

Orchestrating an interoperable sovereign federated Multi-vector Energy data space built on open standards and ready for GAia-X

D3.5 KPIs applicable in OMEGA-X

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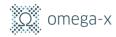


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List of Acronyms

Abbreviation / acronym	Description
BIPV	Building Integrated Photovoltaics
BOS	Balance of System
BUC	Business Use Case
CAPEX	Investment costs or Capital Expenditures
CDR	Charge Detail Record
СРО	Charging Points Operators
DER	Distributed Energy Resources
DoA	Description of Action
DSO	Distribution System Operator
DSSC	Data Space Support Centre
Dx.y	Deliverable number y belonging to WP x
DP	Data Provider
EA	Energy-based availability
EC	European Commission
EMSP (or eMSP)	E-Mobility Service Provider
EM UCF	Electromobility Use Case Family
EO	Expected Outcomes
ETL	Extract, Transform, Load
EU	European Union
EV	Electric Vehicle
FLEX UCF	Flexibility Use Case Family
FSP	Flexibility Service Provider
GCO	Granular Certificates
GDPR	General Data Protection Regulation
ICT	Information and Communication Technology
IDS	Industrial Data Space
IEC	International Electrotechnical Commission

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Abbreviation / acronym	Description
IEEE	Institute of Electrical and Electronics Engineers
ISO	International Organization for Standardization
KWh	Kilowatt-hour
KWp	Kilowatt peak
KPI	Key Performance Indicator
LEC UCF	Energy Communities Use Case Family
LCOE	Levelized Cost of Energy
MW	Megawatt
MWh	Megawatt-hour
N/A	Not Applicable
Nb	Number
O&M	Operations and Maintenance
OPEX	Reduction of operational expenditures
PV	Photovoltaic
R&D	Research and Development
REN	Renewable Energy Network
RES	Renewable Energy Sources
REN UCF	Renewables Use Case Family
ROI	Return on Investment
SD	Service Developer
SME	Electrical Mobility Company
SUC	System Use Case
TBD	To Be Decided
UC	Use Case
UCF	Use Case Family
WACC	Weighted Average Cost of Capital
WP	Work Package

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Executive Summary

The present deliverable lies under the scope of OMEGA-X design activities, as a direct result of those related to KPI elicitation for use case validation.

The main objective of this deliverable is to identify and define the OMEGA-X Use Case and Reference Architecture Key Performance Indicators (KPIs) which will support the monitoring and assessment procedure of the demonstrators and project activities. This document describes the metrics (technical, functional, impact-oriented) against which the realization of the use cases identified in OMEGA-X in the various pilot sites will be validated.

Therefore, this work on KPI elicitation, as presented in this deliverable, is closely linked to OMEGA-X activities for Use case (UC) identification and Full system architecture and building blocks design. Furthermore, the work conducted regarding the implementation of OMEGA-X demonstrators, related to the 4 Use Case Families (UCF) Renewables (REN), Local Energy Communities (LEC), Electromobility (EM) and Flexibility (FLEX), are also key for the development and understanding of this deliverable, as the pilots serve to demonstrate and validate the services and architecture defined in the project.

The methodology followed to achieve the objective above is detailed in the next figure and at Section 2.

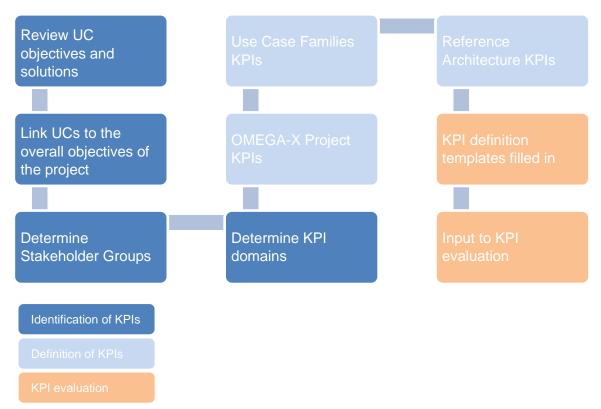


Figure 1 Methodology followed to achieve T3.5 objective.

The KPI domain mapping of the Reference Architecture KPIs, common KPIs (more than 1 UCF), and the specific KPIs for each UCF is shown in next table.

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Table 1 KPIs mapping.

KPI	Reference	Common	UC specific KPIs						
Domain	Architecture KPIs	KPIs			EM UCF	FLEX UCF			
Scientific	7	2							
Economic		4	5	9		1			
Societal		5		2		1			
Economic/ Societal	2	1	9	11	1	6			
Economic/ Scientific			1		3				
Scientific/ Societal		3				1			
Total	9		65						

74 KPIs total, 65 Use Case Family KPIs and 9 OMEGA-X data space/Architecture KPIs.

To calculate these KPIs, the data included in the KPI definition templates, detailed in Annexes 1 and 2 must be collected and used following the calculation methodologies described in such templates. The results and evaluation obtained through the monitoring of the KPIs, UCFs and project activities will be subject of future work under KPI evaluation activities.

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1 Introduction

1.1 Purpose of the document and relation to another project work

In this task, the project will define a series of metrics (technical, functional, impact-oriented) against which the realization of the use cases and the implementation of the reference architecture in the various pilot sites will be validated. The assessment of these metrics, to be done in the validation phase of the project, will provide interesting insights for a diverse set of stakeholders.

The outcome of this task is documented in this D3.5 "KPIs applicable in OMEGA-X", which main objective is to identify and define the OMEGA-X Use Case Key Performance Indicators (KPIs) which will support the monitoring and assessment procedure of the demonstrators and project activities.

1.2 Structure of the document

This document is structured in 6 major sections:

Section 1 presents the introduction to D3.5 document, purpose of the document, relation to another project work and structure of the document.

Section 2 describes the methodology followed to fulfil OMEGA-X project objectives and details the template adopted to define each KPI.

Section 3 objective is to identify the KPIs. It covers the description of OMEGA-X Use Cases, considering a brief general introduction addressing its scope, objectives, BUCs, SUCs and Services. Then, it establishes the link between UCs and Expected Outcomes (EO) of the project, defines the Stakeholders groups and KPIs domains

Section 4 objective is to define the KPIs. It describes the Use Case Families KPIs and the Reference Architecture KPIs, following the identification already performed at Section 3 and ending in the detail and specification of all the KPIs, that can be consulted at Annex 2.

Section 5 presents the expected link of the work performed in this task to the evaluation of project KPIs.

Section 6 presents the conclusions of this document D3.5 "KPIs applicable in OMEGA-X".

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2 Methodology

This section describes the methodology followed to fulfil the OMEGA-X project objectives [1] and Expected Outcomes (EO) as well as the methodology followed to identify and define the OMEGA-X KPIs which will support the monitoring and assessment procedure of the demonstrators and project activities.

- EO1 Higher degree of interoperability between data platforms
- EO2 Energy data made available and re-usable
- EO3 Enable new market roles, market participants and energy communities
- EO4 Demonstrated implementations of Energy Data Spaces, exploiting open standards related to data packages, interfaces, protocols, platforms, and procedures
- EO5 Enabling new digital solutions and services supporting the energy transition
- EO6 Increased acceptance of and participation of consumers in data sharing for energy services

The KPIs have been selected as the means to validate and evaluate the effectiveness of the solutions proposed to achieve OMEGA-X project objectives. To promote the development and evaluation of the project, the UCs and project solutions should be analysed in a structured and reproducible manner. This way, a systematic approach, described next, was followed to suit the needs of the OMEGA-X project.

The following steps, already presented at

Figure 1, show the methodological framework followed for the identification and definition of the Key Performance Indicator, Use Case Families and OMEGA-X objectives:

- Identification of KPIs (Section 3)
 - UCs, BUCs, objectives and solutions
 - Link UCs to the overall objectives of the project
 - Stakeholder Groups
 - KPI Domains
- Definition of KPIs (Section 4)
 - OMEGA-X Project KPIs
 - Use Case Families KPIs
 - Reference Architecture KPIs
- KPI evaluation, to be carried out in future evaluation activities in OMEGA-X (Section 5)

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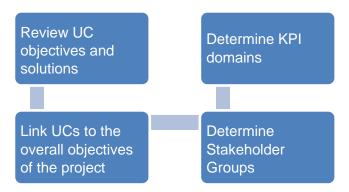


Figure 2 Methodology followed to achieve the KPI elicitation objective - Identification of KPIs part.

The steps established to systematically analyse the Use Cases (UCs) and OMEGA-X objectives for the identification of KPIs, as illustrated in Figure 2, will be described in detail in Section 3. This section will not only explain how these steps are interconnected but also explore the relationships between stakeholder groups and KPI domains, laying the groundwork for the subsequent definition of KPIs.

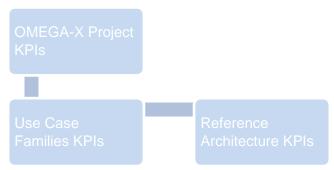


Figure 3 Methodology followed to achieve the KPI elicitation objective – Definition of KPIs part.

To achieve the KPI elicitation objective, a structured and replicable methodology for defining and calculating Key Performance Indicators (KPIs) is described in Section 4, as illustrated in Figure 3.

About ICT standards being followed, this is a dependent task from the previous OMEGA-X activities in architecture [2] and requirements for interoperability, security and privacy [3], so it will therefore follow the same methodologies, even though indirectly:

- From Use cases [2]:
 - IEC 62559-2 [4] (Use case methodology Part 2: Definition of the templates for use cases, actor list and requirements list).
 - IEC 62913-1 [4] (Specific application of the Use Case methodology for defining generic smart grid requirements according to the IEC systems approach).
 - This approach allows the production of consensual descriptions of what is expected in each service carried by the OMEGA-X project. It is used by many actors in the energy world.
- From Architecture [3]:
 - ISO/IEC/IEEE 42010:2011 [6] "Systems and software engineering Architecture description".

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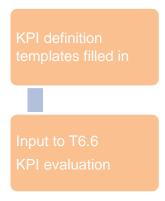


Figure 4 Methodology followed to achieve KPI elicitation objective - KPI evaluation part.

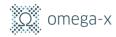
Finally, the results obtained by conducting these steps (Figure 4) can be found in Section 5 and Annex 2.

For the detailed definition of each KPI, presented at Annex 2, a previously designed template was used from Integrid EU project [7], at Annex 1, that was adjusted to the needs of OMEGA-X.

The information contained in this KPI template is the following:

- GENERAL INFORMATION:
 - KPI ID and Name
 - Business Use Case (BUC) and its corresponding System Use Case (SUC) to which it is linked
 - Use Case where KPI applies, if any: If it is related to a specific UC or if it is a KPI identified outside the UCs
 - KPI description: Description of KPI and rationale for including in project
 - KPI formula: Precise mathematical formula for calculating KPI, and explanation of the defined formula
 - Monitoring, the rules to apply the previous formula
 - Units of measurements: (i.e., % percentage basis, MW, MWh, etc.)
 - Parent KPI, if another KPI is necessary to support this KPI, its Name and ID should be indicated
 - o Reporting:
 - Data upload rate indicates how often this indicator must be reported (weekly, monthly, yearly) or "Other" upload rate
 - Information to be displayed, if it is a cumulated value, a trend or n/a
 - KPI calculation trigger (target value): When should the calculation be triggered, periodically and the KPI final target value
- Calculation/Extraction Methodology:
 - KPI Methodology Step ID,
 - Step by step methodology description on how to calculate the defined KPI
 - Responsible Partner for a specific step in KPI calculation methodology
 - Data ID, for all data needed to calculate/perform each step

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Data Collection

- Data ID: Identification of data requiring collection, it is used as well in formulas for calculating KPI
- o Data description: Description of the data to collect
- Data source responsible: Partner(s) responsible for the databases/sources where the data to be collected comes from
- o Data sink responsible: Partner(s) responsible for collecting/aquiring data
- o Data collection method: Describes the method how data is collected
- o Data collection update rate: Indicates how often and when data is collected
- o Data collection time range: Indicates for how long data is collected

Baseline

- Baseline Source: Literature values / Partner historical values / Values measured during the project / Values collected from simulations / Other
- o Partner(s) responsible for Baseline
- Description of the Baseline

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3 Identification of KPIs

3.1 UCs, BUCs, objectives and solutions

This section covers the description of OMEGA-X Use Cases, considering a brief general introduction addressing its scope, objectives, BUCs, SUCs and Services.

The OMEGA-X project has organized its energy-related business offerings into four distinct use case families, each highlighting the benefits of a shared Data Space in addressing specific issues identified by energy stakeholders. These use case families are Renewables, Local Energy Communities, Electro-Mobility and Flexibility. The services that will be created and showcased through various pilot projects within each use case family have been thoroughly examined and documented in D3.4 [3].

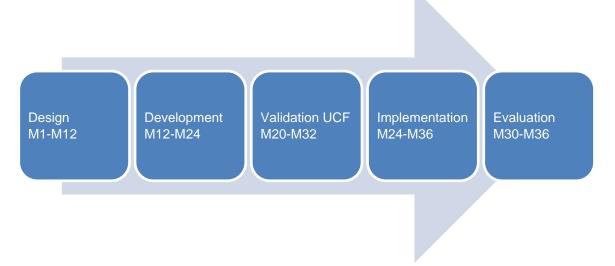


Figure 5 Plan for the implementation of services.

The figure shows the plan for the implementation of the services. Here, the validation and evaluation phases are connected to the KPIs, further described at Section 5.

3.1.1 Renewables Use case family

The main challenges of renewable energies in general, and Photovoltaics (PV) in particular, for getting larger deployment are cost competitiveness and smart grid integration.

On the one hand, regarding cost competitiveness, an optimized Operation and Maintenance (O&M) of large PV plants along their own lifetime is key to reducing Levelized Cost of Energy (LCOE) by increasing Performance Ratio (PR) and reducing O&M costs and Weighted Average Cost of Capital (WACC). Thus, the aim is to provide PV Asset Managers with services helping them to optimize O&M activity.

On the other hand, in relation to smart grid integration, high penetration rates of distributed PV systems in distribution grids requires special measures by the Distribution System Operator (DSO) to ensure the Quality and Security of Service. Consequently, the goal is to provide DSOs with services helping them to plan grid reinforcement when needed and anticipate potential issues during operation to implement the required corrective measurements.

By using data spaces for O&M BUC, this UC family gains access to a wider range of information than the one related to one single portfolio, enhances the learning of real

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performance of new PV technologies under different operating conditions and progressively improves data analytic services. In the business cases of planning and operating PV smart grid integration, the main advantage of using data spaces is the integration of all the required data sources to get the whole picture and make the right decision.

In this use case family, the following partners will participate:

- EDF will be the PV Asset Manager
- EyPESA will be the DSO and the PV Asset Manager
- SENER ING, UPC, METEO and TECNALIA will be service providers.

Additional actors outside of the project consortium are the following:

- PV Asset Owner from EDF portfolio
- Prosumers from EyPESA distribution grid

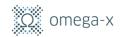
Thanks to the Data Space in OMEGA-X, it will be possible to develop the services described at Table 2.

The use cases (BUCs and SUCs) that will support the services are the following, including how each is connected to the services:

- BUC Ren 1.0 PV O&M Optimization
- BUC Ren 2.0 Operating PV Smart Grid Integration
- BUC Ren 3.0 Planning PV Smart Grid Integration
- SUC Ren 1.0 Actual versus expected production comparison (BUC Ren 1.0)
- SUC Ren 2.0 PV module degradation monitoring (BUC Ren 1.0)
- SUC Ren 3.0 Tracking system monitoring (BUC Ren 1.0)
- SUC Ren 4.0 Recurrent shading problem detection (BUC Ren 1.0)
- SUC Ren 5.0 Cleaning recommendations (BUC Ren 1.0)
- SUC Ren 6.0 Predictive Maintenance of PV generator (BUC Ren 1.0)
- SUC Ren 7.0 Predictive Maintenance of BOS (BUC Ren 1.0)
- SUC Ren 8.0 Benchmarking analysis (BUC Ren 1.0)
- SUC Ren 9.0 PV Generation Forecasting (BUC Ren 2.0)
- SUC Ren 10.0 BIPV Generation Forecasting (BUC Ren 2.0)
- SUC Ren 11.0 Detect and correct measurement errors (BUC Ren 2.0)
- SUC Ren 12.0 Detect non-technical losses (BUC Ren 2.0)
- SUC Ren 13.0 Congestion detection (BUC Ren 2.0)
- SUC Ren 14.0 Voltage volatility detection (BUC Ren 2.0)
- SUC Ren 15.0 Planning grid reinforcement (BUC Ren 3.0)

The Renewable Family is split into three business cases: PV O&M Optimization (BUC Ren 1.0), Operating PV Smart Grid Integration (BUC Ren 2.0), and Planning PV Smart Grid Integration (BUC Ren 3.0). The BUCs planned for the Renewable Use Case Family, describes new potential businesses, with the objectives, sequence of actions, and all the actors involved, further described next at the following sub-sections. A set of advanced data analytics services

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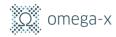


will be developed by SENER ING, METEO, UPC and Tecnalia, on top of the data gathered, and linked with the use cases (BUCs and SUCs) according to the following table.

Table 2 Services connection to service developers and use cases – REN Family.

Service	Category	Service Developers (SDs)	Data Providers (DPs)	BUC	SUC
Actual versus expected production comparison	Descriptive services	SENER ING	EDF, EyPESA	BUC Ren 1.0	SUC Ren 1.0
PV module degradation monitoring	Descriptive services	SENER ING	EDF, EyPESA	BUC Ren 1.0	SUC Ren 2.0
Tracking system monitoring	Descriptive services	SENER ING	EDF, EyPESA	BUC Ren 1.0	SUC Ren 3.0
Recurrent shading problem detection	Descriptive services	SENER ING	EDF, EyPESA	BUC Ren 1.0	SUC Ren 4.0
Cleaning recommendations	Prescriptive services	SENER ING	EDF, EyPESA	BUC Ren 1.0	SUC Ren 5.0
Predictive Maintenance of PV generator	Prescriptive services	SENER ING	EDF, EyPESA	BUC Ren 1.0	SUC Ren 6.0
Predictive Maintenance of BOS	Prescriptive services	SENER ING	EDF, EyPESA	BUC Ren 1.0	SUC Ren 7.0
Benchmarking analysis	Descriptive services	Tecnalia	EDF, EyPESA	BUC Ren 1.0	SUC Ren 8.0
PV Generation Forecasting	Predictive services	METEO	EyPESA	BUC Ren 2.0	SUC Ren 9.0
BIPV Generation Forecasting	Predictive services	Tecnalia	EyPESA	BUC Ren 2.0	SUC Ren 10.0
Detect and correct measurement errors	Data quality assessment services	UPC	EyPESA	BUC Ren 2.0	SUC Ren 11.0
Detect non-technical losses	Descriptive services	UPC	EyPESA	BUC Ren 2.0	SUC Ren 12.0
Congestion detection	Predictive Services	UPC	EyPESA	BUC Ren 2.0	SUC Ren 13.0
Voltage volatility detection	Predictive Services	UPC	EyPESA	BUC Ren 2.0	SUC Ren 14.0
Planning grid reinforcement	Prescriptive services	UPC	EyPESA	BUC Ren 3.0	SUC Ren 15.0

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3.1.2 Energy communities and sector integration Use case family

Local energy communities (LECs) can have a significant impact on multi-vector energy markets by introducing different players in the market: prosumers, associations and cooperatives. The increase in distributed generation, through the higher use of renewable energies, has led to the decentralization of the value chain. Therefore, LECs, with their novel business model, represent nowadays an excellent tool to involve citizens and local economic actors. The main challenges that LECs must face include the lack of coordination between different actors and prosumer involvement. Services are needed that allow to exploit the potential of LECs for the benefit of the community, covering the full value chain, reducing costs and optimizing the LEC's operation.

The advantages which can be derived from the use of a data space concern the possibility of bringing together information from different actors in the community and exploiting data coming from external sources. This information would allow to have a better understanding of the current state of the LEC asset, to make more accurate forecasts and on top of that take proper decisions and, finally, develop services to inform and involve prosumers at different stages from formation to management of LECs.

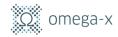
This use case family will be led by RINA-C and will have four pilot sites located in different parts of Europe: Two in Spain, one in Italy and one in Serbia.

- EDP as LEC operator will act as data provider and data user, providing data from the two solar neighbourhoods located in Zaragoza, Spain
- ASTEA as LEC operator will act as data provider and data user, providing data from multi vector municipal LEC in Osimo in Italy
- PUPIN as LEC operator will be a data provider and data user and data user, providing data from their R&D campus in Belgrade, Serbia
- IMPULSA as LEC operator will be a data provider and data user providing data from its headquarters located in Granollers, Spain

Additionally, there will be these other partners that will participate:

- REVOLT, Tecnalia and UPC will be service providers and data users
- EDF will be in charge of supervising the compliance of proposed services with existing regulatory framework in Europe.
- Thanks to the Data Space in OMEGA-X, it will be possible to develop the services described at Table 3.
- The use cases (BUCs and SUCs) that will support the services are the following, including how each is connected to the services:
- BUC LEC 1.0 O&M Optimisation
- BUC LEC 2.0 Energy Consumption Optimisation Through Prosumer Engagement
- BUC LEC 3.0 LEC Planning Services
- SUC LEC 1.0 Smart meter data ingestion and management (BUC LEC 1.0)
- SUC LEC 2.0 Manage authentication (BUC LEC 1.0, BUC LEC 2.0)
- SUC LEC 3.0 Al algorithm training (BUC LEC 1.0, BUC LEC 2.0)
- SUC LEC 4.0 Benchmarking (BUC LEC 1.0, BUC LEC 2.0)
- SUC LEC 5.0 Losses detection (BUC LEC 1.0)

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- SUC LEC 6.0 Provide data analytics and KPI (BUC LEC 1.0, BUC LEC 2.0)
- SUC LEC 7.0 Manage PV & Electric Storage (BUC LEC 1.0)
- SUC LEC 8.0 ETL of smart meter data (BUC LEC 2.0)
- SUC LEC 9.0 Consumer suggestion (BUC LEC 2.0)
- SUC LEC 10.0 Promote notification (BUC LEC 3.0)
- SUC LEC 11.0 Establishing energy demand profiles (BUC LEC 3.0)
- SUC LEC 12.0 Calculating energy baseline (BUC LEC 3.0)
- SUC LEC 13.0 Holistic energy dispatch optimization (BUC LEC 3.0)
- SUC LEC 14.0 Self-consumption digital control (BUC LEC 3.0)
- SUC LEC 15.0 Forecasting services (BUC LEC 3.0)
- SUC LEC 16.0 Implementation of integration solutions (BUC LEC 3.0)

The BUCs identified for this family focus on Local Energy Communities (LEC) from three different aspects: LEC O&M Optimization, LEC Energy Consumption Optimisation through Prosumer Engagement, and LEC Planning Services.

Table 3 Services connection to service developers and use cases – LEC Family.

Service	Category	Service Developers (SDs)	Data Providers (DPs)	BUC	SUC
Gamification for electrical energy savings	LEC Energy consumption optimization services	REVOLT	EDP/ ASTEA	BUC LEC 2.0	SUC 8.0, SUC 2.0, SUC 3.0, SUC 4.0, SUC 9.0, SUC 6.0, SUC 10.0
Local Energy Communities Designer	LEC Energy consumption optimization services	REVOLT	EDP/ IMPULSA/ ASTEA	BUC LEC 2.0	SUC 8.0, SUC 2.0, SUC 3.0, SUC 4.0, SUC 9.0, SUC 6.0, SUC 10.0
Thermal Losses Detection and Benchmarking at LEC level	O&M services	REVOLT	ASTEA	BUC LEC 1.0	SUC 1.0, SUC 2.0, SUC 3.0, SUC 4.0, SUC 5.0, SUC 6.0, SUC 7.0
Water Losses Detection and Benchmarking at LEC level	O&M services	REVOLT	ASTEA	BUC LEC 1.0	SUC 1.0, SUC 2.0, SUC 3.0, SUC 4.0, SUC 5.0, SUC 6.0, SUC 7.0

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Service	Category	Service Developers (SDs)	Data Providers (DPs)	BUC	SUC
Optimizing sharing coefficients in collective self-consumption	LEC Energy consumption optimization services	Tecnalia	EDP	BUC LEC 2.0	SUC 8.0, SUC 2.0, SUC 3.0, SUC 4.0, SUC 9.0, SUC 6.0, SUC 10.0
Optimizing self- consumption of renewable energy at LEC level	LEC Energy consumption optimization services	Tecnalia	IMPULSA	BUC LEC 2.0	SUC 8.0, SUC 2.0, SUC 3.0, SUC 4.0, SUC 9.0, SUC 6.0, SUC 10.0
Planning Services	LEC Planning services	Tecnalia	PUPIN	BUC LEC 3.0	SUC 11.0, SUC 12.0, SUC 13.0, SUC 14.0, SUC 15.0, SUC 16.0
Electrical Losses Detection and Benchmarking at LEC level	O&M services	UPC	EDP/ IMPULSA/ ASTEA	BUC LEC 1.0	SUC 1.0, SUC 2.0, SUC 3.0, SUC 4.0, SUC 5.0, SUC 6.0, SUC 7.0
Reinforcement Plan of Local Energy Communities for Future Renewable Integration	LEC Planning services	UPC	IMPULSA/ ASTEA/ PUPIN*	BUC LEC 3.0	SUC 11.0, SUC 12.0, SUC 13.0, SUC 14.0, SUC 15.0, SUC 16.0
Estimate the probability of congestions	O&M services	UPC	IMPULSA	BUC LEC 1.0	SUC 1.0, SUC 2.0, SUC 3.0, SUC 4.0, SUC 5.0, SUC 6.0, SUC 7.0

^{*} PUPIN to use synthetic data since real data will not be available to test this service.

3.1.3 Collaboration among Electromobility actors Use Case Family

Electric Vehicles are a main component of the European strategy to decarbonize the economy and tackle climate change. Anything that can make life easier for vehicle users (economically or from a practical point of view) is worth developing.

Reservation of charging points and availability of information about their availability and tariffs is critical for EV users as it helps them to plan their journeys confidently without the fear of running out of battery charge. With the increasing adoption of electric vehicles, charging points could become more crowded and EV users would want to avoid the inconvenience, stress, or

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frustration to look for a charging point at destination or on their itinerary. Additionally, information in advance about the tariffs can help them to better plan the journey and its cost.

One of the use cases of this family is thus centred on the data exchanges to be implemented to offer this service to electric vehicle users and concerns the Roaming of booking services (developed by GIREVE, ATOS and EDF). The main challenge in this use case lies in the ability to homogenize exchanges between various e-Mobility Service Providers (EMSP) and charging points operators (CPOs). Although booking for all time horizons is the target, the use case will first focus on booking for near-term use. The user is then the next to be able to use the charge point. OMEGA-X will extend the use case to more distant reservations if there is sufficient time and resources.

Another aspect studied in this family is the possibility of using, virtually, the energy locally produced by EV users at home to recharge their battery while they and their vehicle are in another location; with a certification mechanism that ensures that this production exists when needed.

This mechanism would have the double virtue of encouraging recharging in synchronization with renewable energy production and would open the possibility of offering services to network operators. The second use case of the electro-mobility family is focused on Roaming of self-consumption. The challenges of this use case are related to the ability to certify the different energy flows, and to the coordination of the multiple actors involved in the exchanges (network operators, energy suppliers, charging infrastructure operators, etc.).

In this use case family, the following partners will participate:

- EDF will be a data provider and data user
- GIREVE will be a data provider
- ELIA will be a data provider, data user and service provider
- EW and ATOS will act as service providers

Thanks to the Data Space in OMEGA-X, it will be possible to develop the services described at Table 4.

The use cases (BUCs and SUCs) that will support the services are the following, including how each is connected to the services:

- BUC EM 1.0 Roaming of booking services
- BUC EM 2.0 Roaming of self-consumption
- SUC EM 1.0 Authenticate to EMSP Application
- SUC EM 2.0 Manage Authorizations
- SUC EM 3.0 Manage consumer Meter Data
- SUC EM 4.0 Manage Reservation Ask
- SUC EM 5.0 Manage Reservation Bid
- SUC EM 6.0 Provide a list of Available Charging Stations
- SUC EM 7.0 Transfer consumption Energy Data
- SUC EM 8.0 Verify and Settle Activated Reservations
- SUC EM 9.0 Erase and Rectify Data
- SUC EM 10.0 Manage producer metering data

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- SUC EM 11.0 Authentication of asset
- SUC EM 12.0 Generation of certificates
- SUC EM 13.0 Match certificates

The use case family contains two BUCs: Roaming of booking services and roaming of self-consumption. In both cases, the aim is to simplify the life of the EV user by facilitating charging services anywhere in Europe, enabling in a simple and fair manner to select the source of electricity (in particular, its own production). The Electro-mobility family has identified a set of 13 System Use Cases on which the Business Use Case Roaming of reservation relies.

The use cases (BUCs and SUCs) that will support the services are the following, including how each is connected to the services:

Table 4 Services connection to service developers and use cases – EM Family.

