



Funded by
the European Union

Horizon Europe

EUROPEAN COMMISSION

European Climate, Infrastructure and Environment Executive Agency (CINEA)

Grant agreement no. 101160684



Use of open-source P2P energy sharing platforms for energy Democratization

Deliverable D 1.4 U2Demo Use Case Repository

Document Details

Due date	31-08-2025
Actual delivery date	29-08-2025
Lead Contractor	INESC ID
Version	1.0
Prepared by	Victoria Deichmann (INESC ID), Diogo Pinto Ferreira (INESC ID), Hugo Morais (INESC ID), Ricardo de Roos (Den Haag), Patrick Segeren (Den Haag), Humberto Queiroz (EDP NEW), Roberta Alonzo (EnGreen), Micaela D'Ambrosio (EnGreen), Thomas Heylen (Klimaan), Steven Laurijssen (Klimaan), Aliene van der Veen (TNO), Eva Winters (TNO)
Teams involved	Erik Delarue (KU Leuven), Yucun Lu (KU Leuven), Jelle Meus (KU Leuven), Glenn Reynders (KU Leuven)
Reviewed by	Glenn Reynders (KU Leuven) as scientific coordinator
Dissemination Level	Public

Project Contractual Details

Project Title	Use of open-source P2P energy sharing platforms for energy democratization
Project Acronym	U2Demo
Grant Agreement No.	101160684
Project Start Date	01-09-2024
Project End Date	29-02-2028

Duration	42 months
-----------------	-----------

Document History

Version	Date	Contributor(s)	Description
0.1	11.08.2025	Victoria Deichmann (INESC ID), Diogo Pinto Ferreira (INESC ID)	First draft
0.2	22.08.2025	Feedback on the BUCs by representatives of each pilot site	Review of the BUCs
0.3	26.08.2025	Glenn Reynders (KU Leuven)	Review by scientific coordinator
1.0	29.08.2025	Coordination team (INESC ID)	Final version, submitted to platform

Disclaimer

This document has been produced in the context of the U2Demo¹ project. Views and opinions expressed in this document are however those of the authors only and do not necessarily reflect those of the European Union or the European Climate, Infrastructure and Environment Executive Agency (CINEA). Neither the European Union nor the granting authority can be held responsible for them.

Acknowledgment

This document is a deliverable of U2Demo project. U2Demo has received funding from the European Union's Horizon Europe programme under grant agreement no. 101160684.



**Funded by
the European Union**

¹ <https://u2demo.eu/>

Executive Summary

This deliverable – and the Use Case (UC) repository it presents – is the output of the work conducted in Task 1.4: *Definition of Business and System Use Cases for U2Demo Pilots* of the U2Demo project. For the definition of UCs, the flexible assets of energy communities (ECs) of the four demo sites in the Netherlands, Belgium, Italy and Portugal were analysed, including the inventory of the present and future needs. This resulted in the identification of 10 Business Use Cases (BUCs). The BUCs were categorised into the three categories: (1) Current operation of the EC, (2) EC operation with internal market models and P2P models, (3) Operation of the EC with flexibility/ancillary services. These BUCs address the current operation of the ECs, as well as the future operation of the ECs including additional flexible assets, additional flexibility markets and different market model structures. As the infrastructure and the needs of the demo sites vary significantly, the BUCs are modelled pilot-specific, but can be easily applied to ECs with similar structures.

The BUCs are modelled in Sparx Enterprise Architect® software, version 16, with the open license Modсарus® plugin² [1]. The models show the objectives and preconditions of the BUCs, the roles participating and the information exchanged between the roles. The modelling was done according to the UC methodology proposed in IEC 62559-2:2015 [2]. The resulting UC repository is available on the U2Demo GitHub public community, the link is provided in this report. The UC repository and the identified data exchanges are key for development of the platform architecture in Work Package (WP) 3 and for the development and implementation of the algorithms in WP2 and WP4, respectively. Thus, this task provides the basis for a successful development and implementation of the tools developed in the U2Demo projects in the demo sites.

² <https://sparxsystems.com/products/3rdparty.html#modсарus>

Table of Contents

Executive Summary	2
Table of Contents	3
List of Figures.....	4
Acronyms	5
1 Introduction	6
1.1 Scope and Objectives	6
1.2 Structure	6
1.3 Relationship with other Work Packages	6
2 U2Demo Business Use Cases	7
3 Conclusion	8
4 References.....	9



List of Figures

Figure 1 - Overview of the BUCs of the U2Demo project 7



Acronyms

BUC	Business Use Case
D	Deliverable
EC	Energy Community
P2P	Peer-to-Peer
UC	Use Case
WP	Work Package

1 Introduction

1.1 Scope and Objectives

The deliverable D1.4 – *U2Demo Use Case Repository* presents the Use Case repository for the U2Demo project and gives the direct link to the public repository. The repository shows the Business Use Cases (BUCs) identified in the four demo sites of the U2Demo project in the Netherlands, Belgium, Italy and Portugal. The models of the BUCs aim at presenting the objectives and preconditions for the BUC, the roles of different participants and stakeholders and the information flow between the roles. The BUCs show both the current operation of the Energy Communities (ECs), as well as possible future operation scenarios including additional flexible assets and flexibility markets and different energy sharing models.

