



## Recommendations for the Harmonised Electricity Role

Model

D2.5

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## About OneNet

OneNet will provide a seamless integration of all the actors in the electricity network across Europe to create the conditions for a synergistic operation that optimizes the overall energy system while creating an open and fair market structure.

The project OneNet (One Network for Europe) is funded through the EU's eighth Framework Programme Horizon 2020. It is titled "TSO – DSO Consumer: Large-scale demonstrations of innovative grid services through demand response, storage and small-scale (RES) generation" and responds to the call "Building a low-carbon, climate resilient future (LC)".

While the electrical grid is moving from being fully centralized to a highly decentralized system, grid operators have to adapt to this changing environment and adjust their current business model to accommodate faster reactions and adaptive flexibility. This is an unprecedented challenge requiring an unprecedented solution. For this reason, the two major associations of grid operators in Europe, ENTSO-E and E.DSO, have activated their members to put together a unique consortium.

OneNet will see the participation of a consortium of over 70 partners<sup>1</sup>.

The key elements of the project are:

1. Definition of a common market design for Europe: this means standardised products and key parameters for grid services which aim at the coordination of all actors, from grid operators to customers;
2. Definition of a Common IT Architecture and Common IT Interfaces: this means not trying to create a single IT platform for all the products but enabling an open architecture of interactions among several platforms so that anybody can join any market across Europe; and
3. Large-scale demonstrators to implement and showcase the scalable solutions developed throughout the project. These demonstrators are organized in four clusters defined to include countries in every region of Europe and testing innovative use cases never validated before.

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<sup>1</sup> The OneNet project partners are listed at: <https://onenet-project.eu/partners/>

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## List of Abbreviations and Acronyms

Acronym	Meaning
<b>BRP</b>	Balance Responsible Party
<b>BSP</b>	Balance Service Provider
<b>BUC</b>	Business Use Case
<b>CACM</b>	Capacity Allocation and Congestion Management
<b>CEP</b>	Clean Energy Package
<b>CGM</b>	Common Grid Model
<b>CSA</b>	Coordinated Security Analysis
<b>DER</b>	Distributed Energy Resources
<b>DSO</b>	Distribution System Operator
<b>EBGL</b>	Electricity Balancing GuideLines
<b>ebIX</b>	Energy Business Information eXchange
<b>E.DSO</b>	European Distribution System Operators
<b>EFET</b>	European Federation of Energy Traders
<b>EIC</b>	Energy Identification Code
<b>ENTSO-E</b>	European Network of Transmission Operators for Electricity
<b>ENTSOG</b>	European Network of Transmission Operators for Gas
<b>FSP</b>	Flexibility Service Provider
<b>HERMR</b>	Harmonised Electricity Market Role Model (BRIDGE)
<b>HRM</b>	Harmonised electricity market Role Model
<b>LFC</b>	Load Frequency Control
<b>MO</b>	Market Operator
<b>OA</b>	Observability Area
<b>OCR</b>	Outage Coordination Region
<b>OPC</b>	Outage Planning Coordination
<b>RfG</b>	Requirements for Generator
<b>RGCE</b>	Regional Group Continental Europe
<b>SGAM</b>	Smart Grid Architecture Model
<b>SO</b>	System Operator
<b>SOR</b>	System Operation Region
<b>SO GL</b>	System Operations GuideLines
<b>TSO</b>	Transmission System Operator
<b>TYNDP</b>	Ten Years Network Development Plan



<b>WP</b>	Work Package
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## Executive Summary

This Deliverable is presented as part of Work Package (WP) 2 of the OneNet project. The overall objective of this Work Package is to set a common basis for the work done in the OneNet Project. Deliverable 2.5 is part of this basis, presenting an overall analysis of all the roles and actors proposed for all the use cases presented in the project demos.

It is important to mention the clear difference between a role and an actor. An actor represents a party that participates in a business transaction. Within a given business transaction an actor assumes a specific role or a set of roles. An actor is a composition of one or more roles and as such does not appear in the model.

A harmonised role represents the external intended specific behaviour of an actor. When actors (e.g. DSO, TSO, traders and suppliers) carry out their activities, they perform specific roles. Roles are the main scope of the Harmonised electricity market Role Model (HRM) [3], which is a document proposed and maintained by ENTSO-E, ebiX and EFET and used to describe the relationship and responsibilities among the various actors in the electricity system.

This document has been used as the reference basis for the application of the roles for each use case in this Deliverable. The reason follows the application of this document currently for the data exchanging between actors of the electricity market, on which standards like the Common Information Model rely on for the message exchange for great numbers of processes between the Transmission System Operators (TSOs).

The definition of roles in the exchange of data is fundamental since a clear role modelling will ensure that data will be exchanged between the correct players in the electricity market. The implementation of the HRM is based on the European Union official documents, such as the System Operation Guidelines [1] or the Capacity Allocation and Congestion Management [2] documents.

A clear definition of roles is as well crucial to achieve a good standardization of the digital platforms, as proposed in the OneNet project, as this will indicate the correct exchange of any information between the participants. As part of the work of WP2, the use cases for each country and demo areas have been proposed.

Through standard 62559-2, the use cases were developed and together with the demo partners, the roles involved in every step were proposed. The purpose of this document is to review these roles proposed by the demos in the light of the HMR and the updates proposed to it by the BRIDGE regulation working group (HEMRM).

At last, a final analysis presenting the comments from both TSO and DSO point-of-view is presented, to support the continuous improvement of the HRM to integrate more market participants, being aligned with the mandate from European Commission.

## 1. Introduction

The correct clear modelling in the data exchange between different participants of the energy market is essential when developing flexible and open architectures to transform the European electricity market. For a market that exchanges data with countries, a standardisation process must respect common rules, so it ensures the quality and the possibility to accommodate participants. The OneNet project contributes to this continuous development of data and tools, presenting the experience gathered during the use cases development to advance the energy market.

Different initiatives have dedicated considerable effort to support this standardization, contributing to the continuous development of such standardization, as is the case for the BRIDGE, a cooperation group of Smart Grid, the “Energy Storage”, “Islands” and “Digitalisation” H2020 projects, as cited in BRIDGE webpage<sup>2</sup>. The BRIDGE initiative can add value to the role model proposition of OneNet.

Deliverable 2.5 takes the work carried out in work package 2 regarding products, services and business use cases to devise recommendations to update the HRM report, assessing the contributions provided by other OneNet Deliverables such as Deliverable 2.3 and also the work that is under development on the demos; the Northern, Southern, Western and Eastern Cluster Demonstrators.

The review of the roles identified in the different demonstrators of OneNet is fundamental for the harmonisation of the data, as each actor exchanges the data in the OneNet Use Cases.

### WP2 objectives

The Work Package 2 of the OneNet project has the objective to revisit the European Union projects and review the role of existing digital platforms and market solutions, summarizing their contributions and benefits. It builds on this information to sketch the new products and business use cases proposed by the OneNet project approach.

These products and business use cases will strongly engage the consumers to maximize the flexibility resources they offer to grid operators to improve the operation and planning of their grid and meet the clean energy challenges.

The WP2 of the OneNet project proposes the review of different European Union markets, with specific priorities for KPIs, scalability and replicability of OneNet solution to enable the pan-EU integration of these new services and products digitally procured for system operation.

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<sup>2</sup> BRIDGE Reference webpage where the groups were cited: <https://www.h2020-bridge.eu/>

This pan-EU integration must be carefully analysed, since that, with the continuous development of energy markets, more and more roles and actors are proposed for their representation by different research projects. However, to ensure the quality and the good representation of such actors in the energy market, a very detailed analysis of the roles proposed by different market participants must be done to ensure the quality required by the EU regulators and market participants, so the European electricity market reaches a high-quality standardized market data exchange process.

## Description of Task 2.4

Within WP2, Task 2.4 entitled “Harmonising EU electricity markets for the future ecosystem: Priorities set for Key Performance Indicators, Scalability and Replicability of OneNet solutions” defines the different KPIs for the OneNet demonstrators and addresses the harmonisation of the KPIs definitions among the project demonstrators. It identifies the gaps and challenges related to the KPI definition and devises the methodology for scalability and replicability to be used in OneNet (WP 11), based on best practices proposed by the BRIDGE replicability task force. Part of harmonising the European Union electricity markets for the future ecosystems is to harmonise the roles involved to facilitate the cross-border exchange and markets.

The methodology for scalability and replicability to be used in OneNet is also developed, based on best practices proposed by the task force on replicability in BRIDGE. The outcome of this task will be a set of KPIs and a methodology for scalability to be used as input for Task 11.4.

## Objective of Deliverable 2.5

Task 2.4 includes Deliverable 2.5 (D2.5), for the analysis of all roles and actors presented on the use cases of the OneNet project, intending to advise, whenever possible, recommendations on the Harmonised Electricity Market Role Model<sup>3</sup> document presented below.

There are two main documents used to meet the D2.5 objectives:

- Firstly, the Harmonised Electricity Market Role Model (HRM), a model developed jointly by ENTSO-E, eBIX<sup>®</sup> and EFET to describe the roles that given objects can have within the European electricity market.
- Secondly, the ‘BRIDGE – Harmonised Electricity Market Role Model (HEMRM)’ produced by the BRIDGE Regulation Working Group, which is an initiative by the European Commission that aims at creating a structured view on key issues encountered in innovation projects. The full name of the HERMRM is ‘BRIDGE – Harmonised Electricity Market Role Model (HEMRM); A Differential Analysis concerning the

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<sup>3</sup> HRM available in ENTSO-E webpage: <https://www.entsoe.eu/digital/cim/role-models/>

ENTSO-E- ebIX – EFET Model'. It aims at providing a common view of the EU Bridge projects on the roles and actors in the electricity market with a particular focus on flexibility.

This analysis aims to be a basis of discussion for a future update of the HRM, so that new roles identified in the innovation projects can be included. The projects providing input to the BRIDGE report included CoordiNet, EU-SysFlex, FEVER, Goflex, INTERFACE and PlatOne<sup>4</sup>. OneNet did not contribute as the project kick-off only after the start of the initiative.

Deliverable 2.5 aims at providing the OneNet perspective to this essential synthesis effort. According to the timeline of the project, this is only a first approach, since a final recommendation for the whole OneNet has not yet been reached. Nonetheless, this Deliverable provides a holistic overview of the OneNet roles and their various definition, highlighting differences and new roles and actors that need to be defined to implement the OneNet use cases and should be harmonised with other innovation projects and with the HRM. This Deliverable also provides a thorough comparison of the OneNet roles with the roles presented in HRM, and with those evaluated within the BRIDGE initiative.

The harmonisation effort will be key to have a common understanding of what each role entails, and which actors perform each of these roles. This will be essential to facilitate data exchange between stakeholders and facilitate the inclusion of new market participants.

## Methodology of the Deliverable

The methodology of the deliverable is presented below, composed by the collection of definitions within the OneNet project, comparison with the HRM and BRIDGE HERMR definitions and the analysis of each proposition.

Step 1 – collect the definitions of all the roles proposed by the OneNet use cases. This step is fundamental since the objective of the Deliverable is to propose suggestions to the HRM document to align its role definition with OneNet roles. A preliminary comparison of the disparities in the role definition within the OneNet project, including a complete overview of the roles necessary to implement each of the use cases, will be provided.

Step 2 – Is a comparison will be performed among the roles proposed in OneNet use cases, the roles currently presented in the HRM and the roles proposed by the BRIDGE initiative. This step will allow visualizing which OneNet roles match the HRM roles, and which can contribute to the discussion for the inclusion of proposed roles. Furthermore, it demonstrates how BRIDGE comes as an important contribution to support the discussion of new roles, not only in OneNet but also in the other H2020 research projects, bringing new participants to the standardization process of the energy market.

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<sup>4</sup> Reference for the project can be found at: <https://cordis.europa.eu/project/id/864300>

Step 3 – An analysis of each OneNet new potential role is brought to contribute to the continuous development of the HRM and H2020 projects roles models, categorising them as a new or existing definition. Note that, in some cases, the roles proposed by OneNet use cases can have different definitions but do not significantly differ from those presented in the HRM, which means that these roles need to be properly assessed before proposing new ones. Thus, one of the contributions that Deliverable 2.3 aims to provide is to start a discussion for future projects for enhancing the harmonisation of the roles applied in the use cases proposed for each research project.

