
	[0..*]	Reason (BidTimeSeries level)
code	[1]	A95 Complementary information
text	[1]	The textual explanation corresponding to the reason code.
	[1..*]	Series_Period The time interval and resolution for a period associated with a TimeSeries.
timeInterval	[1]	The start and end time of the period.
resolution	[1]	The definition of the number of units of time that compose an individual step within a period.
	[1]	Point The Point information associated with a given Series_Period within a TimeSeries.
position	[1]	Fixed 1.
quantity.quantity	[1]	The quantity for the interval in question with a resolution in Megawatt
price.amount	[1]	The power price for each unit of quantity.
energy_Price.amount	[0..1]	The offered price. Not used for demands.
activated_Quantity.quantity	[0..1]	The quantity that has been activated for the interval in question.

Table 2: Attribute usage of Merit Order List Document (CIM version)

5.2 ERRP Activation Document (IEC/CIM 62325-451-7 Activation Document version 6.0)

The *ERRP Activation Document (CIM version)* is developed by ENTSO-E/WG-EDI, see [1].

5.2.1 Class diagram: ERRP Activation Document contextual model (CIM version)

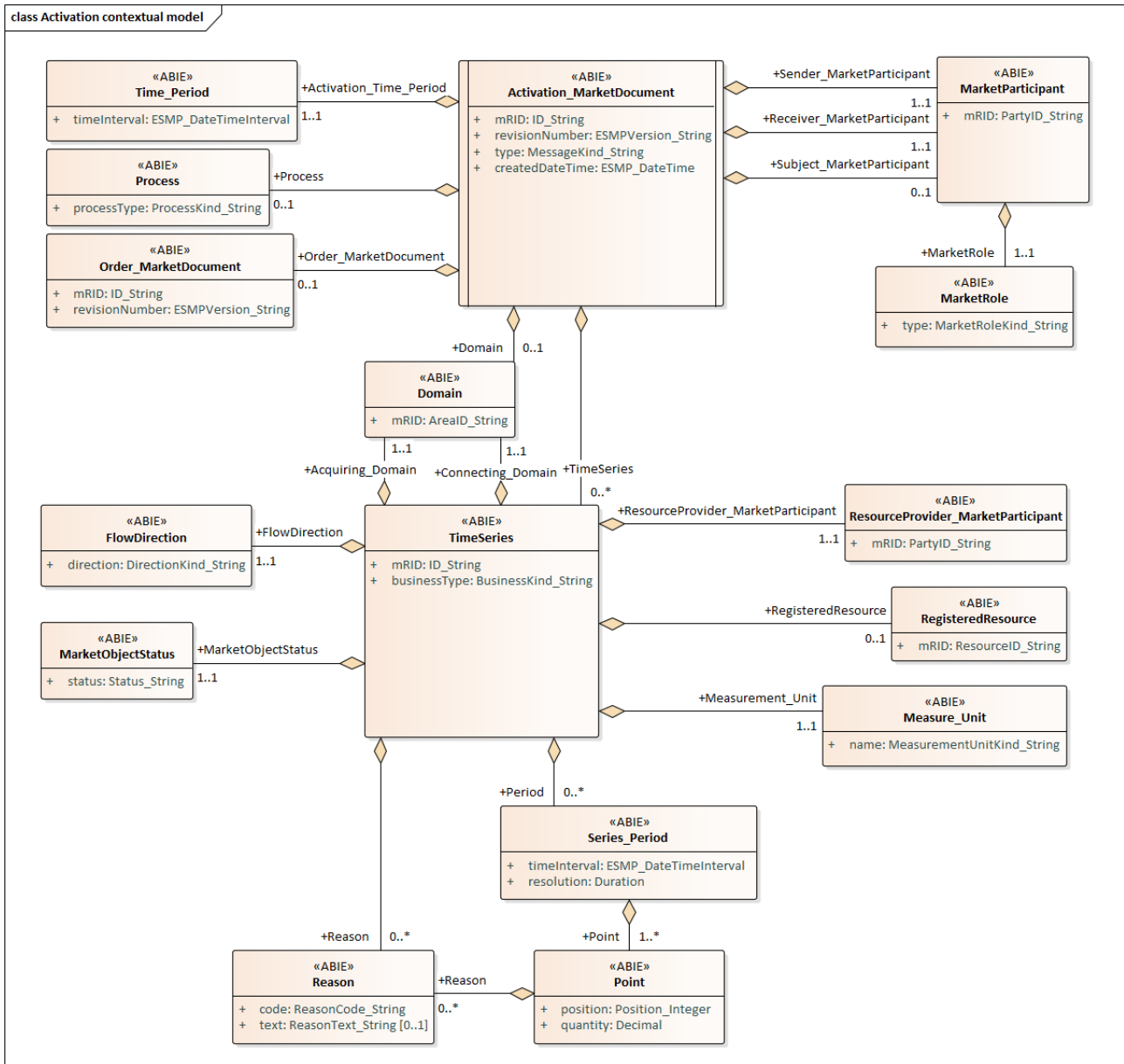


Figure 15: Class diagram: ERRP Activation Document contextual model (CIM version)