Service	Category	Service Developers (SDs)	Data Providers (DPs)	BUC	SUC
Mobility services with regards to the selection of charging offers meeting specific user criteria (static & dynamic information exchange about charging points and offers)	E-mobility services	(TBD)	GIREVE	BUC 1.0 - 2.0	SUC EM 4.0, 5.0, 6.0
Mobility services with regards to charging services price information (price calculation, price comparison)	E-mobility services	(TBD)	GIREVE	BUC 1.0 - 2.0	SUC EM 4.0, 5.0, 6.0
Mobility services with regards to the booking of a charging service	E-mobility services	(TBD)	GIREVE	BUC 1.0 - 2.0	SUC EM 4.0, 5.0, 6.0
EMSP Referral/reselling to a CPO allowing to purchase a charging service at CP	Referral/reselling services	(TBD)	GIREVE	BUC 2.0	SUC EM 7.0
API development and data exchanges	Technical intermediation services	ISP		BUC 1.0-2.0	SUC EM 2.0, 3.0

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Service	Category	Service Developers (SDs)	Data Providers (DPs)	BUC	SUC
Authentication of behind the meter assets (PV, Charging point, EV,)	Authentication services	EW	ELIA, OEM	BUC 2.0	SUC EM 11.0
Marketplace for GCO certificate exchange	Marketplace services	ELIA	GIREVE, Data Access providers	BUC 2.0	SUC 12.0, 13.0

3.1.4 Flexibility Use Case Family

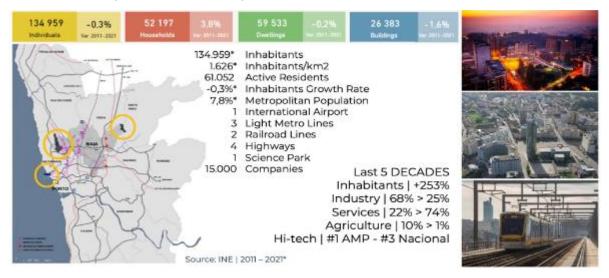


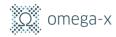
Figure 6 Flexibility pilot site. Maia Municipality.

In energy systems, flexibility is linked to the ability a power system has in adjusting its consumption and production to a varying electricity demand both anticipated and unanticipated. Currently electricity produced from renewables cannot be stored efficiently, therefore it is impossible, for instance, to shave peak hours and smoothen the energy demand by moving some of the consumption to off-peak hours. The end goal is therefore to provide flexibility while optimizing some cost function, such as by minimizing the cost of production through renewable usage.

Flexibility benefits requires a high-level of information integration between different partners, which will be highly accelerated through a common data space simplifying and reducing the burden of many managerial, bureaucratic, and technological aspects of the data exchange. Examples of information exchanged include consumption and production of all network nodes periodically, information from weather stations, information from advanced analytics and predictive services, models already trained, energy consumption/production profiles, information on how to activate and deactivate consumption and production remotely of specific resources, among others.

This Use Case Family will be led by EDP and will have one pilot site located in Portugal, in the municipality of Maia, in Porto region. The University of Maia, ISMAI, will be helping Maia

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throughout the project. Tecnalia and Odit-e will be the service developers and most of the data with be provided either by the municipality of Maia or E-Redes (EDP).

Maia municipality is within the metropolitan area of Porto and has 135.000 inhabitants. Maia is one of the most industrialized municipalities of Portugal and an important transportation hub. Maia began seriously paving the way to be a sustainable city in 2012, first by tackling energy issues and in 2014 by creating the Sustainable Energy Action Plan addressing the RES penetration, energy efficiency, CO2 emissions, mobility, citizen's engagement, among others. In Maia municipality there are a few production and consumption endpoints that can be used as a source of flexibility that will be the basis for our pilot. These are briefly listed next:

Production sources:

PV generator of municipal pool

Consumption sources:

- Maia Forum (public building): HVAC, pumps, and rest of consumption appliances
- Municipality EVs (Electric Vehicles) car fleet
- Other public buildings

In terms of partners and their interactions, the roles will be:

- Maia will be the prosumer, providing and using data
- ISMAI (University/RTO) will be a facilitator and a data provider
- EDP will be the energy supplier, a facilitator, and is also the owner of E-REDES
- E-REDES is the DSO and the flexibility market operator, providing and using data
- Tecnalia will be the flexibility service provider
- Odit-e will be the analytic service provider

Thanks to the Data Space in OMEGA-X, it will be possible to develop the services described at Table 5.

The use cases (BUCs and SUCs) that will support the services are the following, including how each is connected to the services:

- BUC Flex 1.0 Flexibility for internal optimization
- BUC Flex 2.0 Flexibility for congestion management with bilateral contracts
- BUC Flex 3.0 Flexibility for capacity management with market structures
- SUC Flex 1.0 Define the context of flexibility management (all BUCs)
- SUC Flex 2.0 Optimize the baseline of resources (all BUCs)
- SUC Flex 3.0 Manage flexibility needs (BUC Flex 2.0 and 3.0)
- SUC Flex 4.0 Optimize flexibility offers (BUC Flex 3.0)
- SUC Flex 5.0 Manage flexibility offers (BUC Flex 3.0)
- SUC Flex 6.0 Activate flexibility orders (BUC Flex 2.0 and 3.0)

The services to be developed are identified in the following Table, including how the use cases (BUCs and SUCs) are connected to the services:

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Table 5 Services connection to service developers and use cases – FLEX Family.

Service	Category	Service Developers (SDs)	Data Providers (DPs)	BUC	SUC
Grid observability and network analysis	Predictive services	Odit-e	MAIA / DSO	BUC Flex 1.0 BUC Flex 2.0 BUC Flex 3.0	SUC Flex 1.0 SUC Flex 3.0
Grid validation platform, real-time	Flexibility management services	Odit-e	MAIA / DSO	BUC Flex 2.0 BUC Flex 3.0	SUC Flex 3.0 SUC Flex 5.0
Flexibility platform for DER connection, planning	Flexibility management services	Odit-e	MAIA / DSO	BUC Flex 1.0 BUC Flex 2.0 BUC Flex 3.0	SUC Flex 1.0 SUC Flex 3.0
Passive consumption baseline prediction service	Predictive services	Tecnalia	MAIA / DSO	BUC Flex 1.0 BUC Flex 2.0 BUC Flex 3.0	SUC Flex 1.0 SUC Flex 2.0
Active consumption resource prediction service	Predictive services	Tecnalia	MAIA	BUC Flex 1.0 BUC Flex 2.0 BUC Flex 3.0	SUC Flex 2.0
Intermittent DER generation resource baseline prediction service	Predictive services	Tecnalia	MAIA / DSO	BUC Flex 1.0 BUC Flex 2.0 BUC Flex 3.0	SUC Flex 1.0 SUC Flex 2.0
Prosumer EMS internal optimization service	Flexibility management services	Tecnalia	MAIA	BUC Flex 1.0 BUC Flex 2.0 BUC Flex 3.0	SUC Flex 2.0
Flexibility order disaggregation service	Flexibility management services	Tecnalia	MAIA	BUC Flex 2.0 BUC Flex 3.0	SUC Flex 6.0
Aggregated flexibility offers optimization service	Flexibility management services	Tecnalia	MAIA	BUC Flex 3.0	SUC Flex 4.0

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3.2 Link UCs to the expected outcomes of the project

The next step in the methodology involves indicating which specific UCs will contribute to accomplish each OMEGA-X Expected Outcomes (EOs). This will allow to assess at a later stage in the project if, and to what extent, the OMEGA-X project objectives have been fulfilled.

Next table shows the list of the OMEGA-X project EOs, which combined, tackle the main goal of the project: to implement a data space (based on European common standards), including federated infrastructure, data marketplace and service marketplace, involving data sharing between different stakeholders and demonstrating its value for real and concrete Energy use cases and needs, while guaranteeing scalability and interoperability with other data space initiatives, not just for energy but also cross-sector.

In addition, the table indicates the UCs that will allow to achieve each of these EOs.

Table 6 OMEGA-X project EOs and the corresponding UCs.

EO number	EO description	UC
EO1	Higher degree of interoperability between data platforms	LEC UCF FLEX UCF EM UCF REN UCF OMEGA-X data space/Architecture
EO2	Energy data made available and re-usable	REN UCF FLEX UCF EM UCF OMEGA-X data space/Architecture
EO3	Enable new market roles, market participants and energy communities	LEC UCF FLEX UCF REN UCF EM UCF
EO4	Demonstrated implementations of Energy Data Spaces, exploiting open standards related to data packages, interfaces, protocols, platforms, and procedures	LEC UCF REN UCF FLEX UCF EM UCF OMEGA-X data space/Architecture
EO5	Enabling new digital solutions and services supporting the energy transition	LEC UCF FLEX UCF REN UCF EM UCF

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EO number	EO description	UC
EO6	Increased acceptance of and participation of consumers in data sharing for energy services	LEC UCF FLEX UCF EM UCF

The Domains proposed for OMEGA-X project have been selected to cover the Expected Outcomes, without limiting the scope to technical solutions. Then, the domain's relation to the Use Cases is shown in next table.

Table 7 Domain's relation to UC.

	Domain	UC
1	Scientific: innovation, data and research outputs measurements	All UCF
2	Economic: analysis of consumer needs, expectations and concerns that can lead to new business models and innovations and how energy sector regulation can be improved to accommodate innovations for smart energy systems	All UCF
3	Societal: user engagement, trust, privacy and life quality measurements	All UCF

3.3 Target Stakeholders Groups

To maximise the impact of OMEGA-X, the stakeholder engagement is considered essential. It focuses on sharing results with pre-defined target groups and to engage these for the replication of pilots and to ensure sustainability of OMEGA-X outputs long after the project has ended.

Consequently, the next step in the methodology involves indicating the target Stakeholders group that will contribute to accomplish the OMEGA-X Expected Outcomes (EOs) relating it with the specific Domains and the respective relative objective and impact, as shown in next table. That will later allow the assessment of OMEGA-X project objectives fulfilment.

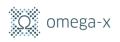
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Table 8 Target Stakeholders Groups related to EO and Domains.

Target Groups	Expected Outcomes	Domain
RES Producers, DSOs, TSOs	REN Use Case Family: Enhancing RES usage and grid management by optimising RES asset management, estimating probability of congestions in the grid and total harmonic distortion caused by RES. [EO 2, 4 and 5]	Scientific/Societal: 20% increased performance in grid control algorithms and 10% increased cross border stability due to roaming services.
Municipalities, LEC, DSO, Electrical mobility company (SME), Industries	Flexibility Use Case Family: Improving grid performance through provision of flexibility services to DSO based on aggregation of multiple distributed infrastructures operated by a single owner (Maia municipality). [EO 3, 5 and 6]	Societal/Economic: Bilateral business model developed to provide economic remuneration for unlocking the value of flexibility sources.
LECs, DSOs, Gas, District Heating providers, ESCOs, etc.	LEC Use Case Family: leverage data from different actors to develop, implement and validate services to optimise LEC operation by taking into account in an integrated and synchronised manner multiple energy vectors including electricity, heating and cooling and hydrogen. [EO 1, 3,4, 5 and 6]	Societal/Economic: 40% increased autonomy in LECs, 10% decarbonization increase, 5 energy carriers considered.
Producers, local communities and network managers	Flexibility Use Case Family: DER collaborative connection platform will provide a multitude of relevant benefits a) maximizing deployment of new RES which otherwise would not get the connection permission by DSO, if grid is not reinforced; b) increased ROI of DER projects and c) proposing an alternative to the current "first come, first served, first payer" process of grid connection for DERs by collaborative technical offer allowing optimal integration of the community. [EO 1, 2, 3, 4 and 6]	Economic/Societal: 80% increase in prosumer flexibility with 15% energy bill reduction for them.
Local Energy Communities	LEC Use Case Family: Digital tools for increasing efficiency and RES self-consumption. In long-term, this leads to significant socio-economic impact, as it enables fair/constant energy access with low price fluctuation. [EO3 and 6]	Economic/Societal: 20% end user increased engagement in LEC initiatives, with 10% increased consumer satisfaction.

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Target Groups	Expected Outcomes	Domain
Mobility service provider, EV charging booking service providers, Self-consumption service providers, Energy Supplier, Charging Point Operator, Roaming and clearing services providers	Electromobility Use Case Family: Reduce cost, data non-quality/non- consistency, risks and cybersecurity breaches (including personal data) in Electromobility. Provide trust, transparency, and traceability (complying with GDPR). Create of trust/security across power/mobility sectors via robust identification/authorization processes. Large-scale deployment of value-added charging & customer centric services with real-time data exchange, thanks to industry standards. Facilitate competition, reduce lock-in effects via open/interoperable ecosystems. Integrate small scale, DER in scalable way. [EO 1, 2, 4 and 6]	Societal: Enhance consumer satisfaction with consumer centric value-added services. Green tracking process. Empower end users to produce and consume own green electricity Technological/Economic: Enable new kind of Energy Block exchanges allowing energy services and business models peer-to-peer trades.
Data/Service Providers/Consumers (Energy companies including SMES, ICT companies, public sector, RTOs and Academia)	OMEGA-X Data Space: definition of a federated soft infrastructure and building blocks by developing new and reusing and extending existing technologies from previous projects and leveraging existing open reference standards. Marketplace to allow exchange and monetisation of data and services. [EO 1, 2 and 4]	Scientific: interoperability with other similar data spaces towards a common European data space. Economic: Direct impact on EU data economy by EUR 7.2 -10.9 billion in 2028.
Flexibility providers, large generators, consumers/prosumers, Flexibility users: utilities/DSO RES producers	REN Use Case Family: Identifying potential inefficiencies by benchmarking different plants from different companies in similar conditions. Flexibility Use Case Family: Flexibility services to the DSO which are only possible using data from multiple entities (flexibility providers, DSOs, public data, CPOs, prosumers). [EO 3 and 5]	Economic: Lower exploitation costs of energy assets by. The savings can be forwarded either to fund Energy efficiency or flexibility, i.e., to improving ROI, or be redirected to investment, even in other areas besides Energy.
RES producers Market participants and LECs leveraged by the stakeholder's participation.	REN Use Case Family: benchmarking different plants from different technologies to help in the decision-making process to select the best investment alternative.	Economic/Societal: Enabling grid reinforcement planning for future renewable scenarios.

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Target Groups	Expected Outcomes	Domain
Self-consumption service providers, Energy Supplier, Charging Point Operator, Balance responsible, TSO, DSO	Flexibility Use Case Family: DER collaborative connection platform will maximize deployment of new RES generators, which otherwise would not get the connection permission and avoid renewable energy curtailment of DER generators.	
	Electromobility Use Case Family: Enable new kind of Energy Block exchanges allowing energy services and business models involving peer to peer energy trades. [EO 1, 2, 3 and 5]	

3.4 KPI Domains

The KPIs are linked to project outcomes and KPI domains were defined per type of project outcome (Scientific, Economic, Societal), to support the KPI identification. These categories also allow to classify the KPIs into groups and facilitates filtering and finding the KPIs of particular interest for the reader. The KPIs categorised by domain can be found in section 4.2.

The domains used in OMEGA-X project are the following:

- Scientific Domain is related to the KPIs measuring the technological performance and scientific development.
- Economic Domain is related with the KPIs are measuring the economic and regulatory performance.
- Societal Domain is related to the KPIs measuring the users' degree of satisfaction.

Not limiting the scope to KPIs in the Scientific domain, and including economic and societal domains, will allow for a better overview and assessment of the impact of the UCs and the project.

About the KPIs definition, they were defined accordingly with the types of metrics (technical, functional, impact-oriented) against which the realization of the use cases as identified in [2] and the implementation of the reference architecture also described in [2] in the various pilot sites will be validated during the evaluation phase of OMEGA-X.

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4 Definition of KPIs

4.1 OMEGA-X Project KPIs

This section provides a comprehensive and detailed definition of the project KPIs, building upon the identification process already conducted in Section 3. The outcome of this section will encompass the precise specifications of all the 74 identified KPIs, which can be referred to in Annex 2. This documentation will serve as a valuable resource for evaluating the project KPIs, as elaborated upon in Section 5.

The definition of these KPIs is based on the establishment of a set of metrics, encompassing technical, functional, and impact-oriented aspects. These metrics will be used to validate the realization of the use cases outlined in [2] and the implementation of the reference architecture introduced also in [2] across the various pilot sites within the implementation activities of OMEGA-X.

Out of the total 74 KPIs, 65 pertain to the Use Case Family, while the remaining 9 relate to OMEGA-X data space/Architecture KPIs. The specific details and breakdown of the SSH KPIs can be found in D7.1 [8].

Furthermore, to assess the effectiveness of the communication and dissemination plan, the communication team will employ an evaluation strategy that encompasses both quantitative and qualitative KPIs [8]. This strategy aims to measure the impact of the communication efforts and gauge their success in reaching the intended target audience.

4.2 Use Case Families KPIs

The use case description method proposed by the IEC includes in its templates the possibility of defining KPIs at business use case (and later at system use case) level. The addition of KPIs is even recommended.

These KPIs mainly concern metrics linked to the business success or proper functioning of the use case described. For example: number of users overall or over time slots, volumes traded or degree of liquidity of a market, satisfaction of a category of players, among others.

For system use cases, the KPIs will focus more on metrics linked to the successful execution of exchanges or data processing for the use case: calculation time, exchange latency, volume of data processed, among others.

Below is a list of KPIs derived from the projects use case families.

Table 9 UC KPIs detail.

Expected Outcome	l Domain	KPI id & description	UCF & where to be verified	Type of metrics
EO2	Scientific	KPI 2.3 Number of datasets made available through the marketplace with the developed data governance schema and data privacy, security and sovereignty.	All UCF (T5.3)	technical

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Expected Outcome	Domain	KPI id & description	UCF & where to be verified	Type of metrics
E02	Scientific	KPI 2.4 Increased usage of datasets	All UCF (T5.6)	technical
	Economic/ Societal	KPI 2.5 Increased number of prosumers that share data for energy monitoring and sustainable energy actions definition.	LEC UCF (T6.3)	impact- oriented
		KPI 2.6 New energy services developed for smart consumers.	All UCF (WP5)	impact- oriented
		KPI 2.7 Increased consumer satisfaction.	LEC UCF (T6.3)	impact- oriented
	Economic	KPI 2.8 Data driven business models defined	All UCF (T7.2)	impact- oriented
EO3	Economic	KPI 3.1 Flexibility offer optimisation by aggregators and LECs.	FLEX UCF (T6.5)	functional
		KPI 3.2 Increased revenues by the LEC coming from ancillary services provided to the TSO/DSO.	LEC UCF (T6.3)	functional
		KPI 3.3 Increased RES production in the community until 2026.	REN UCF (T6.2)	functional
	Scientific/ Societal	KPI 3.4 Number of services provided by new market participants.	All UCF (T5.3)	impact- oriented
		KPI 3.5 Revenue increase from the provision of flexibility into the grid.	FLEX UCF (T6.5)	impact- oriented
		KPI 3.6 New business models for new market roles/participants.	All UCF (T7.2)	impact- oriented
	Economic/ Scientific	KPI 3.7 Discovering of CPO/eMSP offers	EM UCF (T6.4)	functional
		KPI 3.8 Charging points open for GCO claims	EM UCF (T6.4)	functional
		KPI 3.9 Cross border exchange of GCO.	EM UCF (T6.4)	functional

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Expected Outcome	Domain	KPI id & description	UCF & where to be verified	Type of metrics
EO3	Economic/ Societal	KPI 3.10 Increased revenue from SMEs that participate in the project.	LEC UCF (T6.3)	impact- oriented
		KPI 3.11 Percentage of utilisation of public data is increased.	LEC UCF (T6.3)	impact- oriented
		KPI 3.12 Households connected	EM UCF (T6.4)	functional
EO4	Economic	KPI 4.4 Number of datasets shared between pilots	LEC UCF (T6.3)	impact- oriented
	Scientific/ Societal	KPI 4.5 Complete toolbox validated in large-scale pilots.	All UCF (T6.1)	technical
EO5	Economic	KPI 5.1 Data analytics services are developed or enhanced.	All UCF (T5.1)	technical
	Economic/ Scientific	KPI 5.2 Data analytics services for RES developed, implemented and validated.	REN UCF (T6.2)	impact- oriented
	Economic/ Societal	KPI 5.3 RES availability increase.	REN UCF (T6.2)	functional
		KPI 5.4 Economic benefit increase for RES producers.	REN UCF (T6.2)	impact- oriented
		KPI 5.5 Economic benefit increase for DSOs and TSOs.	REN UCF (T6.2)	impact- oriented
		KPI 5.6 Energy bill decrease for prosumers.	REN UCF (T6.2)	impact- oriented
		KPI 5.7 CO2 emissions reduction.	REN UCF (T6.2)	impact- oriented
		KPI 5.8 Enabling flexibility service provision for the DSO.	FLEX UCF (T6.5)	impact- oriented
	Economic	KPI 5.9 Services supported by new datasets.	All UCF (T5.3)	functional
		KPI 5.10 Open data sets available for third parties as a result of the project.	All UCF (T6.1)	functional
	Economic/ Societal	KPI 5.11 Energy loss characterization error.	REN UCF (T6.2)	impact- oriented
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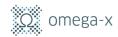
Expected Outcome	Domain	KPI id & description	UCF & where to be verified	Type of metrics
EO5	Economic/ Societal	KPI 5.12 Fault detection time.	REN UCF (T6.2)	functional
	Economic	KPI 5.13 PV Asset OPEX reduction.	REN UCF (T6.2)	functional
	Economic/ Societal	KPI 5.14 Electric Power Quality.	REN UCF (T6.2)	functional
		KPI 5.15 Continuity of Service.	REN UCF (T6.2)	functional
	Economic	KPI 5.16 CAPEX.	REN UCF (T6.2)	functional
		KPI 5.17 OPEX.	REN UCF (T6.2)	functional
		KPI 5.18 Asset improvements.	REN UCF (T6.2)	functional
EO6	Economic/ Societal	KPI 6.1 Prosumer flexibility offer increase.	FLEX UCF (T6.5)	impact- oriented
		KPI 6.2 Energy bill reduction.	FLEX UCF (T6.5)	impact- oriented
		KPI 6.3 Revenue increase for flexibility providers.	FLEX UCF (T6.5)	impact- oriented
		KPI 6.4 Incentives towards end users that support sharing/trading of data.	FLEX UCF (T6.5)	functional
		KPI 6.5 Increased sharing of data from consumers.	FLEX UCF (T6.5)	functional
	Societal	KPI 6.6 RES usage increase.	LEC UCF (T6.3)	impact- oriented
		KPI 6.7 CO2 emissions reduction.	LEC UCF (T6.3)	impact- oriented
	Economic/ Societal	KPI 6.8 Energy autonomy increase for single user.	LEC UCF (T6.3)	functional
		KPI 6.9 Imported energy/ Total energy consumption.	LEC UCF (T6.3)	functional

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Expected Outcome	Domain	KPI id & description	UCF & where to be verified	Type of metrics
EO6	Societal	KPI 6.10 Number of users involved in the pilots.	All UCF (T7.6)	impact- oriented
		KPI 6.11 Gender representation, Number of men, women, non- binary involved in the pilots.	All UCF (T7.6)	impact- oriented
		KPI 6.12 Awareness impact, percentage of people in the target group that have been reached and/or are activated by the project.	All UCF (T7.6)	impact- oriented
		KPI 6.13 Perceived value from the citizens (Surveys based in Likert scale (% of surveys with average to good results).	All UCF (T7.6)	impact- oriented
		KPI 6.14 Technical requirements, Number of requirements identified through end user engagement.	All UCF (T7.6)	impact- oriented
		KPI 6.15 Percentage of citizens that support municipality in integrating more RES in the energy mix, as flexible sources.	FLEX UCF (T6.5)	impact- oriented
	Economic/ Societal	KPI 6.16 Water losses detection	LEC UCF (T6.3)	functional
		KPI 6.17 Thermal losses detection	LEC UCF (T6.3)	functional
		KPI 6.18 Electrical losses detection	LEC UCF (T6.3)	functional
		KPI 6.19 Coverage smart meters	LEC UCF (T6.3)	impact- oriented
		KPI 6.20 Increase decarbonisation of Local Energy Communities	LEC UCF (T6.3)	impact- oriented
	Economic	KPI 6.21 OPEX Reduction	LEC UCF (T6.3)	functional
		KPI 6.22 CO2 compensated	LEC UCF (T6.3)	impact- oriented

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Expected Outcome	Domain	KPI id & description	UCF & where to be verified	Type of metrics
EO6	Economic	KPI 6.23 Euros saved	LEC UCF (T6.3)	impact- oriented
		KPI 6.24 Energy ranking	LEC UCF (T6.3)	impact- oriented
		KPI 6.25 Energy costs	LEC UCF (T6.3)	functional
		KPI 6.26 Production forecasting		functional
		KPI 6.27 Demand forecast	LEC UCF (T6.3)	functional

KPI 4.4 was changed from: "Variation of stakeholders that have difficulties in using data from other organizations received from market sampling survey" (at the Grant Agreement) to: "Number of datasets shared between pilots" which makes more sense in the work being performed.

KPI 6.8 was changed from: "Energy autonomy increase" (at the Grant Agreement) to: "Energy autonomy increase for single user" which makes more sense in the work being performed.

There are 21 new KPIs (in addition to the 53 previously identified from the Grant Agreement), that were identified under D3.1 [2] works:

- REN UCF: 8 new KPIs (5.11 To 5.18), totalizing now 15 KPIs for this UCF
- LEC UCF: 12 new KPIs (6.16 to 6.27), totalizing now 22 KPIs for this UCF
- EM UCF: 1 new KPI (3.12), totalizing now 4 KPIs for this UCF
- FLEX UCF: no new KPIs, totalizing now 9 KPIs for this UCF

Table 10 UC KPIs summary.

UCF & wher	e to verify KPI	Lead Partner			N° of KPIs			
All UC	F (WP5)	Tecnalia				1		
All UC	F (T5.1)		UPC				1	
All UC	F (T5.3)		ICOM				3	
All UC	F (T5.6)	Tecnalia			1			
All UC	F (T6.1)		EDF				2	
REN U	CF (T6.2)		Tecnalia				15	
LEC U	CF (T6.3)		RINA-C				22	
EM UC	CF (T6.4)		EDF				4	
FLEX UCF (T6.5)		EDP				9		
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UCF & where to verify KPI	Lead Partner	N° of KPIs
All UCF (T7.2)	UCP	2
All UCF (T7.6)	AU	5

In total, 65 Use Case Family KPIs.

4.3 Reference Architecture KPIs

This section outlines those OMEGA-X KPIs that are closely related to the definition of the architecture and alignment with data space principles. Therefore, most of them are crosscutting and non-functional requirements, affecting all OMEGA-X business and system use cases.

The project will make sure those KPIs, which mostly emanate from the Architectural description (D3.1 report [2]), are, first, understood by all stakeholders (being module developers or deployment responsibles) and then, incorporated in all relevant outputs.

While the process of conveying the message across the multiple participants in the ideation-development-deployment process is a challenging task, measuring those KPIs should not be very difficult, as they are usually just evaluated with a Boolean question (Yes/No) or fulfilled by identifying a list/number of technologies/choices made.

Table 11 Reference Architecture KPIs detail.

Expected Outcome		KPI id & description	UCF & where to be verified	Type of metrics
EO1	Scientific	KPI 1.1 Interoperability test with other projects in the same call, ensuring that different types of stakeholders' exchange data and services, use it to improve current services to their customers and enable new innovative products/services.	OMEGA-X data space/Architecture (T2.4)	functional
		KPI 1.2 Alliances with relevant European Dataspace initiatives.	OMEGA-X data space/Architecture (WP2)	impact- oriented
	Economic/ Societal KPI 1.3 Number of Data Spidentified from other domain i.e., electromobility and Smidentified from other domain i.e., electromobility and smidenti		OMEGA-X data space/Architecture (WP2)	impact- oriented

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Expected Outcome	Domain	KPI id & description	UCF & where to be verified	Type of metrics
EO1	Economic/ Societal	KPI 1.4 Number of other projects identified to share best practices with about service improvement.	OMEGA-X data space/Architecture (WP2)	functional
EO2	Scientific	KPI 2.1 Governance models developed, implemented and validated in large scale pilots.	OMEGA-X data space/Architecture (WP4)	technical
		KPI 2.2 Open-source components to allow secure, private and sovereign exchange of data and services implemented and validated in large scale pilots.	OMEGA-X data space/Architecture (WP4)	technical
EO4	Scientific	KPI 4.1 New/extended Open- source components published on IDS/GitHub.	OMEGA-X data space/Architecture (WP4)	technical
		KPI 4.2 Standard connectors/APIs for vertical interoperability.	OMEGA-X data space/Architecture (WP4)	technical
		KPI 4.3 API for inter-Data Spaces technical interoperability.	OMEGA-X data space/Architecture (WP4)	technical

Table 12 Reference Architecture KPIs summary.

Task	Lead Partner	N° of KPIs
OMEGA-X data space / Architecture (WP2)	AU	3
OMEGA-X data space / Architecture (T2.4)	RINA-C	1
OMEGA-X data space / Architecture (WP4)	ATOS IT	4
OMEGA-X data space / Architecture (WP4)	TECNALIA/ATOS IT/ICOM	1

In total, 9 OMEGA-X data space / Architecture KPIs.

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5 KPI evaluation

Based on the templates defined in this deliverable the future OMEGA-X evaluation activities will conduct the formal evaluation of the KPIs using real data from large scale pilots. These KPIs will be compared with the defined targets and the different stakeholders will be consulted for acceptance. The results will be documented as part of deliverable "D6.3 OMEGA-X use case family evaluation".