## **Structure of the Deliverable**

Chapter 2 includes a short introduction to the current studies on the role models, together with the relation with the Smart Grid Architecture Model (SGAM). The areas presented in the SGAM and the HRM itself, with all the relations, are discussed.

There is also the description of BRIDGE projects that produce high value and are an important contribution to the review of the current roles presented by the HRM. This contribution is presented in this deliverable. Furthermore, BRIDGE conclusions are briefly explained in this deliverable.

Chapter 3 presents the roles identified by all the use cases within the OneNet project. More specifically, subchapter 3.1 focuses on those OneNet roles already included in the HRM document while subchapter 3.2 addresses those are currently not present in the 2020 HRM document. The presentation of these roles comes together with the descriptions presented in each Business Use Case where the role was identified. Then, subchapter 3.3 compares the roles identified in OneNet with those of the HRM document and those of the BRIDGE initiative.

In the end, closing remarks regarding the main points discussed in this Deliverable are presented in the conclusion section.



## 2. Role Models Current Studies

This chapter presents the importance of studies done by some of these stakeholders. First, the role models for the electricity and gas study that has been conducted by the Harmonisation Group, set up by ENTSO-E, EFET and eBIX is analysed. Then, this Deliverable count with the key contribution of the BRIDGE Initiative, which is an effort done by several H2020 Projects to suggest improvements and be able to include the new roles identified by the projects participating in the BRIDGE Program.

Based on the work carried out by key organisations such as ENTSO-E, E.DSO, EFET, among others, several new actors and roles have been proposed in this work. This proposal includes not only the electricity market but also other areas like the gas sector (described briefly below), recognising the great importance of including more participants from other related sectors in the current role models. This enables the possibility to assign additional roles to the existing actors, increasing the reliability of the relationships presented in the HRM and facilitating the definition of cross-sector actors based on the new roles defined for the related sectors, allowing for a more representative document.

The analysis of such roles must start with the presentation of the Smart Grid Architecture Model (SGAM), which consists of the presentation of smart grid use cases from an architectural point of view. The SGAM presents the areas in which the data is exchanged. In the case of the use cases presented, the data is exchanged in the business layer. Figure 1 presents the proposition of this study, which is currently applied for the consideration of interoperability data exchange.

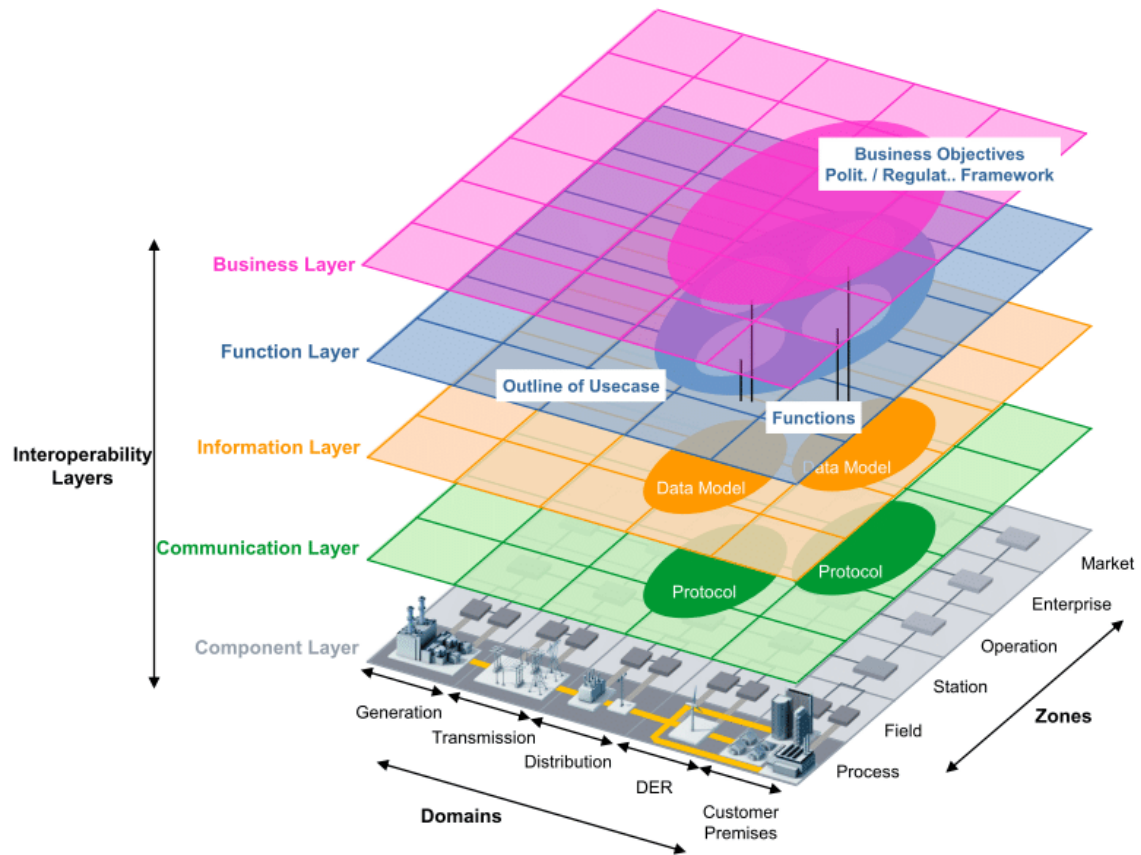


Figure 1 - Smart Grid Architecture Model

The SGAM presents the different interoperability layers divided by their domains, which are the Generation, Transmission, Distribution, Distributed Energy Resource (DER) and the Customer. On the other hand, the zones of Process, Field, Station, Operation, Enterprise and Market are presented. Finally, for the tri-dimensional relationship to be completed, the following layers are presented: Business, Function, Information, Communication and Component.

The SGAM is fundamental for this analysis because it demonstrates how the different domains and zones affect the exchange of data between the different market participants. To demonstrate this importance, the CIM – Common Information Model makes use of the Harmonised Role Model but affects only some of these domains such as generation, transmission and distribution, as shown in Figure 2.

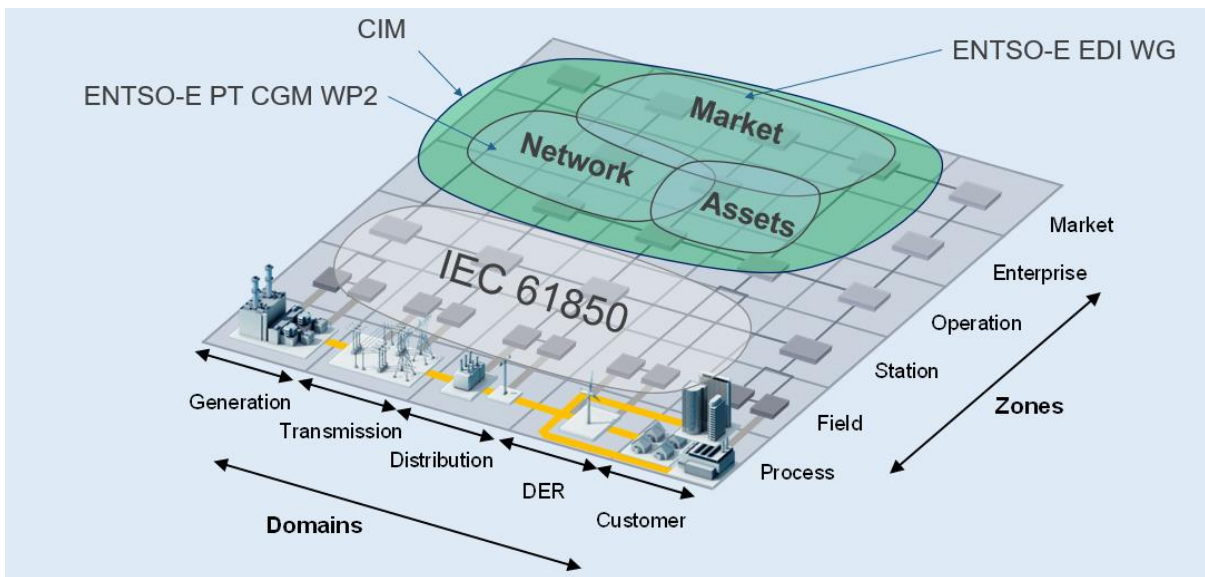


Figure 2 - CIM on the SGAM

A complete description of the SGAM and the description of each information can be found on the CEN-CENELEC-ETSI Smart Grid Coordination Group Smart Grid Reference Architecture [4].

## 2.1. Role Models for Electricity and Gas

There is an ongoing project to consider the integration of different sectors in the use cases of H2020 projects. The influence on energy role models can affect gas role models and vice-versa. Although the OneNet project has no use cases in the gas sector, it is valuable to be considered this trend in the data exchange. There is an ongoing effort by the Harmonisation Group represented by ENTSO-E, ebIX and EFET to align the Energy Identification Codes (EICs) between electricity and gas sectors. Over many years, a coding scheme has been developed, managed and maintained within ENTSO-E (under the Common Information Model Expert Group) to facilitate cross-border exchanges and to identify in an efficient and reliable manner different objects and parties relating to the Internal Energy Market (IEM) and its operations.

This is known as the Energy Identification Coding (EIC) scheme, approved by ENTSO-E for the harmonisation and implementation of standardised electronic data interchanges. Among these codes, some are handled by ENTSO-E and also by ENTSO-G. These codes, which make part of the EIC Codes<sup>5</sup>, have the purpose of representing data to be exchanged, with different data sets, based on the roles provided by the Harmonised Role Model. This work is under evaluation by the Harmonisation Group and the continuous development of the

<sup>5</sup> ENTSO-E webpage for the current EIC Codes : <https://www.entsoe.eu/data/energy-identification-codes-eic/eic-approved-codes/>

Harmonised Role Model will also affect the EIC Codes presented nowadays to support the data exchange between the TSOs.

The current studies for the HRM have been developed to facilitate the dialogue between the market participants concerning information exchanges. Every year, the Harmonisation Group (HG) is responsible for providing a new and reviewed version comprising the analysis of the current year. The HRM updated on a yearly basis describes the roles that can be played by given entities within the European electricity market. An analysis is fundamental to guarantee the quality of the document, to ensure that roles are not created overlapping with other roles. This means that the creation of unnecessary roles, which can induce confusion and questions on the implementation of these roles, is an important aspect to be analysed when proposing new roles to the HRM and should be avoided.

The figure 3 presents the roles, domains and their relations that are currently available on the Harmonised role model. This figure is available on the HRM document, available for download at the ENTSO-E webpage<sup>6</sup>.

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<sup>6</sup> ENTSO-E webpage for the HRM: <https://www.entsoe.eu/digital/cim/role-models/>