5.2.2 Class diagram: ERRP Activation Document assembly model (CIM version)

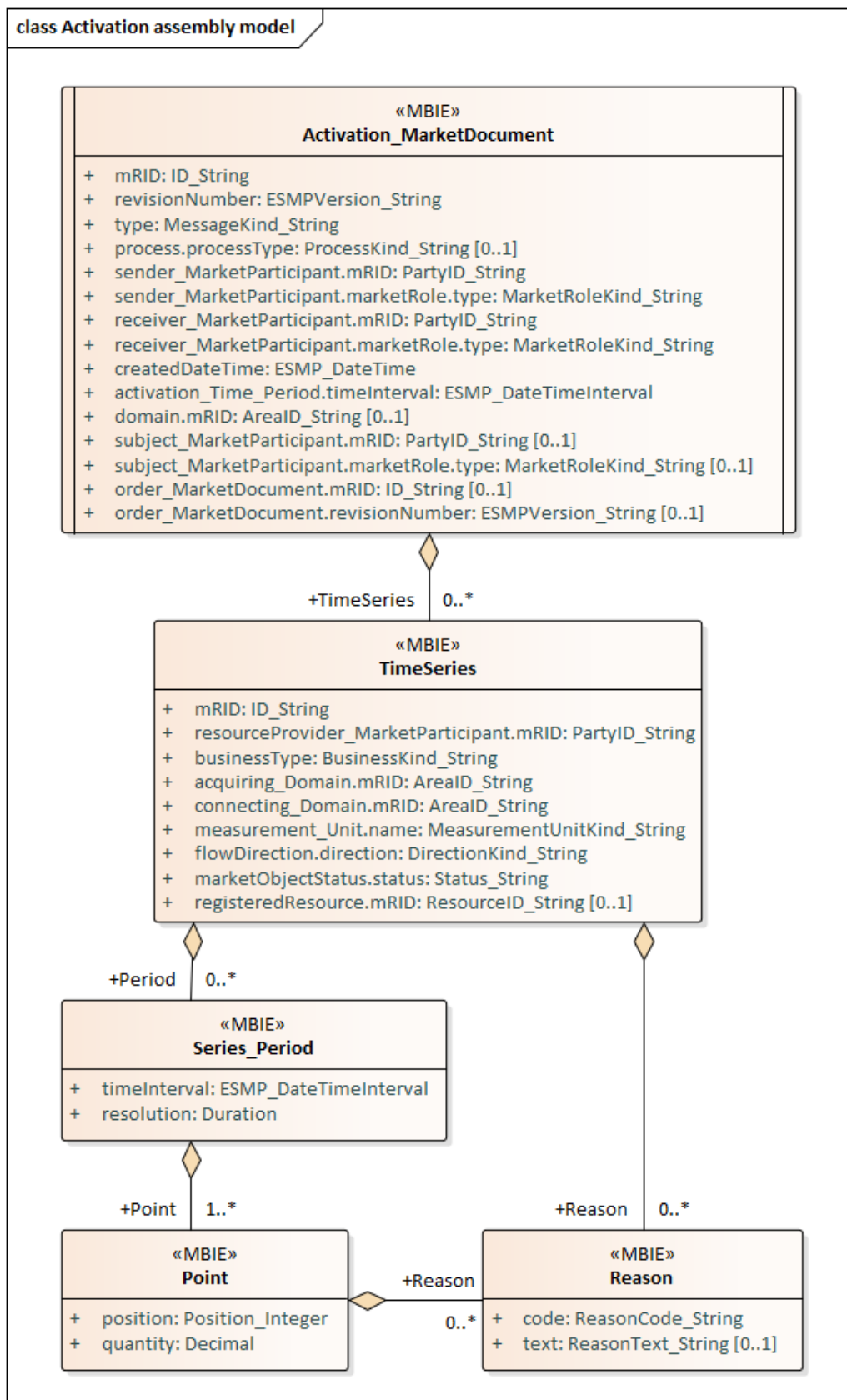


Figure 16: Class diagram: ERRP Activation Document assembly model (CIM version)

5.2.3 Attribute usage: ERRP Activation Market Document (CIM version)

Attribute	Cl.	Code and description
Activation_MarketDocument		
mRID	[1]	Unique identification of the document.
revisionNumber	[1]	Fixed 1.
type	[1]	For request: A36 Deactivation document A39 SATCR activation A40 DATCR activation (normal activations based on MOL) Z37 Faster than standard FAT Z38 Faster than standard deactivation time Z39 Slower than standard FAT Z40 Period shift activation Z41 Production smoothing (applicable only in Norway) For response: A41 Activation response Code A39 SATCR activation is only used in Denmark.
process.processType	[1]	New codes: A47 Manual frequency restoration reserve A51 Automatic frequency restoration reserve
sender_MarketParticipant.mRID	[1]	Identification of the party who is sending the document.
sender_MarketParticipant.marketRole.type	[1]	Sender of request: A04 System Operator Sender of response: A27 Resource Provider A46 Balancing Service Provider
receiver_MarketParticipant.mRID	[1]	Identification of the party who is receiving the schedules.
receiver_MarketParticipant.marketRole.type	[1]	Receiver of response: A04 System Operator (for the response) Receiver of request: A27 Resource Provider A46 Balancing Service Provider
createdDateTime	[1]	Date and time for creation of the document.
activation_Time_Period.timeInterval	[1]	The beginning and ending date and time of the period covered by the document.
domain.mRID	[1]	National Area.
subject_MarketParticipant.mRID	[0..1]	Identification of the party for whom the bid document is submitted.
subject_MarketParticipant.marketRole.type	[0..1]	A46 Balancing Service Provider (BSP)
order_MarketDocument.mRID	[1]	Unique identification of the activation order "Activation ID". The same Activation id is used in the request and the response.
order_MarketDocument.revisionNumber	[1]	The version of the activation order. Incremented with one for each transmission of the document from the System Operator. The same version is used in the request and the response.
	[1..*]	Time Series

mRID	[1]	Reference to relevant bid or an “Move of planned production ID”.
resourceProvider_ MarketParticipant.mRID	[1]	The identification of the Balancing Service Provider or Resource Provider related to the contract identification.
businessType	[1]	A01 Production A04 Consumption A12 Secondary control (A time series concerning secondary reserve) (FRR-A, earlier LFC) A96 Automatic frequency restoration reserve A97 Manual frequency restoration reserve
acquiring_Domain.mRID	[1]	Bidding Zone. 10Y1001A1001A91G The EIC identification of the Nordic Market Area
connecting_Domain.mRID	[1]	Bidding Zone (repeated from Acquiring Area).
measurement_Unit.name	[1]	MAW MW
flowDirection.direction	[1]	A01 Up A02 Down
marketObjectStatus.status	[1]	<i>Only in the request:</i> A10 Ordered (The quantities in the time series are to be activated) <i>Only in the response:</i> A07 Activated (<i>The quantities in the time series have been activated</i>), i.e., confirmation A09 Cancelled (<i>The tender indicated in the time series has been completely cancelled. In this case the resources are no longer available to all Acquiring TSOs</i>), i.e., rejection. A11 Unavailable
registeredResource.mRID	[0..1]	Identification of the resource that is used to supply energy capabilities to the TSO. Mandatory in Finland, Norway, and Sweden. Optional in Denmark
	[1..*]	Series_Period
timeInterval	[1]	The start and end date and time of the time interval of the period in question.
resolution	[1]	The time resolution is always the difference between the Time Interval End and the Time Interval Start.
	[1]	Point
position	[1]	The position of the observation in a time series – Always 1.
quantity	[1]	The quantity for the interval in question.
	[0..1]	Reason (Point Level)
code	[1]	A95 Complementary information B22 System regulation B23 Frequency regulation B49 Balancing B59 Unavailability of reserve providing unit 999 Errors not specifically identified

		The code A95 may be used to transmit extra information related to a bid.
text	[0..1]	To be used together with Reason Code A95 .

Table 3: Usage of ERRP Activation Document (CIM version)

5.3 ERRP Activation Document (ENTSO-E version)

The *ERRP Activation Document (ENTSO-E version)* is the *Activation document* from the ENTSO-E ERRP IG version 5.0, see [1].