The KPI evaluation will be done from M30-M36 (October 2024, April 2025), however, it is likely that during the development phase of technical development activities of the project and/or pilot implementation phase some changes might happen that could impact the defined KPIs. Therefore, following the iterative methodology defined in OMEGA-X, the KPIs defined in this deliverable will be reviewed and updated, if necessary, as part of deliverable "D3.2 Use Cases and Architecture living report-Second release" in month M24 (April 2024) before the formal evaluation in deliverable D6.3 "OMEGA-X use case family evaluation".

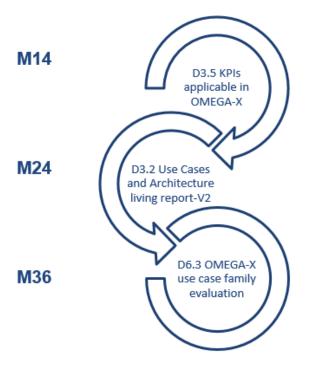


Figure 7 KPI Definition and evaluation process.

Finally, the output from the KPI evaluation performed in the future evaluation activities will be fed to the different tasks for exploitation and business. In particular, the results of the KPI evaluation will impact the feasibility of the business models and the scalability and replicability of solutions conducted inside the impact group of activities for OMEGA-X.

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6 Conclusions

The present deliverable, within the scope of OMEGA-X Design activities and, among those, especially for the KPI elicitation for use case validation task, plays a crucial role in the OMEGA-X project. It aims to identify and define Key Performance Indicators (KPIs) for the OMEGA-X Use Cases. The main objective is to facilitate the monitoring and assessment of project activities and demonstrators, so that they can be precisely evaluated with respect to the specific demonstrator objectives together with the overall OMEGA-X architectural and framework related goals.

The deliverable is closely linked to the Use case identification Full system architecture and building blocks activities, also grouped within the same set of Design activities for OMEGA-X. Additionally, the work to be conducted as part of OMEGA-X demonstration implementation activities, specifically the four Use Case Families (UCF) of Renewables (REN), Local Energy Communities (LEC), Electromobility (EM), and Flexibility (FLEX), is crucial for the development and understanding of this deliverable. The pilots in these UCFs serve to demonstrate and validate the services and architecture defined in the project.

This document is structured into six major sections, each addressing specific aspects of the KPI identification and definition process. It begins with an introduction, presenting the purpose of the document and its relation to other project works.

The methodology section describes a comprehensive methodology followed to achieve the objective of identifying and defining the KPIs. The methodology involves a systematic approach, including the identification of UCs, BUCs, objectives, and solutions, as well as the linkage between UCs and the overall objectives of the project.

The identification of KPIs section establishes the link between UCs, objectives, stakeholder groups, and KPI domains. As a result of the methodology, a total of 74 KPIs have been identified for the OMEGA-X project, classified into three domains: Scientific Domain, Economic Domain, and Societal Domain:

- Scientific Domain is related to the KPIs measuring the technological performance and scientific development.
- Economic Domain is related with the KPIs measuring the economic and regulatory performance.
- Societal Domain is related to the KPIs measuring the users' degree of satisfaction.

Stakeholder groups and KPI domains were also considered in setting the foundations for the KPI definition.

The definition of KPIs section further elaborates on the KPIs related to the OMEGA-X Project, Use Case Families, and Reference Architecture. To calculate the KPIs, the KPI definition templates provided in the annexes were used, and the data collection methodologies described within those templates. The monitoring of the KPIs, UCFs, and project activities will be subject to future work under KPI evaluation and is discussed in a dedicated section.

Finally, the document concludes with a summary of the findings presented in the deliverable.

Overall, this deliverable contributes to the project's evaluation by establishing a comprehensive set of KPIs that will be used to assess the technological performance, economic and regulatory performance, and users' degree of satisfaction in the OMEGA-X project.

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7 References

- [1] OMEGA-X, OMEGA-X Grant Agreement 101069287, 2022.
- [2] OMEGA-X, D3.1 Use Cases and Architecture living report. First release., 2023.
- [3] OMEGA-X, D3.4 Data analytic services and requirements related to interoperability, security, privacy and data sovereignty, 2022.
- [4] IEC 62559-2:2015 "Use case methodology Part 2: Definition of the templates for use cases, actor list and requirements list".
- [5] IEC 62351:2022 SER Power systems management and associated information exchange Data and communications security, 2022.
- [6] ISO/IEC/IEEE, ISO/IEC/IEEE 42010:2011, Systems and software engineering Architecture description, 2011.
- [7] Demonstration of INTElligent grid technologies for renewables INTEgration and INTEractive consumer participation enabling INTEroperable market solutions and INTErconnected stakeholders, 2020.
- [8] OMEGA-X, D7.1 Plan for the dissemination and exploitation including communication activities and online presence, 2022.
- [9] OMEGA-X, D2.1 Foundations for a holistic iterative methodology, 2022.

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Annex 1 KPI Template

Table 13 KPIs definition template.

			GENERAL INFO	RMATION		
ID				Name		
Busine Syster	ess UC/ m UC					
Use Ca	ase	Renewables	Energy communities□	Electromobility	∕ Flexibility□	N/A□
Descri	iption					
Formu	ıla					
Monito	oring					
Units				Parent KPI		
Report DWH]	ting [to	Data upload ra	ate		"Other" upload rate	
		Information di	isplay	Cumulated value□	Trend□	N/A□
KPI calcula trigger value)	ation r (target					
		CALCULA	ATION/EXTRACTION	ON METHODO	LOGY	
Step ID		Ste _l	p description		Responsibl	e Data ID
1						
			DATA COLLE	CTION		
Data ID	Data descri ption	Data source (entity/respon ible)		Data collection method	Data collection update rate	Data collection time range
1						
			BASELIN	E		
	eline urce	Literature□	Historical data□	Measuren □	nents Simulat	ions Other
		"Other" basel	ine source			
Respo	onsible					
Desc	ription					

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Annex 2 KPI filled in templates

74 filled in KPI templates.

The KPIs detailed in this section can be updated or adapted, until the end of the project, to better fit the reality of the use cases and needs of OMEGA-X project.

Table 14 KPI 1.1 definition.

			GENERAL INFO	RMATION					
ID		KPI 1.1		Name	Interoperabilit project	y with sister			
Busin Syster	ess UC/ m UC	All BUCs/SUC	Cs						
Use C	ase	Renewables ⊠	Energy communities⊠	Electromob y⊠	ilit Flexibility⊠	N/A□			
Descr	iption	Interoperabilit	Number of projects in the same call with whom testing interoperability. Interoperability is intended as the exchange of data between projects or the esting of services between projects.						
Formu	ıla		$\sum_{i=1}^{N} Project_{i}$						
Monito	oring		Monitoring will start in T2.4 (M13) and will continue for the entire duration of the project (M36)						
Units		N/A		N/A					
Repor DWH]	ting [to	Data upload	rate	Other	"Other" upload rate	End of the project			
		Information of	display	Cumulated value□	Trend□	N/A⊠			
KPI calcul trigge value)	r (target	3 projects							
		CALCUI	LATION/EXTRACTION	ON METHOD	OLOGY				
Step ID		Ste	p description		Responsi	ble Data ID			
1	Compute has been		f sister projects wh	UCF Leade	ers $Project_i$				
2		mpute the number of sister projects that tested UCF Leaders Property use cases							
3		Compute the number of sister projects with whom data Project nas been shared							
4	Report t	he total numbe	r of projects reache	ed	RINA-C				

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	DATA COLLECTION									
Data ID	Data descri ption	Data source (entity/respon sible)	Data sink (entity/respons ible)		rate		coll	ata ection range		
1 Project _i UCF Leader Rina-C Notification N/A N/A										
	BASELINE									
	ELINE urce	Literature□	Historical data□		Measure □	ments	Simul	ations	Other ⊠	
	"Other" BASELINE source N/A									
Resp	Responsible N/A									
Desc	ription	N/A								

Table 15 KPI 1.2 definition.

	Table 10 M. T. 12 domination									
			GENERAL INFO	RMATION						
ID		KPI 1.2		Name	Euro	nces with opean Data atives.				
Busine UC/ Sy UC		All BUCs/SUCs								
Use C	ase	Renewables□	Energy communities□	Electromobility		Flexibility		N/A⊠		
Descr	iption		Strategic and technical alignment with European Dataspace initiatives egarding Omega-X 5 points of actuation							
Formu	ula									
Monito	oring	Monitoring will	Monitoring will continue for the entire duration of the project (M36)							
Units		N/A		Parent KPI	N/A					
Repor	ting	Data upload ra	te	Other	"Oth	ner" pad rate	Enc proje	of the		
		Information dis	splay	Cumulated value⊠	Т	rend□	N	/A□		
KPI		2 alliances								
calcul	ation									
trigge	r									
(targe	t value)									
		CALCULA	ATION/EXTRACTI	ON METHODOL	OGY					
Step ID		Step description Responsible Data								
1	participa		d other Dataspac o align and share Il documents.			EDF, AT	OS			

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	DATA COLLECTION									
Dat a ID	Data descripti on	Data source (entity/responsi ble)	Data sink (entity/responsi ble)	Data collectio n method	Data collection update rate	coll	ata ection range			
N/A										
			BASELINE							
BASE	ELINE ce	Literature□	Historical data□	Measure	ments Simula	ations	Other ⊠			
	"Other" BASELINE source No baseline needed									
Resp	onsible	N/A								
Desc	cription	N/A								

Table 16 KPI 1.3 definition.

		GENERAL INFOR	MATION						
ID	KPI 1.3		Name	Number of D identified from domains					
Business UC/ System UC	All BUCs/SUCs								
Use Case	Renewables□	Energy communities□	Electromobility	□ Flexibility	□ N/A⊠				
Description	and Smart Manu energy-based se	lumber of Data Spaces identified from other domains, i.e., electromobility and Smart Manufacturing/Industry 4.0, to share experience related to nergy-based service improvements and innovation, thus creating alliances it other national or Horizon Europe projects.							
Formula	N/A	· · ·							
Monitoring		Active monitoring of other dataspace initiatives and sister projects dentification Strategic Agendas and reference architecture							
Units	N/A		Parent KPI	N/A					
Reporting	Data upload rat	te	Other	"Other" upload rate	End of the project				
	Information dis		Cumulated value⊠	Trend□	N/A□				
KPI calculation trigger (target value)	lculation gger								
	CALCULA	TION/EXTRACTION	N METHODOLO	GY					
Step ID	Ste	ep description		Respons	ible Data ID				
1 Map and	identify Data spa	aces from other do	mains.	EDF, ATO	os				

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	DATA COLLECTION									
Dat a ID	Data descripti on	Data source (entity/responsi ble)	Data sink (entity/respons ible)	Data collection method	colle	ata ection te rate	coll	ata ection range		
N/A										
	BASELINE									
BASE	LINE	Literature□	Historical data□	Measureme	ents□	Simula	tions	Other		
sour	ce							\boxtimes		
		"Other" BASELINE	source	No baseline	need	ed				
Resp	Responsible EDF									
Desc	Description The result will be benchmarked with respect to the reference Architectures of Gaia-X, IDSA and the sister projects.									

Table 17 KPI 1.4 definition.

			GENERAL INFOR	MATION				
ID		KPI 1.4		Name	Number of other projection identified to share best practices with about service improvement.			
	ness UC/ em UC	All BUCs/SUCs						
Use (Case	Renewables⊠	Energy communities⊠	Electromobility	/⊠ Flexibili	ty⊠	N/A□	
	ription	Number of other projects identified to share best practices about service improvement, with the aim to increase degree of interoperability						
Form	ıula	N/A						
	toring	Active monitoring of relevant projects.						
Units		# Parent KPI N/A						
Repo	orting	Data upload rate Other			"Other" upload rate	End proje	of the ect	
		Information dis	play	Cumulated value□	Trend⊠	N	/A□	
KPI		4						
	ılation							
trigge								
(targe	et value)							
			TION/EXTRACTIO	N METHODOLO				
Step ID		Ste	p description		Respo	nsible	Data ID	
1	Monitoring and identification of relevant projects EDF							
2	Engage with project in sharing of best practices EDF							
3.	Analyse a	and report			EDF			

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	DATA COLLECTION									
Dat a ID	Data descripti on	Data source (entity/responsi ble)	Data sink (entity/responsi ble)	Data collectio n method	colle up	ata ection date ate	coll	ata ection range		
N/A										
			BASELINE							
BASE	LINE	Literature□	Historical data□	Measure	ment	Simula	ations	Other		
sour	ce			s□				\boxtimes		
	"Other" BASELINE source No baseline needed									
Resp	Responsible N/A									
Desc	cription	N/A								

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Table 18 KPI 2.1 definition.

GENERAL INFORMATION											
ID	KPI 2.1		Name	Governance mode developed, impler and validated in la pilots.	nented						
Business UC/ System UC	Applicable to all	BUCs									
Use Case	Renewables□	Energy communities□	Electromobility	/□ Flexibility□	N/A⊠						
Description	In the DoA a specific objective (objective 4) was defined to design, develop and validate 2 different data governance models: 1. Community model in which the governance model is shared between data space participants with main responsible rotated periodically; 2. Unique organization responsible for the data governance. However, since then the Data Space Support Centre (DSSC) Coordination and Support Action was created so different Data Spaces Solutions (IDSA, GAIA-X, FIWARE) can converge into a common definition of a Data Space which is applicable not only to energy but also to other sectors. As part of this convergence, DSSC is currently working on the definition a Data Space Governance Model. It seems reasonable that OMEGA-X adopts the Data Governance model defined in DSSC. Therefore, this KPI will validate that the Governance model defined in DSSC is correctly implemented in all the use case families which include the different										
Formula	N/A										
Monitoring	N/A			21/2							
Units	N/A		Parent KPI	N/A							
Reporting	Data upload ra	te	N/A	"Other" upload rate							
	Information dis		Cumulated value□	Trend□	N/A⊠						
KPI calculation trigger (target value)				SSC is correctly is is OMEGA-X. 2							

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		CALCULATION	ON/EXTRACTION	METHOD	OLOGY					
Ste p ID		Step des	scription		Res	ponsibl	е	Data ID		
1	Monitor the deliverables of DSSC and attend different forums of DSSC (Thematic Groups, Expert Groups) and Energy Interoperability task force to understand the definition of the Data Space Governance Model defined by the DSSC. ATOS/TECNALIA/I COM									
2	Implement the defined Data Governance Model into the OMEGA-X federated data space ATOS/TECNALIA/I N/A COM									
3	Validate the defined Data Governance Model into all the use case families which include the different large-scale pilots. UCF leaders (TECNALIA/EDF/RI NA-C/EDP)									
			DATA COLLECTI	ON						
Dat a ID	Data descripti on	Data source (entity/responsi ble)	Data sink (entity/responsi ble)	Data collecti on method	Da colled update	ction	coll	Data ection erange		
N/A										
			BASELINE							
BASI	SELINE Literature ☐ Historical data ☐ Measurements Simulation Other ☐ S ☐ ☑									
	"Other" BASELINE source N/A									
Res	ponsible	N/A								
Des	cription N/A									

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Table 19 KPI 2.2 definition.

	GENERAL INFORMATION									
ID		KPI 2.2		Name	Total O Compo	pen-Soo nents	urce			
	ness UC/ em UC	All								
Use	Case	Renewables⊠	Energy communities⊠	Electromobi	ility⊠ F	lexibility ⊠	′ N/A□			
Desc	cription	Open-source compof data and service								
Forn	nula	$\sum_{i=1}^{N} Component_{i}$								
	itoring	Active monitoring starting at WP3 architecture definition and continuing on WP4/WP5 development activities so that open-source modules are used always as first option, especially those listed/used in IDSA and/or Gaia-X reference implementations.								
Units		No units		Parent KPI	[KPI Na					
Repo	orting [to l]	Data upload rate			"Other upload					
		Information displ	Cumulated value□	Trend	d□	N/A⊠				
KPI calcu trigg	ulation er	6 components								
		CALCULATIO	N/EXTRACTIO	N METHODO	LOGY					
Ste p ID		Step desc	cription		Respo	nsible	Data ID			
1	Flag Open	-Source component	ts on developm	ent phase	Module develop		Component			
2	Aggregate	number of open-so	urce componer	nts	ATOS		Total Component s			
	DATA COLLECTION									
Dat a ID	Data descripti on	Data source (entity/responsib le)	Data sink (entity/resp onsible)	Data collection method	Dat collec update	tion	Data collection time range			
1	Compone nt _i	Component developers	Coordinator	Notification	N/A		/A			

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	BASELINE											
BASELINE	Literature□	Historical data	a□	Measurements□	Simulations□	Other⊠						
source												
	"Other" BASELINE source Data Space Reference Architectures											
Responsible	ATOS											
Description		and the sister p	roject	respect to the ref s. The number of 0 OMEGA-X								

Table 20 KPI 2.3 definition.

		GENERAL INFO	RMATION						
ID	KPI 2.3		Name	Total number of datasets	of available				
Business UC/ System UC	All BUCs are rel	evant							
Use Case	Renewables⊠	Energy communities⊠	Electromobili	ty⊠ Flexibility	⊠ N/A□				
Description		sets made availab governance sche		•					
Formula	$\sum_{i=1}^{N} Dataset_{i}$	$\sum_{i=1}^{N} Dataset_{i}$							
Monitoring	adds or dele	through Data Govetes a data source elf-descriptions fro	e	dating every tim	ne a provider				
Units	No unit		Parent KPI	[KPI Name/ID]					
Reporting [to DWH]	Data upload rat	e		"Other" upload rate					
	Information dis	play	Cumulated value□	Trend□	N/A□				
KPI calculation trigger	Upon request								
Target Value	10 datasets								

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		CALCULATIO	N/EXTRACTION M	METHODOI	LOGY			
Ste p ID		Step de	scription		Re	spons	sible	Data ID
1	Search all	available datasets i	n catalogue		ICC	M		Search data
2	Count self-	descriptions from c	ICC	M		Add data		
3	Make repo	rt of the responses	ICC	M				
			DATA COLLECTIO	N				
Dat a ID	Data descripti on	Data source (entity/responsi ble)	Data sink (entity/responsi ble)	Data collecti on method	collecti collection on update t method rate			
1	Dataset nr	ICOM	ICOM	Metadat a	Upon modif n of catalo		n of mark and o	ementatio etplace data set tration
			BASELINE					
BASI	ELINE ce	Literature□	Historical data□	Measurer □	nents	Simu	lations	other □
		"Other" BASELINE source No baseline needed.						
Res	sponsible NA							
Desc	cription	NA						

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Table 21 KPI 2.4 definition.

			GENERAL IN	FORMATION	N						
ID	KPI 2.	4		Name		Increase datasets		usage	of		
Business UC/	All BU	Cs/SUCs									
System UC											
Use Case	Rer	newables⊠	Energy con	nmunities⊠	Electror	•		ibility ⊴	N/A □		
Descriptio n	one s extendallow allow valida	Currently most of the existing data analytics servicers use a data source from one single data provider to train and validate the services. OMEGA-X will extend/develop, implement and validate a set of open-source components to allow secure, private and sovereign exchange of data and services. This will allow to leverage multiple datasets from multiple data providers to train and validate the models achieving a higher robustness. (number of datasets used by existing services after T5.1 – T5.2 – number of datasets used by existing services before T5.1 – T5.2)									
Formula	(number o		g services after T5.1 – imber of datasets used				es before	T5.1 – T5.2	<u>)</u> *		
Monitoring	T5.1,	T5.2 and T6.6									
Units	N/A			Parent KP	I	N/A					
Reporting [to DWH]	Data (Data upload rate N/A "O up						N/A			
	Inforn	nation display	/	Cumulated value□		Trend	i 🗆	N/A	4X		
KPI calculatio n trigger Target	T6.6										
Value	2070	CALCINA	ION /EVIDA	CTION METH	100010	CV					
Step			ION/EXTRAG p descriptio		IODOLO		ponsi	ibla	Data		
ID									ID		
	re T5.1	e number of -T5.2	datasets use	ed by existin	ng servic	es Tecr	nalia	N	/A		
		ne number of er T5.1-T5.2	datasets ι	ised by nev	w/improv	ed Tecr	nalia	N	/A		
3 Calc	culate the ration between obtained results from step 1 and						nalia	N	/A		
			DATA CC	LLECTION							
Data C	Data Data source Data sink Data					D	ata	D	ata		
ID des	criptio n	(entity/respo	nsib (entity	//responsib le)	collect n meth	od up	ectio date ate	n t	lectio time nge		
N/A											

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	BASELINE											
BASELINE	Literature□	Historical da	ata⊠	Measurements□	Simulations□	Other□						
source	"Other" BASELI	er" BASELINE source N/A										
Responsibl	e Tecnalia/ UCF	leaders										
Description	Number of data	asets used by	existin	g services before	T5.1-T5.2.							

Table 22 KPI 2.5 definition.

		GENERAL IN	IFORMATION						
ID	KPI 2.5		Name	Prosur	ner invol	vement			
Business	BUC LEC 2.0	ECO							
UC/ System UC	SUC LEC 4.0 I	•							
		SUC LEC 5.0 Provide Data Analytics and KPI							
		Prosumer behav							
Use Case	Renewables	Energy communities!	Electron ⊠ □	_	Flexibili	ty N/A□			
Description		ber of prosume ergy actions def	inition.		O,	J			
Formula	Prosi	ımers _{increase} =	$Prosumers_{M3}$	₁₂ — Pro	$sumers_{M}$	⁷²⁰ · 100			
		increase	Pros	umers _N	120				
	Prosumers _{M20} = the total number of prosumers involved at M20 before the pilot implementation Prosumers _{M32} = the total number of prosumers involved at M32 after the pilot implementation								
Monitoring	Start mon	itoring at WP3 L	lse Cases an	d Servi	ces defin	ition			
	 Continuing 	· ·	plementation	of ser		LEC Use Case			
		on WP6 T6.6 K and analysed	PI elicitation,	where t	he result	ing values will be			
Units	%		Parent KPI	[KPI N	ame/ID]				
Reporting [to DWH]	Data upload r	ate	Other	"Othe		End of pilot			
	Information display Cumulated value□ Trend⊠ N/A□								
KPI calculation trigger (target value)	10% increase								

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		CALCUL	ATION/EXTRAC	TION A	ΛΕΤΗ	ODOLOGY			
Ste p ID		Step de	escription			Responsi	ble	Data	ı ID
1		of prosumers inv nting OMEGA-X		ilot bef	ore	Pilot owne	r	Prosumers _{M20}	
2		of prosumers inversed inversed in the contraction of OM	•	er	Pilot owne	r	Prosum	ers _{M32}	
3	Collect in increment	•	put from pilot owners and report the t					Prosume	rs _{increase}
			DATA COL	LECTIC	N				
Dat a ID	Data descrip tion	Data source (entity/respon sible)	Data sink (entity/respon sible)	Data collection method		Data collection update rate		Data collecti time range	
1	Number of prosum ers	Pilot owners	RINA-C	Datab	ase	Twice: bef and after pilots' implement n		N/A	
			BASEL	.INE					
BASE sour	LINE ce	Literature□	Historical data□]	Mea: □	surements	Sim	ulations	Other ⊠
		"Other" BASELINE source Compute number of prosumers							
Resp	oonsible	Pilot owners							
Desc	ription	Number of pros	umers that are ir	nvolve	t				

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Table 23 KPI 2.6 definition.

	GENERAL INFORMATION									
ID		KPI 2.6		Name		New ene			deve	eloped
	110/	DUIO				for smar	t cor	nsumers.		
	ness UC/ em UC	BUC								
_	Case	Renewables□	Ene	rgy	Elect	romobility[7	Flexibili	tv□	N/A
			commur				_		-, —	
Desc	ription	New energy serv	ices deve	loped for	r smart	consumers	3.			
Form	nula	Number of service	ces energy	y service	es for s	mart consu	ıme	rs after T	5.1	·T5.2 -
		Number of existi	ing servic	es enerç	gy serv	ices for sn	nart	consum	ers	before
		T5.1-T5.2								
	itoring	T5.1, T5.2 and T	6.6							
Units		N/A		Parent	KPI	N/A				
_		Data upload rate		N/A		"Other"			_	
DWH	J	Information disp	olay	Cumula		Trend□ N/A>				
value□										
	KPI T6.6									
	calculation trigger									
	arget Value 2									
lary	ci valuc	CALCULAT	ION/EYTE	ACTION	I METH	ODOLOG	v			
Ste			descripti		4 WEIH	ODOLOG		sponsib	مار	Data
p ID		Step	uescripti	1011			IVE	saponaik	,ie	ID
1		the number of ex sumers before T5	_	vices en	ergy se	ervices for	Ted	cnalia		N/A
2		the number of s		norav, co	orvicos	for emart	Tor	nalia		N/A
2		s after T5.1-T5.2	ervices e	nergy se	ei vices	ioi siliait	160	Jilalia		IN/A
3	Calculate	the difference be	tween obt	ained re	sults fr	om step 1	Ted	cnalia		N/A
	and 2									
			DATA (COLLEC	TION					
Dat	Data	Data source		Data sir		Data		Data	D	ata
a ID	descripti	o (entity/respon	sibl (ent		onsibl	collectio				lectio
	n	e)		e)		n		pdate		time
NI/A						method		rate	ra	nge
N/A				A CELINIE						
DACE	TIME	12		ASELINE			C:)
BASE	LINE SOUR		Historical data⊠	Measur	rements	S∐		mulation	s C	Other
		"Other" BASE	LINE soul	се						
Resp	oonsible	TECNALIA/ U	JCF leade	rs						
Desc	ription	Number of numbers of existing services energy services for smart consumers before T5.1-T5.2.								

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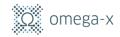


Table 24 KPI 2.7 definition.

			GENERAL INF	ORMATION				
ID		KPI 2.7		Name		eased cor sfaction	nsum	er
Busine UC/ Sy UC		All BUCs/SUC	S					
Use Ca	ase	Renewables ⊠	Energy communities⊠	Electromob ⊠	ility	Flexibility		N/A□
Descri	iption	public service services in rela energy transition	lata in energy sec and thus increase ation to data mana on to achieve affo of networks and o	ed quality of lif agement, and rdable and cl	e, as effici ean e	well as melency to seenergy good	nore e uppo als (i.	efficient rt the e., real
Formu	ıla	Survey based	in Likert scale to b	oe filled in by	at lea	ast 40 con	sume	ers
Monito	oring	Case Fam	•	·				
			g on WP6 T6.3 a nily for the verifica				ices a	at LEC Use
			on WP6 T6.6 KP and analysed	l elicitation, w	here	the result	ing va	alues will be
Units		%		Parent KPI	I -	Name/ID]	
Report [to DW		Data upload r	ate		"Other" upload rate			
		Information d	isplay	Cumulated value□	Tı	rend□		N/A⊠
KPI calcula trigger (target value)	r t	10% increase						
			LATION/EXTRACT	TION METHO				
Step ID		Step description Res						Data ID
1	Identific	cation of target		Pilot own	er			
2	Conduct first survey before service implementation to collect baseline RINA-C							
3	Conduct a second survey after service implementation RINA-C							

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			DATA COL	LECTIO	NC				
Data ID	Data descri ption	Data source (entity/respon sible)	Data sink (entity/respon sible)	colle	ata ection thod	Data collect update	ion		ollection range
1	% of incre ment	Pilot owners	RINA-C	Survey		Twice: before and after pilots' implementati on		A week	
			BASEL	INE					
BASEL source		Literature□	Historical data□] Measu □		urements Sim □		ulations	Other ⊠
		"Other" BASELINE source Results from first survey							
Respo	onsible	N/A							
Descr	iption	N/A							

Table 25 KPI 2.8 definition.

		GENERAL INFO	RMATION						
ID	KPI 2.8		Name	Data-driven business model defined					
Business UC/ System UC	All Business use	cases							
Use Case	Renewables⊠ Energy communities⊠ Electromobility⊠ Flexibility⊠ N/A								
Description Formula Monitoring	Identification of puse case family N/A	N/A							
Units	N/A		Parent KPI	N/A					
Reporting [to DWH]	Data upload rat	e		"Other" upload rate	N/A				
	Information dis	play	Cumulated value□	Trend□	N/A⊠				
KPI calculation trigger (target value)	At least 2 data-d	riven business mo	odels						

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			DATA COLLECTIO	N							
Dat a ID	Data descripti on	Data source (entity/responsi ble)	Data sink (entity/responsi ble)	Data collecti on method	Data collection update rate	Data collection time range					
1.1	families ws 23										
BASELINE											
BASE sour	ELINE ce	Literature⊠	Historical data□	Measurem	ents□ Simula	ations Other					
	"Other" BASELINE source Interviews/surveys with use case family leaders and pilots										
Resp	Responsible UCP										
Desc	Description The expected results will be compiled in a white paper for project's dissemination.										

Table 26 KPI 3.1 definition.