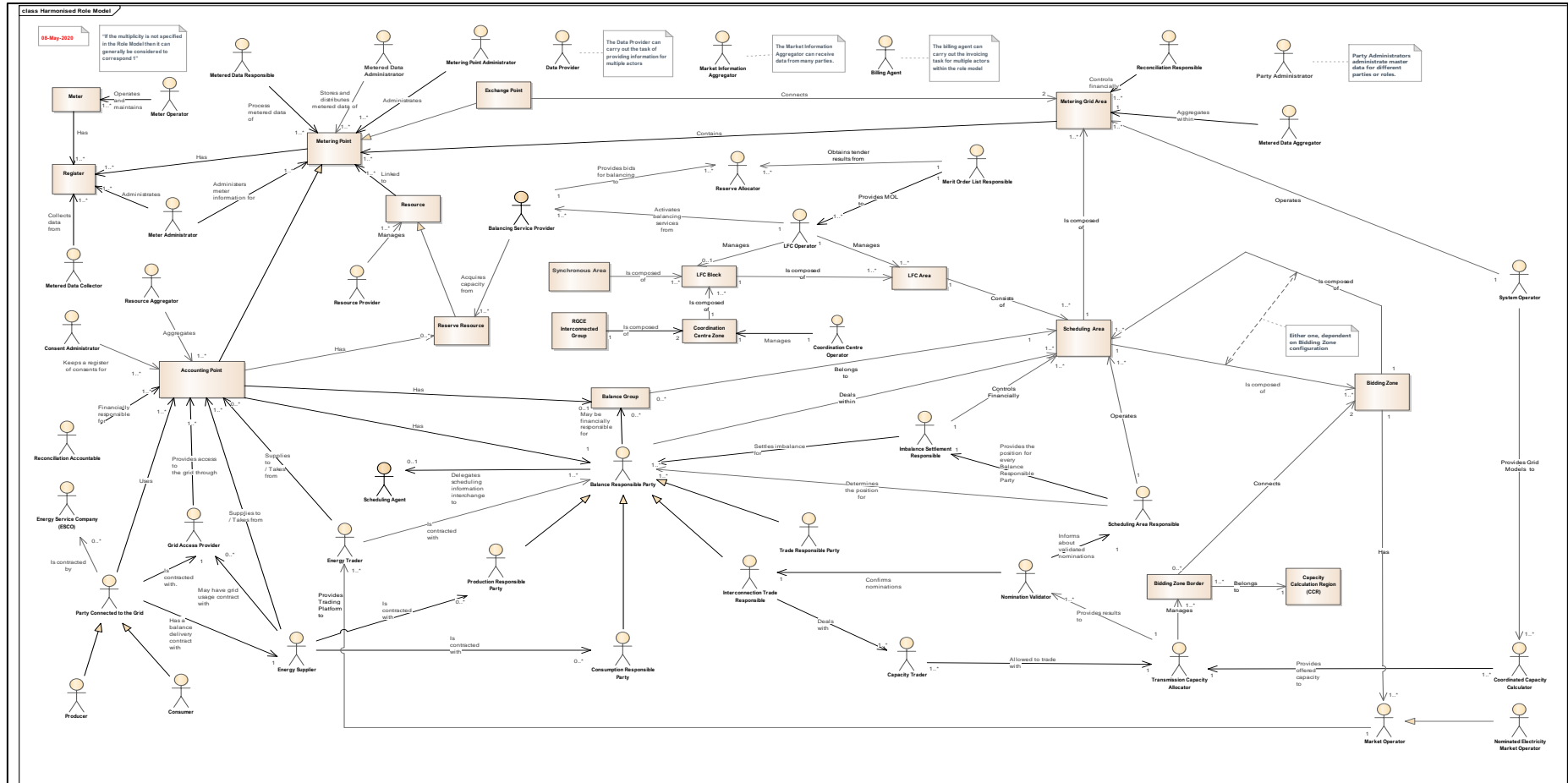


Figure 3 - The Harmonised European electricity market Role Model [3]

The gas sector has likewise a role model, presenting the roles necessary to exchange the data between the different participants of the market.

The role models for electricity and gas are also being reviewed by the Harmonisation Group for its harmonisation, but is still in progress. Nonetheless, the debate continues and supports the improvement of the relationship between these two sectors.

## **2.2. Domains under studies into the HRM**

The current updates performed by the ENTSO-E data exchange CIM Expert Group also consider the constant review of the role models. At this moment, there is a current study named Coordinated Security Analysis (CSA) to update some of the data exchanges presented in ENTSO-E EDI Library<sup>7</sup>. This study proposes, among other points, to include the concept of observability area and sensitivity area, among other innovative concepts which aim to address the new complex aspects of the energy sector.

### **2.2.1. Control Area**

The Control Area is a new domain approved to be included in the next version of the HRM in 2022. The Control Area means a coherent part of the interconnected system, operated by a single system operator and shall include connected physical loads and/or generation units if any [5]. A Control Area is defined in Transparency regulation (No 543/2013) [5] and System Operation Guidelines (SO GL), which states that “[...] the definitions in Transparency Regulation (EU) No 543/2013 [...] shall apply”. In SO GL, Outage Coordination Region (OCR) definition is based on the Control Area. For the ENTSO-E implementation, Control Area is used in the Transparency Platform, which consists of an online tool that provides up-to-date information on public procurement for the energy sector, and also the OCR is used in Outage Planning Coordination (OPC) tool based on the Control Area from the Transparency Platform. Looking at the Transparency Platform and the Load Frequency Control (LFC) report, the Control Area and the LFC Area are different (eg.: the case of Denmark).

The OneNet project proposes the TSO and the DSO roles, also the application of the currently existing System Operator role. Thus, the Control Area domain will have a relation with the OneNet data exchange. According to the CSA study, a Control Area is a grouping of generating units and/or loads and a set of tie lines (as terminals) which may be used for a variety of purposes including automatic generation control, power flow solution area interchange control specification, and input to load forecasting. All generation and load within the area defined by the terminals on the border are considered in the area interchange control. Note that any number of

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<sup>7</sup> ENTSO-E website for the EDI library: <https://www.entsoe.eu/publications/electronic-data-interchange-edi-library/>

overlapping control area specifications can be superimposed on the physical model. The following general principles apply to Control Area:

- a. The control area orientation for net interchange is positive for an import, negative for an export.
- b. The control area net interchange is determined by summing flows in Terminals. The Terminals are identified by creating a set of TieFlow objects associated with a ControlArea object. Each TieFlow object identifies one Terminal.
- c. In a single network model, a tie between two control areas must be modelled in both control area specifications, such that the two representations of the tie flow sum to zero.
- d. The normal orientation of Terminal flow is positive for flow into the conducting equipment that owns the Terminal. (i.e. flow from a bus into a device is positive.) However, the orientation of each flow in the control area specification must align with the control area convention, i.e. import is positive. If the orientation of the Terminal flow referenced by a TieFlow is positive into the control area, then this is confirmed by setting TieFlow.positiveFlowIn flag TRUE. If not, the orientation must be reversed by setting the TieFlow.positiveFlowIn flag FALSE.

This proposition is not compliant with what is in the Transparency Platform. This definition used by Transparency Platform, LFC Area and Control Area are different (Danish case as an example) and the Outage Coordination Region is based on Control Area (SO GL and it is indeed the case on the tools).

Thus, The Harmonisation Group, responsible for the HRM, agreed to add the Control Area in the new HRM 2020 version, as “Control Area means a coherent part of the interconnected system, operated by a single System Operator and shall include connected physical loads and/or generation units if any”.

EU Regulation 543/2013 requires data publication mainly per bidding zone, however, the “control area” term is used as an area of TSO responsibility.

The Control Area term is mentioned for several publications in the Regulation 543/2013:

- 11.3 Ramping restrictions
- 11.4 Critical network elements
- 13.1.a Information relating to Redispatching
- 14.1.a Installed capacities per production type
- 16.1.a Actual generation per generation unit
- 16.1.b Aggregated generation per production type

At last, the Transparency Platform has the following publications to corroborate the creation of the control area in the new version of the HRM:

- All Load data domain (Actual total load 6.1.a, Day ahead Total Load forecast 6.1.b, week ahead Total Load forecast 6.1.c, month ahead Total Load forecast 6.1.d, a year ahead Total Load forecast 6.1.e, a year ahead forecast margin 8.1)
- All Generation domain (Installed capacity per production type 14.1.a, Installed capacity per production unit, Production and generation units 14.1.b, actual generation per generation unit 16.1.a, actual generation per production type 16.1.b&c, Generation forecast for wind and solar 14.1.d, Aggregate Filling Rate of Water Reservoirs and Hydro Storage Plants 16.1.d, Day ahead generation forecast 14.1.c)
- Almost all data items in the Transmission domain (scheduled commercial exchanges 12.1.f, cross border physical flows 12.1.g, forecasted capacities 11.1, Explicit allocation data 11.1, 12.1.a, 12.1.c, 12.1.h, total nominated capacity 12.1.b, Implicit allocation data 11.1, 12.1.e, Cross Border Capacity of DC Links - Intraday Transfer Limits 11.3, Expansion and dismantling projects 9.1 (Report – only per control area), Critical network elements 11.1 (only per control area),
- All Outage data domain (Unavailability of Transmission grid 10.1.a&b, Unavailability of off-shore grid 10.1.c, Unavailability of production and generation units 15.1a,b,c,d, aggregated unavailability of consumption units 7.1.a&b, Fall-backs (only per control area))
- Congestion management data domain (Countertrading 13.1.b, Redispatching 13.1.a (only per control area), costs of congestion management 13.1.c (only per control area))

### 2.2.2. Outage Coordination Region

According to the CSA study, an Outage Coordination Region means a region that has a common organisation or service that is responsible for planning and coordinating outages and their impact on the grid operation. This is not defined in the current HRM, but is defined in article 3 of SO GL, and means a combination of Control Areas for which TSOs define procedures to monitor and, where necessary, coordinate the availability status of relevant assets in all time-frames.

Thus, a proposed definition for Outage Coordination Region is a combination of control areas for which the TSOs define procedures to monitor and where necessary, coordinate the availability status of relevant assets in all timeframes.

### 2.2.3. System Operation Region

The System Operation Region (SOR) is mentioned in the Article 36 of the Regulation (EU) 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal electricity market [6].



The SOR is defined in Annex 1, Article 3 (1) - 2020-03-30 ACER Decision on SOR - Annex I [7]. Regulation (EU) 2019/943 says that “System operation regions include TSOs that have been designated or assigned with responsibilities which are relevant for system operation, such as but not limited to calculation of capacity, assessment of needed remedial actions to ensure the security of the whole system, coordination of all the outages to ensure security and efficiency, adequacy assessment and tasks related to the provision of system balancing”.

Based on these, the Harmonisation Group agreed that the definition of a SOR could be a region that includes TSOs designated or assigned with which are relevant for system operation, such as, but not limited to: capacity calculation, remedial actions, outage coordination and adequacy. This decision is still under analysis.

#### 2.2.4. Network Region

This network region is included in the Common Grid Model (CGM) reference data, thus, needs to receive a definition and also the Network Region is stated in the CGM reference document. Nevertheless, it is still under evaluation if the Network Region could also be named “Model Authority Region”. But this specific region does not necessarily need to be included in the HRM. Instead, it can be included in the EIC Function list published by ENTSO-E. The EIC list is a coding scheme that has been developed, managed and maintained by ENTSO-E, under the CIM Expert Group to facilitate cross-border exchanges and to efficiently and reliably identify different objects and parties relating to the Internal Energy Market and its operations [8]

Based on Article 19 of Capacity Allocation and Congestion Management, for each bidding zone and each scenario:

(a) all TSOs in the bidding zone shall jointly provide a single individual grid model which complies with Article 18(3); or

(b) each TSO in the bidding zone shall provide an individual grid model for its control area, including interconnections, provided that the sum of net positions in the control areas, including interconnections, covering the bidding zone complies with Article 18(3)

Individual grid models shall cover all network elements of the transmission system that are used in regional operational security analysis for the concerned time-frame.

This region is included in the CGM reference data, thus, needs to receive a definition and also the Network Region is stated in the CGM reference document. Nevertheless, it is still under decision if the Network Region could also be named “Model Authority Region”. But this role specifically does not necessarily need to be included in the HRM. Instead, it can be included in the EIC Function list published by ENTSO-E. The EIC list is a coding scheme that has been developed, managed and maintained by ENTSO-E, under the CIM Expert Group to facilitate cross-border exchanges and to efficiently and reliably identify different objects and parties relating to

the Internal Energy Market and its operations [8](a) all TSOs in the bidding zone shall jointly provide a single individual grid model which complies with Article 18(3); or

(b) each TSO in the bidding zone shall provide an individual grid model for its control area, including interconnections, provided that the sum of net positions in the control areas, including interconnections, covering the bidding zone complies with Article 18(3)

Individual grid models shall cover all network elements of the transmission system that are used in regional operational security analysis for the concerned time-frame.

This region is included in the CGM reference data, thus, needs to receive a definition and also the Network Region is stated in the CGM reference document. Nevertheless, still under decision if the Network Region could also be named “Model Authority Region”. But this role specifically does not necessarily need to be included in the HRM. Instead, it can be included in the EIC Function list published by ENTSO-E. The EIC list is a coding scheme that has been developed, managed and maintained by ENTSO-E, under the CIM Expert Group to facilitate cross-border exchanges and to efficiently and reliably identify different objects and parties relating to the Internal Energy Market and its operation [8].

#### 2.2.5. Observability Area

The Observability Area (OA) is a concept presented in current H2020 research projects, not only OneNet. This concept is proposed with the intention to include the supervision of the system’s stability under the responsibility of the System Operator, together with the performance in real-time. Although this concept is not yet defined by HRM, Article 3 of SO GL refers to Observability Area (OA) and defines it as: “Observability Area means a TSO’s system and the relevant parts of distribution systems and neighboring TSOs’ transmission systems, on which the TSO implements real-time monitoring and modelling to maintain operational security in its control area including interconnectors.