5.3.1 Class diagram: ERRP Activation Document (ENTSO-E version)

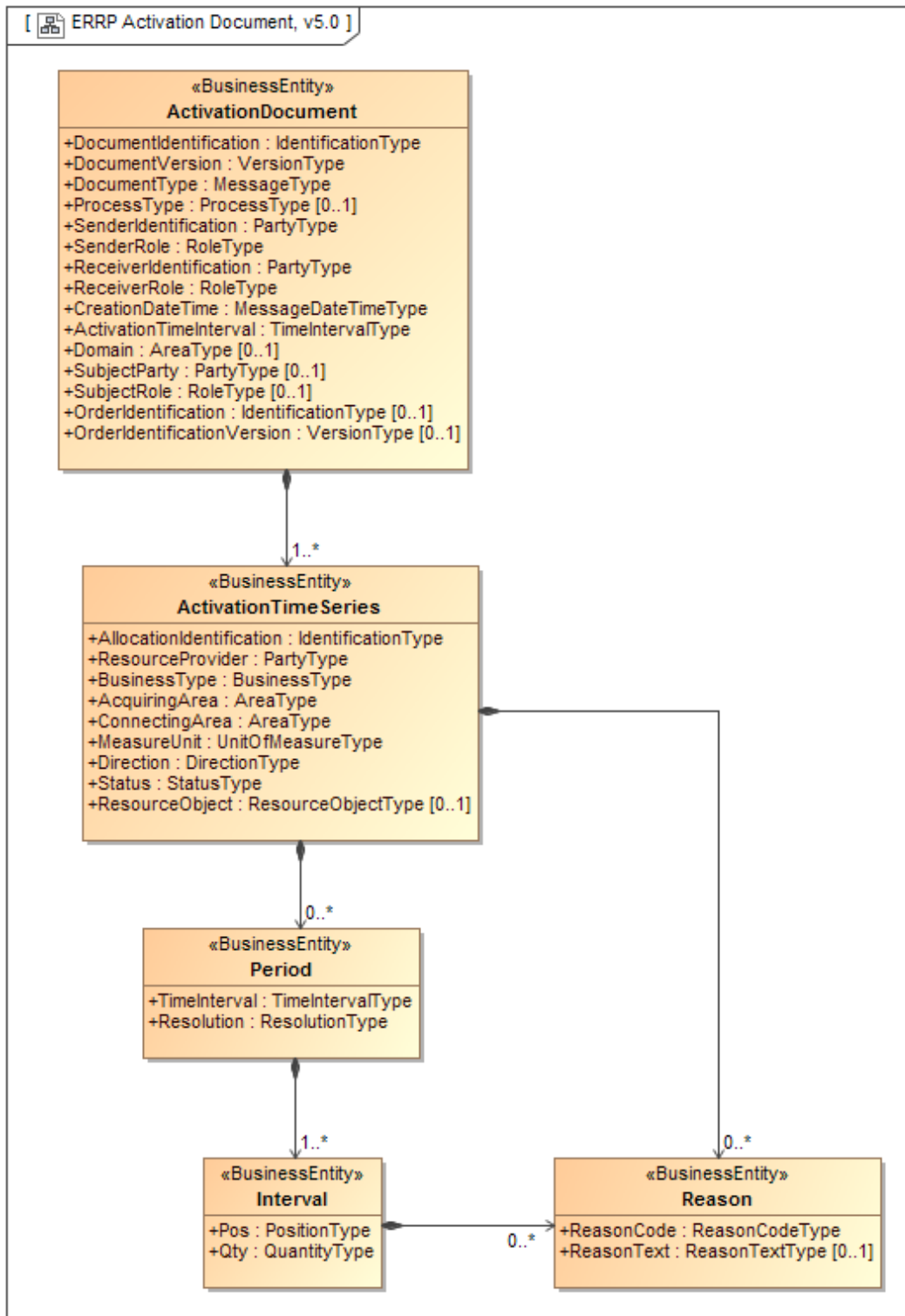


Figure 17: Class diagram: ERRP Activation Document (ENTSO-E version)

5.3.2 Attribute usage: ERRP Activation document (ENTSO-E version)

Attribute	Cl.	Code and description
Activation Document		
Document Identification	[1]	Unique identification of the document.
Document Version	[1]	Fixed 1
Document Type	[1]	A36 Deactivation document A39 SATCR activation A40 DATCR activation (normal activations based on MOL) A41 Activation response Code <i>A39 SATCR activation</i> is only used in Denmark.
Process Type	[1]	A47 Manual frequency restoration reserve A51 Automatic frequency restoration reserve
Sender Identification	[1]	Identification of the party who is sending the document.
Sender Role	[1]	A04 System Operator A27 Resource Provider A46 Balancing Service Provider
Receiver Identification	[1]	Identification of the party who is receiving the schedules.
Receiver Role	[1]	A04 System Operator (for the response) A27 Resource Provider A46 Balancing Service Provider
Creation Date Time	[1]	Date and time for creation of the document.
Activation Time Interval	[1]	The beginning and ending date and time of the period covered by the document.
Domain	[1]	National Area.
Order Identification	[1]	Unique identification of the activation order "Activation ID". The same <i>Activation id</i> is used in the request and the response.
Order Identification Version	[1]	The version of the activation order. Incremented with one for each transmission of the document from the TSO. The same version is used in the request and the response.
	[1..*]	Activation Time Series
Allocation Identification	[1]	Reference to relevant bid or an "Move of planned production ID".
Resource Provider	[1]	The identification of the Balancing Service Provider or Resource Provider related to the contract identification.
Business Type	[1]	A01 Production A04 Consumption A12 Secondary control (A time series concerning secondary reserve) (FRR-A, earlier LFC) A96 Automatic frequency restoration reserve A97 Manual frequency restoration reserve
Acquiring Area	[1]	Bidding Zone.
Connecting Area	[1]	Bidding Zone (repeated from Acquiring Area).
Measure Unit	[1]	MAW MW
Direction	[1]	A01 Up A02 Down

Attribute	Cl.	Code and description
Status	[1]	<p><i>Only in the request:</i></p> <p>A10 Ordered (The quantities in the time series are to be activated)</p> <p><i>Only in the response:</i></p> <p>A07 Activated (<i>The quantities in the time series have been activated</i>), i.e. confirmation</p> <p>A09 Cancelled (<i>The tender indicated in the time series has been completely cancelled. In this case the resources are no longer available to all Acquiring TSOs</i>), i.e. rejection.</p>
Resource Object	[1]	Identification of the resource that is used to supply energy capabilities to the TSO.
	[1..*]	Period
Time Interval	[1]	The start and end date and time of the time interval of the period in question.
Resolution	[1]	The time resolution is always the difference between the Time Interval End and the Time Interval Start.
	[1]	Interval
Pos	[1]	The position of the observation in a time series – Always 1.
Qty	[1]	The quantity for the interval in question.
	[0..1]	Reason (Interval Level)
Reason Code	[1]	<p>A95 Complementary information</p> <p>B22 System regulation</p> <p>B23 Frequency regulation</p> <p>The code A95 may be used to transmit extra information related to a bid.</p>
Reason Text	[0..1]	To be used together with Reason Code A95 .