GENERAL INFORMATION										
ID	KPI 3.1		Name	IAIIOI (ity offer	optim	isation		
Business	BUC Flex3.0 Fl	exibility for	capacity m	anagem						
UC/	SUC Flex4.0 O	•	•							
System UC	SUC Flex6.0 A	ctivate flexil	oility orders							
Use Case	Renewables□	Energy		omobilit	y□ F	lexibility	/⊠	N/A□		
		communitie								
Descriptio	Flexibility offer	•	, ,,							
n	From Aggregat	•	•		service ((Tecnali	a) and	d Flexibility		
Formula	order disaggregation service (Tecnalia) $\frac{\sum_{i=1}^{N} Flexibility \ of fers \ M32_i - \sum_{i=1}^{N} Flexibility \ of fers \ M20_i}{\sum_{i=1}^{N} Flexibility \ of fers \ M20_i}$									
Tormala		i =1	Σ^N Flexibil	$a_{i=1}$	M20.	,,				
	M20 – Month 2									
	M32 – Month 3	•	•	•	•		111			
Monitoring		•		•			ion			
	 Start monitoring at WP3 Use Cases and Services definition Continuing WP6 T6.5 implementation of services at Flexibility Use Case 									
	_	the verificat	•			s at 1 le	XIDIIIty	Ose Case		
	_	on WP6 T6 and analyse		tation, w	vhere th	e result	ing va	lues will be		
Units	%		Parent KP		[KPI Na	ame/ID]				
Reporting	Data upload ra	ate	Other		"Other		In the	end of the		
[to DWH]					upload	l rate	pilot			
	Information di	splay	Cumulated		Trer	nd⊠		N/A□		
			value□							
KPI	10% increase									
calculation										
trigger (&										
target value)										
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		CALCIII	ATIO	N/FYTE	RACTION N	VETHOL)CV				
Step				ription	<u>IACIION N</u>	LIIIOL		spons	ible		Data	i ID
1	,	and sum the nur tors and LECs b				•	MA	Α		Flex of fers M20		ers M20
2		and sum the nur				•	EDF)		Flex	c of fe	ers M32
	DATA COLLECTION											
Dat a ID	Data descripti n	descriptio (entity/respons			ta sink //responsi ble)	Dat collec meth	tion		ata ectio ite ra		col n	Data lectio time inge
1	Flex of fers	M2 MAIA		EDP		Databa s availat		N/A			N/A	
2	Flex of fers	M3 MAIA		EDP		Database N s available		N/A			N/A	
				В	ASELINE							
	BASELINE Literature□ H source "Other" BASELIN				ata⊠	Mea s□	sure	ment	Sim	ulati	ons	Other
Resp	ponsible Maia Municipality & Service developers											
Desc	The result will be benchmarked with respect to the information collected by Maia Municipality. The flexibility offer optimisation will be compared with the in OMEGA-X T6.5, to verify the objective outcome of Enabling new market roles, market participants and energy communities.								th that			

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Table 27 KPI 3.2 definition.

	GENERAL INFORMATION										
ID		KPI 3.2		Name		Incre LEC	eased reve	enu	es by the		
	ness UC/ em UC	BUC LEC 1.0 BUC LEC 2.0									
Use	Case	Renewables	Energy communities⊠	Electro	omob	oility	Flexibility	' □	N/A□		
Desc	ription	Increased eco	nomic profits LE								
Form	nula		mereuse	į	Reve	nues					
		Revenues _{M20} pilot implemen	= the total reven ntation	ues for L	_EC r	mana	agers at M	20	before the		
			Revenues $_{\rm M32}$ = the total revenues for LEC managers at M32 after the pilomplementation								
Moni	toring	 Start monitoring at WP3 Use Cases and Services definition 									
			ng on WP6 T6.3 r the verification	•			services	at L	EC Use Case		
		_	g on WP6 T6.6 k ted and analyse		ation	, whe	ere the res	sulti	ing values will		
Units	5	%		Parent	KPI	[KPI	Name/ID]			
Repo DWH	orting [to l]	Data upload	rate			"Other" upload rate		En	nd of the pilot		
		Information of	display	Cumula value□	ted	Т	rend⊠		N/A□		
	calculation er (target e)	10% increase									
			ATION/EXTRACT	ION WE	THO	DOL	OGY				
Ste p ID		Step des	cription		Re	spo	nsible		Data ID		
1			evenues by LEC ilot (M8 to M20)		Pilot owner			Revenues _{M20}			
2	_	Quantify the revenues by LECs after mplementing the pilot (M20 to M32)			Pilot owner			Re	evenues _{M32}		
3	Report the increment				RIN	A-C					

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			DATA COL	LECTION					
Dat a ID	Data descriptio n	Data source (entity/resp onsible)	Data sink (entity/respon sible)	Data collect metho	ion	Data collecti update i	on		llection range
1	Revenues _{M?}	Pilot owner	Pilot owner	Database N/A		N/A			
2	Revenues _M ;	Pilot owner	Pilot owner	Database N/A		N/A			
			BASEL	INE					
BASE		Literature□	Historical data⊠] M		urements	Sim	ulations	Other
		"Other" BAS	ELINE source						
Resp	Responsible Pilot owners								
Desc	Description Revenues by LEC the year before implementing the pilot, from M8 to M20							to M20.	

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Table 28 KPI 3.3 definition.

		GENERAL INFO	RMATION							
ID	KPI 3.3		Name	Incre	eased cor	nmur	nity RES			
					luction					
Business		exibility for interna								
UC/ System		exibility for conges								
UC		exibility for capacit ProsumerEngage								
		otimisation through				urnitic	3 Lileigy			
		LEC Operation a				on				
Use Case	Renewables□	Energy	Electromobi	lity	Flexibility	/⊠	N/A□			
		communities⊠			•.					
Description		oroduction (energy								
	•	whole community ble self-consumpt	· •	•						
		e different resourc								
	•	S production/optin								
	To be calculated	d in these pilots:								
	Maia (T6.5)									
	 Zaragoza (1 	Γ6.3)								
	Granollers (T6.3)								
	• Osimo (T6.3	• Osimo (T6.3)								
	Data to be provided by the Data Provider in each pilot: ISMAI, EyPESA,									
	EDP and Astea, respectively and calculation to be done by each pilot owner:									
Formula	Maia Municipality, EyPESA, EDP and Astea									
Torrida	`	\sum RES productio	m_{i}/\sum_{Tot}	al pr	$oduction_i$					
	4	=1	$\lim_{i \to 1} \int \frac{1}{i=1} di$							
		uring the validation								
		nth 20 of the project: 32 of the project:					on			
Monitoring										
		oring at WP3 Use								
		on WP6, T6.3	•				0,			
		es Use Case Fam se Case Family, f	•	•						
	_	•				Ŭ				
	•	n WP6 T6.6 KPI e	elicitation, who	ere tr	ne resultir	ng va	lues will be			
	collected ar				,	_				
Units Reporting Ite	%	10	Parent KPI Other	(KPI		_	ne end of			
Reporting [to DWH]	Data upload rat	e	Other		oad rate		pilots			
J,	Information dis	play	Cumulated		rend⊠		N/A□			
			value□	-						
KPI	Up to 60%									
calculation										
trigger (target value)										
Document name: [03.5 KPIs applicable in	n OMEGA-X			Page:	66 of	161			

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		CALCULA	TION/EXTRACTION	ON ME	THOD	OLO	GY				
Ste p ID			description					spons	ible	Data ID	
1	the pilot execution producti on, Tota producti onon										
	DATA COLLECTION										
Dat a ID	Data descript ion	Data source (entity/respons ible)	Data sink (entity/respon sible)	collec	Data Data ollection				co	Data collection time range	
1	RES productio n	Prosumer(s) in each pilot	Data provider for each prosumer in each pilot	Databa	ase	N/A	N/A		N/A		
2	Total production	Prosumer(s) in each pilot	Data provider for each prosumer in each pilot	Databa	ase	N/A			N/A		
			BASELIN	IE							
BAS sou	ELINE rce	Literature□ Historical data□ Measuremen ts□						nen Simulation Othe			
		"Other" BASELIN	IE source	N/A							
Res	ponsible	N/A									
Des	escription N/A										

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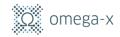


Table 29 KPI 3.4 definition.

			GENER	AL INFOR	MATION						
ID		KPI 3.4			Name			al nun vices	nber	of new	I
UC/ UC	iness System	All BUCs are rele	evant								
Use	Case	Renewables⊠		ergy unities⊠	Electro	mobili ⊠	ity	Flexib	oility	X N	I/A□
Des	cription	Number of service	ces provi	ded by ne	w marke	et parti	icipa	ants.		'	
	nula		N	, for each					"i"		
Mon	itoring	 Monitoring through Data Governance – updating every time a p adds or deletes a service Counting self-descriptions from catalogue 							rovider		
		-	iii-descri	piloris iroi			F1 (B		/		
Unit		No unit			Parent I		_	l Nam	ne/IL)]	
Rep DWI	orting [to ⊣ı	Data upload rat	е					her" oad r	ate		
J		Information dis	play		Cumulat value□			rend[N//	A□
KPI calc trigg	ulation ger	Marketplace laur	nch								
Targ	get Value	4 services									
		CALCULA	TION/FX	(TRACTIO	N METH	ODOI	.OG	Υ			
					MEIII	ODOL					
Ste p ID			descrip		T WILLI	<u>ODOL</u>			pon	sible	Data ID
р	Define if		descrip	otion	MEIII				ice	sible	
p ID		Stepnew market partici	descrip	otion				Serv Prov	ice ider VI	sible	
p ID 1	Count se participar	Stepnew market partici	pant of reactalogues of all	not gue for spe participan	ecific ma			Serv Prov	ice ider VI	sible	
p ID 1 2	Count se participar Make rep	Step new market partici If-descriptions from its ort of the response	pant of r n catalog es of all DATA	not gue for spe participan A COLLEC	ecific ma ts CTION	rket		Serv Prov ICON	ice ider VI		ID
p ID 1 2 3 Dat a ID	Count se participar Make rep Data descripti	Step new market partici f-descriptions from its ort of the response Data source (entity/respons	pant of ron catalogues of all Data (entity, sil	not gue for spe participan	ecific ma ts CTION Data collect metho	rket a iion od	co	Serv Prov ICOM ICOM Data llection	ice ider M M on ate	Da colle time	
p ID 1 2 3 Dat a	Count se participar Make rep Data descripti	Step new market partici of-descriptions from its ort of the response Data source (entity/respons	pant of r n catalog es of all DATA Data (entity)	participan A COLLEC a sink //respon ble)	ecific ma ts CTION Data collect metho Metadat	rket a tion od a	co upo Upo moo of	Serv Prov ICOM ICOM Data llection	ice ider M M	Da colle	ata ction range nentati
p ID 1 2 3 Dat a ID 1	Count se participar Make rep Data descripti on Report	Data source (entity/responsible) All Service	pant of ron catalogues of all Data (entity, sil	participan A COLLEC a sink /respon	ecific ma ts CTION Data collect metho Metadat	rket a iion od a	co upc Upc moo of cata	Serv Prov ICOM ICOM Data Ilection date ron difficat	ice ider M M M on ate	colle time I After implem on of market and se	ata ction range nentati
p ID 1 2 3 Dat a ID 1	Count se participar Make rep Data description Report	Data source (entity/responsible) All Service Providers	pant of responding to the catalog to	participan A COLLEC a sink //respon ble) BASELINI	ecific ma ts CTION Data collect metho Metadat	rket a tion od a Measu	co upo Upo moo of cata	Serve Prove ICOM ICOM ICOM ICOM ICOM ICOM ICOM ICOM	ice ider M M M on ate	Colle time I After implem on of market	ata ction range nentati
p ID 1 2 3 Dat a ID 1	Count se participar Make rep Data description Report ELINE	Step new market partici If-descriptions from its ort of the response Data source (entity/respons ible) All Service Providers Literature "Other" BASELIN	pant of responding to the catalog to	participan A COLLEC a sink //respon ble) BASELINI	ecific mates ts CTION Data collect metho Metadat	rket a tion od a Measu	co upo Upo moo of cata	Serve Prove ICOM ICOM ICOM ICOM ICOM ICOM ICOM ICOM	ice ider M M on ate ion	colle time I After implem on of market and se	ata ction range nentati cplace rvices Other
p ID 1 2 3 Dat a ID 1 BAS soul	Count se participar Make rep Data description Report ELINE rce	new market partici If-descriptions from its ort of the response Data source (entity/respons ible) All Service Providers Literature□ "Other" BASELIN NA	pant of responding to the catalog to	participan A COLLEC a sink //respon ble) BASELINI	ecific ma ts CTION Data collect metho Metadat	rket a tion od a Measu	co upo Upo moo of cata	Serve Prove ICOM ICOM ICOM ICOM ICOM ICOM ICOM ICOM	ice ider M M on ate ion	colle time I After implem on of market and se	ata ction range nentati cplace rvices Other
p ID 1 2 3 Dat a ID 1 BAS soul	Count se participar Make rep Data description Report ELINE	Step new market partici If-descriptions from its ort of the response Data source (entity/respons ible) All Service Providers Literature "Other" BASELIN	pant of responding to the catalog to	participan A COLLEC a sink //respon ble) BASELINI	ecific ma ts CTION Data collect metho Metadat	rket a tion od a Measu	co upo Upo moo of cata	Serve Prove ICOM ICOM ICOM ICOM ICOM ICOM ICOM ICOM	ice ider M M on ate ion	colle time I After implem on of market and se	ata ction range nentati cplace rvices Other
p ID 1 2 3 Dat a ID 1 BAS soul Res	Count se participar Make rep Data description Report ELINE rce ponsible cription	new market partici If-descriptions from its ort of the response Data source (entity/respons ible) All Service Providers Literature□ "Other" BASELIN NA	pant of responding to the catalog es of all DATA (entity sil ICOM	participan A COLLEC a sink /respon ble) BASELINI cal data	ecific ma ts CTION Data collect metho Metadat	rket a tion od a Measu	co upo Upo moo of cata	Serve Prove ICOM ICOM ICOM ICOM ICOM ICOM ICOM ICOM	ice ider M M on ate Simu	colle time I After implem on of market and se	ata ction range nentati cplace rvices Other



Table 30 KPI 3.5 definition.

		GENERAL INFO	RMATION							
ID	KPI 3.5		Name	Provision of fl	exibility to					
	DUO EL O O EL	21.224 6 6		grid						
Business UC/		exibility for congest efine the context of			I contracts					
System UC		anage flexibility nee		gement						
Use Case	Renewables□	Energy	Electromobi	ility Flexibility	⊠ N/A□					
	rtononabios <u></u>	communities□		, 10/110/110	,,					
Descriptio		Revenue increase from the provision of flexibility into the grid (avoided cost).								
n		ns, the possible ch	anges in the en	ergy price (M2	0 vs M32)					
	should be consi			··· (O	-I:4 - -\					
Formula	From Flexibility platform for DER connection planning service (Odit-E) $\sum_{i=1}^{N} Revenue \ from \ flexibility \ M32_i - \sum_{i=1}^{N} Revenue \ from \ flexibility \ M20_i$									
Tomidia	$\Delta_{i=1}$ Recentle j is				, 1V120 _i					
		$\sum_{i=1}^{N}$ Revenue from								
		of the project: Bef	•							
Monitoring	M32 – Month 32 of the project: After the pilot implementation									
Worldoning	Start monitoring at WP3 Use Cases and Services definition									
	Continuing on WP6 T6.5 implementation of services at Flexibility Use Case									
	Family for the verification of the KPI target									
	 Finalising on 	WP6 T6.6 KPI eli	citation, where	the resulting	values will be					
	collected and	analysed								
Units	%		Parent KPI	[KPI Name/ID]					
Reporting	Data upload ra	te	Other	"Other"	In the end of					
[to DWH]	In famous tile or all		Occurred at a st	upload rate	the pilot					
	Information dis	spiay	Cumulated	Trend⊠	N/A□					
KPI	>10%		value□							
INI I										
calculation	21070									
calculation trigger (&	21070									
trigger (& target	71070									
trigger (&										
trigger (& target value)	CALCI	JLATION/EXTRACTI	ON METHODO		Data ID					
trigger (& target	CALCI	JLATION/EXTRACTI ep description	ON METHODO	DLOGY Responsible	e Data ID					
trigger (& target value) Step ID Ident	CALCU Ste	ep description evenue from the pro	ovision of		Data ID Flex rev M20					
trigger (& target value) Step ID 1 Ident flexit	CALCU Ste ify and sum the r bility into the grid	ep description evenue from the probefore implementing	ovision of g the pilot.	Responsible DSO	Flex rev M20					
trigger (& target value) Step ID 1 Ident flexib	CALCU Ste ify and sum the r illity into the grid ify and sum the r	ep description evenue from the pro	ovision of g the pilot. ovision of	Responsible						

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					DATA COLL	ECT	ION				
Dat a ID	Data descript	onsible)		Data sink (entity/respo ble)		Data collection method	colle up	ata ection date ate	Data collection time range		
1	Flex rev M2	0	DSO		EDP		Databases available	N/A		N/A	
2	Flex rev M3	2	DSO EDP Databases N/A available			N/A					
					BASELII	NE					
BAS	ELINE rce	Lite	rature□	His	storical data⊠		Measurem	ents	Simula	ations	Other
		"Ot	her" BASEI	INI	Esource						
Res	ponsible	Mai	a Municipa	ity	& DSO						
Des	Pescription The result will be benchmarked with respect to the information collected by Maia Municipality. The provision of flexibility to grid will be compared with that in OMEGA-X T6.5, to verify the objective outcome of Enabling new market roles, market participants and energy communities.										

Table 31 KPI 3.6 definition.

		GENERAL INFO	RMATION		
ID	KPI 3.6		Name	New Busines	s Models
Business UC/ System UC	All Business us	se cases			
Use Case	Renewables⊠	Energy communities⊠	Electromobilit	ty⊠ Flexibility	⊠ N/A□
Description	Identification a	nd development of	potential new b	usiness mode	els
Formula	N/A				
Monitoring	N/A				
Units	N/A		Parent KPI	N/A	
Reporting [to DWH]	Data upload ra	ate		"Other" upload rate	N/A
	Information di	splay	Cumulated value□	Trend□	N/A⊠
KPI calculation trigger (target value)	4				

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CALCULATION/EXTRACTION METHODOLOGY									
Ste p ID	Step description						Responsible		a ID
1	Online course on business modelling with pilots							1.1	
2	Onsite wor	Onsite workshop for the development of business models UCP 1.2							
DATA COLLECTION									
Dat a ID	Data descripti on	Data source (entity/responsi ble)	Data sink (entity/responsi ble)	Data collecti on method	collec	Data ollection update rate		Data collection time range	
N/A	N/A	N/A	N/A	N/A	N/A N/A				
BASELINE									
BASELINE source		Literature⊠	Historical data⊠	Measure			nulations		Other ☑
		"Other" BASELINE source Online course and worksh			rksho	р			
Res	Responsible UCP								
Des	Description The expected results are a business model developed for each pilot.								

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Table 32 KPI 3.7 definition.

GENERAL INFORMATION									
ID	KPI 3.7	KPI 3.7		Discovering of CPO/eMSP offers					
Business UC/ System U	descriptions BUC_1.2: [Boodescriptions BUC_2.1: [Sel	BUC_1.2: [Booking] - MSP receives B2C eMSP charging services offers							
Use Case	Renewables	Energy communities		/ Flexibility□	N/A□				
Description	spaces. It coul (owned by eM It supposes the services data of	Data describing charging services offers are available on OMEGA-X data spaces. It could be either B2B roaming offers (Owned by CPOs) or B2C offers (owned by eMSP). It supposes that CPO and/ or eMSP has agreed to expose their charging services data description on OMEGA-X data space, either directly or via an EV interoperability Service provider.							
Formula		Number of CPO or eMSP directly connected or via an EV interoperability Service provider							
Monitorin	g N/A								
Units	Company		Parent KPI N/A	[KPI Name/ID]					
Reporting [to DWH]		Data upload rate		"Other" upload rate	N/A				
	Information d	nformation display		Trend□	N/A ⊠				
KPI calculatio trigger (target value)	calculation trigger (target value)								
CALCULATION/EXTRACTION METHODOLOGY Step ID Step description Responsibl Data ID									
Step ID		Step description			Data ID				
1	OMEGA-X data p	of CPO and eMSP to provision contracts	hat agree to sign	CPO/eMS P data provision contracts					
2	Aggregates the r	umber signatures		Coordinator (EDF) Total CPO/eMS					

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			DATA COLLECTIO	N					
Data ID	Data descript ion	Data source (entity/respo nsible)	Data sink (entity/responsi ble)	Data collecti on method	Da colled update	ction	colle	ata ection range	
CPO/eM SP data provisio n contract s	Signatur es	Coordinator (EDF)		N/A	N/A		N/A		
			BASELINE						
BASELINE	source	Literature□	Historical data□	Measurer	nents	Simula □	tions	Other ⊠	
		"Other" BASEL	INE source	E source No active operators yet					
Respons	Responsible EDF								
Description Service doesn't exist yet; the use case is here to show that having multiple operators in a reservation process in feasible							ng		

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Table 33 KPI 3.8 definition.

			GENERAL	INFOR <i>i</i>	MATIC	ON			
ID		KPI 3.8		Name		Chargi claims	ng points open	for (GCO
Busi UC/ S UC	ness System		If Consumption certificate in the				o store a charg	je	
Use (Case	Renewables	Energy comm	unities	Elect	romobil ⊠	ity Flexibility		N/A□
	ription	 Number of charging points available on OMEGA-X Data spaces at which an EV User can claim a GCO when charging his EV. It supposes that: An EV user is able to give consent to his eMSP, and eMSP connected parties, to make his own EV User Charge Detail Record (CDR) available on the OMEGA-X Data Space in order to be registered on the appropriate GCO registery by the Granular Certificates (GCO) Registery Operator. eMSP has agreed to expose CDR of its consenting customers directly, or indirectly, to Granular certificates (GCO) registry operator via OMEGA-X Data space 							
Form	iula	Number of cha	arging points o	pen for	GCO				
Moni	toring	N/A							
Units	;	Charging Poir	nt	Parent	KPI	[KPI N	ame/ID]		
Repo [to D	orting WH]	Data upload				"Other rate	" upload		
		Information of	lisplay	Cumula value□		-	Γrend□	1	N/A ⊠
KPI calcu trigg (targ value	et	At least 2 cha	•				,		
		CALC	ULATION/EXTR	RACTIO	N ME	THODO	LOGY		
Step ID		Ste	p description				Responsible		Data ID
1	consent	eMSP that agrees to expose CDR of their ing customers to Granular certificates (GCO) operator via OMEGA-X Data space							
2	these eMSP charging services Offer charging points available through charging these eMSP charging services of the charging point charging point charging point charging points available through						arging		
3	Aggrega	ates the numbe	r of charging p	oints			ELIA		

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	DATA COLLECTION								
Data ID	Data descripti on	Data source (entity/responsible)	Data sink (entity/resp onsible)	colle	ata ction hod	Da colled update	ction	coll	ection range
eMSP open to GCO	List of eMSP	eMSP or E\ Interperablity y service provider		List		N/A		N/A	
eMSP chargin g point covera ge	Nb of charge point	eMSP	GCO Registry	Declarative		N/A		N/A	
			BASEL	INE					
BASELIN	e□		storical data□	s□ □				Other ⊠	
	"Other" BASELINE source Currently no baseline for this metric for a similar service						c for a		
Respon		ELIA							
Descrip	tion	Objective to	reach multiple	chargir	ng point	S			

Table 34 KPI 3.9 definition.

		GENERAL INF	ORM	ATION				
ID	KPI 3.9		Nan	ne (Cross bo	order exchan	ge of GCO	
Business UC/ System UC		elf Consumption] certificate in the				store a cha	rge	
Use Case	Renewables	Energy communities		Electron	-	Flexibility] N/A□	
Description	sense of	 The demonstrator will cover cross border exchange of GCO in the sense of 						
		 The EV user charges his EV in Country A and claims for a match of this GCO consumption with a GCO -Production made on a country B. 						
	 The marketplace on which this exchange will happen will guarantee temporal matching, meaning the certificate exchange between the countries must be based in the same time-period and owned by the same user. 							
Formula	Number of cro	oss border exch	ange	S				
Monitoring	n/a							
Units	cross border	exchanges	Pare	ent KPI		l Name/ID]		
Reporting [to DWH]	Data upload	rate				her" pad rate		
	Information of	display	Cun valu	nulated e□		Trend□	N/A ⊠	
KPI calculation trigger (target value)	2 EU countrie	S						

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	CALCULATION/EXTRACTION METHODOLOGY								
Step ID			Step descr			Responsible	Data ID		
1	cons	enting custo	hat agreed to omers to Gran via OMEGA-	ular certifi	cates (GCO)	ELIA	eMSP open to GCO		
2			of countries a services Offer		rough these	ELIA	eMSP country coverage		
3	Flag	the GCO pi	roduction Regi		ELIA	Number of GCO production registry			
4		the number uction Regis	of countries o	these GCO	ELIA	GCO production registry country coverage			
5	Flag (4)	the number	of common c	etween (2) &	ELIA	Common countries			
6		ulates the n 2)*(3)*(4)] -	ELIA	Number of cross border situations					
Doto		Data		ATA COL		Data	Doto		
Data	טו ו	Data descripti on	Data source (entity/resp onsible)	Data sink (entity/r esponsi ble)	Data collection method	Data collection update rate			
eMSP open t GCO		Nb of eMSP	eMSP or EV Interperablit		List	N/A	N/A		
			y service provider						
eMSP countr covera	y age	Nb of country	provider eMSP		Declarative	N/A	N/A		
countr	y age er of ction		provider		Declarative list	N/A	N/A		
countr covera Number GCO produc	y age er of etion y etion y y y	country Nb of	provider eMSP			N/A	N/A		

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BASELINE									
BASELINE source	Literature□	Historical data□	Measurements	Simulations	Other				
			\boxtimes						
	"Other" BAS	SELINE source							
Responsible	ELIA								
Description		CDR's (which would certificates)	ld have to be exch	anged with					

Table 35 KPI 3.10 definition.

	GENERAL INFORMATION								
ID	KPI 3.10		Name	Increased rev	enue fron	n SMEs			
Business UC/	BUC LEC 1.0	O&M							
System UC	BUC LEC 2.0	ECO							
Use Case	Renewables	Energy communities	Electrom	obility□ Fle	xibility□	N/A□			
Description	Increased eco	ncreased economic profit from SME that participate in the project.							
Formula	SMF Rewent	$SME \ Revenues_{increase} = \frac{SME \ Revenues_{M32} - SME \ Revenues_{M20}}{SME \ Revenues_{M32}} \cdot 100$							
	BIII Revent	$SME Revenues_{M20}$ $SME Revenues_{M20}$							
	SME Revenue implementatio	es _{M20} = the tota	il revenues at	: M20 before th	ne pilot				
	'	:: es _{M32} = the tota	l revenues at	M32 after the	nilot				
	implementatio		ii rovoridoo di	. WOZ GROT THO	pliot				
Monitoring	Start monitor	oring at WP3 U	se Cases an	d Services def	inition				
		on WP6 T6.3 in everification of	•		at LEC Us	se Case			
		n WP6 T6.6 K I and analysed		where the re	sulting va	lues will			
Units	%		Parent KPI	[KPI Name/ID)]				
Reporting [to DWH]	Data upload	rate	Other	"Other" upload rate	End of the	ne pilot			
	Information display Cumulated value□ Trend⊠ N/A□								
KPI calculation	15% increase								
trigger (target value)									

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		CALCULAT	ION/EXTRACTIO	N METHO	DOLOGY				
Step ID		Step de	scription		Respons	sible	Dat	ta ID	
1			evenues by SME bilot (M8 to M20)	involved	SME		SME R	evenues,	
2		e revenues by ng the pilot (M	SME involved afto 20 to M32)	er	SME		SME R	evenues ₁	
3	Report the	increment			RINA-C				
	DATA COLLECTION								
Data ID	Data descripti on	Data source (entity/resp onsible)	Data sink (entity/respons ible)	Data collecti on method	Data [collection update rate		Data collection time range		
1	Revenues _M	SME	SME	Databas e	N/A		N/A		
2	$Revenues_M$	SME	SME	Databas e	N/A		N/A		
			BASELINI	E					
BASEL	INE source	Literature□	Historical data⊠	Meası	urements	Simu □	lations	Other	
		"Other" BASELINE source							
Respo	nsible	SME							
Descr	Revenues by SME the year before implementing the pilot, from M8 M20.						M8 to		

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Table 36 KPI 3.11 definition.