The BUCs were identified through meetings with the demo site leaders. These BUCs provide important input to the following work on the platform architecture and the algorithm implementation.

1.2 Structure

This deliverable is divided into three chapters. First, in Chapter 1, an overview of the aim of this deliverable and the relationship to other deliverables in the U2Demo project are presented. The BUCs identified for the U2Demo project following the IEC 62559-2:2015 [2] are shown in Chapter 2, along with a link to the Use Case repository on the U2Demo GitHub community³. Lastly, Chapter 3 summarizes the deliverable.

1.3 Relationship with other Work Packages

This deliverable and the UC repository are the output of Task 1.4 - *Definition of Business and System Use Cases for U2Demo Pilots*. The identification of the BUCs and subsequently the characterization of the information flows between the stakeholders in the UCs is an important basis for the platform architecture developed in Work Package (WP) 3 - *Open-Source Energy Sharing Communities Platform* and the implementation of the algorithms in WP4 - *P2P Trading and Energy Sharing Algorithms*. Additionally, the governance structures and the objectives of the different pilot sites described in the UCs are an input to WP2 - *P2P Energy Sharing Functional Architecture for Energy Trading and Flexibility Provision*.

With this contribution, the U2Demo UC repository is an important basis for the development and implementation of the energy sharing tools developed within the U2Demo project in WP5 - *P2P Energy Sharing tools demonstration*.

³ <https://github.com/U2DemoProject>

2 U2Demo Business Use Cases

For the U2Demo project, 10 BUCs were identified, which characterize the current operation, as well as possible operations of the ECs in the future, with additional flexible assets and flexibility markets and new market structures for the energy sharing. As the pilot sites of the U2Demo project have significant differences in the governance models and the energy sharing models, the BUCs in the repository are pilot-site specific. However, they can be easily applied to ECs with similar layouts. The BUCs are classified into the three categories:

- Current operation of the EC
- EC operation with internal market models and P2P models,
- Operation of the EC with flexibility/ancillary services

An overview of all BUCs is presented in Figure 1.

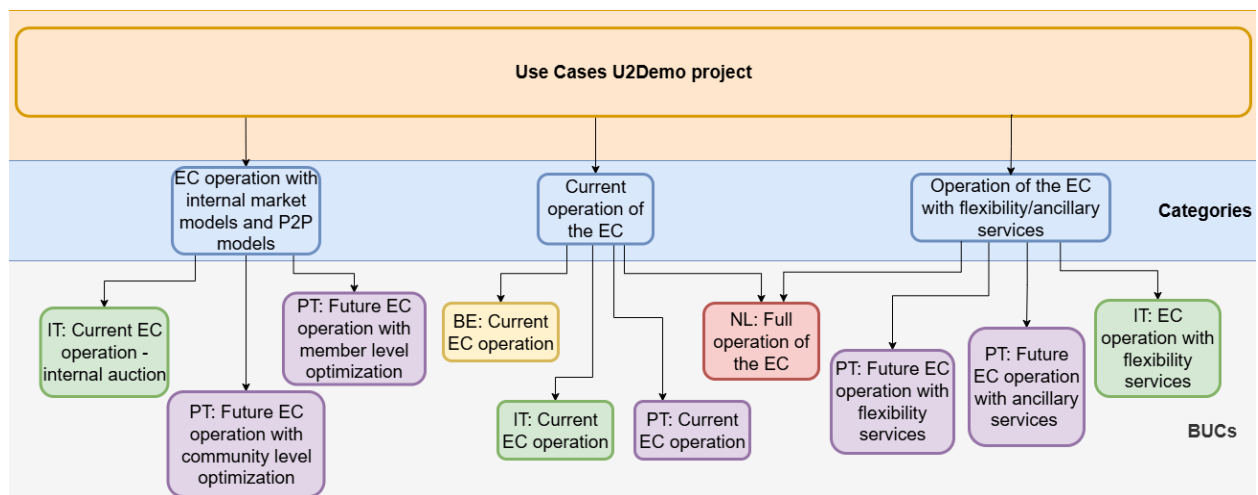


Figure 1 - Overview of the BUCs of the U2Demo project

The BUCs were modelled according to the Use Case methodology in IEC 62559-2:2015 [2] in the visual modelling and design tool Sparx Enterprise Architect®, version 16, with the Modсарus® plugin [1], an open license plugin for Enterprise Architect developed by EDF R&D. This plugin allows to generate and transform Use Cases into UML models.

The U2Demo Use Case can be accessed on the U2Demo GitHub public community through the link:

<https://github.com/U2DemoProject/BusinessUseCases>

3 Conclusion

This deliverable gives an overview of the BUCs identified for the U2Demo project and provides the link to the UC repository available on the U2Demo GitHub community. The BUCs were modelled in Sparx Enterprise Architect® software with Modsarus® plugin [1], according to the UC methodology in IEC 62559-2:2015 [2].

In total, 10 BUCs were identified, each one matching the governance model and energy sharing structure of one of the four demo sites located in the Netherlands, Belgium, Italy and Portugal.

4 References

- [1] EDF, “Modsarus® User Guide,” 2013.
- [2] IEC International Electrotechnical Commission Webstore, “IEC 62559-2:2015 Use case methodology – Part 2: Definition of the templates for use cases, actor list and requirements list,” International standard, [Online]. Available: <https://webstore.iec.ch/publication/22349>.