Table 4: Usage of ERRP Activation Document (ENTSO-E version)

5.4 ERRP Activation Document, Dependencies (CIM and ENTSO-E versions)

Document Type	Process Type	Business Type	Allocation ID	Direction	Status	Reason
A36 Deactivation document	A51 Automatic frequency restoration reserve	A01 Production	Activation ID	Required	Required	Required
		A12 Secondary control (A time series concerning secondary reserve) (FRR-A, earlier LFC)	Activation ID	Required	Required	Not used
A39 SATCR activation	A47 Manual frequency restoration reserve	A97 Manual frequency restoration reserve	Bid ID	Required	Required	Not used
A40 DATCR activation	A47 Manual frequency restoration reserve	A97 Manual frequency restoration reserve	Bid ID or Move of planned production ID	Required	Required	Dependent on national rules
A41 Activation response	A51 Automatic frequency restoration reserve	A12 Secondary control (A time series concerning secondary reserve) (FRR-A, earlier LFC)	Order ID	Required	Required	Not used
	A47 Manual frequency restoration reserve	A01 Production A04 Consumption A97 Manual frequency restoration reserve	Bid ID or Move of planned production ID from received activation			

Table 5: Dependency matrix for ERRP Activation Document

5.5 ACE OL Point Value Document (IEC/CIM)

The ACE OL Point Value Document (CIM version) is developed by NBM, see [1].

5.5.1 Class diagram: ACE OL Point Value Document contextual model (CIM version)

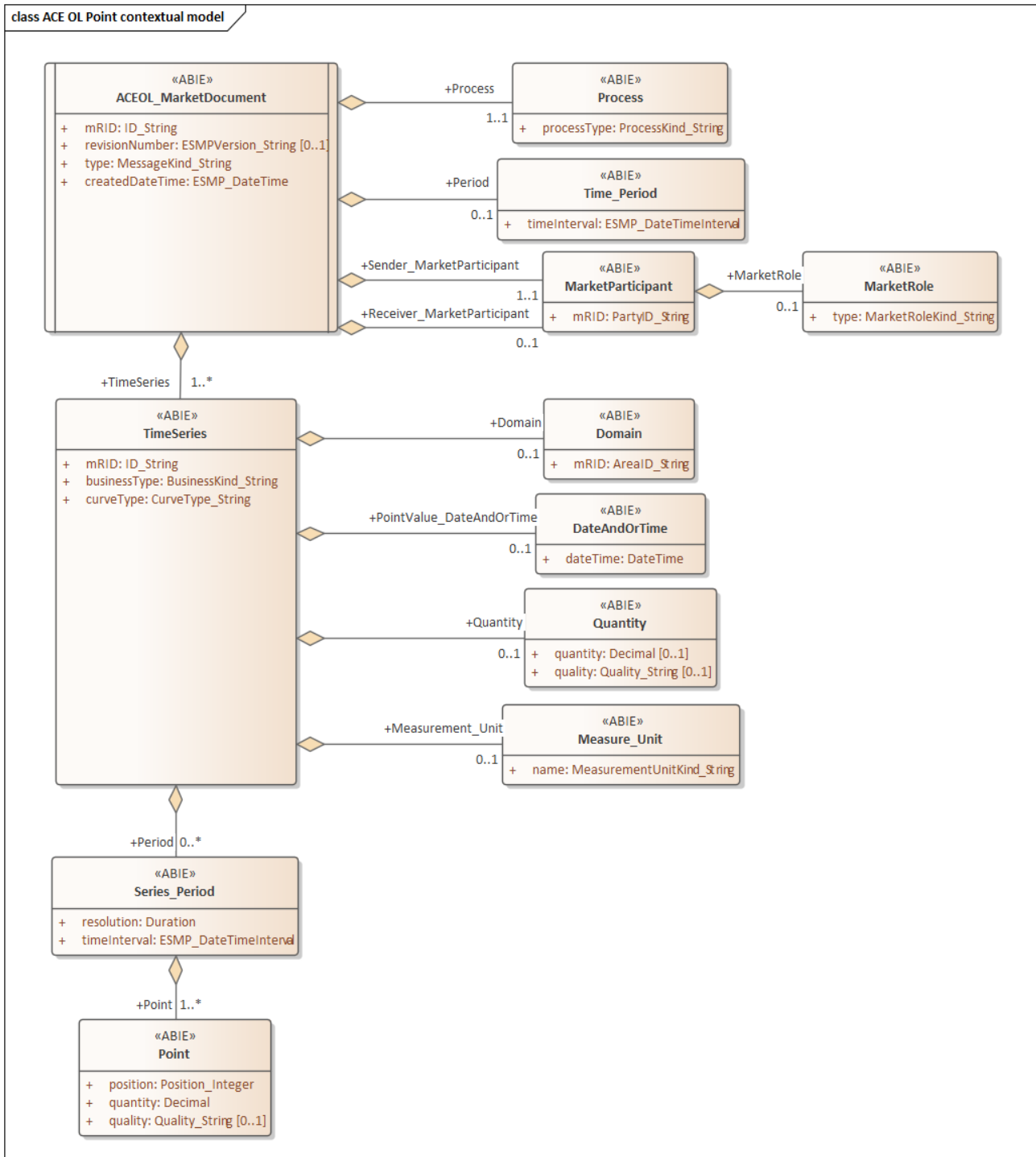


Figure 18: Class diagram: ACE OL Point Value Document contextual model (CIM version)