			GENERAL INF	ORMATION	1				
ID		KPI 3.11		Name				of utilisation of sincreased.	
Busin Syster	ess UC/ m UC	BUC LEC 1.0 BUC LEC 2.0 BUC LEC 3.0	ECO	ing					
Use C	ase	Renewables	Energy communities	Electrom	obilit	y Fle	xibility	□ N/A□	
Descr	iption	Increased usa	ge of public da	ata		'			
Formu	ıla	Public Data	usage _{increase} Public Do =	ata usage _{M:} Public L	₃₂ – 1 Data 1	Public usage	Data M20	$usage_{M20} \cdot 100$	
		implementatio	ublic data usage $_{\rm M20}$ = the total use of public data at M20 before the pilot uplementation ublic data usage $_{\rm M32}$ = the total use of public data at M32 after the pilot						
		implementatio	•	Jiai use oi į	Jublic	, uala	at ivio	z aitei tile pilot	
Monito	oring	ContinuinCase FarFinalising	nily for the ver	6.3 implemoification of the KPI elicitation	entat the K	ion of PI tar	servio	efinition ces at LEC Use sulting values will	
Units		%		Parent KF	P	[KPI N	lame/l	D]	
Repor DWH]	ting [to	Data upload	rate	Other		"Othe uploa rate		End of pilot	
		Information o	lisplay	Cumulated value□	t	Trer	nd⊠	N/A□	
	alculation r (target	25% increase							
		CALCULATION/EXTRACTION METHODOLOGY							
Step ID			Step description Respon Data ID sible						
1		d quantify the uning the pilot (Ma		ata before	Pilot own		Publi	c Data usage _{M20}	
2	_	e use of public I20 to M32)	data after imp	lementing	Pilot own		Publi	c Data usage _{M32}	
3	Report the	increment			RIN	A-C			

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		CALCULATION	ON/EXTRACTION	ON METH	OD	OLOG'	1			
Step ID		Step desc	ription		Respon sible			Data ID		
1		ntify and quantify the use of public data before plementing the pilot (M8 to M20)						Public Data usage _{M20}		
2	Quantify the u the pilot (M20	•	lata after imple	menting	Pilo		Publi	c Data u	$sage_{M32}$	
3	Report the inc	rement			RIN	IA-C				
			DATA COLLE	CTION						
Data ID	Data description	Data source (entity/res ponsible)	Data sink (entity/resp onsible)	Data Da collection collection method upd			ction ate		ollection range	
1	Public Data usage,	Pilot owner	Pilot owner	Databas	е	e N/A		N/A		
2	Public Data usage,	Pilot owner	Pilot owner	Databas	е	N/A		N/A		
			BASELIN	NE						
BASEL	INE source	Literature□	Historical data	a⊠ Mea	asur	ements	Sim	ulations	Other	
		"Other" BASELINE source								
Respo	onsible	nsible Pilot owners								
Descr	iption	Public data to N	use in the pilot 1/20.	the year l	befo	re impl	ement	ting the p	oilot,	

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Table 37 KPI 3.12 definition.

			GENERAL IN	FORM	ATION		GENERAL INFORMATION									
ID		KPI 3.12		Name	;	Но	useholds c	onne	ected							
	ess UC/	BUC_2.2: [Pro				sto	re a produc	tion								
Syster		certification in		gistery												
Use Ca	ase	Renewables	Energy		Electromobi	lity	Flexibility		N/A□							
			communities		×											
Descri	ption	The demonstra	ator shows th	nat:												
		 A househ 	old (produce	er) car	n be connec	ted	behind the	e me	eter and							
			•	•	e issued, carı											
		•			rigin of the p		•		·							
		• Through t	 Through the Omega-X dataspace, the households can connect with 													
		the GCO registry which will store the production certificates.														
Formu		Number of hou	useholds issu	ing pr	oduction cert	ifica	tes									
Monito	oring	n/a														
Units	Character and	Households		Parer	nt KPI		Name/ID									
DWH]	ting [to	Data upload r	ate				ther"									
рмиј		Information d	ienlay	Cumi	ılated value			NI/A								
			ispiay	Cumc	ilateu value		Γrend□	N/A	. Z							
KPI ca	Iculation	Count numbe	r of househol	lde												
	(target	Count numbe	i di fidusefidi	ius												
value)	(tai got															
		CALCULAT	ION/EXTRAC	CTION	METHODOL	OG'	Y									
Step		Step	description)			Responsi	ble	Data							
I.B.																
ID		ID.														
1 1		ls providing inje	ection data to	the m	etered data	1	MDC		Injecti							
	Household collector (I		ection data to	the m	etered data	1	MDC		on							
1	collector (I	MDC)							on data							
	collector (I						MDC DHO		on data DHO							
1	collector (I	MDC)							on data							
2	Data hub of MDC	MDC) operator (DHO)	receiving ac	cess to	o data from		DHO	ICET	on data DHO access							
1	Data hub of MDC	MDC)	receiving ac	cess to	o data from			ıcer	on data DHO access							
2	Data hub of MDC	MDC) operator (DHO)	receiving ac	cess to	o data from		DHO	ıcer	on data DHO access Produ cer							
2	Data hub of MDC	MDC) operator (DHO)	receiving ac	cess to	o data from ouseholds		DHO	ıcer	on data DHO access							
2	Data hub of MDC	MDC) operator (DHO)	receiving ac	and h	o data from ouseholds		DHO		on data DHO access Produ cer							
2 3	Data hub of MDC GCO regis	MDC) operator (DHO) stry receives da	receiving acta from DHO	and h	o data from ouseholds		DHO DHO/Produ		on data DHO access Produ cer data							
1 2 3	Data hub of MDC GCO regis	operator (DHO) stry receives da	receiving acta from DHO DATA CO Data sink	and h	o data from ouseholds	Co	DHO/Produ Data	col	on data DHO access Produ cer data Data							
1 2 3	Data hub of MDC GCO regis Data description Metering	Data source (entity/respo nsible) Producer	receiving acta from DHO DATA CO Data sink (entity/res	and h	o data from ouseholds	Co	DHO/Produ Data Data Dilection date rate	col	on data DHO access Produ cer data Data lection e range							
2 3 Data ID Injection	Data hub of MDC GCO regis Data description	Data source (entity/responsible)	receiving acta from DHO DATA CO Data sink (entity/res ponsible)	and h	o data from ouseholds	coup	DHO/Produ Data Data Dilection date rate	col	on data DHO access Produ cer data Data lection e range							
2 3 Data ID Injecti on data	Data hub of MDC GCO regis Data description Metering data	Data source (entity/responsible) Producer meter	ta from DHO DATA CO Data sink (entity/res ponsible) MDC	and h	o data from ouseholds	coup	DHO/Produ Data Data Dilection date rate	col time	on data DHO access Produ cer data Data lection e range							
2 3 Data ID Injecti on data Produ	Data hub of MDC GCO regis Data description Metering	Data source (entity/respo nsible) Producer	receiving acta from DHO DATA CO Data sink (entity/res ponsible) MDC GCO	and h	o data from ouseholds	coup	DHO/Produ Data Data Dilection date rate	col	on data DHO access Produ cer data Data lection e range							
2 3 Data ID Injecti on data	Data hub of MDC GCO regis Data description Metering data	Data source (entity/responsible) Producer meter	ta from DHO DATA CO Data sink (entity/res ponsible) MDC	and h	o data from ouseholds	coup	DHO/Produ Data Data Dilection date rate	col time	on data DHO access Produ cer data Data lection e range							

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		BASELINI	E			
BASELINE source	Literature□	Historical data□]	Measurements	Simulations	Other
						\boxtimes
	"Other" BAS	ELINE source	No	baseline today		
Responsible	ELIA					
Description	New service					

Table 38 KPI 4.1 definition.

		G	ENERAL INFORA	MATION				
ID		KPI 4.1		Name	New Ope		urce	
Busin Syster	ess UC/ m UC	All						
Use C	ase	Renewables	Energy	Electromobi	-	•	N/A□	
Descr	intion		Image: Section of the communities in the communities is a section of the communities in the communities is a section of the communities in the communities is a section of the communities in the communities is a section of the communities in the communities is a section of the communities in the communities is a section of the communities in the communities is a section of the communities in the communities is a section of the communities in the communities is a section of the communities in the communities is a section of the communities in the communities is a section of the communities in the communities is a section of the communities in the communities is a section of the communities in the communities is a section of the communities in the communities is a section of the communities in the communities is a section of the communities in the communities in the communities is a section of the communities in the communities in the communities is a section of the communities in the communit					
Formu		$\sum_{i=1}^{N} NEW_Compo$	•	тропото ра	ionorioa or	1100	, Old Tab	
	Active monitoring starting at WP3 architecture definition and on WP4/WP5 development activities so that NEW open-source modules or extensions of previous open source modules are by the project, specially aiming at contributing to listed/used in and/or Gaia-X reference implementations.						urce re produced d in IDSA	
Units		No units		Parent KPI	[KPI Nam	ne/ID]	
Repor DWH]	ting [to	Data upload ra	ate		"Other" upload rate			
		Information d	isplay	Cumulated value□	Trend□		N/A⊠	
KPI ca	alculation r	2 components						
		CALCULATIO	N/EXTRACTION	N METHODOL	.OGY			
Step ID		Step d	lescription		Resp sibl		Data ID	
1	Flag NEW C	pen-Source co	mponents on dev	velopment	Modul develo ers		NEW_Comp onent _i	
2	Aggregate n	umber of NEWo	pen source com	ponents	ATOS		Total Components	
			DATA COLLECT	ION				
Data ID	Data Data source Data sink descriptio (entity/responsible) sible)			Data collection method	Data collectio n update rate		a collection me range	
1	NEW_Com ponent _i	Component developers	Coordinator	Notification	N/A	N/A	.	

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	BASELINE										
BASELINE source	Literature□ Historica data□	al I	Measurements□	Simulations□	Other⊠						
	"Other" BASELINE so	ource	Data Space Refe	rence Architect	ures						
Responsible	ATOS										
Description	The result will be ben Architectures of siste modules used will be	r project	s. The number of	NEW Open-So	ource						

Table 39 KPI 4.2 definition.

GENERAL INFORMATION	ON						
ID KPI 4.2 Name	Connec	ctor					
Business UC/ All							
System UC							
	mobility	Flexibil	lity⊠	N/A□			
	X						
Description Standard connectors for vertical interop	perability						
Formula $\sum_{i=1}^{N} Connector_{i}$							
Monitoring Usage of open source and IDSA/Gaia-2							
proper reuse of the connector along the							
Promote the extension of the connector as part of the project outcomes Units Parent KPI [KPI Name/ID]							
Units No units Parent KPI	"Other						
Reporting [to Data upload rate DWH]	upload						
Information display Cumulated	Tren			 √/A⊠			
value□	11611	u⊔	ı	N/A			
KPI 1 opens source connector used in all 4	OMEGA-	·X use ca	ase fai	milies			
calculation	· · · · · · · · · · · · · · · · · · ·	, , ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,					
trigger							
CALCULATION/EXTRACTION ME	THODOLO	OGY					
Step Step description		Respon	1	Data ID			
ID		sible					
1 Present Connector to Use Case developers		ATOS	Conr	nector			
2 Implement the connector in use cases		Use		nector_impl			
		case	eme	nted			
		develop					
2 Count instances of the compositor		ers	Tata	l			
3 Count instances of the connector BASELINE		ATOS	Tota	l_connector			
	surements	Simu	ılations	C Oth on V			
BASELINE source Literature Historical data Meas	Surement		iiations	Other⊠			
"Other" BASELINE source Data S	Space Ref	erence /	Δrchite	octures			
Responsible ATOS	pado Ital	01011007	N O I II C	ocuros			
Description The connector should be compliant	with both	IDSA ar	nd Gai	a-X			
specifications.		.20, (a.	i a ca	4 / (
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Table 40 KPI 4.3 definition.

			G	ENERAL INFORM	NOITA					
ID		KPI 4.3			Nam	ie		APIs for perability		
	ness UC/ em UC	All								
Use	Case	Renewat	oles⊠	Energy commur	ities⊠	Electro y[mobilit ⊠	Flexib	ility	N/A □
	cription			Spaces technica r data/services fr						a
Forn		$\sum_{i=1}^{N} API_{i}$								
	itoring	WP4/WP5 horizontal way the O	develor services	starting at WP3 a pment activities s s and allowing ex X Marketplace do	o that a ternal d es insid	n API is ata spac le the pr	provide ces to in oject.	ed on to nteract t	p of he sa	the
Units	S	No units			Pare	ent KPI	[KPI N	lame/ID		
Repo	orting [to	Data uplo	ad rate				"Othe			
		Information	on displ	lay	Cum valu	ulated e□	Tre	nd□	N/	A⊠
KPI calcu trigg	ulation Jer	1 Open Al	PI							
		CAL	CULATIC	ON/EXTRACTION	METHO	DDOLOC	GY			
Ste p		CAL		ON/EXTRACTION description	METHO	ODOLOG		espons	sible	а
	Flag API	on developm	Step	description	METHO	<u>ODOLO(</u>	R	.PI		
p ID			Step	description	METHO	ODOLOG	R A d			a ID API _i Tot al API
p ID 1		on developm	Step	description		DDOLOG	R A d	.PI evelope		a ID API _i Tot al
p ID 1	Aggregat	on developm	Step nent pha APIs	description se DATA COLLECT	ION		A d	.PI evelope .TOS	ers	a ID API _i Tot al API
p ID 1		on developm e number of Data so	Step nent pha APIs ource sponsi	description	ION [Data lection ethod	A d A	.PI evelope	Da colle	a ID API, Tot al API s ata ectio ime
p ID 1 2 Dat a ID	Aggregat Data descript on	on developmente number of Data so	Step nent pha APIs ource sponsi	DATA COLLECT Data sink (entity/respons	ION [si coll m	Data lection ethod	Da colle updat	PI evelope TOS	Da colla n t	a ID API, Tot al API s
p ID 1 2 Dat a	Aggregat Data descript	on developm The number of The Data so	Step nent pha APIs ource sponsi	DATA COLLECT Data sink (entity/respondel) Coordinator	ION [si coll m	Data lection	A d A	PI evelope TOS ata ction	Da colle	a ID API, Tot al API s ata ectio ime
p ID 1 2 Dat a ID 1	Data descript on	on development of the number o	Step nent pha APIs ource sponsi) oper	DATA COLLECT Data sink (entity/respondel) Coordinator BASELINE	ION [Si coll mo	Data lection ethod ication	Da colle updat	PI evelope TOS ata ction te rate	Da colle n t rai N/A	a ID API, Tot al API s ata ectio ime nge
p ID 1 2 Dat a ID 1	Data descript on API	on developmente number of Data so	Step nent pha APIs ource sponsi) oper	DATA COLLECT Data sink (entity/respondel) Coordinator	ION [Si coll mo	Data lection ethod	Da colle updat	PI evelope TOS ata ction	Da colle n t rai N/A	a ID API, Tot al API s ata ectio ime nge
p ID 1 2 Dat a ID 1 BASE	Data descript on API	on development of the number o	APIs Durce sponsi Oper Histo	DATA COLLECT Data sink (entity/respondule) Coordinator BASELINE prical data	lON Si col mo Notif	Data lection ethod ication	Da colle updat	ata ction te rate	Da colle n t rai	a ID API, Tot al API s ata ectio ime nge
p ID 1 2 Dat a ID 1 BASE sour	Data descript on API ELINE	on development of the number o	APIs Durce sponsi Oper Histo	DATA COLLECT Data sink (entity/respondule) Coordinator BASELINE prical data	lON Si col mo Notif	Data lection ethod iication suremer	Da colle updat	ata ction te rate	Da colle n t rai	a ID API, Tot al API s ata ectio ime nge
p ID 1 2 Dat a ID 1 BASE sour	Data descript on API	on development of the number o	Step nent pha APIs ource sponsi) oper Histo SELINE s	DATA COLLECT Data sink (entity/respondule) Coordinator BASELINE prical data	Notif	Data lection ethod fication suremer Referen	Da colle update N/A Total Simulate Archererence	ata ction e rate ulations	Da colle n t ran N/A	a ID API, Tot al API s ata ectio ime nge

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Table 41 KPI 4.4 definition.

		GENERAL IN	FORMATION							
ID	KPI 4.4		Name		oer of data een pilots	sets	shared			
Business UC/ System UC	BUC LE SUC LE SUC LE	C 1.0 O&M C 2.0 ECO C 3.0 Al algorith C 4.0 Benchma C 6.0 Provide d	rking	and K	PI					
Use Case	Renew ables□	3) 10/10/10/10/10/10/10/10/10/10/10/10/10/1								
Description	Number	of datasets								
Formula		Shared dat rents months sh rior months sha	ared dataset	f share shared	th Growth ed datasets _M l datasets _M _	$-\frac{1}{1}-1$	- 100			
Monitoring	the Sta Cor Cas Fina	on identification change in number monitoring at a strain tinuing on WP6 se Family for the alising on WP6 be collected an	per of shared WP3 Use Ca T6.3 implen to verification of T6.6 KPI elici	datase ses ar nentati of the I	ets nd Services ion of serv KPI target	s defi	inition at LEC Use			
Units	%		Parent KPI	[KPI I	Name/ID]					
Reporting [to DWH]	Data up	load rate	Monthly	"Oth	er" ad rate					
		tion display	Cumulated value□	Tı	rend⊠		N/A□			
KPI calculation trigger (target value)	20% increase									
	CALCU	LATION/EXTRA	CTION METH	ODOL	OGY					
Ste p ID	Ste	o description			Respons	ible	Data ID			
1 Identify the nur specific mome		nared data sets every month.	starting from	a	Pilot owne	er	М			
	Divide the current months total number of shared datasets with the prior months total M-1									

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			D	ATA	CO	LLECTIC	N		
Dat a ID			tion Data source (entity/res ponsible)		Data sink (entity/res ponsible)		Data collection method	Data collection update rate	Data collecti on time range
1	Nr of shared d	atasets	Pilot ow	ner	Pilo	t owner	Database	monthly	monthly
2	Nr of shared d	atasets	Pilot ow	ner	Pilo	t owner	Database	monthly	monthly
3	Public Data us	age _{M20}	Pilot ow	t owner Pilo		t owner Database		N/A	N/A
				ı	BASE	LINE			
BASE	ELINE source	Literati	ure Historic			al data	Measurements ☐	Simulations	Other
		"Other	ther" BASELINE N/A						
Resp	oonsible	N/A							
Desc	Description N/A								

Table 42 KPI 4.5 definition.

		GENER	AL INFO	DRM <i>A</i>	ATION				
ID	KPI 4.5			Nam	10		Complete toolbox validated in large-scale pilots		
Business UC/ System UC	All								
Use Case	Renewables		ergy inities⊠	Ele	ectromob	ility	Flexib	oility⊠	N/A
Description	the Data Space (developed in scale pilots in real life scena	OMEGA-X will produce a toolbox composed of a common infrastructure for the Data Space (developed in WP4) and data and service marketplaces developed in WP5). This complete toolbox will be implemented in large-cale pilots in WP6 in order to demonstrate its robustness and scalability in the scenarios. These components are implemented and validated in presommercial real-life scenarios scale involving all the energy value chain.							
Formula	$\sum_{i=1}^{N} Component_{i}$								
Monitoring									
Units	No units			Pare	ent KPI		[KPI Nan	ne/ID]	
Reporting [to DWH]	Data upload	rate					"Other" upload r	ate	
	Information	display		С	umulate value□	d	Trend		N/A⊠
KPI calculation trigger (& target value)	2 components	S							
Document name:	D3.5 KPIs applicab	ole in OMEGA->	(Page:	86 of 1	61
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			CALCUL	ATION/EXTRACT	ION METHO	DOLO	GY				
Step ID			St	tep description		Resp			sponsi	sponsible	
1			ponents of to UC leade	the common infra ers	astructure fo	or the		ATC	os		
2		Present components of data and service marketplaces to UC leaders									
3	Validate components of the toolbox in UC										
4 Aggregate number of validated toolboxes EDF											
	DATA COLLECTION										
Data ID	Data descri ption		ta source ity/respon sible)	Data sink (entity/respon sible)	Data colle metho			Data collection ipdate rate		Data collectio n time range	
1	IDS/Gi thub	Serv Deve	rice elopers	UCF leaders	Notification	ı	N/A	A			7-M36
				BASELI	NE						
BASEL	BASELINE source Literature ☐ Historical data☐ Measuremen Simulatio ns☐ Other ☐										
	"Other" BASELINE source Similar project										
Respo	nsible		EDF								
Descr	Description The result will be benchmarked with respect to the sister projects.										

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Table 43 KPI 5.1 definition.

			GENERAL IN	FOR <i>i</i>	MATION					
ID		KPI 5.1		Nan	ne	Ana	lytic s	ervic	es	
	iness System	All BUCs and S	SUCs.							
Use	Case	Renewables ⊠	Energy communities⊠	Ele	ectromobili	ity⊠	Flexib	ility⊠	I N/A□	
Des	cription	Deploy 10+ dat	ta analytic energy	serv	vices in the	es in the scope of use case families.				
Forr	nula	Deį	$\sum_{i=1}^{N}$ $ployedService_{i} =$		oyedServi f Service _i otherwise		oeen de	eploy	ved	
Mon	itoring	Monitoring with services develo	in WP5, specially opment.	with	in T5.1 an	id T5.	2, which	ch ar	e focused on	
Unit	s	N/A		Pare	ent KPI	[KP	l Name	e/ID]		
	orting DWH]	Data upload ra	ate	Mor	nthly		her" oad ra	ite		
		Information di	splay	Cun valu	nulated ıe⊠	Т	rend□		N/A□	
KPI calc trigg	ulation ger	10 Analytic ser	vices deployed							
		CALC	JLATION/EXTRAC	CTIOI	N METHOI	DOLC	GY			
Ste p ID		Ste	p description			Re	espon e	sibl	Data ID	
1		on services depled into the Use (oyed once they a Case Family.	re be	eing	Fa	e Cas mily ader	e	DeployedServi	
2		ite the total num use case famili	nber of services d es.	eploy	ed in the	UF	C		Total	
			DATA CO	LLEC	TION					
Dat a ID	Data descrip on	Data source ti (entity/respo			Data collecti on method	colle n up	ata ectio date ite		ta collection time range	
1	Deploye Service		UC Family leader		Notificati on	N/A		N/A		
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		BASELINE				
BASELINE source	Literature□	Historical data□		Measurement s□	Simulations	Other⊠
	"Other" BASELIN	NE source	Siı	milar projects		
Responsible	UPC					
Description	The result will be	benchmarked wit	h r	espect to the si	ster projects.	

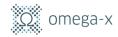
Document name:	Document name: D3.5 KPIs applicable in OMEGA-X						
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Table 44 KPI 5.2 definition.

	GENERAL INI	ORMATION		
ID	KPI 5.2	Name	Data analytics ser	rvices for
Business UC/ System UC	BUC Ren PV O&M Optimization BUC Ren PV Smart Grid Integra			
	Energy Generation Forecast se	rvice would als	so be tested in:	
	BUC Flex1.0 Flexibility for interest.	ernal prosume	r portfolio optimiza	tion
	BUC Flex2.0 Flexibility for core	ngestion mana	gement with bilate	ral contracts
	BUC Flex3.0 Flexibility for cap	pacity manage	ment with market	structures
	BUC LEC-ECO ProsumerEng Consumption Optimisation this	•	~ *	nities Energy
	 BUC LEC-O&M: LEC Operation 	on and Mainte	nance Optimization	n
Use Case	Renewables⊠ Energy communities⊠	Electromob	ility Flexibility⊠	N/A□
Description	The KPI counts the new data ar implemented, and validated in the proposed: Predictive Maintenance for Benchmarking Digital Twin BIPV Self Constitution Detect to measurement error Detect non-technical losses Congestion detection Detection of the volatility penetration Plan grid reinforcements for Energy Generation Forecast Compare actual production PV Cleaning Advisor Shading Analysis. Tracking algorithm check	ne pilots. By the large PV plant sumption Systems of voltage of voltage or future renewant	ts ts ems in Buildings in grids with high	3 are
Formula	$\sum_{i=1}^{N} Service_{i}$			

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				GENERAL INF	ORMATION					
Moni	itoring	Sta	art monito	oring at WP3 Use	Cases and S	Services de	finition	1		
		Ca: Use Ca: • Fin	Case Family, T6.3 implementation of services at Energy Communities Use Case Family and T6.5 implementation of services at Flexibility Use Case Family, for the verification of the KPI target							
Units	 S	N/A		<u> </u>	Parent KPI	5.1/Analyti	c serv	ices		
	orting		Oata upload rate Other Other Other Other At the end of the pilot activities (M32)							
		Informa	nformation display Cumulated Trend□ N/A□ value⊠							
trigg (targ	KPI 15 services calculation trigger (target value)									
	CALCULATION/EXTRACTION METHODOLOGY									
Ste p ID			Step	description		Respons	sible	Data ID		
1	integrate	ed into th	ne Use C	yed once they ar ase Family.		Service develope		DeployedServ		
2			otal numb ase fami	oer of services de ily.	eployed in the	Use Case Family Le		Total		
				DATA COL						
Dat a ID	Data descri ption		respon ole)	Data sink (entity/respon sible)	Data collection method	Data collection update rate		ta collection ime range		
1	Deploye Service	Service Develop		UC Family leader	Notification	N/A	N/A			
	BASELINE									
BASE	BASELINE source Literatur e□ Historical data□ Measurements Simulations Other⊠ □									
	"Other" BASELINE Similar projects source									
		SC	ource							
Resp	onsible			Family Leader						

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Table 45 KPI 5.3 definition.

GENERAL INFORMATION									
ID	KPI 5.3	Na	ame	RES availability	y increase				
Business UC/	BUC Ren PV O	&M Optimization							
System UC	BUC Ren PV Sr	mart Grid Integratio	n						
Use Case	Renewables⊠	Energy	Electromob	li Flexibility□	N/A□				
		communities□	ty□	_					
Description	Energy-bas a period with irradiance. (and lost errors eloss(i) [kW] Etotal [kWh feed-in method feed-in met	communities \Box sed availability (EA) th high irradiance is Therefore, it uses a nergy): $EA [\%] = \begin{pmatrix} 1 - \frac{1}{2} \\ 1 - \frac{1}{2$	ty \Box takes into a smore valual shase for calculation $E_{total} + \sum_{i} E_{loss}^{(i)}$ $E_{total} + \sum_{i} E_{loss}^{(i)}$ it yield per evaluation the period is to accurate stinguished: where lost adiation accomb adiation accomb $E_{total} = E_{total}$ PR is determined in modulation the system which the Function $E_{total} = E_{total}$ in the period do in kWh/kV alignment/incontractor cannot a shade $E_{total} = E_{total}$	onsideration that ble than in a per lculation not time $\frac{i}{i}$ $x100$	at an hour in riod with low e but energy according to the lost yield. Alculated via mula below: average PR into the grid diverters or ination. esponsibility				
	availability Force maje Snow and i Damage to by the cust	ce on PV modules the PV plant (inclu omer or third partic	uding the cal es who are i	oles up to the fenot sub-contrac	eed-in point)				
	Contractor,	including but not li	inica to vari	adiloiti,					

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Porm	ription	 Disconnection or reduction a result of an order issued to Operational disruption by g of the grid operator; Disconnections or power redevices. Downtimes resulting from components (for example, to the mail of th	 Disconnections or power regulation by the grid operator or his control devices. Downtimes resulting from failures of the inverter or MV voltage components (for example, transformer, switchgear), if this requires Technical support of the manufacturer and/or Logistical support (for example supply of spare parts) by the manufacturer. Downtimes due to scheduled maintenance measured per year and component. Outages of the communication system. Delays of approval by the customer to conduct necessary works. Downtimes for implementation of measures to improve the PV plant, if this is agreed between the parties. Downtimes caused by the fact that the customer has commissioned third parties with the implementation of technical work on the PV plant. 								
1 0111	iuia	$EA \ [\%] = \left(1\right)$	$-\frac{\sum_{i}E_{loss}^{(i)}}{\sum_{i}E_{loss}^{(i)}}$	<u>(i)</u>	x100						
		- 1	$E_{total} + \sum_{i}$	$E_{loss}^{(i)}$	<u> </u>						
Mon	itoring	 Start monitoring at WP3 Use Continuing WP6 T6.2 implement Family for the verification of the Finalising on WP6 T6.6 KPI excollected and analysed 	entation of se ne KPI target	rvices	at Renew	able					
Units	S	%	Parent KPI	[KPI	Name/ID]						
	orting [to	Data upload rate		"Oth			he end of				
DWF	·J	Information display	Cumulated value⊠		ad rate rend□	the	pilot N/A□				
	ulation er (target e)	1%									
			CALCULATION/EXTRACTION METHODOLOGY								
Ste p ID		Step description Responsible Data ID									
1	implement	ne EA production the last year be ing the pilot, from M8 to M20.	g the pilot, from M8 to M20. EDF, production my20. EyPESA n M20								
2		ne EA production during the pilot, se of following recommended prece.			ENGIE, EDF, EyPESA		Res productio n M32				

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			DATA COLLE	CTION					
Dat a ID	Data descripti on	Data source (entity/respon sible)	Data sink (entity/respo nsible)	Data collection method		Data collect update	ion	Data collection time range	
1	Energy availabilit y M20	ENGIE, EDF, EyPESA	ENGIE, EDF, EyPESA			N/A		N/A	
2	Energy availabilit y M32	ENGIE, EDF, EyPESA	ENGIE, EDF, EyPESA	Databa	ase	N/A		N/A	
			BASELII	NE					
BASE sour	LINE ce	Literature□	Historical data	⊠	Meas s□	surement Simu ns□		ılatio	Other□
		"Other" BASELI	NE source						
Resp	Responsible Each pilot owner (ENGIE, EDF, EyPESA)								
Desc	cription	RES production M20.	the last year be	fore im	pleme	nting the	pilot, f	rom M	18 to

Table 46 KPI 5.4 definition.