#### 2.2.6. Monitoring Area

The Monitoring Area is cited in article 3 of SO GL, defined as a part of the synchronous area or the entire synchronous area, physically demarcated by points of measurement at interconnectors to other monitoring areas, operated by one or more TSOs fulfilling the obligations of a monitoring area. Although this monitoring area is still under the definition, it can be analyzed further to also be included in HRM.

#### 2.2.7. Region

The Region is a subject still not yet defined on the HRM and is not defined in CACM nor SO GL. The region definition could be applied instead as a “Geographical Region” and “Sub-geographical Regions” cited in CGMES

3.0, although there is no definition for these both regions. There is also the remark that a “Sub-Geographical region” may only be another smaller Geographical Region, thus, the sub-geographical region could be ignored or deleted on a future proposal. Another remark is that the Bidding Zone region, informed by the HRM, cites a “Geographical Area”, which can conflict with this “Geographical Region” proposed. We can conclude that the Region discussion is still valid for future improvements of the HRM and no definition has been proposed yet.

### 2.3. Role Models reviews by BRIDGE

In April 2021, a public analysis that came from a joint task force in BRIDGE composed of several projects has presented an analysis concerning the Harmonised Electricity Market Role Model. This document is HEMRM – A Differential Analysis concerning the ENTSO-E - eBIX – EFET Model [9].

This analysis was proposed by the BRIDGE<sup>8</sup> Initiative, which counts on the active engagement of specific projects appointed by the European Commission. According to the project’s definition, *The BRIDGE process fosters continuous knowledge sharing amongst projects, thus allowing them to deliver conclusions and recommendations about the future exploitation of the project results, with a single voice, through four different Working Groups representing the main areas of interest: Data Management, Business Model, Regulations and Consumer & Citizen engagement.*

The TSO-DSO Coordination report<sup>9</sup> from BRIDGE is taken as a reference for discussion in this deliverable. It is a document resulting from discussions at the BRIDGE Regulation Working Group and Data Management Working Group<sup>10</sup>. This report attempts to map the interactions between the roles and propose suggestions to the ongoing improvement of the HRM. The market design and data exchange between TSOs and DSOs are the main targets here, studying the relations between the actors and how they are implemented.

The figure 4 presents the current Harmonized Role Model, with these newly identified roles that may support better involvement from different actors. This is the current conclusion of the BRIDGE for the proposed improvements of the HRM to better represent the roles. This proposed change is under continuous change and development by the BRIDGE participants.

It is important to raise the difference between this Deliverable and the BRIDGE effort. Deliverable 2.5 has the objective to make proposals for the current HRM 2020 document, based on the use cases presented in the OneNet project, whereas the BRIDGE presents the analysis of Use Cases from different research projects (which may include different sectors outside the energy sector). Nonetheless, it is also very important to demonstrate

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<sup>8</sup> Website for the BRIDGE Project: <https://www.h2020-bridge.eu/>

<sup>9</sup> TSO-DSO Coordination Report from BRIDGE: [https://www.h2020-bridge.eu/wp-content/uploads/2020/01/D3.12.f\\_BRIDGE-TSO-DSO-Coordination-report.pdf](https://www.h2020-bridge.eu/wp-content/uploads/2020/01/D3.12.f_BRIDGE-TSO-DSO-Coordination-report.pdf)

<sup>10</sup> BRIDGE website for the Regulation and Data Management working group.



that the effort of many research projects organised through BRIDGE has presented a great contribution for an overall alignment of roles, which was not done before during H2020 projects. This is significant because the alignment contributes to better role modelling from all the participants (TSOs, DSOs, third parties, etc.).

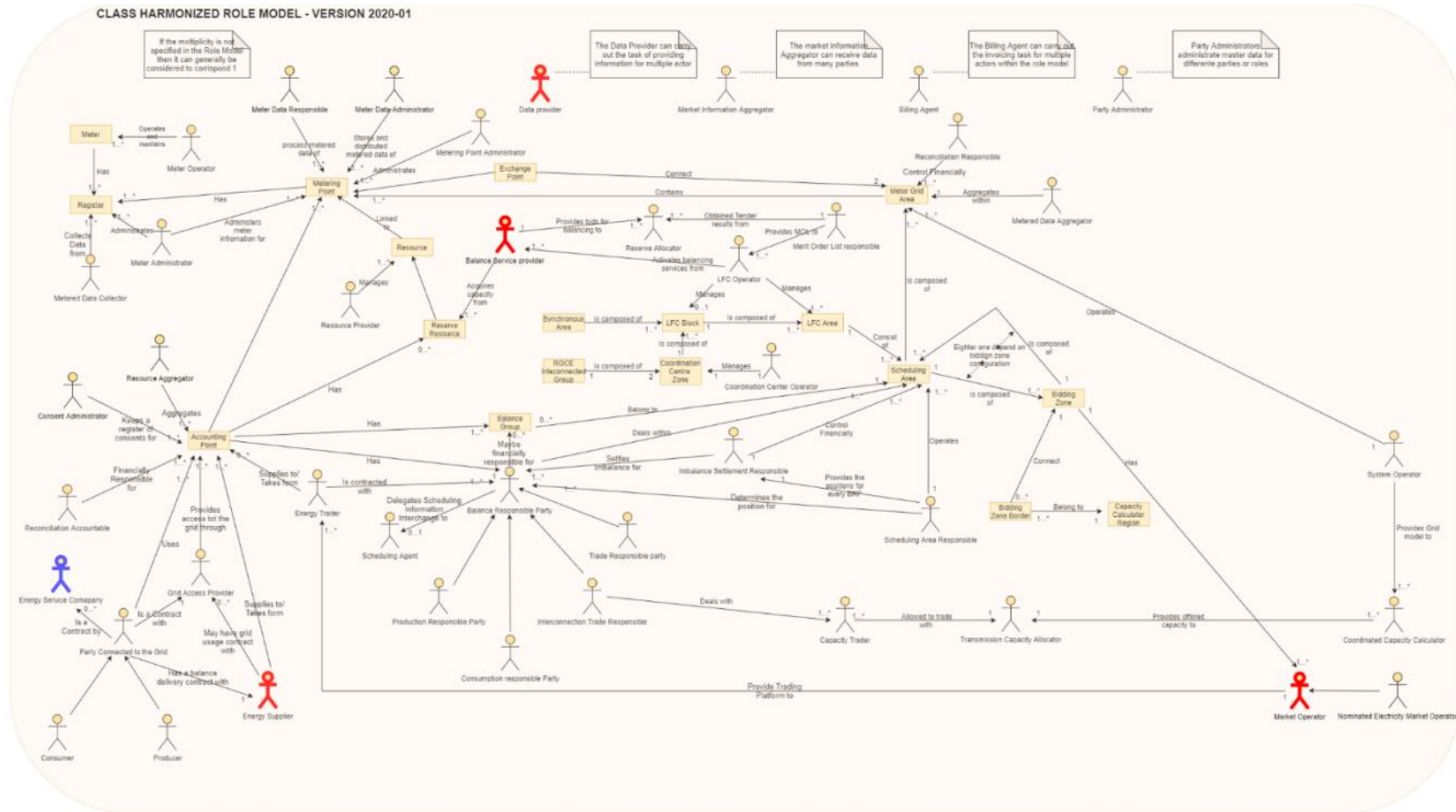


Figure 4 - Harmonised Role Model with the Identified new roles [9]

BRIDGE has also recommended a specific role model for data exchange related business roles, based on HEMRM. The figure 4 depicts existing HEMRM data exchange related roles, classes, and relationships (green) as well as new recommended roles, classes and relationships (red). Some roles existing in HEMRM would require new definitions (yellow). A detailed explanation can be found in the BRIDGE document [9]. It is not in the scope of Deliverable 2.5 to depict each proposition from BRIDGE, but these propositions were considered for the conclusion of D2.5, considering the valuable contribution of the role review by H2020 projects in the BRIDGE initiative.

The figure 5 demonstrates the data exchange roles, classes and relationships of HEMRM, but adding new roles, classes and relationships proposed in the BRIDGE – European energy data exchange reference architecture report<sup>11</sup>, presented by BRIDGE. In this report, existing HRM roles (in green) are presented together with non-existent roles and classes (in red). The orange roles present different definitions from the current HRM.

For the purpose of the OneNet project, only the roles and classes that are applied in the OneNet project will be compared in Deliverable 2.5. A detailed description of each of these will be presented in Section 3 of this deliverable.

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[https://ec.europa.eu/energy/sites/default/files/documents/bridge\\_wg\\_data\\_management\\_eu\\_reference\\_architecture\\_report\\_2020-2021.pdf](https://ec.europa.eu/energy/sites/default/files/documents/bridge_wg_data_management_eu_reference_architecture_report_2020-2021.pdf)



## 3. Review of the Roles Identified in OneNet Use Cases

The analysis of the roles applied for the OneNet project is performed in this chapter. This analysis builds upon the initial mapping of roles defined within the OneNet business use cases, presented in Deliverable 2.3 [10]. Sub-chapter 3.1 focuses on the OneNet roles already included in the HRM document, whereas subchapter 3.2 addresses the roles that are present in OneNet but not in the HRM 2020 document.

In Chapter 3.3, a comparison between the roles proposed in OneNet, the roles presented in the HRM and the BRIDGE HRMRM analysis is provided. The objective is to showcase the current status regarding the roles applied to the energy market together with the main discussion points with important members of the industry, associations and energy companies.

### 3.1. OneNet Roles integrated in existing HRM 2020

Subchapter 3.1 presents the analysis of the roles applied in OneNet which are already included in the HRM document. In this subsection, the tables present an overview of the distinct definitions of roles in OneNet for each of the use cases, intending to compare these, assess potential differences and evaluate whether these definitions are already harmonised or recommendations for the HRM document can be extracted.

#### 3.1.1. Market Operator

The Market Operator (MO) role is described in several use cases. The Table 1 presents the definitions for Market Operator in the OneNet use cases. The Northern cluster demos of Hungary, Slovenia and Portugal apply the description proposed by the HRM, which is based on regulation informed by the HRM. The Portuguese Demo presents this same definition for MO TSO and MO DSO. The Polish demo presents a “Market Operator” definition or the “Flexibility Platform Operator” definition.

For this analysis, the Market Operator role is harmonised for all of the use cases proposed, thus, no further definition or update is needed in the project, concerning the proposition for the HRM. A detailed comparison between the OneNet, HRM and Bridge can be found in subchapter 3.3.



Table 1 – Market Operator analysis for the Use Cases

Actor	Role's description at OneNet	BUC
Market Operator	A market operator is a party that provides a service whereby the offers to sell electricity or electricity flexibility are matched with bids to buy electricity or electricity flexibility.	Cypriot Demo – Active Power Flexibility Cypriot Demo – Reactive Power Flexibility and Power Quality
Market Operator	A market operator is a party that provides a service whereby the offers to sell electricity are matched with the bids to buy electricity.	Slovenian Demo – Congestion management in distribution grids under market conditions Slovenian Demo – Voltage control in distribution grids under market conditions
Market Operator	Responsible for market clearing	Hungarian Demo – MV feeder voltage control Hungarian Demo – HV/MV transformer overload
Market Operator	According to Article 2(7) of the Regulation (EU) 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity (recast), market operator designates “an entity that provides a service whereby the offers to sell electricity are matched with bids to buy electricity”.	Portuguese Demo – Exchange of Information for Operational Planning
MO TSO	According to Article 2(7) of the Regulation (EU) 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity (recast), market operator designates “an entity that provides a service whereby the offers to sell electricity are matched with bids to buy electricity”. electricity market (recast)	Portuguese Demo – Exchange of Information for Congestion Management – Short Term Portuguese Demo – Exchange of Information for Congestion Management – Long Term
MO DSO	According to Article 2(7) of the Regulation (EU) 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity (recast), market operator designates “an entity that provides a service whereby the offers to sell electricity are matched with bids to buy electricity”. electricity market (recast), the	Portuguese Demo – Exchange of Information for Congestion Management – Short Term Portuguese Demo – Exchange of Information for Congestion Management – Long Term
Market Operator (MO) or Flexibility Platform Operator (FPO)	A party (natural or legal person) who organizes auctions (continuous auction, discrete auctions, call for tenders) between buyers and sellers of electricity-related products in the markets. Manage/operate the platform for trading (where bids and offers are collected). Clear the market and	Polish Demo – requalification of resources provided by Flexibility Service Providers to support flexibility services in the Polish demo Polish Demo – Managing flexibility delivered by DER to provide balancing services to TSO

	communicate the results of the electricity market (recast).	Polish Demo – Event-driven Active Power Management for Congestion Management and voltage control by the DSO Polish Demo – Balancing Service Provider on the Flexibility Platform
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### 3.1.2. System Operator

The system operator (SO) role is described in the Polish and Northern demo clusters. The proposed descriptions are partially aligned with the System Operator definition that can be found in the HRM. However, these can be further aligned with the HRM or other existing EU regulatory documents, such as the System Operation Guidelines or the Capacity Allocation and Congestion Management documents. The table 2 presents the SO definitions found in the OneNet project BUCs.