5.5.2 Class diagram: ACE OL Point Value Document assembly model (CIM version)

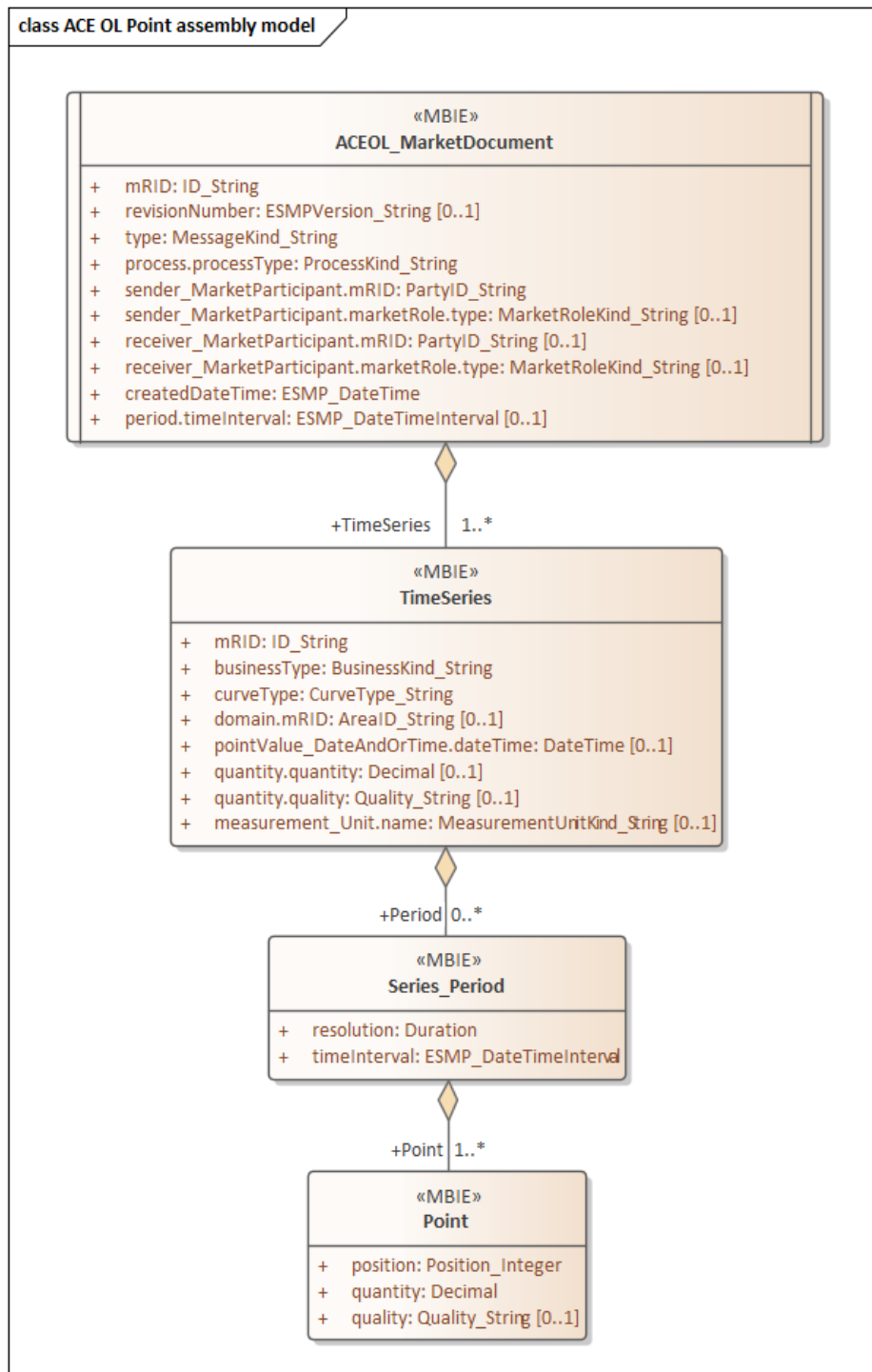


Figure 19: Class diagram: ACE OL Point Value Document assembly model (CIM version)

5.5.3 Attribute usage: ACE OL Point Value Document (CIM version)

Attribute	Cl.	Code and description
ACEOL_MarketDocument		
mRID	[1]	Unique identification of the document. Global uniqueness is easily achieved by using a UUID for the mRID. It is strongly recommended to do this.
revisionNumber	[0..1]	Fixed 1.
type	[1]	Z35 ACE OL
process.processType	[1]	Z12 ACE OL real-time
sender_MarketParticipant.mRID	[1]	Identification of the party who is sending the document.
createdDateTime	[1]	The date and time of the creation of the document.
	[1..*]	Time Series
mRID	[1]	Unique ID of the time series.
businessType	[1]	Z27 ACE OL (Area Control Error Open Loop)
curveType	[1]	A02 Point
domain.mRID	[1]	Bidding zone for ACE OL.
pointValue_DateAndOrTime.dateTime	[1]	Point value date and time. Only used when processType= Z12 .
quantity.quantity	[1]	Value of ACE OL. Only used when processType= Z12 . Unit type is implicitly MW .
quantity.quality	[0..1]	May be used, and only when procesType= Z12 . A01 Adjusted A02 Not available A03 Estimated A04 As provided A05 Incomplete A06 Calculated

Table 6: Attribute usage of ACE OL Point Value Document (CIM version)

5.6 ESS Schedule Document from IEC62325-451-2 Ed.2 (ACE OL Limits)

The ESS (ENTSO-E Scheduling System) Schedule Document is used for ACE OL Limits exchanges. The ACE OL limits is used for visualisation when ACE OL exceed or goes below certain values within a bidding zone. The ACE OL limits is sent infrequent, i.e. the distribution may range from e.g. 3 months down to every 15 minutes. ACE OL Limits are given by Time Series for each Bidding Zone within a TSO area of responsibility.

This chapter describes a Nordic subset of the document described in IEC 62325 framework for energy market communications, Part 451, see [1].