		GENERAL INFOR	MATION						
ID	KPI 5.4		Name	Economic increase f producers	or RES				
Business UC/ System UC		M Optimization art Grid Integratio	n						
System oc	BUC Reli PV SII	ian Gno miegralio	11						
Use Case	Renewables⊠	Energy communities□	Electromob	ility Flexibi	lity□ N/A□				
Description	increase in earni	Economic earning increase for RES producers. Depending on the pilot the ncrease in earning can come from an increase in the revenues, a decrease on the costs, or both.							
Formula	$(\sum_{i=1}^{N} RES)$	earning M32 _i $-\sum_{i=1}^{N} RE_i$	S earning M20 _i)	$\left/ \sum_{i=1}^{N} RES \ earning$	ng M20 _i				
Monitoring	Start monitoring	Start monitoring at WP3 Use Cases and Services definition							
	_	P6 T6.2 implement verification of the I		ces at Renev	wable Use Case				
	 Finalising on V collected and a 	VP6 T6.6 KPI elic analysed	itation, where	e the resultin	g values will be				
Units	%		Parent KPI	[KPI Name	e/ID]				
Reporting [to DWH]	Data upload rate	9		"Other" upload ra	In the end of the pilot				
	Information disp	olay	Cumulated value□	Trend⊠	N/A□				
KPI calculation trigger (target value)	15% increase								
Document name:	03.5 KPIs applicable in	OMEGA-X		Page:	94 of 161				
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		CALCULAT	ION/EXTRACTIO	N MET	HODOLO	OGY				
Ste p ID		Step	espon	sible	Data ID					
1	Quantify the earnings the last year before implementing the pilot, from M8 to M20. ENGIE, EDF, EyPESA earnin g M20									
2	Quantify th	ne earnings during	the pilot, from M2	20 to M	132.		NGIE, E yPESA	EDF,	Res earnin g M32	
			DATA COLLEC	TION						
Dat	Data	Data source	Data sink	D	ata	D	ata		ata	
а	descripti	(entity/respons	(entity/respons	y/respons collection collection colle						
ID	on	ible)	ible)		thod	upda	te rate	time	range	
1	RES earning M20	ENGIE, EDF, EyPESA	ENGIE, EDF, EyPESA	Datab	ase	N/A	N/A N			
2	RES earning M32	ENGIE, EDF, EyPESA	ENGIE, EDF, EyPESA	Datab	ase	N/A		N/A		
			BASELINE							
BASI sour	ELINE ce	Literature ☐ Historical data ☑ Measurement Simulation Others ☐ ☐							Other	
		"Other" BASELIN	E source							
Res	ponsible	Each pilot owner	(ENGIE, EDF, Ey	PESA))					
Desc	cription	Earning for the RI from M8 to M20.	Each pilot owner (ENGIE, EDF, EyPESA) Earning for the RES producer the last year before implementing the pilot, from M8 to M20.							

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Table 47 KPI 5.5 definition.

	GENERAL INFORMATION										
ID		KPI 5.5		Name		onomic be ease for I Os	-	s and			
Busine	ess	BUC Flex1.0 Fle	exibility for interna	I prosumer portf	olio d	optimizatio	on				
UC/ Sy	stem		exibility for conges			-		ntracts			
UC			exibility for capacit								
			ProsumerEngage								
			ptimisation throug					0,			
			UC LEC-O&M: LEC Operation and Maintenance Optimization								
Use Ca	ase	Renewables□									
			communities⊠	,	_		_				
Descri	ption	Economic benef	fit increase for DS	Os and TSOs du	ue to	the cut o	f cos	ts due			
	•		e of grid reinforcer								
			ES curtailment, or								
		increment of cos	sts due to flexibilit	y purchase. Thu	s, in	each pilo	t the				
		calculation of th	e earning would b	e different and w	vould	d be done	by th	ne DSO			
		implied at the pi	lot site, due to the	need of busines	ss re	lated info	•				
Formu	la	$\sum_{i=1}^{N} a_{i}a_{i}$	$\sum_{i=1}^{N} a_i$		$\sqrt{\sum_{i=1}^{N}}$						
		$(\sum SO)$	earning $M32_i - \sum_{i=1}^{N} S_i$	O earning $M20_i$) /	\sum_{s}	50 earning	$M20_i$				
		i=1	i=1	1	i=1						
Monito	ring	• 5	Start monitoring at	WP3 Use Case	s and	d Service	s def	inition			
Monito	, iiig		Continuing on WP								
			Energy Communiti					a.			
			mplementation of					mily for			
			he verification of the		~ty	ouc ouc	o . a.	,,			
			inalising on WP6		ion, v	where the	resu	ulting			
			alues will be colle					J			
Units		%		Parent KPI		I Name/ID	D]				
Report	ting [to	Data upload ra	te			her"		e end of			
DWH]		·			uple	oad	the p	oilot			
					rate	9	•				
		Information dis	splay	Cumulated	Т	rend⊠	Ν	I/A□			
				value□							
KPI		10% increase				'					
calcula	ation										
trigger											
	value)										
		CALCULA	ATION/EXTRACTION	ON METHODOLO	OGY	,					
Step		Ste	p description			Respons	ible	Data			
ID								ID			
1 G	Quantify	the earnings the	last year before in	mplementing the	.	EDP, othe	er	SO			
		m M8 to M20. DSO/TSOs of earning									
	-					the pilot s		M20			
2 G	Quantify	the earnings dur	ing the pilot, from	M20 to M32.		EDP, othe		SO			
		ŭ	•			DSO/TSC		earning			
					t	the pilot s	ites	M32			

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			DATA COLLECTIO	N			
Dat a ID	Data descripti on	Data source (entity/responsi ble)	Data sink (entity/responsi ble)	Data collecti on method	Data collection update rate	colle	ata ection range
1	Earning M20	EDP, other DSO/TSOs of the pilot sites	EDP, other DSO/TSOs of the pilot sites	Databas e	N/A	N/A	
2	Earning M32	EDP, other DSO/TSOs of the pilot sites	EDP, other DSO/TSOs of the pilot sites	Databas e	N/A	N/A	
			BASELINE				
BASI sour	ELINE ce	Literature□	Historical data⊠	Measurer	ments Simul	ations	Other
		"Other" BASELINE					
	oonsible	DSO/TSOs of each	_ •				
Desc	cription	Earning for the DS M8 to M20.	O/TSO the last yea	ar before in	nplementing t	ne pilo	t, from

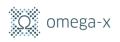
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Table 48 KPI 5.6 definition.

		GENERAL INFO	RMATION						
ID	KPI 5.6		Name	Energy bill ded prosumers	crease for				
Business UC/ System UC	BUC Flex1.0 Flexibility for internal prosumer portfolio optimization BUC Flex2.0 Flexibility for congestion management with bilateral contracts BUC Flex3.0 Flexibility for capacity management with market structures BUC LEC-ECO ProsumerEngagement: Local Energy Communities Energy Consumption Optimisation through prosumer engagement BUC LEC-O&M: LEC Operation and Maintenance Optimization								
Use Case	Renewables□	Energy communities⊠	Electromobility□	☐ Flexibility⊠	N/A□				
Description	prosumers invol To be calculated	d in these pilots: T6.3) (T6.3) 3) ded by the Data Frespectively and	Provider in each p calculation to be	oilot։ ISMAI, Eyl done by each բ	oilot				
	Average value for implementation From M20 – Mo To M32 – Month	$M32_i - \sum_{i=1, j=1}^{i=N, j=12} End$ or all Prosumer i counth 20 of the project	luring the validat	ion of each pilo	t				
Monitoring	n/a		D (1/D)	FIZELAL //EDI					
Units Reporting [to DWH]	·		Parent KPI	upload rate	In the end of the pilots				
	Information dis	splay	Cumulated value□	Trend⊠	N/A□				
KPI calculation trigger (target value)	20% reduction								

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		CALCULATIO	N/EXTRACTION MI	ETHODOLO	GY					
Ste p ID			scription		Responsil	ole Data ID				
1		e average energy b ng the pilot, from M	ill the last year befo 8 to M20.	ore	Pilot owner	Energy bill M20				
2	Quantify the M32.	e average energy b	average energy bill during the pilot, from M20 to Pilot owner							
		DATA COLLECTION								
Dat a ID	Data descripti on	Data source (entity/responsi ble)	Data sink (entity/responsi ble)	Data collectio n method	Data collection update rate	Data collection time range				
1	Energy bill M20	Pilot owner	Pilot owner	Database	N/A	N/A				
2	Energy bill M32	Pilot owner	Pilot owner	Database	N/A	N/A				
			BASELINE							
BASE	CCE	Literature ☐ Historical data ☒ Measurements Simulations ☐ ☐								
		"Other" BASELINE source								
Res	oonsible	Each pilot owner								
Desc	cription	Energy bill the last	year before implem	nenting the p	oilot, from M8	to M20.				

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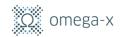


Table 49 KPI 5.7 definition.

GENERAL INFORMATION											
ID		KPI 5.7		Name	CO2 6	emission	s r	eduction			
	ness UC/ em UC	All BUCs									
	Case	Renewables⊠	Energy communities⊠	Electrom	obility	Flexibili	ty	N/A□			
	cription	implemented in earlin each BUC, the o	O2 emissions after ch pilot side. Deper calculation can be dountry's average m	nding on th one differe	ne diffe ently (f	erent bus or instan	ine ice	ss logic			
Forn	nula	$\left(\sum_{i=1}^{N} Emissi\right)$	ions M32 _i - $\sum_{i=1}^{N} Emiss$	ions $M20_i$)	$\left/\sum_{i=1}^{N} E_{i}\right $	missions M	120 _i				
Mon	itoring	 Start monitorir 	ng at WP3 Use Cas	es and Se	ervices	definitio	n				
		 Continuing WI 	P6 for the verification	n of the K	PI targ	get					
		 Finalising on Notes be collected a 	WP6 T6.6 KPI elicit nd analysed	ation, who	ere the	e resultin	g v	alues will			
Unit	S	%	6 Parent [K								
Repo DWF	orting [to	Data upload rate			"Othe	er" nd rate		the end the pilot			
	,	Information displa	ay	Cumulat ed value□		end□	<u>Oi</u>	N/A□			
	ulation er (target e)	20% reduction									
			N/EXTRACTION M	ETHODOL							
Ste p ID		Step des	cription		Res	ponsible	е	Data ID			
1	_	e CO2 emissions th ng the pilot, from M	•		Pilot o	owner		Emissio ns M20			
2	Quantify th M32.	e CO2 emissions d	uring the pilot, from	M20 to	Pilot o	owner		Emissio ns M32			
			DATA COLLECTION	V							
Dat a ID	Data descripti on	Data source Data sink Data Data (entity/responsib (entity/responsi collecti collection co						Data ollection ne range			
1	Emissions M20	Pilot owner	Pilot owner	Databas e	N/A		N/	Ą			
2	Emissions M32	Pilot owner	Pilot owner	Databas e	N/A		N/	A			

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	BASELINE BASELINE											
BASELINE	Literature□	Historical data	N X	Measurements□	Simulations□	Other□						
source	"Other" BASEL	INE source										
Responsible	Each pilot owne	Each pilot owner										
Description	CO2 emissions	the last year b	efore	implementing the	pilot, from M8 t	o M20						

Table 50 KPI 5.8 definition.

		Table 50 KPI 5.8 del	inition.						
	(GENERAL INFORM	ATION						
ID	KPI 5.8		Name	Flexibili provisio	-	vice			
Business UC System UC	SUC Flex3.0 Man	cibility for capacity rage flexibility need age flexibility offer age flexibility offer	ls			ructui	res		
Use Case	Renewables□	Energy communities□	Electror	nobility	Flexi	- 1	N/A□		
Description	From Grid validat	/ service provision ion platform real-tir network analysis s	ne service (O		nd Gri	d			
Formula		$\sum_{i=1}^{N}$	$Service_i$						
Monitoring	 Start monitor 	ring at WP3 Use Ca	ases and Ser	vices def	finitior	า			
		n WP6 T6.5 imple for the verification			at Fl	lexibili	ity Use		
	_	 Finalising on WP6 T6.6 KPI elicitation, where the resulting values will collected and analysed 							
Units	No units		Parent KPI	[KPI Na)]			
Reporting [to DWH]	Data upload rate)	Other	"Other" upload			e end e pilot		
	Information disp	blay	Cumulated value⊠	Trend	□L	N	/A□		
KPI calculation trigger (targe value)									
		ON/EXTRACTION	METHODOLO			***			
Ste p ID	Step	description		R	espo e	nsibi	Data ID		
	on flexibility services ented in the Flexibility			to be E	DP		Service		
	te the total number	of services deploye	ed.	Е	DP		Total		
		DATA COLLECT							
Dat Data a descrip ID on	Data source ti (entity/responsi ble)	Data sink (entity/responsi ble)	Data collection method	Dat collect update	tion	colle	ection range		
1 Service _i	Service developers	EDP	Notification	N/A		N/A			
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	BASELINE											
BASELINE	Literature□	Historical data⊠	Measurement	Simulations	Other□							
source			s□									
	"Other" BASELINE source											
Responsible	Maia Municipal	ity & DSO										
Description	by Maia Munici those in OMEG	be benchmarked with pality. The flexibility so iA-X T6.5, to verify the and services support	ervice provision e objective outco	will be compa ome of Enabli	ared with							

Table 51 KPI 5.9 definition.

		G	ENERAL INFORMA	TION							
ID		KPI 5.9		Name	Use of	new datas	et				
Syst	ness UC/ em UC	Data Managemen									
Use	Case	Renewables⊠	Energy communities⊠	Electromo	bility⊠	Flexibility ⊠	N/A□				
Desc	cription	All OMEGA-X servaccess to before	vices supported by	at least 1 dat	aset the	y did not h	ave				
Forn	nula	Yes/no									
Mon	itoring	if they are using dataset(s) they did not have access to before									
Unit	S	No unit		Parent KPI	[KPI Na	ame/ID]					
Repo	orting [to l]	Data upload rate	Pata upload rate "Other" upload rate								
		Information displ	lay	Cumulated value□	Trer	nd□ I	N/A□				
KPI calc trigg	ulation Jer	1 new data set. Ma	arketplace launch								
Targ	et Value	1 new data set pe	r service.								
		CALCULATIO	ON/EXTRACTION A	NETHODOLO	GY						
Ste p ID		Step de	escription		Resp	onsible	Data ID				
1	For each s used	ervice provided def	fine if at least 1 nev	v dataset is	Service	Provider					
2	Make repo	rt of the responses	of all participants		ICOM						
			DATA COLLECTION	DN .							
Dat	Data	Data source	Data sink	Data	Da	ta	Data				
а	descripti	(entity/responsi	(entity/responsi	collection	colle	ction co	llectio				
ID	on	ble)	ble)	method	updat		time ange				
1	Report	ICOM	ICOM	questionnai re	once		week				

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	BASELINE											
BASELINE	Literature□	Historical data		Measurements□	Simulations□	Other□						
source	"Other" BASEL	Other" BASELINE source No baseline needed.										
Responsible	NA											
Description	NA											

Table 52 KPI 5.10 definition.

		CE	NERAL INFORMATIO)N				
ID			NEKAL INFORMATIO		Open	doto oo	to	
		KPI 5.10		Name	availa	i data se able	เร	
Syst	ness UC/ em UC	Data Management						
Use	Case	Renewables⊠	Energy communities⊠	Electrom 🗵		×		N/A□
	cription		I is to measure the rethird parties as a res				an b	e
Forn	nula		$\sum_{i=1}^{N} Data$	i set_i				
	Active monitoring begins at WP6 starting phase and continues till the end of the project							
Units		No units		Parent KPI	_	[KPI Name/ID]		
Repo	orting [to l]	Data upload rate		"Other" upload rate				
		Information displa	ау	Cumulate d value□	Tre	end□	N.	/A⊠
trigg	calculation er (& et value)	2 open data sets						
		CALCULATION	N/EXTRACTION MET	THODOLOG	GY			
Ste p ID		Step d	escription			Respon e	sibl	Dat a ID
1	Flag potent demonstrat		n be opened by part	ners in	l	JC leade	ers	Data set _i
2	Aggregate	number of open data	a sets		E	EDF		Tota I
								data sets
			DATA COLLECTION					
Dat a ID	Data descriptio n	Data source (entity/responsib le)	Data sink	Data collectio n method	coll	ection ate rate	col n t	ata lectio time nge
1	potential open datasets	UC leaders	UCF leaders	notificatio n	N/A			7-M36

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BASELINE BASELINE										
BASELINE	Literature□	Historical data	a□	Measurements□	Simulations□	Other□				
source	"Other" BASEL	INE source	other	similar projets						
Responsible	EDF									
Description	Benchmark with	n other sister p	roject							

			Table 53 KPI 5.1	1 definitio	n.							
			GENERAL INFO	DRMATIO	N							
ID		KPI 5.11		Name	Energy I	oss ch	aracteri	izat	ion error			
	iness System	BUC Ren P	V O&M Optimization									
Use	Case	Renewabl es⊠	Energy communit	ies□	Electror ty□		Flexibil	ity	N/A□			
Des	cription	detected fa computed a the failure of means of the measurement	for of the estimation of ilure mode through da as the difference between the corresponding in-fie ent for failure modes re	ta analyti een the e s tool and eld inspec elated to	cs in PV stimated d the ene ction tech PV gener	systen energy rgy los nique, rator.	ns. This y loss e ss meas like IV	s er stin sure cur	ror is nated by ed by			
Forr	nula	where <i>Elos</i>	estimationerror[%] = $\frac{0}{2}$ $S_{\text{estimated}}$ is the energy lool, $Eloss_{\text{measured}}$ is the	oss estim	nated by	the fail	lure det	ecti				
Mon	itoring	WP6 T6.2 i	mplementation of serv	rices at R	enewable	e Use	Case F	ami	ly			
Unit	S	%		Parent k	(PI	[K	(PI Nam	ne/I	D]			
	orting DWH]	Data uploa	d rate		"Other" rate	uploa	ıd					
		Information	n display	Cumulat value□	ed	Tren	d□		N/A⊠			
trigg	ulation ger (& et value)	10%										
		CAL	CULATION/EXTRACT	ION MET	HODOLC	OGY						
Ste p ID			Step description			Res	ponsib	le	Data ID			
1	Estimatio and notific		of energy loss related to detected failure mode Service provider									
2	In-field m measurer		of energy loss through	h IV curve	е	Pilot	owner					
3	Computa	tion of avera	ged estimation error			Servi Provi						

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			DATA COLL	ECTION						
Da ta ID	Data descript ion	Data source (entity/respon sible)	Data sink (entity/respon sible)	Data collect ion metho d	Data collection update rate	Data collection time rang				
1	Estimate d energy loss	Service provider	Pilot owner	Databa se	Every fault detec	ction Validation period		tion		
2	Measure d energy loss	Pilot owner	Service provider	Databa se	Every fault detec	Every fault detection		ection Validation period		tion
			BASELI	NE						
BAS sou	ELINE rce	Literature⊠	Historical data□]	Measurements ☐	Sim s□	ulation	Othe r□		
	"Other" BASELINE source									
Res	ponsible	Service provider								
Des	cription	Published results	s of other similar	services						

Table 54 KPI 5.12 definition.

		GENERAL INFO	ORM	ATION					
ID	KPI 5.12			Name	Fault detection	n time			
Business UC/ System UC	BUC Ren PV O	&M Optimization							
Use Case	Renewables⊠	Energy communities□		Electromobility	y□ Flexibility □	′ N/A□			
Description	diagnosis tools. modes in some time and measu	This is the time since a fault happens until is noticed by failure detection and liagnosis tools. For this purpose, it is necessary to generate ad-hoc failure nodes in some section of the PV generator to precisely know the starting me and measure the time to detection. This should be carried out for ifferent failure modes and with different severity degrees.							
Formula	Fault	detectiontime [m	inut	$tes] = T_{detect}$	$_{ion} - T_{startingf}$	ault			
Monitoring	WP6 T6.2 imple	ementation of ser	vice	s at Renewak	ole Use Case	Family			
Units	minute		Pare	ent KPI	[KPI Name/ID)]			
Reporting [to DWH]	Data upload ra	te			"Other" upload rate				
	Information dis	splay		Cumulated value□	Trend□	N/A⊠			
KPI calculation trigger (& target value)	Depending on fa	ailure mode							

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		CALCIII ATI	ON/EXTRACTION	METHODO	DIOGY			
Ste p ID			escription	MEIIIODO		Responsible		Data ID
1	Generation	n of ad-hoc failure	Pilot o	wner	-			
2	Notification	of failure detectio	n		Servic	-		
3	Measurem steps 1 an		n of time interval be	etween	Pilot c	wner		
			DATA COLLECTION	ON				
Dat a ID	Data descripti on	Data source (entity/responsi ble)	Data sink (entity/responsi ble)	Data collecti on method	collecti	Data Data ollection collection time ran		ection
1	Starting time of fault generatio n	Pilot owner	Pilot owner	Logbook	Every failure m generation			
2	Fault Alarm	Service Provider	Pilot Owner	Databas e	Every failure m detection			
3	Fault detection time	Pilot owner	Service Provider	Logbook	Every failure mode detection		N/A	
	BASELINE							
BASI	ELINE ce	Literature□	Historical data□	Measurements Simul □		ılations	Other	
"Other" BASELINE source								
Res	oonsible	Pilot owner	'ilot owner					
Des	Description Measurement of fault detection time with the precedent supervising systematical detection time with the precedent supervising systematical detection.					system		

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Table 55 KPI 5.13 definition.

	GENERAL INFORMATION								
ID		KPI 5.13		Name PV Asset OPEX reduction					
	ness UC/ em UC	BUC Ren PV O&	M Optimization						
Use	Case	Renewables⊠	Energy communities	□ Electror		Flexibilit	у N	/A□	
Description Reduction of operational expenditures (OPEX) of reduction of required inspection techniques, avoid preventative activities, anticipation of corrective in						of unnece tions.		/	
Form	nula	where <i>OPEX</i> _{before} recommendation	PEXreduction [%] = OPE is the OPEX in €/MV s of the predictive ma PEX in case of followi	Wp yearly be	efore fo service:	ollowing the sand OP	EX _{aft}	er	
Mon	itoring	WP6 T6.2 implen	nentation of services	at Renewal	ble Use	Case Fa	mily		
Units	5	%		Parent KPI	[KPI Name/ID]				
Repo	orting [to I]	Data upload rate		"Other" upload rate					
		Information disp	olay	Cumulate d value□	Tre	Trend□ N		4 ⊠	
trigg	ulation er (& et value)	20%							
		CALCULATI	ON/EXTRACTION M	ETHODOLO	GY				
Ste p ID		Step	description		F	Responsi	ble	Dat a ID	
1	Measurementa	surement of OPEX before the predictive maintenance ementation							
2		easurement of OPEX after the predictive maintenance nplementation							
3	Computation	putation of OPEX reduction					Pilot owner		
			DATA COLLECTIO	N					
Dat a ID	Data descripti on	Data source (entity/respons ble)	Data sink (entity/responsi ble)	Data collectio n method	collection collection update rate n ti			ata ectio ime nge	
	OPEX	Pilot owner	Pilot owner	Database	N/A		N/A		

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	BASELINE									
BASELINE	Literature□	Historical data⊠	Measurements□	Simulations□	Other□					
"Other" BASELINE source										
Responsibl	e Pilot owner	Pilot owner								
Description	Comparison to 0	Comparison to OPEX evolution in the precedent years								

Table 56 KPI 5.14 definition.

	GENERAL INFORMATION								
ID		KPI 5.14		Name	Electric powe	r quality			
	ness System	Operating PV Smart Grid Integration							
Use	Case	Renewables⊠	Energy communities□	Electromobility	Flexibility	□ N/A□			
Desc	cription	Total number of times there have been significant frequency or voltage deviations due to events such as congestion or unexpected high penetration of renewables.							
Form	nula			$V_{dev_i} + f_{dev_i}$					
Moni	itoring	The pilot owner is responsible of counting the times with significant voltage or frequency deviation.							
Units	S			Parent KPI	[KPI Name/ID)]			
Repo	orting [to				"Other" upload rate				
		Information disp	Trend□	N/A□					
trigg	KPI 1 calculation trigger (& target value)								
			TION/EXTRACTIO	N METHODOLO					
Ste p ID		Step description Responsible ID							
	After executing the services of this BUC, the pilot owner should take actions to improve power quality. It is its responsibility to record the times voltage or frequency deviates significantly. Pilot Owner f_{dev_i}								

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			DATA COLLEG	CTIO	N				
Dat a ID	Data descripti on	Data source (entity/respon sible)	Data sink (entity/respon sible)		Data Ilection nethod	colle	ata ection te rate	colle ti	ata ection me nge
1	V_{dev_i}	Significant voltage deviation occurrence (±10%)	Pilot Owner	Database		Monthly			
2	f _{dev_i}	Significant frequency deviation occurrence ($\pm 0.2 \; Hz$)	Pilot Owner	Database		Monthly			
			BASELIN	Е					
BAS sou	ELINE rce	Literature⊠	Historical data□		Measurer ⊠	nents	Simulat □	ions	Other
	"Other" BASELINE source								
	ponsible	Pilot Owner							
Des	cription	Based in standar	ds						

Table 57 KPI 5.15 definition.

		GENERAL INFOR	MATION						
ID	KPI 5.15		Name	Continuity of se	rvice				
Business UC/ System UC	Operating PV Sm	nart Grid Integratio	n						
Use Case	Renewables⊠	Energy communities□	Electromobility	Flexibility□	N/A□				
Description	Equivalent outag	Equivalent outage time of the installed power at low voltage							
Formula	interruptions duri	$\frac{\sum_{i=1}^k PI_i \times H_i}{\sum PI}$ Being $\sum_{i=1}^k PI_i$ the sum of power installed in the grid and k the number of interruptions during the considered period.							
Monitoring	Monitor the outage time (H_i , in h)	ges occurring in the	e grid in terms o	f power (PI_i , in k\	/A), and				
Units	h		Parent KPI	[KPI Name/ID]					
Reporting [to DWH]	Data upload rate	9	Monthly	"Other" upload rate					
	Information disp		Cumulated value⊠	Trend□	N/A□				
KPI calculation trigger (& target value)	1 h. Target value	: 0 h.							

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		CALCIIIA	TION/EXTRACTIO	N METH	ODOLO	CY					
Ste p ID			description	JIV MILITI	<u> </u>		spons	ible	Data ID		
1	Calculate	power and time o	f every outage oc	curring ir	n a grid.	Pilo	t Owne	er	PI_i H_i		
2	Add them	and calculate the	KPI								
	DATA COLLECTION										
Dat a ID	Data descripti on	Data source (entity/respon sible)	Data sink (entity/respon sible)			colle	Data collection update rate		ata ection me nge		
PI_i	Power installed affected by the interrupti on	Pilot owner	Pilot owner	Outage evaluation			When occurring		thly		
H_i	Duration of the interrupti on	Pilot owner	Pilot owner	g -		When occurring		Mon	thly		
			BASELIN	E							
BAS soul	ELINE rce	Literature⊠	Historical data□ Measu ts⊠		Measur ts⊠	remen Simula s□		ation	Other		
		"Other" BASELIN	NE source								
	ponsible	Pilot Owner									
Des	cription	N/A									

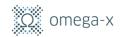
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Table 58 KPI 5.16 definition.

	GENERAL INFORMATION										
ID		KPI 5.16		Name	CAPEX						
UC	System	Planning PV Sm	art Grid Integrat	ion	_	_					
Use (Case	Renewables⊠	Energy communities□	Electromobility	□ Flexibility⊠	N/A□					
	ription		e number of ele		() for Long Term S ced using an optim						
Form	nula	$IC = IC_{Tmfos} + IC_{Li},$ IC = Asset Investment $IC_{Tmfos} = Investment$	ent Costs [€] it cost of transformer	s [€] tment cost of lines or ca	phles [€]						
		$IC_{Batteries} = Investme$	nt cost of Batteries [€	[]							
	Monitoring When the service is executed in a specific grid.										
Units					[KPI Name/ID]						
Repo DWH	orting [to			On demand	"Other" upload rate						
		Information display		Cumulated value□	Trend□	N/A⊠					
trigg	ulation er (& et value)	Near 0.00 €									
				ION METHODOL							
Step ID		Ste	p description		Responsible	Data ID					
1	Model D	istribution grid Ne	etwork using rea	l data	Developer - UPC						
2	Stress th	e Network with F	Developer - UPC								
3		ire asset investm strategies.	ents using passi	ve and flexible	Developer - UPC						
4		ne investment co	Developer - UPC	IC _{Trafos} IC _{Lines} IC _{Batteries}							

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			DATA COLLEC	TION					
Dat a ID	Data descripti on	Data source (entity/respons ible)	Data sink (entity/respons ible)	Data collection method		Data collection update rate			nta ction range
1	IC _{Trafos}	Pilot owner	Pilot owner	Database		When service is executed		e N/A	
2	IC _{Lines}	Pilot owner	Pilot owner	Database		When service is executed		N/A	
3	IC Batteries	Pilot owner	Pilot owner	Databa	se	When service is executed		N/A	
			BASELINE						
BAS soul	ELINE rce	Literature⊠	Historical data⊠	Mea ts□		asuremen I	Sim s⊠	ulation	Other
	"Other" BASELINE source								
Res	Responsible Pilot owners and Service Provider								
Des	cription	Asset Costs, Sec	ondary Substation	n historic	c da	ta, Networl	k par	ameters	s, etc.

Table 59 KPI 5.17 definition.