*Table 2 – System Operator analysis for the Use Cases*

Actor	Actor’s description at OneNet	BUC
System Operator	Transmission System Operator or Distribution System Operator	Polish Demo – requalification of resources provided by Flexibility Service Providers to support flexibility services in the Polish demo Polish Demo – Managing flexibility delivered by DER to provide balancing services to TSO Polish Demo – Balancing Service Provider on the Flexibility Platform
System Operator	A party responsible for operating, ensuring the maintenance of and, if necessary, developing the system in each 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.	Northern Cluster

### 3.1.3. Balancing Service Provider

The Balancing Service Provider (BSP) description is presented for the Polish and demos of the Northern cluster. The descriptions are presented and aligned with the description found in the HRM. Thus, the BSP definition in the HRM document does not need to be updated. The table 3 presents the definitions found in the OneNet BUCs for BSP.

*Table 3 – Balancing Service Provider analysis for the Use Cases*

<b>Actor</b>	<b>Actor’s description at OneNet</b>	<b>BUC</b>
Balancing Service Provider	A party with reserve-providing units or reserve-providing groups able to provide balancing services to one or more LFC Operators	Polish Demo – requalification of resources provided by Flexibility Service Providers to support flexibility services in the Polish demo Polish Demo – Managing flexibility delivered by DER to provide balancing services to TSO Polish Demo – Balancing Service Provider on the Flexibility Platform
Balancing Service Provider	A party with reserve-providing units or reserve-providing groups able to provide balancing services to one or more LFC (Load frequency control) Operators.	Norther cluster

### 3.1.4. Metered Data Responsible

The Metered Data Responsible is described in the Polish demo. The proposal is aligned with the HRM. Thus, no changes or suggestions are necessary for this specific role. The table 4 presents the proposals for Metered Data Responsible.

*Table 4 – Metered Data Responsible analysis for the Use Cases*

<b>Actor</b>	<b>Actor’s description at OneNet</b>	<b>BUC</b>
Metered Data Responsible	A party responsible for the establishment and validation of measured data based on the collected data received from the Metered Data Collector. The party is responsible for the history of metered data for a Metering Point.	Polish Demo – requalification of resources provided by Flexibility Service Providers to support flexibility services in the Polish demo

### 3.1.5. Metered Data Collector

The metered Data Collector is described in the Polish demo. The proposal is aligned with the HRM document. Thus, no changes or suggestions are necessary for this specific role. The table 5 presents the proposals for Metered Data Collector.

*Table 5 – Metered Data Collector analysis for the Use Cases*

<b>Actor</b>	<b>Actor’s description at OneNet</b>	<b>BUC</b>
Metered Data Collector	responsible for meter reading and quality control of the reading.	Polish Demo – requalification of resources provided by Flexibility Service Providers to support flexibility services in the Polish demo

### 3.1.6. Consumer and Producer

The Consumer/Producer is described in the Northern demo. In this case, both definitions are already in the HRM report. It is suggested for the OneNet Use Case to separate each role to differentiate whether the actor is

acting as a Consumer or a Producer. Thus, for every specific data exchanged, the specific role will have to be applied for exchange. The table 6 presents the definitions presented in OneNet for Consumer/Producer.

*Table 6 – Consumer/Producer analysis for the Use Cases*

<b>Actor</b>	<b>Actor’s description at OneNet</b>	<b>BUC</b>
Consumer/ Producer	The consumer is a party that consumes electricity and the Producer is a party that generates electricity.	Northern Cluster

### 3.1.7. Balancing Responsible Party

The Balancing Responsible Party (BRP) description is presented for the Northern cluster. The definition is aligned with the definition presented in the HRM. Thus, no change or suggestion is necessary for this role to be implemented in the OneNet project. The table 7 presents the definition for BRP.

*Table 7 – Balancing Responsible Party analysis for the Use Cases*

<b>Actor</b>	<b>Actor’s description at OneNet</b>	<b>BUC</b>
Balancing responsible party (BRP)	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.	Northern Cluster

### 3.1.8. Resource Aggregator

Below the Resource Aggregator description is presented for the Northern cluster. The definition is aligned with the definition presented in the HRM. Thus, no change or suggestion is necessary for this role compared to the HRM. The table 8 presents the OneNet BUC definition for Resource Aggregator.

*Table 8 – Resource Aggregator analysis for the Use Cases*

<b>Actor</b>	<b>Actor’s description at OneNet</b>	<b>BUC</b>
Resource aggregator	A party that aggregates resources for usage by a service provider for energy market services.	Northern Cluster

### 3.1.9. Imbalance Settlement Responsible

The Imbalance Settlement Responsible description is presented for the Northern cluster. The definition is aligned with the definition presented in the HRM. Thus, no change or suggestion is necessary for this role compared to the HRM. The table 9 presents the definition for Imbalance Settlement Responsible.

Table 9 – Imbalance Settlement Responsible analysis for the Use Cases

Actor	Actor's description at OneNet	BUC
Imbalance settlement responsible (ISR)	A party that is responsible for settlement of the difference between the contracted quantities with physical delivery and the established quantities of energy products for the Balance Responsible Parties in a Scheduling Area.	Northern Cluster

### 3.1.10. Resource Provider

The Resource Provider description is presented for the Northern Cluster. The definition that can be found in the HRM document presents more details than the one in OneNet. It is considered that the Resources Provider role can probably be better described with the definition in the HRM document, without conflicting with the intended meaning, which states that a Resource Provider manages a resource and provides production/consumption schedules for it if required. Thus, for this role, it is proposed to use the HRM definition. The table 10 presents the Northern Cluster proposal for Resource Provider.

Table 10 – Resource Provider analysis for the Use Cases

Actor	Actor's description at OneNet	BUC
Resource Provider	A party who owns the resource.	Northern Cluster

### 3.1.11. Load Frequency Control Operator

The Load Frequency Control (LFC) Operator description is presented for the Polish demo. The proposition is aligned with the HRM. Thus, no changes are proposed for this role. The table 11 presents the definition for LFC Operator.

Table 11 – LFC Operator analysis for the Use Cases

Actor	Actor's description at OneNet	BUC
LFC Operator	Responsible for the load frequency control for its LFC Area or LFC Block.	Polish Demo – requalification of resources provided by Flexibility Service Providers to support flexibility services in the Polish demo Polish Demo – Managing flexibility delivered by DER to provide balancing services to TSO Polish Demo – Balancing Service Provider on the Flexibility Platform

### 3.1.12. Scheduling agent

The Scheduling agent description is presented for the Polish demo. The proposition is aligned with the HRM, which also states that a Scheduling Agent is an entity or entities with the task of providing schedules, according

to the European Regulation for System Operation Guidelines [1]. Thus, no changes are proposed for this role. The table 12 presents the proposed definition for Scheduling Agent.

*Table 12 – Scheduling Agent analysis for the Use Cases*

<b>Actor</b>	<b>Actor's description at OneNet</b>	<b>BUC</b>
Scheduling Agent	A party that is responsible for the schedule information and its exchange on behalf of a Balance Responsible Party	Polish Demo – Managing flexibility delivered by DER to provide balancing services to TSO

### 3.2. New OneNet Roles not present in the current 2020 HRM version

In this section, the roles that are not present in the current version of HRM 2020, but are proposed by the OneNet project are presented. It is also important to assess, for each case, the relevance of suggesting new roles or modifications to the current HRM based on OneNet findings.

#### 3.2.1. Transmission System Operator (TSO)

There are several definitions of TSO for the different OneNet use cases, presented below. It is important to notice that both TSO and DSO are not roles, but actors that may play one or more of the mentioned roles and this is mentioned in the SO definition of the HRM, which takes its definition based on the Directive 2009/72/EC of the European Parliament, stating that “The SO is 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 the reasonable demands for the distribution or transmission of electricity”.

In the analysis of the use cases, only the Cypriot demo takes this definition for its use cases. Other demos consider the SO has roles like Market Operators or Aggregators.

The certification procedure for TSOs is listed in Article 10 of the 2009 Electricity and Gas Directives. Although this can be a proposition, TSO, as an actor, must also have the responsibility not only to transport the energy but also to ensure maintenance for its interconnections. The DSO may also “transport the energy”, from one substation to another as an example. The table 13 presents the proposals for TSO.

Table 13 – Comparison of actors in the OneNet Project with HRM and corresponding role’s analysis.

Actor	Actor description at OneNet	BUC
TSO	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 transmission grid to meet reasonable demands for the transmission of electricity.	Cypriot Demo – Active Power Flexibility Cypriot Demo – Reactive Power Flexibility and Power Quality
TSO	A party (natural or legal person) who is responsible for operating, ensuring the maintenance of and, if necessary, developing the transmission 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 transmission of electricity	Polish Demo – requalification of resources provided by Flexibility Service Providers to support flexibility services in the Polish demo Polish Demo – Managing flexibility delivered by DER to provide balancing services to TSO Polish Demo – Event-driven Active Power Management for Congestion Management and voltage control by the DSO Polish Demo – Balancing Service Provider on the Flexibility Platform
Transmission System Operator (TSO) Market Operator	According to the Article 2.4 of the Electricity Directive 2009/72/EC (Directive): “a natural or legal person responsible for operating, ensuring the maintenance of and, if necessary, developing the transmission 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 transmission of electricity”. Moreover, the TSO is responsible for connection of all grid users at the transmission level and connection of the DSOs within the TSO control area.	French Demo – Improved monitoring of flexibility for congestion management French Demo – Improved TSO-DSO information exchange for DER activation Spanish Demo – Short-term congestion management Slovenian Demo – Congestion management in distribution grids under market conditions Slovenian Demo – Voltage control in distribution grids under market conditions
Production Forecasting operator (TSO/Aggregator); Load Forecasting operator (TSO/Aggregator);	TSO/Aggregator Short term planning department load forecasting operator is responsible for consumption short term, mid-term and long-term forecasts, later on used for TSO level modelling under f-channel platform coordination: IGM updates, DCAF and 2DCAF procedures, Contingency Analysis and Capacity Calculations.	Greek Demo – Enhanced Active/Reactive Power Management for TSO-DSO coordination
DCAF operator (TSO and corresponding expert in DSO);	An expert from TSO/Short term planning department, responsible for day ahead congestion forecast simulation and analysis which as an output gives the list of critical elements and critical outages with the list of	Greek Demo – Enhanced Active/Reactive Power Management for TSO-DSO coordination