5.6.1 Class diagram: ESS Schedule Document contextual model

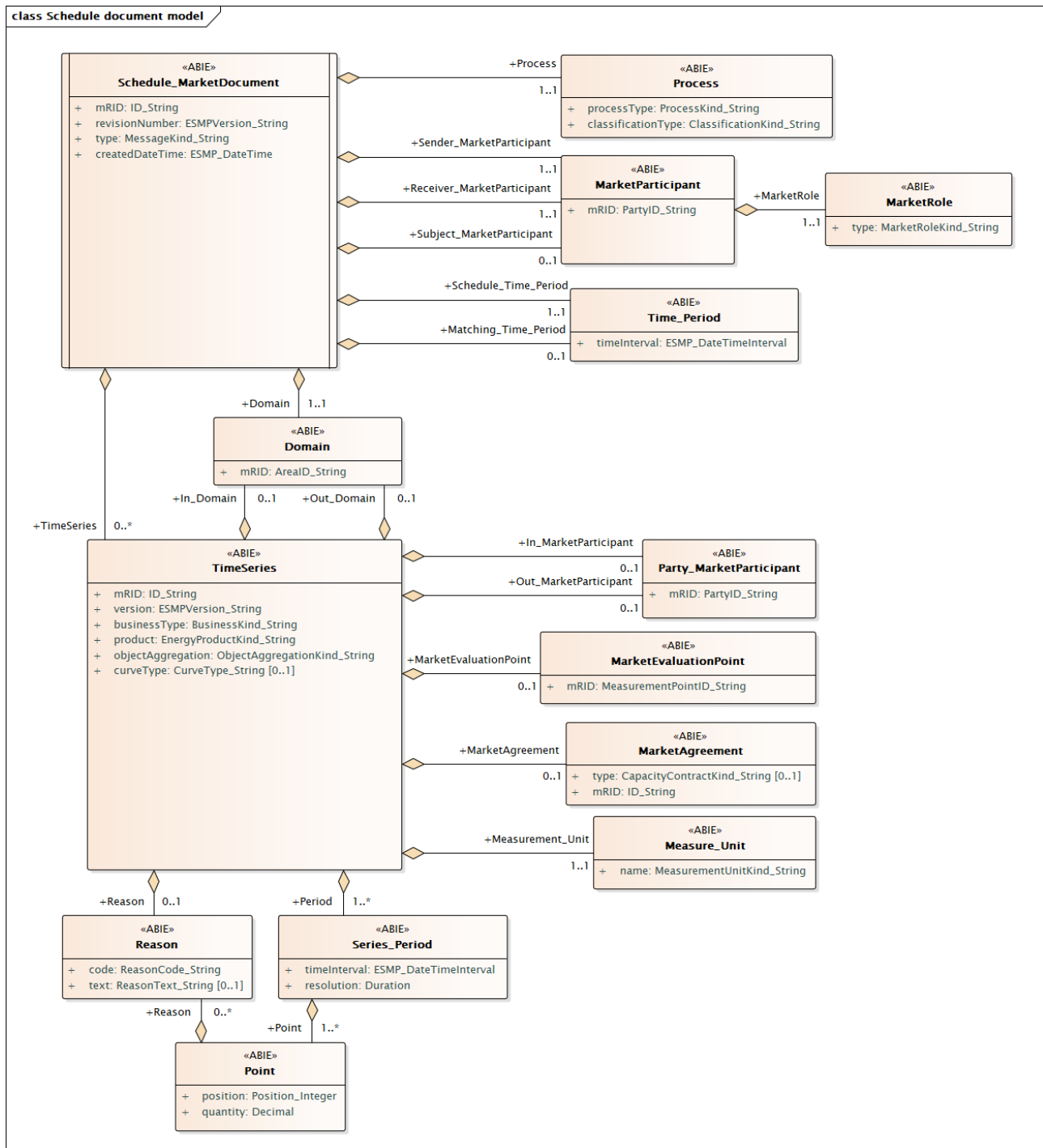


Figure 20: Class diagram: ESS Schedule Document contextual model

5.6.2 Class diagram: ESS Schedule Document assembly model

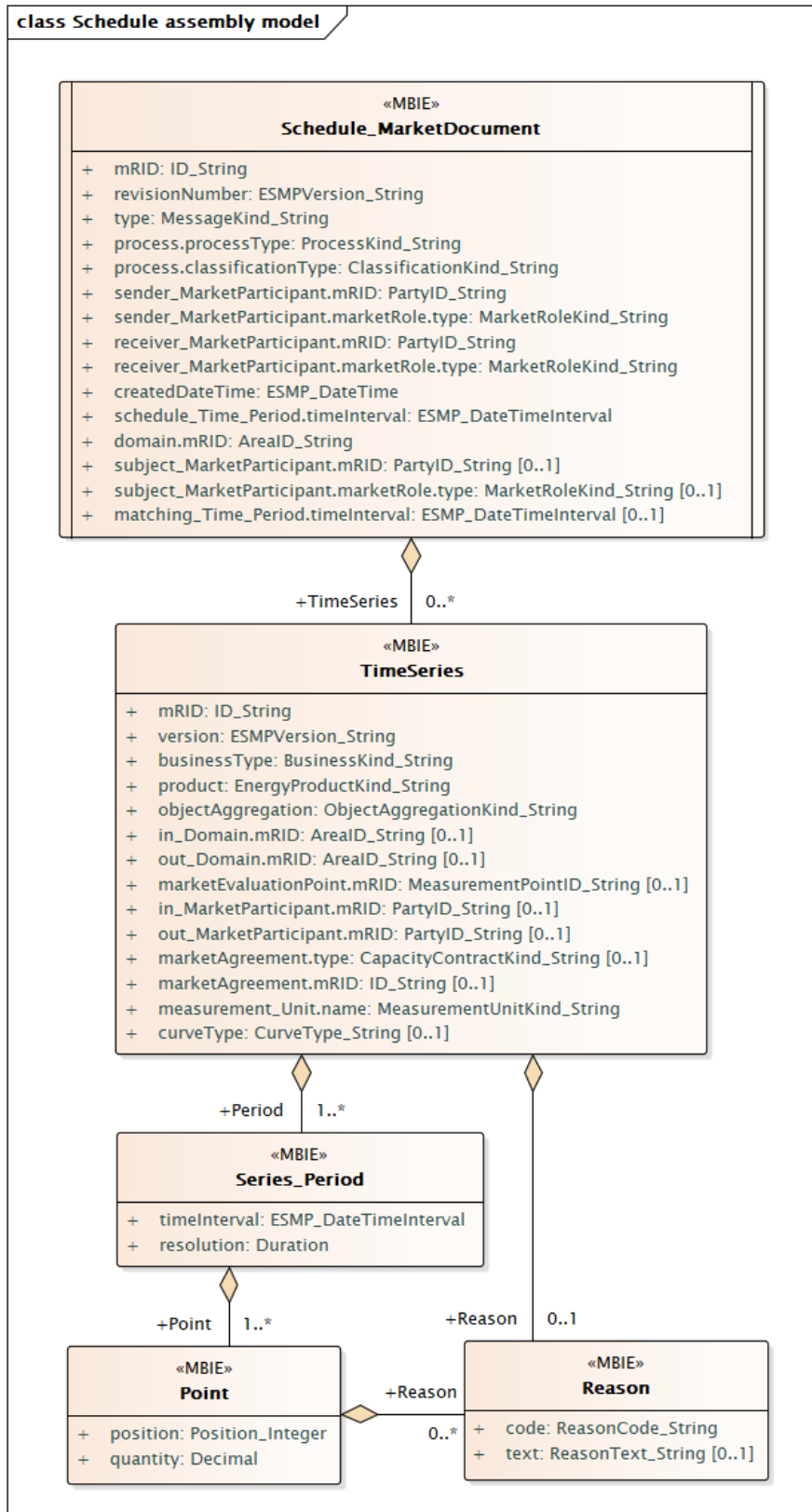


Figure 21: Class diagram: ESS Schedule Document assembly model

5.6.3 Attribute usage ESS Schedule Document, ACE OL Limits

IEC CIM Attribute	CI.	Code and description
	[1]	Schedule_MarketDocument
mRID	[1]	Unique identification of the document. Global uniqueness is easily achieved by using a UUID for the mRID. It is strongly recommended to do this.
revisionNumber	[1]	The identification of the version that distinguishes one evolution of a document from another.
type	[1]	Z36 Power Prognoses
process.processType	[1]	Z12 ACE OL real-time
process.classificationType	[1]	A01 Detail type
sender_MarketParticipant. mRID	[1]	Identification of the party who is sending the document.
sender_MarketParticipant. marketRole.type	[1]	A32 Market information aggregator
receiver_MarketParticipant. mRID	[1]	Identification of the party who is receiving the schedules.
receiver_MarketParticipant.market Role.type	[1]	A04 System Operator
createdDateTime	[1]	Date and time for creation of the document.
schedule_Time_Period. timeInterval	[1]	This information provides the start and end date and time of the time interval covered in this document.