	G	SENERAL INFOR	MATION					
ID	KPI 5.17		Name	OPEX				
Business UC/ System UC	Planning PV Sma	rt Grid Integratio	n					
Use Case	Renewables⊠	Energy communities□	Electromobility	Flexibility⊠	N/A□			
Description	Operational exper the number of ele	,						
Formula	$OC = OC_{Tmfos} + C$	$OC_{Lines} + OC_{Batte}$	ries					
	$OC = Operational Costs \ of Assets \ [\in]$							
	$OC_{Trafos} = Operational cost of transformers [\in]$							
	$OC_{Lines} = Operational cost of lines or cables [\epsilon]$							
	$OC_{Batteries} = Opera$	ntional cost of Ba	tteries [€]					
Monitoring	When the service	is executed in a	specific grid.					
Units	Euro [€]		Parent KPI	[KPI Name/ID]				
Reporting [to DWH]	Data upload rate		On demand	"Other" upload rate				
	Information disp	lay	Cumulated value□	Trend□	N/A⊠			
KPI calculation trigger (& target value)	Near 0.00 €							

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		CALCULATION	ON/EXTRACTIO	N METHODOLOG	GY					
Ste p ID		Step d	escription		Responsib	le Data ID				
1	Model Dist	ribution grid Netwo	ork using real da	ta	Developer - UPC					
2	Stress the	Network with Futu	re PV production	n Scenarios	Developer - UPC					
3	Plan future planning s	e asset investments trategies.	s using passive	and flexible	Developer - UPC					
4		operational cost (i w asset based on	sportation, etc.)	Developer - UPC	OC _{Trafos} OC _{Lines} OC _{Batteri}					
DATA COLLECTION										
Dat a ID	Data descripti on	Data source (entity/responsi ble)	Data sink (entity/respo nsible)	Data collection method	Data collection update rate	Data collectio n time range				
1	OC _{Trafos}	Pilot owner	Pilot owner	Database	When service is executed	N/A				
2	OC_{Lines}	Pilot owner	Pilot owner	Database	When service is executed	N/A				
3	OC _{Batteries}	Pilot owner	Pilot owner	Database	When service is executed	N/A				
			BASELIN	E						
BASI sour	ELINE rce	Literature⊠	Historical data⊠	Measurements□] Simulations⊠	on Other				
		"Other" BASELIN	E source							
	ponsible	DSOs								
Des	cription Asset Costs, Secondary Substation historic data, Network parameters, etc.									

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Table 60 KPI 5.18 definition.

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			DATA COLLECTION	N					
Dat a ID	Data descripti on	Data source (entity/responsi ble)	Data sink (entity/responsi ble)	Data collecti on method	colle	ata ection te rate	coll	ection range	
1	L_{BS}	Pilot owner	Pilot owner	Databas e	As a service parameter		N/A		
2	L_{Pla}	Pilot owner	Pilot owner	Databas e	When service is executed		N/A		
			BASELINE						
BASE sour	ELINE ce	Literature⊠	Historical data□	Measurer □	Measurements Simula □ □		tions	Other □	
		"Other" BASELINE	source						
Res	onsible	Service Developer							
Description The Service Provider will obtain the reduction of asset congestions and voltage deviations from simulations of the stress scenarios.									

Table 61 KPI 6.1 definition.

		GENER	AL INF	ORMAT	ION							
ID	KPI 6.1		Na	ame	Flexik	oility offer i	ncrease					
Business	BUC Flex1.0 F											
UC/	SUC Flex2.0 C	ptimize the b	paseline	e of res	ources							
System												
UC	D				1 1114	T						
Use Case	Renewables	Energy	•	Electro	mobility	Flexibility	/⊠ N/A□					
		communiti										
Descriptio	Prosumer flexibility offer increase.											
n F	From Prosume	From Prosumer EMS internal optimization service (Tecnalia) $\sum_{i=1}^{N} Prosumer Flexibility of fers M32_i - \sum_{i=1}^{N} Prosumer Flexibility of fers M20_i$										
Formula	$\sum_{i=1}^{n} Pros$						offers wizo _i					
					ity of fers I							
		M20 – Month 20 of the project: Before the pilot implementation										
	M32 – Month 3	M32 – Month 32 of the project: After the pilot implementation										
Monitoring	 Start monito 	ring at WP3 l	Jse Ca	ses and	Service	s definition	1					
	• Continuing of	 Continuing on WP6 T6.5 implementation of services at Flexibility Use Case 										
	Family for the verification of the KPI target											
	· ·			· ·		Os a maravile						
	_		KPI ei	icitation	, wnere	tne resulti	ng values will be					
	collected and	analyseu										
Units	%			arent K		Name/ID]						
Reporting	Data upload ra	ate	Ot	her	"Oth	~ -	In the end of the					
[to DWH]						ad rate	pilot					
	Information di	splay		ımulate	d T	rend⊠	N/A□					
1/51	D 000/		va	lue□								
KPI	By 80%											
calculation												
trigger (& target												
value)												
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		CALCI	ILATIO	N/EXTRA	CTION	METHO	DOLO	GY				
Ste p ID				iption					sible		Da	ta ID
1		d sum the nu before imple			•	by	MAIA	١		P Flex of fers M20		f fers M20
2		d sum the nu after implem				by	EDP			P Flex of fers M32		
DATA COLLECTION												
Dat a ID	Data descripti n	Data sou o (entity/re sible		sink espons le)	Date collect	tion		Data Ilecti update rate	ection co		Data Ilection ne range	
1	P Flex of fers N	120 MAIA		EDP		Databa availab		N/A	4		N/A	\
2	P Flex of fers N	132 MAIA		EDP Databas available				4	N/A		4	
				BAS	SELINE							
BASE sour		Literature□	Histo	rical data	\boxtimes	Measu	ırements Simu		Simu □	ulations		Other□
		"Other" BAS	ELINE	source								
Resp	onsible	Maia Municip	ality &	Service	providers	3						
Desc												

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Table 62 KPI 6.2 definition.

			GENERAL IN	FORMATIO	N							
ID		KPI 6.2	Na	me	Energ	gy bill reduct	ion					
Busi	ness	BUC Flex1.0 Flex										
UC/		SUC Flex1.0 Defin				gement						
	em UC	SUC Flex2.0 Opti										
Use (Case	Renewables□	Energy	Electromol	bility□	Flexibility	⊠ N/A□					
Daga	windian		ommunities□	C) In the co	المارامة		منامات مامات					
Desc	ription	Energy bill reducti the energy price (sible changes in					
		From Passive con					ilia) and Active					
		consumption reso	urce prediction	n service (To	ecnalia	a) .	ma, and rionvo					
Form	nula		$\sum_{i=1}^{N} Energy Bil$	$1M20_i - \sum_{i=1}^{N}$	Energ	y Bill M32 _i						
			Σ^N	Enerou Bill	M32 :							
		M20 – Month 20 c	$\frac{\sum_{i=1}^{N} Energy \ Bill \ M20_i - \sum_{i=1}^{N} Energy \ Bill \ M32_i}{\sum_{i=1}^{N} Energy \ Bill \ M32_i}$ $120 - Month \ 20 \ of \ the \ project: \ Before \ the \ pilot \ implementation$									
		M32 – Month 32 c										
Moni	toring	Start monitor					on					
		Continuing on WP6 T6.5 implementation of services at Flexibility Use Case										
		Family for the verification of the KPI target										
		 Finalising on WP6 T6.6 KPI elicitation, where the resulting values will be 										
		collected and		i elicitation,	wnere	e the resulti	ig values will be					
Units	5	%	Pa	rent KPI	[KPI I	Name/ID]						
	orting	Data upload rate	Ye	arly		er" upload						
[to D	WH]				rate							
		Information disp		mulated	Т	rend□	N/A□					
LCDI		D 450/	va	ue⊠								
KPI	ulation	By 15%										
trigg												
targe												
value												
		CALCULA	ATION/EXTRA	CTION METI	HODC	LOGY						
Step	Step description Responsible Data ID											
ID												
1		and sum the Ener	gy Bill 12 mor	th before		MAIA	Energy Bill M20					
0		enting the pilot.										
2			gy Bill 12 mor	ıın anter		MAIA	Energy Bill M32					
			ting the pilot.									

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				DATA C	OLLECTION	V				
Dat a ID	Data descripti n	Data sour o (entity/resp ble)		(entity	a sink /responsi ole)	Data collection method	СО	Data Ilection late rate	co n	Data Ilectio time ange
1	Energy Bill	M2 MAIA		EDP		Databases available	N/A		N/A	
2	Energy Bill M3 MAIA					Databases available	N/A		N/A	
	BASELINE									
BASI	ELINE rce	Literature□	Histo	orical data⊠ Measureme s⊠			ent	Simulations □	on	Other
		"Other" BASEI	LINE s	ource						
Res	ponsible	Maia Municipa	lity							
Desc	The result will be benchmarked with respect to the information collected by Maia Municipality. The historical energy bill will be compared with that after the implementation of OMEGA-X T6.5, to verify the objective outcome of Increased acceptance of and participation of consumers in data sharing for energy services.									

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Table 63 KPI 6.3 definition.

			GENERAL I	NFORMATION							
ID		KPI 6.3	N	ame	Revenue inci	rease					
Busin	ess	BUC Flex1.0 Fl	exibility for inte	rnal optimization							
UC/		SUC Flex2.0 O	ptimize the bas	eline of resources	5						
Syste											
Use C	ase	Renewables□	Energy	Electromobility□	Flexibility	⊠ N/A□					
			communities□								
Descr	iption			providers (increa							
			the possible changes in the energy price (M20 vs M32) should be considered.								
		From Passive consumption baseline prediction service (Tecnalia) and									
		Prosumer EMS	internal optimiz	zation service (Te	cnalia)	D 100					
Formu	ula	$\sum_{i=1}^{N} Rev$		$y P M32_i - \sum_{i=1}^{N} Rev$		ity P M20 _i					
			$\sum_{i=1}^{N} Re$	venue for flexibility l	$PM20_i$						
		M20 - Month 2	0 of the project	: Before the pilot i	mplementatio	on					
		M32 – Month 3	2 of the project	: After the pilot im	plementation						
Monit	oring	Start monit	toring at WP3 L	Jse Cases and Se	rvices definit	ion					
			J								
		_		mplementation of	services at Fi	exibility Use Case					
		Family for	the verification	of the KPI target							
		_		(PI elicitation, whe	ere the result	ing values will be					
		collected a	ind analyzed								
Units		%	P	arent KPI	[KPI Name/II	0]					
Repor	rting	Data upload ra	ite O		"Other"	In the end of the					
[to DV	VH]				upload rate	pilot					
		Information di	splay C	umulated	Trend⊠	N/A□					
			Va	alue□							
KPI		By 10%									
calcul											
trigge											
target											
value)											
Cton				ACTION METHOD		bla Dota ID					
Step ID		Step description Responsible Data ID									
	-	and sum the re		oility providers	MAIA	Flex P rev M20					
		implementing th	<u> </u>								
			venue for flexib	oility providers afte	er EDP	Flex P rev M32					
	implem	enting the pilot.									

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			DATA COLLECTIO	N				
Dat a ID	Data descripti on	Data source (entity/responsi ble)	Data sink (entity/responsi ble)	Data collection method	coll	ection ate rate	col t	Data lection time ange
1	Flex P rev M2	MAIA	EDP	Databases available	N/A			
2	Flex P rev M3	MAIA	EDP	Databases available	N/A		N/A	
			BASELINE					
BASI	ELINE ce	Literature□ H	istorical data⊠	data⊠ Measurement Simulat s⊠ s□			ulation Othe	
		"Other" BASELIN	E source					
Res	ponsible	Maia Municipality	& DSO & Service p	roviders				
Description The result will be benchmarked with respect to the information collected by Maia Municipality. The revenue increase will be compared with that in OMEGA-X T6.5, to verify the objective outcome of Increased acceptance of and participation of consumers in data sharing for energy services.								

Table 64 KPI 6.4 definition.

		lefinition.		
G	ENERAL INFOR	MATION		
ID KPI 6.4		Name	Incentives for	r data sharing
Business N/A UC/ System UC				
Use Case Renewables□	Energy communities□	Electromob y□	ilit Flexibility	y⊠ N/A□
Description Incentives towards e	end users that su	upport sharing	g/trading of da	ata.
Formula	$\sum_{i=1}^{N} I$	$incentives_i$		
 Start monitoring Continuing on V Case Family for Finalising on W collected and ar 	WP6 T6.5 implors the verification P6 T6.6 KPI elic	ementation o	f services at	Flexibility Use
Units No units		Parent KPI	[KPI Name/I	D]
Reporting [to DWH]		Other	"Other" upload rate	In the beginning of the pilot (M20)
Information display	/	Cumulated value⊠	Trend□	N/A□
KPI calculation trigger (& target value) 1 list of incentives properties (6 incentives, 2 technology)	•	•		se case families
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1,				



		CALCULA	TION/EXTRACTION	ON METI	HODC	LOG	ξY			
Ste p ID			description					spon	sible	Data ID
1	sharing/trading of data, along their definition, during the implementation of the Flexibility Use Case Family.								Incentive:	
2								Total		
			DATA COLLE	CTION						
Dat a ID	Data descripti on	Data source (entity/respons ible)	Data source Data sink Data [(entity/respons (entity/respon collection collection)					Data collection update rate		Data lection e range
1	Incentives _i	MAIA & service developers	MAIA & service EDP N/A N/A						N/A	
			BASELIN	E						
BAS sou	ELINE rce	Literature□	Historical data⊠		Meas ts□	urem	nen	Simu s□	ulation	Other
		"Other" BASELI	NE source							
Res	ponsible	Maia Municipalit	Maia Municipality							
Des	The result will be benchmarked with respect to the information collected by Maia Municipality. The existent incentives in data sharing will be compared with those in OMEGA-X T6.5, to verify the objective outcome of Increased acceptance of and participation of consumers in data sharing for energy services.							ompared creased		

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Table 65 KPI 6.5 definition.

			GEI	NERAL IN	FORMA	TION				
ID		KPI 6.5		Nai	me		Increa	ase data s	sharin	g
UC	System	N/A								
Use	Case	Renewables		ergy unities□	Electro	mobili	ty□	Flexibility	y⊠	N/A□
Desc	ription	Increased sha	aring of d	lata from	consum	ers.				
Form	nula	Σ	$\sum_{i=1}^{N} kB of i$	data shared	$lM32_i$ –	$\sum_{i=1}^{N} k$	B of d	ata shared	$M20_i$	
		M20 – Month M32 – Month		e project:		he pilo	t imple	ementatio	n	
Moni	itoring	Start mo		•		•			ion	
		 Continuir 	ng on W		impleme	entatio	n of s	services a		xibility Use
		 Finalising on WP6 T6.6 KPI elicitation, where the resulting values will be collected and analysed 								
Units	5	%		Par	rent KPI			Name/ID]		
	orting	Data upload	rate	Oth	ner		"Oth			e end of
[to D	WH]	1-6	Carles	0				ad rate	the p	
		Information	аіѕріау		mulated ue□		l r	end⊠		N/A□
KPI calcu trigg targe value	et	20% increase	d sharin	g						
		CALC	ULATION	N/EXTRAC	CTION N	NETHO	DOLC	GY		
Ste p ID			ep desci					esponsib	le	Data ID
1		and sum the re					M	AIA	da	ta shared M20
2		and sum the refrom consume					E	OP	da	ta shared M32
				DATA CO	<u> </u>					
Dat	Data	Data so		Data s		Da	ita	Data	a	Data
a ID	descrip	otio (entity/re	sponsi	(entity/re	sponsi	colle		collect		collectio
	n	ble)	ble	!)	met				n time range
1	data share	d M MAIA		EDP		Datab availa		N/A		N/A
2	data share	d M. MAIA		EDP		Datab availa		N/A		N/A
				BASE	LINE					

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BASELINE	Literature□	Historical data□		Measurement	Simulations	Other□
source				s⊠		
	"Other" BASEL	INE				
	source					
Responsible	Maia Municipal	ity				
Description	The result will b	e benchma	rked with resp	pect to the inforr	nation collect	ed by
	Maia Municipal	ity. The incre	ease in data s	sharing will be c	ompared with	those
	in OMEGA-X T	6.5, to verify	the objective	outcome of Inc	reased accep	otance
	of and participa	tion of cons	umers in data	a sharing for ene	ergy services.	

Table 66 KPI 6.6 definition.

		GENERAL INF	ORMATION					
ID	KPI 6.6		Name	RES usage i	ncrease			
Business UC/	BUC LEC 2.	0 ECO						
System UC	BUC LEC 3.	0 Service Plannir	ng					
Use Case	Renewable s□	Energy communities⊠	Electromo	bility Flexibi	lity N/A□			
Description	computed as	e increase in usages the total amount om used over a gi	of energy ge ven period of	enerated by a time	renewable			
Formula	RES	$Susage_{increase} = 1$	RES usage _{M3:} RES 1	₂ — RES usage usage _{M20}	· 100			
	implementat	RES usage $_{M20}$ = sum of RES usage at M20 before the pilot implementation RES usage $_{M32}$ = sum of RES usage at M32 after the pilot implementation						
Monitoring				<u> </u>	•			
monney.		onitoring at WP3						
		ing on WP6 16.3 for the verification	•		at LEC Use Case			
		ng on WP6 T6.6 k cted and analyse		, where the re	sulting values will			
Units	%		Parent KPI	[KPI Name/II)]			
Reporting [to DWH]	Data upload	l rate	Other	"Other" upload rate	End of pilot			
	Information display Cumulated value□ Trend⊠ N/A□							
KPI calculation trigger (target value)	10% increas	е						

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		CALCUL	ATION/EXTRAC	TION I	METHO	DOL	OGY				
Ste p ID		Step	description			ا	Resp	onsi	ible	D	ata ID
1		tify the revenues by LECs before implementing the (M8 to M20) Pilot owner $RES usage_N$								S usage _M	
2	Identify the pilot (M20 t	-	_ECs after imple	mentir	ng the	F	Pilot c	wne	r	RE.	S usage _M
			DATA COL	LECTIO	NC						
Dat a ID	Data descripti on	Data source (entity/resp onsible)	Data sink (entity/respon sible)	colle	ata ection thod	СО	Data Ilecti date	on			llection range
1	RES usage _N	Pilot owner	Pilot owner	Datak	oase	N/A			N/A		
2	RES usage _N	Pilot owner	Pilot owner	Datak	oase	N/A			N/A		
			BASEL	.INE							
BASE sour	LINE ce	Literature□	Historical data⊠	3	Meası □	ırem	ents	Simi	ulatio	ns	Other
		"Other" BASELINE source									
Resp	onsible	Pilot owners									
Desc	ription	Total amount M8 to M20.	of RES used the	e year	before	imple	emen	ting	the p	ilot,	from

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Table 67 KPI 6.7 definition.

			GENERAL INF	ORMATION						
ID		KPI 6.7		Name	CO	₂ emission	s red	uction		
	ness System	BUC LEC 1.0 C	&M Service Planning							
Use	Case	Renewables	Energy communities⊠	Electromo y□	bilit	Flexibility		N/A□		
Desc	ription	Equivalent CO ₂	emissions savin	gs measured	in tC	CO ₂				
Form	nula	1.192	$\frac{CO_{2_{M32}}-CO_{2_{M20}}}{t_{CO_{2_{M20}}}}*100$ $CO_{2_{M32}}=\text{CO}_2 \text{ emissions before the project}$ $CO_{2_{M20}}=\text{CO}_2 \text{ emissions after the project}$							
Moni	 Start monitoring at WP3 Use Cases and Services definition Continuing on WP6 T6.3 implementation of services at LEC Use Case Family for the verification of the KPI target Finalising on WP6 T6.6 KPI elicitation, where the resulting values will be collected and analysed 									
Units	5	%		Parent KPI	[KP	I Name/ID)]			
Repo [to D	orting WH]	Data upload ra	End	of pilot						
		Information dis	splay	Cumulated value□	Т	rend⊠		N/A□		
KPI calcu trigg (targ value	et	10% reduction								
		CALCUL	ATION/EXTRACT	TION METHO	DOL	OGY				
Ste p ID		Step	description			Respons	sible	Data ID		
1	,	the CO_2 emission ting the pilot, from	ons the last year om M8 to M20.	before		Pilot own	er	CO _{2M20}		
2	Quantify M32.	the CO ₂ emission	ns during the pil	ot, from M20	to	Pilot own	er	CO _{2M32}		
			DATA COL	LECTION						
Dat	Data	Data source	Data sink	Data		Data		collection		
a ID	descrip tion	(entity/respon sible)	(entity/respon sible)	collection method		llection date rate	tin	ne range		
1	$CO_{2_{M20}}$	Pilot owner	Pilot owner	Database	N/A		N/A			
2	$CO_{2_{M32}}$	Pilot owner	Pilot owner	Database	N/A		N/A			
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		BASEL	INE			
BASELINE source	Literature□	Historical data⊠]	Measurements □	Simulations	Other
	"Other" BASELI	NE source				
Responsible	Pilot owners					
Description	CO ₂ emissions	the year before i	mplem	nenting the pilot,	from M8 to M	20.

Table 68 KPI 6.8 definition.

		GENERAL INF	ORMATION				
ID	KPI 6.8		Name	Energy auto	nomy increase ser		
Business UC/ System UC	BUC LEC 2.0 SUC LEC 10.0)					
Use Case	Renewables	Energy communities⊠	у□	ilit Flexibility			
Description		rgy autonomy cor consumed energy	for single user				
Formula Monitoring	From M20 – M To M32 – Mon $E_t^{imported} = \text{En}$ $E_t^{produced,local} =$ Start mon Continuing Family for	Energy autonomer during the pilot in fonth 20 of the project the 32 of the project ergy that is imported at WP3 Using on WP6 T6.3 in the verification of the project of the pilot of the project of the pilot of the project of the pilot of the project of the project of the pilot of the project of the pilot of the pilot of the project of the pilot of the project o	nplementation bject: Before the ct: After the pilot ted from the gr nsumption e Cases and S nplementation f the KPI target	e pilot implen ot implementa id Services defin of services a	nentation ation iition at LEC Use Case		
	collected and a	VP6 T6.6 KPI elic analysed	itation, where t	ne resulting v	values will be		
Units	%		Parent KPI	[KPI Name/	ID]		
Reporting [to DWH]	Data upload rate Other upload rate End of pilot						
	Information display Cumulated value□ Trend⊠ N/A□						
KPI calculation trigger (target value)	10%						

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		CALCUL	ATION/EXTRAC	TION METH	IODC	LOGY					
Ste p ID		Step	description			Resp	ons	ible	D	ata ID	
1	Identify to pilot (M8	he prosumers by to M20)	LECs before im	plementing	the	Pilot	owne	r	Pro	sumers _l	
2	_	he prosumers by 0 to M32)	LECs after impl	ementing t	he	Pilot owner Prosum				sumers _l	
	DATA COLLECTION										
Dat a ID	Data descrip tion	sible)	Data sink (entity/respon sible)	Data n collection of method		Data collection update rate				llection ange	
1	$E_t^{imported}$	Pilot owner	Pilot owner	Database	ı	N/A		N/A		l	
2	$E_t^{consume}$	Pilot owner	Pilot owner	Database	se N/A		N/A		N/A		
			BASEL	INE							
BASE sour	LINE ce	Literature□	Historical data⊠	g Mea	asurei	ments	Sim	ulatio	ns	Other	
		"Other" BASELI	NE source								
Resp	onsible	Pilot owner or th	ne DSO								
Desc	Energy autonomy the year before implementing the pilot, from M8 to M20										

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Table 69 KPI 6.9 definition.

	GENERAL INFORMATION											
ID		KPI 6.9	OLIVERAL IIVI	Name	Imported en	orgy/ Total						
טו		KF1 0.9		INAIIIE	energy cons	0,						
Busi	ness	BUC LEC 2.0										
	System	SUC LEC 7.0										
UC		SUC LEC 11.0										
Use	Case	Renewables	Energy communities⊠		ilit Flexibility	□ N/A□						
Desc	ription		rgy autonomy con consumed energy									
Form	nula		Energy autono	$pmy = \frac{\sum_{t=1}^{N} E_{t}^{im}}{\sum_{t=1}^{N} E_{t}^{co}}$	$\frac{1}{100}$ $\frac{1}{100}$ $\frac{1}{100}$							
		Average value	during the pilot in									
		From M20 of the	ne project: Before	the pilot impler	mentation							
		To M32 of the	project: After the	pilot implement	ation							
		$E_t^{imported} = En$	ergy that is impor	ted from the gri	d							
		•	Total Energy co									
Moni	itoring	Start monitoring at WP3 Use Cases and Services definition										
		 Continuing on WP6 T6.3 implementation of services at LEC Use Case Family for the verification of the KPI target 										
		 Finalising or collected an 		elicitation, whe	re the resulti	ng values will be						
Units	6	%		Parent KPI	[KPI Name/	ID]						
Repo [to D	orting WH]	Data upload r	ate	Other	"Other" upload rate	End of pilot						
		Information d	isplay	Cumulated value□	Trend⊠	N/A□						
KPI calcu trigg (targ value	lculation gger rget											
		CALCU	LATION/EXTRAC	TION METHOD	OLOGY							
Ste p ID		Ste	p description		Respons	sible Data ID						
1		and quantify the e pilot execution	energy imported n	from the grid	Pilot own							
2		and quantify the e pilot execution	energy consume n	d from the grid	Pilot own	er $E_t^{consumed}$						

Document name:	Document name: D3.5 KPIs applicable in OMEGA-X						
Reference:	OMEGA-X_D3.5	Dissemination:	PU	Version:	1.0	Status:	Final



	DATA COLLECTION									
Dat a ID	Data descrip tion	Data source (entity/respon sible)	Data sink (entity/respon sible)	Data collection method		Data collect upda rate	tion ite		llection range	
1	$E_t^{imported}$	Pilot owner	Pilot owner	Database		N/A		N/A		
2	$E_t^{consume}$	Pilot owner	Pilot owner	Database		N/A		N/A		
			BASEL	INE						
BASE sour	LINE ce	Literature□	Historical data⊠ Measure □			ements	Simu	ulations	Other	
	"Other" BASELINE source									
Resp	onsible	Pilot owners								
Description Energy autonomy the year before implementing the pilot, from M8 to M20										

Table 70 KPI 6.10 definition.

			GENERAL INFO	RMATION				
ID		KPI 6.10		Name		mber of (er olved in Of		
Busine: System		All BUCs/SUCs						
Use Ca	se	Renewables⊠	Energy communities⊠	Electromobility	l Flexibility⊠		N/A□	
Descrip	tion	Number of (end)	users involved in	OMEGA-X pilo	ts			
Formula	a	N/A						
Monitor	ing	Registration of (end) users in OM	EGA-X pilots				
Units		#		Parent KPI	N/A	١		
Reporti	ng	Data upload ra	Other	"Other" En			of ect	
		Information dis	splay	Cumulated value□	Trend□		N	/A⊠
KPI calculatingger (target)		2000 users						
		CALCULA	TION/EXTRACTION	ON METHODOLO	OGY	,		
Step ID		Ste	p description			Respons	ible	Data ID
1 R	egistrat	ion users in the p	oilot activities			Pilot Own	er	
		nent activities				Pilot Own	er	

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	DATA COLLECTION										
Dat a ID	Data descripti on	Data source (entity/responsi ble)	Data sink (entity/responsi ble)	method		tity/responsi collection collectio		Data collection update rate		coll	ata ection range
1	Pilot owner	Pilot owner	Database			N/A					
			BASELINE								
	BASELINE Literature□ Historica source				Meas s□	urement	Simula s□	ation	Other ⊠		
	"Other" BASELINE source No baseline needed										
Res	ponsible	N/A									
Des	Description N/A										

Table 71 KPI 6.11 definition.

	Table / I KFT 0.11 definition.									
			GENERAL INFORM	IOITAN	N					
ID		KPI 6.11		Name				d rep		
						in er	ngaç	ged ei	nd use	ers
	ness UC/	All BUCs/SUCs								
	m UC									
Use C	Case	Renewables⊠	Energy	Elec	tromob	oility	Fle	xibility	/⊠	N/A□
			communities⊠		\boxtimes					
	ription		entation amongst e	end use	ers					
Form		N/A								
Monit		N/A #								
Units Repo		Data upload rate N/A "Other" N/A								
Kepo	rung	Data upioau rate	,	IN/F	٠,			rate	IN/A	
							renc		NI	/A□
			nay	value		''	CIIC	<i>_</i>	IN	/^⊔
KPI		Balanced represe	Balanced representation							
	lation									
trigge	trigger									
(target value)										
			ION/EXTRACTIO	N METH	HODOL	.OGY				
Ste		Step	description				Res	spons	sible	Data
р										ID
ID T) o mintenti	on of and ware in	OMECA V nilete				Dila	4 01440	~ "	
		on of end users in on end users in C						t own		
	veborung	on end users in C	DATA COLLEC	TION			FIIC	ot Own	EI	
Dat	Data	Data source	Data sink		ata		Data	2		ata
	descripti	(entity/respons	(entity/respons	_	ction			tion		ection
ID	on	ible)	ible)	met				rate		range
1		Pilot owner	Pilot owner	surve		N/A			N/A	3
			BASELINE		,					
BASE	LINE	Literature□	Historical data□		Measu	ireme	ent	Simul	ation	Other
sourc	e				s□			s□		\boxtimes
		"Other" BASELIN	IE source	No ba	aseline	need	ded			
Resp	onsible	N/A								
Desci	ription	N/A								
	T									

Document name:	Document name: D3.5 KPIs applicable in OMEGA-X							
Reference:	OMEGA-X_D3.5	Dissemination:	PU	Version:	1.0	Status:	Final	



Table 72 KPI 6.12 definition.