2DACF operator (TSO and corresponding expert in DSO);	possible mitigation measures...If the DACF is performed by a national TSO than targeted, analysed system is usually only a national power system and first neighbouring systems.	
IGM manager (TSO and corresponding expert in DSO);	TSO/Short term planning department Expert/s responsible for development, maintenance and regular updates of a Individual Grid Models containing: consumption nodes (active and reactive power), production nodes (active power and voltage set), overall voltage profile, assumed power exchanges with the neighbouring systems...IGM models are further used by DACF, 2DACF and ATC calculator for further simulations, calculations and analysis.	Greek Demo – Enhanced Active/Reactive Power Management for TSO-DSO coordination Greek Demo – Enhanced severe weather condition management and outage management for TSO, DSO and micro grid operator
ATC calculator (TSO and RSC);	TSO/Short term planning department Expert in charge of short to long term available capacity calculations, flow based or ATC based (bilateral or composite values).	Greek Demo – Enhanced Active/Reactive Power Management for TSO-DSO coordination Greek Demo – Enhanced severe weather condition management and outage management for TSO, DSO and micro grid operator
Power system control expert (TSO/DSO);	TSO Operational personnel working on intraday – real time power system control and operations in a dispatching room, using DACF, 2DACF, Outage schedules, production schedules and Contingency Analysis outputs that are prepared on a 2day-ahead, or day-ahead basis. Also, these experts are using SCADA/EMS in order to perform intraday 5-15 min simulations and contingency analysis in order to update of the same analysis in a real time	Greek Demo – Enhanced Active/Reactive Power Management for TSO-DSO coordination
Balancing mechanism operator (TSO)	(No description in the BUC)	Greek Demo – Enhanced Active/Reactive Power Management for TSO-DSO coordination
RES Scheduling operator (TSO based)	(No description in the BUC)	Greek Demo – Enhanced Active/Reactive Power Management for TSO-DSO coordination
Losses calculator (TSO)	Improved forecasting of grid losses and available future capacities	Greek Demo – Enhanced Active/Reactive Power Management for TSO-DSO coordination
Regional DACF operator (RSC)	An expert from RSC-Regional Security Center, responsible for day ahead congestion forecast simulation and analysis which as an output gives the list of critical elements and critical outages with the list of proposed mitigation measures...If the DACF is performed by a RSC than targeted, analysed system is usually	Greek Demo – Enhanced Active/Reactive Power Management for TSO-DSO coordination Greek Demo – Enhanced severe weather condition management and outage management for TSO, DSO and micro grid operator

	regional, CCR based network model (CGM – Common Grid Model).	
Regional 2DACF operator (RSC)	An expert from RSC-Regional Security Center, responsible for day ahead congestion forecast simulation and analysis which as an output gives the list of critical elements and critical outages with the list of proposed mitigation measures...If the DACF is performed by a RSC than targeted, analysed system is usually regional, CCR based network model (CGM – Common Grid Model).	Greek Demo – Enhanced Active/Reactive Power Management for TSO-DSO coordination  Greek Demo – Enhanced severe weather condition management and outage management for TSO, DSO and micro grid operator
CGM manager (RSC)	TSO/Short term planning department or and RSC's Expert/s responsible for development, maintenance and regular updates of a Common Grid Models containing: consumption nodes (active and reactive power), production nodes (active power and voltage set), overall voltage profile, assumed power exchanges with the neighbouring systems...CGM models are further used by DACF, 2DACF and ATC calculator for further simulations, calculations and analysis.	Greek Demo – Enhanced Active/Reactive Power Management for TSO-DSO coordination
ATC coordinated calculator (TSO or RSC)	RSC's Expert in charge of short to long term available capacity calculations, flow based or ATC based (bilateral or composite values), calculated in a coordinated manner for all regional borders simultaneously or at least during the same calculation process.	Greek Demo – Enhanced Active/Reactive Power Management for TSO-DSO coordination
Production Forecasting/Scheduling operator (Regional RES coordinator)	Future regional RES production coordinators...Still does not exist, but is foreseen by CEP...It will have a coordination role for all RES units, not only national/system located but all regional RES production will be run from this body. The role and relationship with the EUROPAN will be similar to what is now being used by TSOs for this same functionality which covers production forecasts	Greek Demo – Enhanced Active/Reactive Power Management for TSO-DSO coordination
Maintenance and asset management operator (TSO/DSO)	TSO/DSO asset department expert in charge of grid maintenance planning which uses grid condition forecasts to foresee potential risks and prepare a proper mitigation or preventive measures for it.	Greek Demo – Enhanced severe weather condition management and outage management for TSO, DSO and micro grid operator
Outage scheduler (TSO/DSO)	Expert in charge of outage planning. Outage schedules are further on used for IGM and CGM development and regular updates of a grid topology inside models. This person is an interface between TSO transmission department and TSO short-term planning department, making sure that all	Greek Demo – Enhanced severe weather condition management and outage management for TSO, DSO and micro grid operator

	maintenance activities are well covered and foreseen by IGM topology updates and simulations as well	
TSO	Passive actor Receives information on capacity auctions and energy activations	Hungarian demo – MV feeder voltage control Hungarian demo – HV/MV transformer overload
TSO	According to the European Commission, the TSO is “an organisation committed to transporting energy in the form of natural gas or electrical power on a national or regional level, using fixed infrastructure”. The certification procedure for TSOs is listed in Article 10 of the 2009 Electricity and Gas Directives	Portuguese demo – Exchange of Information for Congestion Management – Short Term Portuguese demo – Exchange of Information for Congestion Management – Long Term Portuguese Demo – Exchange of Information for Operational Planning

### 3.2.2. Distribution System Operator (DSO)

For the case of Distribution System Operator (DSO), this sub-section presents what was proposed for each use case in OneNet. The Cypriot demo also applied the HRM definition for its use case. Thus, for both TSO and DSO, the definition presented in the Cypriot demo is aligned with the HRM proposition. E.DSO has another proposition for the DSO, on which the DSOs are “the operating managers (and sometimes owners) of energy distribution networks, operating at low, medium and, in some member states, high voltage levels (LV, MV)”, as stated in E.DSO’s webpage<sup>13</sup>. This definition can be further analysed to help define the DSO, although, during the current discussions of the BRIDGE, the alignment between the Harmonisation Group (HG) and the BRIDGE was to not include specific roles like TSO or DSO in the HRM. The table 14 presents the definitions included in the OneNet BUCs for DSO.

<sup>13</sup> Source: <https://www.edsoforsmartgrids.eu/home/why-smart-grids/>

Table 14 – DSO definition analysis from the Use Cases

Actor	Actor's description in OneNet	BUC
DSO	Party responsible for operating, ensuring the maintenance of and, if necessary, developing the system in a given area and, for ensuring the long-term ability of the distribution grid to meet reasonable demands for the distribution of electricity.	Cypriot Demo – Active Power Flexibility Cypriot Demo – Reactive Power Flexibility and Power Quality
DSO	Party (natural or legal person) who is responsible for operating, ensuring the maintenance of and, if necessary, developing the distribution 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 of electricity	Polish Demo – requalification of resources provided by Flexibility Service Providers to support flexibility services in the Polish demo Polish Demo – Managing flexibility delivered by DER to provide balancing services to TSO Polish Demo – Event-driven Active Power Management for Congestion Management and voltage control by the DSO Polish Demo – Balancing Service Provider on the Flexibility Platform
DSO	A natural or legal person who is responsible for operating, ensuring the maintenance of and, if necessary, developing the distribution 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 of electricity	Czech Demo – Voltage Control Czech Demo – Reactive Power Overflow Management Czech Demo – Nodal Area Congestion Management Slovenian Demo – Congestion management in distribution grids under market conditions Slovenian Demo – Voltage control in distribution grids under market conditions
Distribution System Operator (DSO)	According to Article 2.6 of the Directive: “a natural or legal person responsible for operating, ensuring the maintenance of and, if necessary, developing the distribution 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 of electricity”.	French Demo – Improved monitoring of flexibility for congestion management French Demo – Improved TSO-DSO information exchange for DER activation Spanish Demo – Long-term congestion management Spanish Demo – Short-term congestion management
DSO/Microgrid operator	DSO/Microgrid operator responsible for the overall O&M activities in a certain geographical area.	Greek Demo – Enhanced severe weather condition management and outage

		management for TSO, DSO and microgrid operator
DSO	Responsible for maintaining service quality (e.g. EN 50160) and quantifying flexibility service needs Participates in energy auctions and energy activations	Hungarian demo – MV feeder voltage control Hungarian demo – HV/MV transformer overload
DSO	According to the E.DSO, the DSOs are “the operating managers (and sometimes owners) of energy distribution networks, operating at low, medium and, in some member states, high voltage levels (LV, MV)”.	Portuguese demo – Exchange of Information for Congestion Management – Short Term Portuguese demo – Exchange of Information for Congestion Management – Long Term Portuguese Demo – Exchange of Information for Operational Planning
Load Forecasting operator (DSO/Micro-grid operator); Production Forecasting operator (DSO/Micro-grid operator);	DSO/Short term planning department load forecasting operator is responsible for consumption short term, midterm and long-term forecasts, later on, used for TSO level modelling under f-channel platform coordination: IGM updates, DACF and 2DACF procedures, Contingency Analysis and Capacity Calculations.	Greek Demo – Enhanced Active/Reactive Power Management for TSO-DSO coordination

### 3.2.3. Prosumer

The Prosumer is only described in the Cypriot use case. This definition is not yet approved by the HRM since both the consumer and the producer have different and very distinct definitions in the HRM. A producer generates energy, meanwhile, the consumer consumes the electricity. An actor may play each time either the role of producer or consumer, but he cannot be at same time both roles. This may affect the exchange of data purposes, given that in a sequence diagram, exchanging data in the Common Information Model Profiling, there is only one role acting at a time, a producer or a consumer. The table 15 presents the proposals for Prosumer.

*Table 15 – Prosumer definition analysis from the Use Cases*

Actor	Actor’s description at OneNet	BUC
Prosumer	A party that produces and consumes electricity.	Cypriot Demo – Active Power Flexibility Cypriot Demo – Reactive Power Flexibility and Power Quality

### 3.2.4. Flexibility Service Provider (FSP)

The FSP is described in many different use cases. Since there are many types of flexibility proposed for the market nowadays, the term “flexibility” may suggest very different cases of roles when data exchange occurs. In the case where the “flexibility provider” that acts as a Balancing Service Provider (BSP) for example the role will, indeed, be this Balancing Service Provider, instead of this new “flexibility service provider” role as proposed here. Thus, the application of Flexibility Service Provider is still under discussion, since the term flexibility may apply to many different types of actors, depending on the role that the actor in the market will play in such a specific Use Case, during a specific data exchange moment. The table 16 presents the proposals for FSP.

*Table 16 – FSP analysis for the Use Cases*

<b>Actor</b>	<b>Actor’s description at OneNet</b>	<b>BUC</b>
Flexibility Service Provider	A party providing flexibility services to energy stakeholders via bilateral agreements or flexibility markets	Cypriot Demo – Active Power Flexibility Cypriot Demo – Reactive Power Flexibility and Power Quality
Flexibility Service Provider	Generic role which links the role customer and its possibility to provide flexibility to the roles market and grid; generic role that could be taken by many stakeholders, such as an aggregator or individual distributed energy resources.	French Demo – Improved monitoring of flexibility for congestion management Spanish Demo – Long-term congestion management Spanish Demo – Short-term congestion management
Flexibility Service Provider	Provides services for the DSO Provides information to the TSO in case of activations through schedules	Hungarian demo – MV feeder voltage control Hungarian demo – HV/MV transformer overload
Flexibility Service Provider	Defined as any legal entity that offers flexibility services in the market, based on acquired (aggregated) capabilities, usually from third parties.	Slovenian Demo – Congestion management in distribution grids under market conditions Slovenian Demo – Voltage control in distribution grids under market conditions
Flexibility Service Provider	Defined as any legal entity that offers flexibility services in the market.	Portuguese demo – Exchange of Information for Congestion Management – Short Term Portuguese demo – Exchange of Information for Congestion Management – Long Term
Flexibility Service Provider	A party (natural or legal person) who is a market participant providing flexibility services to any electricity market who owns at least one distributed energy resources	Polish Demo – requalification of resources provided by Flexibility Service Providers to support flexibility services in the Polish demo Polish Demo – Managing flexibility delivered by DER to provide balancing services to TSO Polish Demo – Event-driven Active Power Management for Congestion Management and voltage control by the DSO

		Polish Demo – Balancing Service Provider on the Flexibility Platform
Flexibility Service Provider	A party which offers flexibility services to the Consumer and thus connects these to the flexibility market	Northern cluster
Flexibility Service Provider being an Aggregator or	A party (natural or legal person) who is a market participant providing flexibility services to any electricity market that represents and aggregates the capacity of the entities that own distributed energy resources (DER).	Polish Demo – requalification of resources provided by Flexibility Service Providers to support flexibility services in the Polish demo Polish Demo – Managing flexibility delivered by DER to provide balancing services to TSO Polish Demo – Event-driven Active Power Management for Congestion Management and voltage control by the DSO Polish Demo – Balancing Service Provider on the Flexibility Platform

### 3.2.5. Platform

The Platform is described by the Czech demo. The term Platform is more related to an actor participating in a System Use Case, instead of a Business Use Case. As a proposition, the Market Operator presented in the HRM is usually an energy/power exchange or platform. Thus, it may be suggested that this platform could instead be a Market Operator. The table 17 presents the proposals for the Platform.