domain.mRID	[1]	The EIC identification of the Control Area 10Y1001A1001A796 (Denmark) 10YFI-1-----U (Finland) 10YNO-0-----C (Norway) 10YSE-1-----K (Sweden)
	[1..*]	TimeSeries
mRID	[1]	A unique identification of the time series.
version	[1]	Fixed 1
businessType	[1]	Z78 Upper Alert Z79 Upper Emergency Z80 Lower Alert Z81 Lower Emergency Z82 Upper Warning Z83 Lower Warning
product	[1]	8716867000016 Active power
objectAggregation	[1]	A01 Area
in_Domain.mRID	[1]	EIC code of area where the energy is going to
measurement_Unit.name	[1]	MAW MW
curveType	[1]	A03 Variable sized Block.
	[1..*]	Series_Period
timeInterval	[1]	The start and end time of the period.

IEC CIM Attribute	Cl.	Code and description
resolution	[1]	<p>The resolution defining the number of periods that the time interval is divided. 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 style="text-align: center;">I.e. PT1M or PT5M</p>
	[1..*]	Point
position	[1]	The position of the observation within the time series. Sequential value beginning with 1.
quantity	[1]	Quantity..

Table 7: Usage of ESS Schedule Document, NBM schedules: ESS Schedule

5.7 Balancing Market Document (IEC/CIM 62325-451-6, Ed. 2.1)

The *Balancing Market Document (CIM version)* is developed by ENTSO-E/WG-EDI, see [1].

5.7.1 Class diagram: Balancing Market Document contextual model (CIM version)

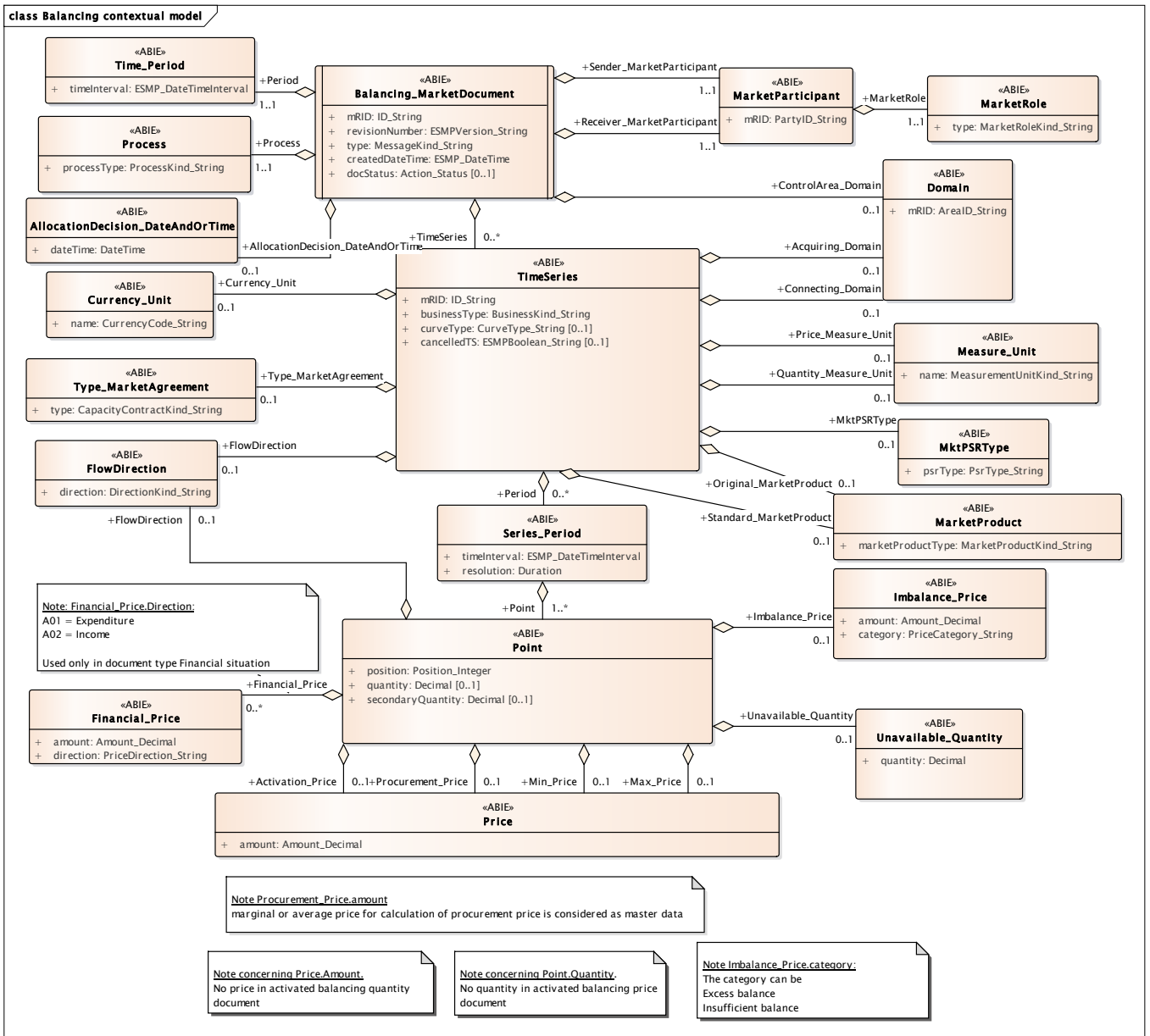


Figure 22: Class diagram: Balancing Market Document contextual model (CIM version)