*Table 17 – Platform definition analysis from the Use Cases*

Actor	Actors' description at OneNet	BUC
<b>Platform</b>	IT environment allowing for market parties exchange of market-based flexibility products, providing necessary feedback both on Aggregators/Units involved in flexibility provision. Moreover, it gives all participants relevant information on the grid availability through a traffic light scheme.	Czech Demo – Voltage Control Czech Demo – Reactive Power Overflow Management Czech Demo – Nodal Area Congestion Management
OneNet common platform	Responsible for the necessary TSO-DSO coordination	Hungarian demo – MV feeder voltage control Hungarian demo – HV/MV transformer overload

### 3.2.6. Unit/Flexibility Provider

The Unit/Flexibility Provider receives a description for the Czech demo. For the Unit/Flexibility provider can receive the same analysis done for item 3.2.7 – Flexibility Service Provider, on which the flexibility receives different roles during the exchange of data. The table 18 presents the proposals for Unit/Flexibility Provider.

Table 18 – Unit/Flexibility Provider analysis for the Use Cases

Actor	Role's description at OneNet	BUC
Unit/Flexibility Provider	Single units (part of the portfolio of the aggregator) proving flexibility to the distribution grid operator.	Czech Demo – Voltage Control Czech Demo – Reactive Power Overflow Management Czech Demo – Nodal Area Congestion Management

### 3.2.7. Distributed Energy Resource

The Distributed Energy Resource receives descriptions for the French and Spanish demos. There are no definitions for the Distributed Energy Resource in HRM, also the term is cited in neither CACM nor in SO GL. In fact, these resources are described as providing active power flexibility. The table 19 presents the proposals for DER.

Table 19 – Distributed Energy Resource definition analysis for the Use Cases

Actor	Actor's description at OneNet	BUC
Distributed Energy Resource	Resources connected at the distribution grid capable of providing active power flexibility, either upward/downward or both. It can comprise several different roles and devices such as demand response (actor/role), distributed generation, electric vehicles, and storage systems. Loads which could modify their consumption according to external set points are often also considered as DER	French Demo – Improved monitoring of flexibility for congestion management
Distributed Energy Resource	Resources connected at the distribution grid capable of providing active power flexibility, either upward/downward or both. It can comprise several different roles and devices such as demand response (actor/role), distributed generation, electric vehicles, and storage systems	Spanish Demo – Long-term congestion management Spanish Demo – Short-term congestion management

### 3.2.8. Weather Forecast Provider

The weather forecast provider receives descriptions for the Greek demo. This is a good proposition to be added to the HRM, since there is no role, class or resource describing the weather information in the current version of the HRM. There is a general role in HRM which is named Information Provider. The Weather Forecast Provider could be a specialization of the Information Provider. The table 20 presents the proposals for Weather Forecast Provider.



Table 20 – Weather Forecast Provider analysis for the Use Cases

Actor	Actor’s description at OneNet	BUC
Weather Forecast Provider	Unit inside the TSO/DSO, or contracted outsourced weather forecast provider company responsible for weather forecasts for selected weather parameters and selected locations in the grid.	Greek Demo – Enhanced Active/Reactive Power Management for TSO-DSO coordination Greek Demo – Enhanced severe weather condition management and outage management for TSO, DSO and micro grid operator

### 3.2.9. Flexibility Register Operator

The flexibility register operator is described in the Greek and Northern cluster demos use cases. This role receives no definition in the current version of the HRM. In OneNet, this actor stores information about assets, (meanwhile no description was found on the Greek demo). For the Flexibility Register Operator, to perform flexibility and store information, it is proposed to review this role name, since the flexibility and information storage may be performed by different parties in the energy market. The table 21 presents the proposals for Flexibility Register Operator.

Table 21 – Flexibility Register Operator definition analysis for the Use Cases

Actor	Role’s description at OneNet	BUC
Flexibility Register Operator	(No description on BUC)	Greek Demo – Enhanced Active/Reactive Power Management for TSO-DSO coordination Greek Demo – Enhanced severe weather condition management and outage management for TSO, DSO and microgrid operator
Flexibility Register Operator (FRO)	A party that stores information about flexibility assets, results of qualification (both product and grid), market results, grid information as well as perform flexibility verification and settlement, aggregates flexibility information, allocates access rights to the various actors and controls the level of access.	Northern Cluster

### 3.2.10. Local Management System (LMS)

The local management system receives a description for the Czech demo. It describes an IT system and, as the Platform actor described on item “3.2.5. Platform” of this deliverable, it could be considered the applicability of a Market Operator role definition for this case, but the Market Operator, according to the HRM, provides a service related to bids. The Local Management System is described as planning the charging patterns, which does not correspond to the Market Operator. The table 22 presents the proposals for LMS.

Table 22 – Local Management System analysis for the Use Cases

Actor	Actor's description at OneNet	BUC
Local Management System	IT system allowing planning of charging patterns according to expected grid conditions and RES production.	Czech Demo – Nodal Area Congestion Management

### 3.2.11. Independent Market Operator (IMO)

The independent market operator is presented in the Spanish demo only. The description informs that the IMO may (besides the responsibility of communication as stated in the description) settle provision of distributed flexibility, which does not resemble a task of a Market Operator, according to the current definition of Market Operator in the HRM. The Market Operator provides services, while this proposed IMO definition possibly settle flexibility for distribution flexibility. The table 23 presents the proposals for IMO.

Table 23 – Independent Market Operator analysis for the Use Cases

Actor	Actor's description at OneNet	BUC
IMO	Responsible for calling, clearing, communicating results and possibly settling the provision of distributed flexibility. This role can be taken by an independent market operator, an existing one (e.g. a NEMO), or a system operator.	Spanish Demo – Long-term congestion management Spanish Demo – Short-term congestion management

### 3.2.12. Optimisation Operator

The Optimisation Operator description is presented for the Northern cluster. It is a different definition from the Market Operator since the Optimisation Operator avoids activations of flexibilities and solving system needs. A Market Operator is only planned to provide service whereby the offers to sell electricity are matched with bids to buy electricity. The table 24 presents the proposals for Optimisation Operator.

Table 24 – Optimisation Operator analysis for the Use Cases

Actor	Actor's description at OneNet	BUC
Optimisation operator	A party which is responsible to avoid activating of flexibilities which either do not contribute to solving system needs or even worsen the situation (constraint setting process), through grid impact assessment. It will find the best value-stack of available flexibilities to be activated by performing an optimization process.	Northern Cluster

### 3.2.13. Aggregator

The Aggregator receives description for different use cases in the OneNet project. Only the Cypriot Use Case applied the definition found in the HRM for the Resource Aggregator. But in the HRM, there is not one single role named only "Aggregator". Instead, we find roles like Market Information Aggregator, Metered Data

Aggregator and Resource Aggregator. The current action performed by the “aggregator” in the OneNet project depends on the use case in question, as presented in table 25. The different definitions don’t allow to have a strong alignment with the current HRM.

*Table 25 – Aggregator analysis for the Use Cases*

<b>Actor</b>	<b>Actor’s description at OneNet</b>	<b>BUC</b>
Aggregator	A party that aggregates resources for usage by a service provider for energy market services.	Cypriot Demo – Active Power Flexibility Cypriot Demo – Reactive Power Flexibility and Power Quality
Aggregator	A natural or legal person who is a market participant providing flexibility services to any electricity market that represents and aggregates the capacity of the entities that own a distributed energy resource (DER).	Czech Demo – Voltage Control Czech Demo – Reactive Power Overflow Management Czech Demo – Nodal Area Congestion Management
Production Forecasting operator (TSO/Aggregator);	TSO/Aggregator Short term planning department load forecasting operator is responsible for consumption short term, mid-term and long-term forecasts, later on, used for TSO level modelling under f-channel platform coordination: IGM updates, DACF and 2DACF procedures, Contingency Analysis and Capacity Calculations.	Greek Demo – Enhanced Active/Reactive Power Management for TSO-DSO coordination



### **3.3. Comparative Analysis between OneNet-HRM-BRIDGE**

After the presentation of all roles presented in the OneNet project in sections 3.1 and 3.2, together with the BRIDGE review presented in the BRIDGE report [11], a comparative analysis is proposed between OneNet, HRM and BRIDGE. This comparative analysis section is presented with the definitions for each case including the project, the document HRM and the BRIDGE initiative. This comparative analysis is key to present the current status for the study of roles in the energy sector throughout all research projects and the OneNet project. Other roles are presented in the BRIDGE report. Nevertheless, the objective of D2.5 is to analyze the roles proposed by the OneNet project. Thus, only those roles proposed by the project presented in BRIDGE are analyzed here.

Table 26 – Comparative analysis between OneNet, HRM and BRIDGE roles

Actor	Actor’s description at OneNet	Actor’s description at HRM	Actor’s description at BRIDGE	OneNet Analysis
Aggregator	A party that is responsible for the schedule information and its exchange on behalf of a Balance Responsible Party	No description on HRM.	Not presented in BRIDGE 2021 report	The absence of this role in both BRIDGE and HRM indicates that this proposition can be replaced by a “Resource Aggregator”, which also is responsible for aggregating the resources for usage by balancing service provider.
Balancing 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.	<p>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.</p> <p>Note: Based on Electricity Balancing – Art.2 Definitions.</p> <p>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.</p>	<p>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.</p> <p>Note: Based on Electricity Balancing – Art.2 Definitions.</p> <p>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.</p>	The definitions demonstrate that this role is harmonised.

Balancing Service Provider	A party with reserve-providing units or reserve-providing groups able to provide balancing services to one or more LFC (Load frequency control) Operators.	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.	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. BSP can also be an extension of BRP.	The definitions demonstrate that this role is harmonised.
Consumer	Consumer is a party that consumes electricity and Producer is a party that generates electricity.	A party that consumes electricity.  Additional information: This is a Type of Party Connected to the Grid.	A party that consumes electricity.  Additional information: This is a Type of Party Connected to the Grid	The OneNet project proposes the Consumer as a party that can consume and produce the electricity. Nonetheless, a role cannot have two different meanings with the same name. The absence of this role on both HRM and BRIDGE indicates that it is suggested to separate the Consumer and the Producer roles.
Distributed Energy Resource	Resources connected at the distribution grid capable of providing active power flexibility, either upward/downward or both. It can comprise several different roles and devices such as demand response (actor/role), distributed generation, electric vehicles, and storage systems. Loads that could modify their consumption according to external set points are often also considered as DER	No description on HRM.	Not presented in BRIDGE 2021 report	The distributed energy resource presents only one proposition for the OneNet project, but this role is not defined in the HRM nor the BRIDGE report. It is recommended to explore whether this role should be added to the HRM document.

<p>Distribution System Operator</p>	<p><i>This role received several descriptions from different Use Cases. Please see subsection 3.2.2.</i></p>	<p>No description on HRM.</p>	<p>A DSO is a System Operator.</p> <p>DSO is responsible for the security of supply and reliability of the distribution grid. For this reason, it monitors the grid in order to identify possible arising issues and, if there is a need, it makes use of resources to solve such problems, by network reconfiguration and/or by requests to market operators or directly to properly contracted customers.</p> <p>In addition to the above and more in detail:</p> <ul style="list-style-type: none"> <li>- is responsible for the access of the customers to the grid;</li> <li>- operates, maintains, develops and is fully responsible for the part of the electricity system, named "Distribution Network", typically starting from the HV/MV transformers (or vHV/HV transformers depending upon Member State Regulation) down to the customer's POD;</li> <li>- acts on Local Flexibility Market requiring Local Flexibility Services to solve distribution grids issues;</li> <li>- ensures a transparent and non-discriminatory access to the distribution network for each user;</li> <li>- assess network status of the distribution grid and broadcasts selected information of the network status to eligible actors (e.g. aggregators, other system operators);</li> </ul>	<p>The distribution system operator is included and described in both the OneNet project and in the BRIDGE report. This role in OneNet presents slightly different definitions for the use cases, therefore, the OneNet project is not aligned with HRM for this role.</p> <p>What should be a consolidated definition will be explored in more detail with the Harmonisation Group for its insertion in the HRM.</p>
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			<p>- in critical situations, implements dedicated actions and deliver alerts during stress events If necessary, implement emergency measures including load shedding and DER curtailment; - cooperates with the Transmission System Operator in carrying out their responsibilities (e.g. load shedding).</p> <p>ADDITIONAL Information: Extract from the provisions of DIRECTIVE 2009/72/EC, Art.31: “ ...The distribution system operator shall be responsible for ensuring the long-term ability of the system to meet reasonable demands for the distribution of electricity, for operating, maintaining and developing under economic conditions a secure, reliable and efficient electricity distribution system in its area with due regard for the environment and energy efficiency...”</p>	
Flexibility Register Operator	A party that stores information about flexibility assets, results of qualification (both product and grid), market results, grid information as well as perform flexibility verification and settlement, aggregates flexibility information, allocates access rights to the various actors and controls the level of access.	No description on HRM.	Administrator of all the information that is stored in the Flexibility Register. Responsible for allocating access rights to the various actors and controlling the level of access. Stores flexibility assets, results of qualification (both product and grid), stores market results, grid information, aggregates flexibility information and stores the results of the settlement. Forwards activation signals to flexibility assets upon request of the SOs. The	The flexibility Register Operator proposes to store information about flexibility assets. In the HRM, the Market Information Aggregator also provides the possibility of storing information, which can, thus, be compared to this proposition. Furthermore, in BRIDGE, this role also takes the task of administrating all