5.7.2 Class diagram: Balancing Market Document assembly model (CIM version)

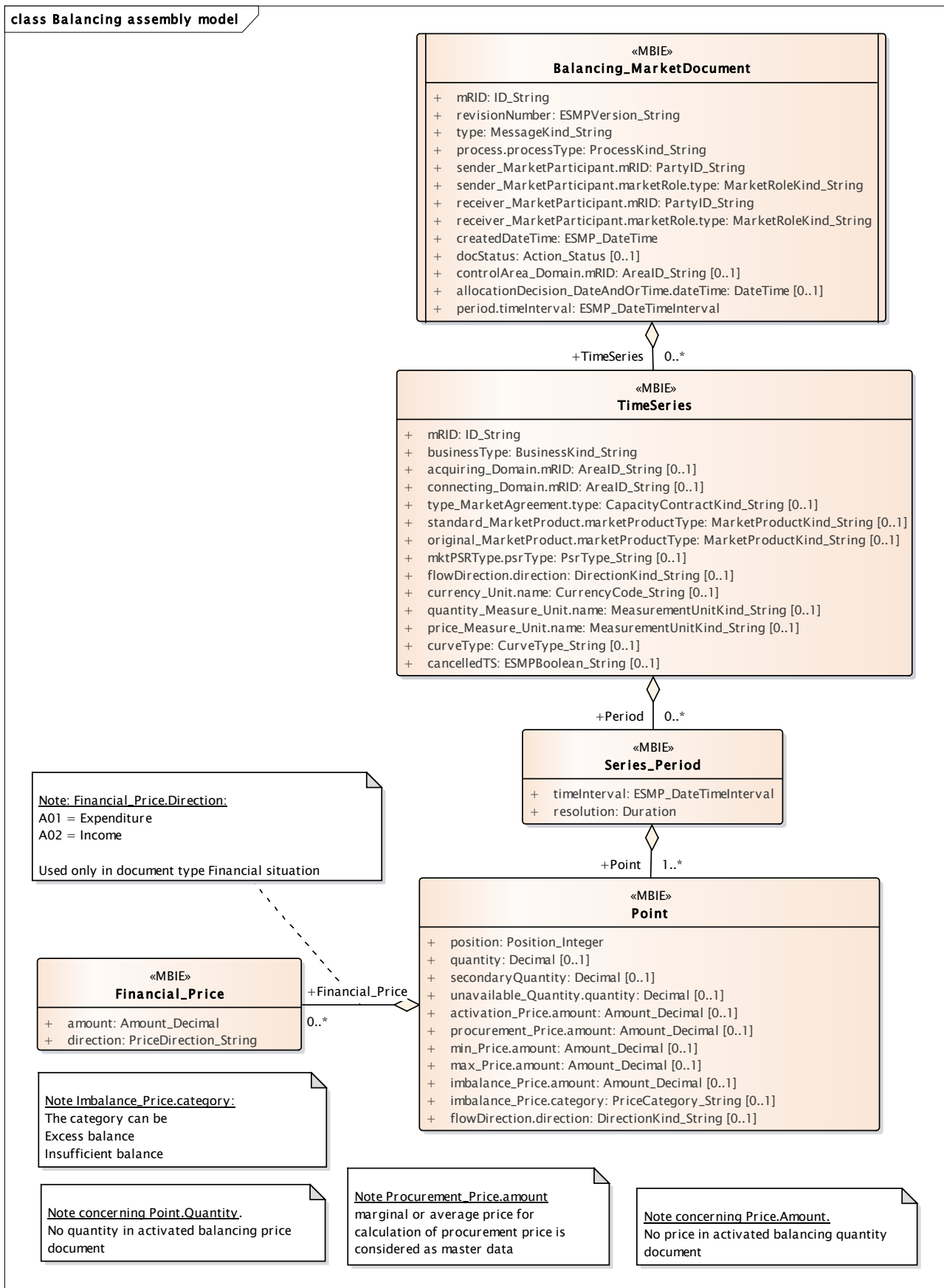


Figure 23: Class diagram: Balancing Market Document assembly model (CIM version)

5.7.3 Attribute usage: Balancing Market Document (CIM version)

Attribute	Cl.	Code and description
Balancing_MarketDocument		
mRID	[1]	Unique identification of the document.
revisionNumber	[1]	Fixed 1.
type	[1]	A38 Reserve Allocation Result (Operational bids) A44 Price document
process.processType	[1]	A47 Manual frequency restoration reserve
sender_MarketParticipant.mRID	[1]	Identification of the party who is sending the document.
sender_MarketParticipant.marketRole.type	[1]	A11 Market operator (or TSO)
receiver_MarketParticipant.mRID	[1]	Identification of the party who is receiving the schedules.
receiver_MarketParticipant.marketRole.type	[1]	A04 System Operator A08 Balance responsible party A11 Market operator (NBM) A35 MOL Responsible A38 Reconciliation Responsible A46 Balancing Service Provider
createdDateTime	[1]	Date and time for creation of the document.
controlArea_Domain.mRID	[1]	Nordic Market Area, National Area or Bidding Zone.
period.timeInterval	[1]	Unique identification of the activation order "Activation ID". The same <i>Activation id</i> is used in the request and the response.
	[1..*]	Time Series
mRID	[1]	Unique ID of the time series.
businessType	[1]	A01 Production A04 Consumption B23 Consumption imbalance price (Balance regulation market price in dominant direction) C57 Metered frequency
acquiring_Domain.mRID	[1]	Relevant area for the market.
currency_Unit.name	[1]	Any valid ISO 3 letter currency code, e.g.: DKK Danish Kroner EUR EURO NOK Norwegian Kroner RUB Russian Rubel SEK Swedish Kronor
quantity_Measure_Unit.name	[0..1]	MWH MWh HTZ Hz Not used when only sending prices.
price_Measure_Unit.name	[0..1]	MWH MWh Shall be used when sending a price, otherwise not used.
	[1..*]	Series_Period
timeInterval	[1]	The start and end date and time of the time interval of the period in question.

Attribute	Cl.	Code and description
resolution	[1]	The time resolution is always the difference between the Time Interval End and the Time Interval Start.
	[1..*]	<i>Point</i>
position	[1]	The position of the observation in a time series.
quantity	[1]	The quantity for the interval in question.
activation_Price.amount	[0..1]	The price for the interval in question Only used when sending prices
imbalance_Price.amount	[0..1]	The imbalance price used for Business Type B69 Only used when sending prices

Table 8: Attribute usage of Balancing Market Document (CIM version)

5.7.4 Dependencies (CIM version)

Balancing Market Document		TimeSeries			
type	receiver_ MarketParticipant. marketRole.type	businessType	quantity_ Measure_ Unit.name	price_ Measure_ Unit.name	Imbalance Price
A38 Reserve Allocation Result (Operational bids)	A04 System Operator	A01 Production	MWH	MWH	
	A08 Balance responsible party				
	A11 Market operator (NBM)	A04 Consumption	MWH	MWH	
	A35 MOL Responsible	B23 Consumption imbalance price (Balance regulation market price in dominant direction)	MWH	MWH	Yes
	A38 Reconciliation Responsible				
	A46 Balancing Service Provider	C57 Metered frequency	HTZ		
A44 Price document	A04 System Operator	A01 Production			
	A08 Balance responsible party	A04 Consumption			
	A11 Market operator (NBM)	B23 Consumption imbalance price (Balance regulation market price in dominant direction)			
	A35 MOL Responsible				
	A38 Reconciliation Responsible	C57 Metered frequency			
	A46 Balancing Service Provider				

Table 9: Dependency matrix for ERPP Activation Document (CIM version)