			Flexibility operator should be a trusted authority due to the sensitivity level of the information being handled.	information stored in the flexibility register, among other tasks also here described.
Flexibility Service Provider	A party providing flexibility services to energy stakeholders via bilateral agreements or flexibility markets	No description on HRM.	<p>A party providing flexibility services to energy stakeholders via bilateral agreements or flexibility markets. An FSP can also be a BSP if enabled to the LFC services.</p> <p>In the Bridge HEMRM, FSP is an extension of BSP.</p> <p>FSP offer services potentially to all the system operators, directly or through market operators.</p>	The flexibility Service Provider is represented here as a party providing flexibility. This was not yet so far in the HRM because, on each specific data exchange (represented in the sequence diagrams), a specific role can provide flexibility. Thus, this task of providing flexibility would overlap another role. The proposition from BRIDGE can be taken into account and it has already been presented to the HRM authors for review. This topic received feedback from ENTSO-E, ebIX and EFET and may be brought to analysis in the future.
Imbalance Settlement Responsible	A party that is responsible for settlement of the difference between the contracted quantities with physical delivery and the established quantities of energy products for the Balance Responsible Parties in a Scheduling Area.	A party that is responsible for settlement of the difference between the contracted quantities with physical delivery and the established quantities of energy products for the Balance Responsible Parties in a Scheduling Area. Note: The Imbalance Settlement Responsible may delegate the invoicing responsibility to a more generic role such as a Billing Agent.	A party that is responsible for settlement of the difference between the contracted quantities with physical delivery and the established quantities of energy products for the Balance Responsible Parties in a Scheduling Area. Note: The Imbalance Settlement Responsible may delegate the invoicing responsibility to a more generic role such as a Billing Agent.	

Independent Market Operator	Responsible for calling, clearing, communicating results and possibly settling the provision of distributed flexibility. This role can be taken by an independent market operator, an existing one (e.g. a NEMO), or a system operator.	No description on HRM.	Not presented in BRIDGE 2021 report	This role has no propositions from HRM and BRIDGE report. A recommendation would be to assess if this could be included in HRM.
LFC Operator	Responsible for the load frequency control for its LFC Area or LFC Block.	Responsible for the load frequency control for its LFC Area or LFC Block. Additional information: This role is typically performed by a TSO.	Responsible for the load frequency control for its LFC Area or LFC Block. Additional information: This role is typically performed by a TSO.	The definition of the roles in OneNet, HRM and Bridge are harmonised.
Local Management System	IT system allows the planning of charging patterns according to expected grid conditions and RES production.	No description on HRM.	Not presented in BRIDGE 2021 report	There is no definition of this role in HRM or BRIDGE. A Recommendation can be to assess if this could be included in HRM
Market Operator	An entity that provides a service whereby the offers to sell electricity are matched with bids to buy electricity	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.	A market operator is a party that provides a service whereby the offers to sell electricity or electricity flexibility are matched with bids to buy electricity or electricity flexibility. 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. Flexibility Market operator is a type of MO for the Markets where only energy flexibilities are traded	The definition of the roles is aligned. The BRIDGE proposes that a Flexibility Market Operator is a type of Market Operator for the markets
Metered Data Collector	A party responsible for meter reading and quality control of the reading.	A party responsible for meter reading and quality control of the reading.	A party responsible for meter reading and quality control of the reading.	The definition of the role indicates that these are aligned.

Metered Data Responsible	A party responsible for the establishment and validation of measured data based on the collected data received from the Metered Data Collector. The party is responsible for the history of metered data for a Metering Point.	A party responsible for the establishment and validation of measured data based on the collected data received from the Metered Data Collector. The party is responsible for the history of metered data for a Metering Point.	A party responsible for the establishment and validation of measured data based on the collected data received from the Metered Data Collector. The party is responsible for the history of metered data for a Metering Point	The definitions of the roles indicate that these are harmonised.
Optimisation Operator	A party that is responsible to avoid activating of flexibilities that either do not contribute to solving system needs or even worsen the situation (constraint setting process), through grid impact assessment. It will find the best value-stack of available flexibilities to be activated by performing an optimization process.	No description on HRM.	Not presented in BRIDGE 2021 report	There is no such role in HRM nor BRIDGE. No similarities were checked for this role when compared to the HRM. It is suggested to be assessed whether to include in HRM.
Platform	IT environment allowing for market parties exchange of market-based flexibility products, providing necessary feedback both on Aggregators/Units involved in flexibility provision. Moreover, it gives all participants relevant information on the grid availability through a traffic light scheme.	No description on HRM.	Not presented in BRIDGE 2021 report	A market operator also usually is a platform. In this case, considering flexibilities, it is also the case to analyse if a Market Operator would be indeed best placed here.

Prosumer	A party that produces and consumes electricity.	No description on HRM.	Not presented in BRIDGE 2021 report	The OneNet project proposes the Prosumer as a party that can consume and produce electricity. But a role cannot have two different meanings with the same name. The absence of this role on both HRM and BRIDGE indicates that it is suggested to separate the Consumer and the Producer.
Resource Aggregator	A party that aggregates resources for usage by a service provider for energy market services.	A party that aggregates resources for usage by a service provider for energy market services.  Note: In the current version, the only service provider in HRM is the Balancing Service Provider.	A party that aggregates resources for usage by a service provider for energy market services.	The definitions of the role indicate that these are aligned.
Resource Provider	A party who owns the resource.	A role that manages a resource and provides production/consumption schedules for it, if required.	A role that manages a resource and provides production/consumption schedules for it, if required.	The Resource Provider according to the OneNet project owns the resource. The HRM and BRIDGE propose this role to also manage this resource and provide production and forecast. Thus OneNet is suggested to apply the HRM or BRIDGE proposition.

Scheduling Agent	A party that is responsible for the schedule information and its exchange on behalf of a Balance Responsible Party	<p>The entity or entities with the task of providing schedules.</p> <p>Source: System Operation Guideline, Commission Regulation (EU) 2017/1485.</p> <p>Additional information: A party that is responsible for the schedule information and its exchange on behalf of a Balance Responsible Party.</p>	The entity or entities with the task of providing schedules.	The proposition from the OneNet, BRIDGE and HRM are aligned.
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.	<p>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.</p> <p>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).</p>	<p>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.</p> <p>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).</p>	The description of the System Operator is aligned for this role.

<p>Transmission System Operator</p>	<p>This role received several descriptions from different Use Cases. Thus, it is not possible to take a final proposition from the OneNet project.</p>	<p>No description on HRM.</p>	<p>TSO is a System Operator.</p> <p>TSO is responsible for the security of supply and reliability of the transmission grid. For this reason, it monitors the grid to identify possible arising issues and, if there is a need, it makes use of resources to solve such problems, by network reconfiguration and/or by requests to market operators or directly to properly contracted customers.</p> <p>In addition to the above and more in detail:</p> <ul style="list-style-type: none"> <li>- is responsible for real time the physical generation-consumption balance on a geographical perimeter, including ensuring the frequency control service;</li> <li>- operates, maintains, develops and is fully responsible for the part of the electricity system, named "Transmission Network", typically starting from the producers connected to the HV grid and arriving at the DSOs' HV/MV transformers (or vHV/HV transformers depending upon the Member State Regulation);</li> <li>- acts on Markets requiring services to solve transmission grids issues;</li> <li>- ensures transparent and non-discriminatory access to the transmission network for each user;</li> <li>- assess network status of the transmission grid and broadcast selected information of the</li> </ul>	<p>The transmission system operator receives a specific description on both the OneNet project and also in the BRIDGE report. The descriptions from OneNet present so many different versions that it is not possible to present here a consolidated conclusion for the transmission system operator.</p> <p>In the HRM, the TSO is represented as an actor.</p>
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			<p>network status to eligible actors (e.g. aggregators, other system operators);</p> <ul style="list-style-type: none"> <li>- provides data to the interconnection capacity market operator for the management of cross border transactions;</li> <li>- in critical situations, implements dedicated actions and deliver alerts during stress events If necessary, implement emergency measures (e.g. system defence plan) including load shedding;</li> <li>- cooperates with the Distribution System Operators in carrying out their responsibilities (e.g. load shedding).</li> </ul> <p>ADDITIONAL INFORMATION</p> <p>Extract from the provisions of DIRECTIVE 2009/72/EC, Art.40: "...Transmission system operator shall be responsible for: ensuring the long-term ability of the system to meet reasonable demands for the transmission of electricity, operating, maintaining and developing under economic conditions secure, reliable and efficient transmission system with due regard to the environment, in close cooperation with neighbouring transmission system operators and distribution system operators..."</p>	
Unit/Flexibility Operator	Single units (part of the portfolio of the aggregator) provide flexibility to the distribution grid operator.	No description on HRM.	Not presented in BRIDGE 2021 report	This role proposed by the OneNet project is not included in HRM or the BRIDGE report.



Weather Forecast Provider	The unit inside the TSO/DSO, or contracted outsourced weather forecast provider company responsible for weather forecasts for selected weather parameters and selected locations in the grid.	No description on HRM.	Not presented in BRIDGE 2021 report	The weather forecast provider is a valuable proposition since we do not have so far a weather role for the current HRM.
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## 4. Conclusions

The evaluation of the roles and the harmonisation is an exercise that is starting to be explored in the H2020 projects. After doing this assessment in the OneNet project, it is highly recommended for future innovation projects to do this exercise during the use cases proposals, making sure there are definitions for all the roles necessary to implement their use cases. For the definition stage, it is recommended to use roles, domains and regions based on the European Commission mandated documents, such as CACM or SO GL, as currently done by HRM document, that will continuously be improved with the input of assessments like the BRIDGE analysis and the evaluation presented in this Deliverable.

After making sure all the roles have their corresponding definition, it is suggested to ensure that these roles are harmonised. This positions all demos at the same level in terms of understanding and will hopefully facilitate the exchange of data moving forward.

The Deliverable 2.5 of the OneNet project has presented an overview and analysis for all roles involved in all OneNet use cases, not only per country but also on the demo sites. It is important to notice that for some of the use cases presented in this analysis, a strong alignment with the definitions presented in the HRM was present, such as in the Polish Use Cases or the Northern cluster.

Also, the proposition of new roles was presented, such as TSOs and DSOs as roles. This goes in line with the BRIDGE HERMR, in which the proposition of new roles strives to include the exchange of data between more participants of the electricity market. This involvement is considered key to all the energy sector and group discussions like the Harmonisation Group, handled by ENTSO-E, eBIX and EFET. This group embraces the discussion of these new propositions, noting that the analysis of new roles must follow detailed analysis for reasons such as avoiding overlapping roles (roles that present the same objectives or definitions) or roles that do not follow the EU codes and guidelines for the market data exchange.

It is recommended, with the conclusion of this Deliverable 2.5, that new roles involved in research projects, which in most cases are brought for the BRIDGE for discussion, to analyse the proposition based on the current codes and guides mandated by the EU, to continuously make proposals for the improvement of the HRM but maintaining the traceability of its proposal. It must be considered that the market data exchange is based on these official propositions to help improve more and more the liability, efficiency and security of the electricity energy sector.

Nevertheless, the participation of more actors in the market such as TSOs, DSOs, aggregators, among others, demands the constant review of the HRM for including these gaps that may appear in use cases. As presented by this Deliverable 2.5, important new propositions like the Weather Forecast domain, which is not currently presented in the HRM, has shown to be key contributions that reflect that OneNet definitions, as well as BRIDGE



definitions, present a demand for inclusion of more roles at the distribution level not currently reflected in the HRM.

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