			GENERAL INFOR	MATION					
ID		KPI 6.12		Name		d users info ivated	orme	d and	
UC/ UC	iness System	All BUCs/SUCs							
Use	Case	Renewables⊠	Energy communities⊠	Electrom y⊠	obilit	Flexibility	₫	N/A□	
Des	cription		ct, Percentage of are activated by the		ne target	t group tha	t hav	e been	
Forr	nula	N/A	_						
Mon	itoring	Active engageme	ent monitoring by I	oilot leads a	and eng	agement a	ctiviti	es	
Unit	S	% and qualitativ	е	Parent KF	I N/A	١			
Rep	orting	Data upload rate	е	N/A		ther" load rate	N/A		
		Information dis	olay	Cumulated value⊠		Frend□	N	/A□	
calculation trigger (target value) CALCULATION/EXTRACTION METHODOLOGY									
Ste p ID			description	N MEIIIOL	,OLOG	Respons	ible	Data ID	
1	Identificati	ion target groups				Pilot own	er		
2			ement target group	os		Pilot own			
3			rget groups activit		put	Pilot own			
		, ,	DATA COLLEC						
Dat a ID	Data descripti on	Data source (entity/respons ible)	Data sink (entity/respons ible)	Data		Data ollection date rate	coll	oata ection range	
1	1 Pilot owner Pilot owner Survey, monitoring, qualitative feedback								
			BASELINI						
BAS soul	ELINE rce	Literature□	Historical data□	Me s□	asurem	ent Simula s□	ation	Other 🖂	
		"Other" BASELIN	NE source	No baselin	e neede	ed			
	ponsible cription	N/A N/A							

Document name:	Document name: D3.5 KPIs applicable in OMEGA-X						
Reference:	OMEGA-X_D3.5	Dissemination:	PU	Version:	1.0	Status:	Final



Table 73 KPI 6.13 definition.

			GENERAL INFOR	MATION					
ID		KPI 6.13		Name	Perce citizer	ived va ns	lue fro	om the	
Sys	iness UC/ tem UC	All BUCs/SUCs		_					
Use	Case	Renewables⊠	Energy communities⊠	Electromobil y⊠	it Fle	xibility	\boxtimes	N/A□	
	cription	Perceived value f long term)	rom the citizens of	of OMEGA-X pi	lot activ	/ities (s	hort to	erm –	
Forr	nula	N/A							
Mon	Monitoring Active monitoring by pilot leads, surveys, workshops, interviews, focus groups								
Unit	S	%		Parent KPI	[KPI N	lame/II	D]		
Rep	orting	Data upload rate)	N/A	"Othe	er" d rate	N/A		
		Information disp	olay	Cumulated value⊠		nd□	N	/A□	
trigg	<pre>KPI calculation trigger (target value)</pre> >=70% Surveys based in Likert scale (% of surveys with average to good results).								
		CALCULAT	ION/EXTRACTIO	N METHODOLO	OGY				
Ste p ID		Step	description		Re	espons	ible	Data ID	
1	Identificati	on target groups				ot own			
2	Communio	cation and engage	ement target group	os		ASC & I	Pilot		
3	Workshop	s, focus groups, s	urvevs		Pil	ot own	ers		
			DATA COLLEC	TION					
Dat	Data	Data source	Data sink	Data	Da	ata	D	ata	
a	descripti	(entity/respons	(entity/respons	collection		ction		ection	
ID	on	ible)	ible)	method		e rate		range	
1	Value	Pilot owner	Pilot owner	Survey, registration	N/A		N/A		
			BASELINE						
BAS	ELINE	Literature□	Historical data□	Measui s□	rement	Simula s□	ation	Other ⊠	
GGGI				3□		J D L		<u>(1)</u>	
		"Other" BASELIN	IF source	No haseline no	hahac				
Pas	nonsiblo	"Other" BASELIN	IE source	No baseline no	eeded				
	ponsible cription	"Other" BASELIN N/A N/A	IE source	No baseline no	eeded				

Document name:	Document name: D3.5 KPIs applicable in OMEGA-X						
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Table 74 KPI 6.14 definition.

			GENERAL INFOR	MATION				
ID		KPI 6.14		Name	Nur ider	chnical requited through the control of the control	quiren ugh e	nents
	iness UC/ tem UC	All BUCs/SUCs						
Use	Case	Renewables⊠	Energy communities⊠	Electromol	bility	Flexibility	\boxtimes	N/A□
Des	cription	Number of require	ements identified	through end	user e	engageme	nt.	
Forr		N/A				0 0		
Mon	itoring	End user experier	nce monitoring, in	nterviews, sui	veys			
Unit		#	J ,	Parent KPI	N/A			
Rep	orting	Data upload rate)	N/A		her" oad rate	N/A	
		Information disp	lay	Cumulated value⊠	Т	rend□	N.	/A□
trigg	ulation ger get value)	#, at least 10 tech	ION/EXTRACTIO		N OC	V		
Ste			<u> </u>	N MEIHODC	LOG		ciblo	
p ID		Siep	description			Respons	Sible	Data
								Data ID
1	Identificati	on target groups				Pilot own		
1		on target groups on relevant experi	ence monitoring t	ools		Pilot own	ier	
1	Identificati			cools			ier ier	
1	Identificati	on relevant experi				Pilot own	ier ier	
1	Identificati Identificati	on relevant experi on technical requi Data source	DATA COLLEC	CTION Data		Pilot own Pilot own EDF	ner ner ner,	ID Pata
1 2 3 Dat	Identificati Identificati	on relevant experi on technical required Data source (entity/responsi	DATA COLLECT Data sink (entity/respon	CTION Data collection		Pilot own Pilot own EDF Data	ner ner, D	ID Pata ection
1 2 3 Dat a ID	Identificati Identificati Data	on relevant experi on technical requirence Data source (entity/responsi ble)	DATA COLLECT Data sink (entity/respon sible)	CTION Data		Pilot own Pilot own EDF	ner ner, D	ID Pata
1 2 3 Dat	Identificati Identificati Data descripti	on relevant experi on technical required Data source (entity/responsi	DATA COLLECT Data sink (entity/respon sible) Pilot owner	CTION Data collection method		Pilot own Pilot own EDF Data	ner ner, D	ID Pata ection
1 2 3 Dat a ID	Identificati Identificati Data descripti	on relevant experi on technical requirence Data source (entity/responsi ble)	DATA COLLECT Data sink (entity/respon sible)	CTION Data collection method		Pilot own Pilot own EDF Data Data Ilection date rate	ner ner, D colle time	Pata ection range
1 2 3 Dat a ID	Identificati Identificati Data descripti on	on relevant experi on technical requirence Data source (entity/responsible)	DATA COLLECT Data sink (entity/respon sible) Pilot owner	Data collection method		Pilot own Pilot own EDF Data Data Illection date rate	ner ner, D colle time	ID Pata ection
1 2 3 Dat a ID 1	Identificati Identificati Data descripti on	on relevant experion technical requirements Data source (entity/responsible) pilot owner	DATA COLLECT Data sink (entity/respon sible) Pilot owner BASELINE	Data Collection method Meas	upo	Pilot own Pilot own EDF Data Illection date rate ent Simul	ner ner, D colle time	Pata ection range
Dat a ID 1	Identificati Identificati Data descripti on	on relevant experion technical requirements Data source (entity/responsible) pilot owner Literature□	DATA COLLECT Data sink (entity/respon sible) Pilot owner BASELINE	Data collection method Meas	upo	Pilot own Pilot own EDF Data Illection date rate ent Simul	ner ner, D colle time	Pata ection range

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Table 75 KPI 6.15 definition.

			GENERAL IN	FORMATION					
ID		KPI 6.15		Name		grating RI rces	ES a	s flexible	
Busin		BUC Flex1.0 Fl							
	ystem	SUC Flex1.0 D		-	_	gement			
UC		SUC Flex2.0 O							
Use C	ase	Renewables□	Energy communities□	Electromobili	ty□	Flexibility	/ ×	N/A□	
	ription	Percentage of citizens that support municipality in integrating more renewables in the energy mix (RES already existing in the beginning of the pilot), as flexible sources and applying energy efficiency measures as a way to reduce its internal costs (Surveys based in Likert scale, % of surveys with average to good results). From Intermittent DER generation resource baseline prediction service (Tecnalia)							
Form	ula	M20 – Month 2	$\frac{\sum_{i=1}^{N} Citizens \ integrating \ RES \ M32_{i} - \sum_{i=1}^{N} Citizens \ integrating \ RES \ M20_{i}}{\sum_{i=1}^{N} Citizens \ integrating \ RES \ M20_{i}}$ $M20 - Month \ 20 \ of \ the \ project: \ Before \ the \ pilot \ implementation$ $M32 - Month \ 32 \ of \ the \ project: \ After \ the \ pilot \ implementation$						
Monit	oring		toring at WP3 U	<u> </u>					
		Case Fam Finalising	on WP6 T6.5 ily for the verific on WP6 T6.6 KI ind analysed	ation of the KPI	l targ	jet		·	
Units		%		Parent KPI		I Name/ID			
Repoi		Data upload ra	ite	Other		her" oad rate	In th	ne end of pilot	
		Information di	splay	Cumulated value□	Т	rend⊠		N/A⊠	
KPI calcu trigge (&targ value	er get	90%							
Cton		CALCULATION/EXTRACTION METHODOLOGY							
Step ID	Step description Responsible Data ID								
1	municip	and sum the nur ality in integratin ore implementing	g more renewal		gy	MAIA		Cit RES M20	
2	Identify municip	and sum the nur ality in integratin r implementing t	nber of citizens g more renewal		gy	EDP		Cit RES M32	

Document name:	Document name: D3.5 KPIs applicable in OMEGA-X						
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			DATA COLLECTIO	N					
Dat a ID	Data descripti on	Data source (entity/responsi ble)	Data sink (entity/responsi ble)	Data collectio n method	Da colled update	ction	colle	ata ection range	
1	Cit RES M20	MAIA	EDP	Databas es available	N/A N/A		N/A		
2	Cit RES M32	MAIA	EDP	Databas es available	N/A		N/A		
			BASELINE						
BASI	ELINE ce	Literature□	Historical data⊠	ta⊠ Measurements Simulations □					
		"Other" BASELIN	E source						
Res	ponsible	Maia Municipality							
Description The result will be benchmarked with respect to the information collected by Maia Municipality. The integration of RES as flexibility sources will be compared with those in OMEGA-X T6.5, to verify the objective outcome of lncreased acceptance of and participation of consumers in data sharing for energy services.									

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Table 76 KPI 6.16 definition.

			GENERAL INFO	ORMATION				
ID		KPI 6.16		Name	Wat	er losses	detec	ction
Busine		BUC LEC 1.0	LEC O&M optim	nization				
System	UC	SUC LEC 1.0	ETL of smart me	eter data				
		SUC LEC 2.0	Manage authen	tication				
		SUC LEC 3.0	Al algorithm trai	ning				
			Provide Data Ar					
Use Ca	se	Renewables	Energy communities⊠	Electromob	ility	Flexibili	ty	N/A□
Descrip	otion	Evaluate and on an annual l	detect water loss basis in %	ses of the LEC	. Re	duction c	of water	er losses
Formul	а	WaterLo	$osses_{decrease} = W$	VaterLosses _{bas}	seline	– Water	rLosse	S _{pilot}
		WaterLosses_{baseline} = the average of estimated water losses in the last x years in %						es in the
		WaterLosses_{pilot} = the estimated water losses after the pilot implementation in %						
Monito	Start monitoring at WP3 Use Cases and Services definition						l	
			g on WP6 T6.3 i r the verification	•		ervices a	at LEC	Use Case
		·	on WP6 T6.6 K	Ĭ		a tha rac	ultina	values will
		_	ed and analysed		WIICI	0 1110 100	Janung	values will
Units		%		Parent KPI	[KP	l Name/l	D]	
Reporti DWH]	ng [to	Data upload i	rate	Other	upl	her" oad	End o	of pilot ⊠
		Information a	l'a ra la v	Cumulatad	rate			N1/A (7)
		Information d	- 1 3	Cumulated value□	11	rend⊠		N/A□
KPI cale trigger		5% decrease						
value)								
			ATION/EXTRACT	ION METHOD	OLO			
Step ID							Data ID	
	Define the years in 9	_	stimated water lo	osses in the las	st x	ASTEA		1
		e estimated wantation in %	iter losses after t	the pilot		REVOLT	-	2
		ata from pilot a and report the	nd implement wa KPI	ater losses		REVOLT	-	3

Document name:	Document name: D3.5 KPIs applicable in OMEGA-X						
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			DATA COL	LECTION		
Data ID	Data descrip tion	Data source (entity/resp onsible)	Data sink (entity/respon sible)	Data collection method	Data collection update rate	Data collection time range
1	Water losses in the last x years in %	ASTEA	REVOLT	Database Daily: water consumpt on of LEC		At least 2 years
2,3	Estimat ed water losses after the pilot impleme ntation in % and KPI calculati on	ASTEA	REVOLT	Database	Half yearly: KPI evaluation	N/A
			BASEL	INE		
BASELI source		Literature□	Historical data⊠	Measur ⊠	rements Sim	ulations Other
		"Other" BAS	ELINE source	Water consur years	nption of LEC	in the last x
Respo	nsible	ASTEA				
Description Water consumption of users in the last x years. Data collected by water meters.						ected by water

Document name:	Document name: D3.5 KPIs applicable in OMEGA-X						
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Table 77 KPI 6.17 definition.

			GENERAL INF	ORMATION					
ID		KPI 6.17		Name	Thermal los	ses d	letection		
	ness UC/	BUC LEC 1.0	D LEC O&M optim	ization					
Syst	em UC	SUC LEC 1.0	ETL of smart me	eter data					
		SUC LEC 2.0	Manage authent	ication					
		SUC LEC 3.0	O AI algorithm train	ning					
		SUC LEC 5.0	O Provide Data An	alytics and KP	l				
Use	Case	Renewable s□	Energy communities⊠	Electromob y□	ilit Flexibility		N/A□		
Desc	cription		d detect thermal lo the last 5 years.	sses of the LE	C. Thermal e	nergy	reduction		
Forn	nula	ThermalLo	$osses_{decrease} = Th$	ermalLosses _{ba}	_{seline} – Ther	malL	osses _{pilot}		
			hermalLosses_{baseline} = the average of estimated thermal losses in he last x years in %						
			ThermalLosses_{pilot} = the estimated thermal losses after the pilot mplementation in %						
Mon	itoring	Start monitoring at WP3 Use Cases and Services definition							
		 Continuing on WP6 T6.3 implementation of services at LEC Use Case Family for the verification of the KPI target 							
		_	on WP6 T6.6 KPI and analysed	elicitation, whe	ere the result	ing va	alues will be		
Units	S	%		Parent KPI	[KPI Name/	ID]			
Repo	orting [to l]	Data upload	rate	Other	"Other" upload rate	End	of pilot ⊠		
		Information	display	Cumulated value□	Trend⊠		N/A□		
	ulation er (target e)	2% decrease							
			LATION/EXTRACT	ION METHOD					
Ste p ID		Step description Responsible Data ID							
1	Define the x years in	•	stimated thermal l	osses in the las	st ASTEA		1		
2	Define the implement		ermal losses after	the pilot	REVOLT		2		
3	Collect data from pilot and implement thermal losses detection and report the KPI REVOLT 3						3		

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			DATA COL	LECTIC	N				
Dat a ID	Data descripti on	Data source (entity/resp onsible)	Data sink (entity/respon sible)	coll	oata ection ethod	Dat collect upda rate	tion te	Data co time r	
1	Average of estimated thermal losses in the last x years in %	ASTEA	REVOLT	Database		monthly: thermal consumpti on of LEC Yearly: KPI		At least	1 year
2,3	Estimated thermal losses after the pilot implemen tation in % and KPI calculatio n	ASTEA	REVOLT	Datab	pase	Yearly: evaluat		N/A	
			BASEL	.INE					
BASE	ELINE ce	Literature□	Historical data⊠	3	Measure ⊠	ements	Sim	ulations	Other
		"Other" BASE	ELINE source	Thern years		umption	of LE	C in the	last x
	oonsible	ASTEA							
Description Thermal consumption of users in the last x years. Data collected by small meters.						smart			

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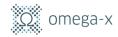


Table 78 KPI 6.18 definition.

GENERAL INFORMATION										
ID		KPI 6.18		Nam	е	Electi	rical losse	es det	tecti	on
Busi UC/ S UC	ness System	LEC Operation	and Maintenanc	e Opti	mizatio	n				
Use (Case	Renewables	Energy communities⊠		ectromo	obility	Flexibilit	ty	N/	A□
Desc	ription	Reduction of ele	ectrical losses at	a LEC	Clevel ((in per	centage)			
Form	nula		Initial los In	sses – A nitial lo	ctual los sses	<u>ses</u> × 10	00			
Moni	toring	Initial losses cal grid. Actual losses ca			ne servi	ice is e	executed	in a s	pec	ific
Units	;	%		Pare	nt KPI	-				
Repo [to D	orting WH]	Data upload ra	te			"Otho	er" ad rate			
		Information dis	splay	Cum value	ulated :□	Tre	end□		N/A	lΣ
KPI calcu trigg	ulation er	50 %								
	CALCULATION/EXTRACTION METHODOLOGY									
Ste p ID		Step	description				Respon	sible	D	ata ID
1	Calculate	ed initial power lo	sses in a specif	ic grid	(in kW))	Pilot Ow	ner	Lo	osses ₀
2				mmendation: e KPI can be then			Pilot Ow	ner	Lo	osses _t
			DATA COL	LECTIO	NC					
Dat a ID	Data descrip tion	Data source (entity/respon sible)	Data sink (entity/respon sible)	colle	ata ection thod	coll	Oata ection ate rate			lection ange
1	Losses ₀	Pilot owner	Pilot owner	Datal	oase	Once		N/A		
2	Losses _t	Pilot owner	Pilot owner	Datal	oase	Montl	hly	Mont	hly	
			BASE	LINE						
BASE sour		Literature□	Historical data	₹	Meas	ureme	nts Simu □	ulation		Other □
		"Other" BASELI	NE source	N/A						
Resp	onsible	Pilot owners								
Desc	ription	Losses existing	in the grid befor	e appl	ying the	e servi	се			
Document name: D3.5 KPIs applicable in OMEGA-X Page: 140 of 161										
Refere		OMEGA-X D3.5 Disse		J	Version:	1.0	Status:	1,40 (Fin	



Table 79 KPI 6.19 definition.

	GENERAL INFORMATION										
ID		KPI 6.19		Name	Cove	erage sma	art m	eters			
Busi		BUC LEC 1.0	LEC O&M optimiz	ation							
UC/ S	System	SUC LEC 1.0	ETL of smart mete	er data							
		SUC LEC 2.0 I	Manage authentic	ation							
		SUC LEC 4.0 I	Benchmarking								
			Provide Data Anal	<u> </u>							
Use (Case	Renewables □	Energy communities⊠	Electromot	oility	Flexibility	y	N/A□			
Desc	ription	Minimum weekly % coverage of smart meters									
Form	ıula		$coverage_{increase=} rac{coverage_{sm}}{coverage_{manual}}$								
			coverage_{increase}= increase of the readings								
		coverage	.{sm}= Minimum v	-				t meters			
		-	- ` '		•	0 ,					
	coverage _{manual}= Minimum weekly/monthly readings by human operation (normally once a month)										
Moni	toring	 Start mon 	itoring at WP3 Us	e Cases and	Servi	ces defini	tion				
		 Continuing on WP6 T6.3 implementation of services at LEC Use Case 									
			the verification of	•							
		•	on WP6 T6.6 KPI	elicitation, wh	here t	he resulti	ng va	alues will be			
			and analysed								
Units		n/a		Parent KPI	_	Name/ID]				
Repo [to D	orting WH]	Data upload r	ate	Other	"Oth uplo	ner" pad rate	End	of pilot ⊠			
		Information d	isplay	Cumulated value□	Tr	end⊠		N/A□			
KPI		3 times increas	se								
	ılation										
trigg (targ											
value											
		CALCU	LATION/EXTRACT	TION METHOI	DOLC	OGY					
Ste	Step description Resp						ible	Data ID			
p ID	Oalle et l	ata fuana alla (and antique to the			DEVOLT	-	4			
1			nd estimate cover	age		REVOLT		1			
2	Calculate	alculate the KPI				REVOLT		2			

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			DATA COL	LECTIC	N				
Dat a ID	Data descrip tion	Data source (entity/respon sible)	Data sink (entity/respon sible)	coll	oata ection ethod	Dat collec upda rate	tion ite		llection range
1	Covera ge	ASTEA	REVOLT	Database		Minimum monthly walk-by readings		onthly alk-by	
2	KPI	REVOLT	REVOLT	Datab	pase Monthl		У	N/A	
			BASEL	.INE					
BASE	CELINE CCE	Literature□	Historical data⊠	3	Measurements ⊠		Simulations		Other
	"Other" BASELINE source Manually readings by human operator							tor	
Responsible ASTEA									
Desc	cription	Manually reading	gs by human op	erator					

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Table 80 KPI 6.20 definition.

			GENERAL INF	ORMATION						
ID		KPI 6.20		Name				isation of munities		
	ness UC/ em UC	SUC LEC 1.	0 LEC O&M optir 0 ETL of smart m							
			0 Benchmarking0 Provide Data A	nalytics and k	(PI					
Use (Case	Renewable s□	Energy communities⊠	Electromo	bility F	Flexibility	/	N/A□		
Desc	ription	Evaluate total	al CO2 emissions	based on loc	al conv	ersion fa	actor	s energy		
Form	ula		Fo	or Water/Ther	mal					
		$C02_{Tot}$	= C02 emission of	of water/therm	nal ener	gy in a t	ime	period		
		$\Delta C02_{TL} =$	CO2 emission av	oided by redu	cing ba	seline T	hern	nal losses		
		$\Delta C 02_{WL} =$	$\Delta C02_{WL}$ = CO2 emission avoided by reducing baseline Water losses							
		$C02_{o\&i}$	$C02_{0\&M}$ = CO2 emission avoided after the pilot implementation							
		$\Delta C02_{O\&M} = \frac{\Delta C02_{TL} + \Delta C02_{WL}}{C02_{Tot}}.100$								
Monit	toring	Start monitoring at WP3 Use Cases and Services definition								
			ing on WP6 T6.3 for the verification	•		rvices a	t LE(C Use Case		
			ng on WP6 T6.6 I ected and analyse		where	the resu	ulting	values will		
Units	;	%		Parent KPI	[KPI N	ame/ID]				
Repo DWH	rting [to]	Data upload	d rate	Other	"Other upload		End	of pilot ⊠		
		Information	display	Cumulated value□	Trer	nd⊠		N/A□		
	er (target	<1% decrea	se							
		CALCU	LATION/EXTRAC	TION METHO	DOLOG	Υ				
Ste p ID		Step description Responsibl Data ID e								
1	Collect data	a from pilot and estimate C02 emissions/saved						1		
2	Calculate th	ne KPI				STEA/R)LT	EV	2		

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DATA COLLECTION										
Dat a ID	Data descripti on	Data source (entity/resp onsible)	Data sink (entity/respon sible)	collection		Data collection update rate		Data collection time range		
1	Evaluate total CO2 emissions/ saved based on local conversio n factors energy	ASTEA	REVOLT	Database		After pilots' implementati on		N/A		
2	KPI	ASTEA	REVOLT	Database		After pilots' implementati o		N/A		
	BASELINE									
BASE sour		Literature□	Historical data⊠		Measurements ⊠		Simulations		Other	
"Othe		"Other" BAS	Other" BASELINE source		% of water lossesaverage of thermal energy losses					
Resp	Responsible ASTEA									
Desc	CO2 emission of the last x years (without O&M optimization)									

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Table 81 KPI 6.21 definition.

	Table of Ref 10.21 definition.										
			GENERAL INF								
ID		KPI 6.21		Name	OPEX Redu	ıction					
	ness	BUC LEC 1.0	LEC O&M optimis	ation							
UC/	System	SUC LEC 1.0	ETL of smart mete	er data							
		SUC LEC 4.0	Benchmarking								
		SUC LEC 5.0	Provide Data Ana	lytics and KPI							
Use	Case	Renewables	Energy communities⊠	Electromobil	ity Flexibility		N/A□				
Desc	cription	Reduction of c	perational expens	ses							
Forn	nula		Foi	Water/Therma	a/						
		Example,	for water Cost =	m3 loss * Ener	rgy to m3 *	Ener	gyCost				
			$Cost = cost \ of \ v$	vater losses in	a time period	1					
	CostO&M = cost of water losses after the pilot implementation (water losses detection)										
	$Cost - Cost_{0\&M}$										
		$rac{\mathit{Cost} - \mathit{Cost}_{\mathit{O\&M}}}{\mathit{Cost}} \cdot 100$									
Mon	itoring	 Start mon 	Start monitoring at WP3 Use Cases and Services definition								
		 Continuing on WP6 T6.3 implementation of services at LEC Use Case 									
			the verification of	•							
		 Finalising 	on WP6 T6.6 KPI	elicitation, who	ere the result	ing va	alues will be				
		collected	and analysed								
Units	S	%		Parent KPI	[KPI Name/	ID]					
	orting	Data upload r	ate	Other	"Other"	End of phot					
[to D	DWH]				upload rate						
		Information d	isplay	Cumulated	Trend⊠						
				value□	TTOTIGES		14// (
KPI		<1% decrease		<u> </u>							
	ulation										
trigg (targ											
valu											
		CALCU	LATION/EXTRAC	TION METHOD	OLOGY						
Ste		Ste	p description		Respons	sible	Data ID				
p ID											
1	Collect	lata from pilot a	nd estimate costs		REVOL1	Γ/	1				
					ASTEA						
2	Calculat	e the KPI			REVOLT	REVOLT/					
					ASTEA						
Door	D										
DOCUN	nent name:	ocument name: D3.5 KPIs applicable in OMEGA-X Page: 145 of 161									

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			DATA COL	LECTIC	N				
Dat a ID	Data descrip tion	Data source (entity/respon sible)	Data sink (entity/respon sible)	coll	oata ection ethod	Dat collec upda rate	tion ite	Data co time i	llection range
1	Estimat ed water and thermal losses	ASTEA	REVOLT	Database		Monthly		N/A	
2	KPI	REVOLT/ ASTEA	REVOLT	Datab	ase	After pi implemation		N/A	
			BASEL	INE					
BASE sour	CELINE CE	Literature□	Historical data⊠		Measure ⊠	ements	Simulations ⊠		Other
	"Other" BASELINE sou		NE source	Water years	r and the	rmal los	ses (of the last	t x
Resp	onsible	ASTEA							
Description Water and thermal losses of the last x years									

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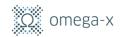


Table 82 KPI 6.22 definition.

			GENERAL INF	ORMATION							
ID		KPI 6.22		Name	C02	compens	sated				
	ess UC/		.0 Local Energy C		_	y Consur	nptio	n			
Syste	m UC	·	n through prosume	er engagemei	nt						
			.0 Benchmarking	1.0	(D)						
			.0 Provide Data A	•	(PI						
			.0 Prosumer beha								
			.0 ETL of smart m		1 '1'4						
Use C	ase	Renewabl es⊟	Energy communities⊠		TIIIDO	Flexibility		N/A□			
Descr	iption	_	Quantity of carbon emission reduced due to challenge faced by consumers after joining the LEC								
Formu	ula		$CO_{2reduced} =$	E _{self consumed}	· Ken	$\frac{nission}{1} \cdot 10$	00				
						F1 7					
			$K_{emission}$: C0 ₂ factor emission $\left\lfloor \frac{kg_{CO_2}}{kWh} \right\rfloor$								
		I	$E_{selfconsumed} = \sum_{t} \min(E_{produced}(t), E_{consumed}(t))$								
Monite	oring	Start monitoring at WP3 Use Cases and Services definition									
		Continu	uing on WP6 T6.3	implementati	on of	services	at LE	C Use Case			
		Family	for the verification	of the KPI ta	rget						
			ng on WP6 T6.6 I ected and analyse		, whe	ere the res	sultin	g values will			
Units		%		Parent KPI	[KPI	l Name/ID)]				
Repor	ting [to	Data uploa	d rate	Other	"Otl	her"	of pilot				
DWH]					uplo	upload rate					
		Information	n display	Cumulated value□	Tr	rend⊠		N/A□			
KPI ca	alculation	15%									
	r (target										
value)			LATION /EVERA C	FIGNI METUO	DOI (261/					
01			LATION/EXTRAC	IION MEIHO	DOLC		*10.1	D-1-1D			
Step ID		Ste	p description			Respons	sible	Data ID			
	Compute minimum between energy consumed and produced in the LEC for each time interval					Pilot own	er	$E_{selfconsume}$			
2	Obtain the CO2 factor emission for a specific time instan				ant	REVOLT		K _{emission}			
	Collect input from pilot owners and compute emission percentage reduced					REVOLT		CO _{2reduced}			

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			DATA COL	LECTION					
Data ID	Data descripti on	Data source (entity/resp onsible)	Data sink (entity/respon sible)		collection method		on ate	Data co time r	
1 Energy Pilot own Consumpt ion		Pilot owners	REVOLT	API and Database		Monthly or weekly		Year, Month	
2	Energy Productio n	Pilot owners	REVOLT	API and Database		Monthly o	or	Year, Mo	onth
			BASEL	INE					
BASE source		Literature□	Historical data□	☐ Measu		urements S		ulations	Other
	"Other		ELINE source						
Responsible Pilot owners									
Description Energy consumption and production in the LEC									

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Table 83 KPI 6.23 definition.

	GENERAL INFORMATION									
ID		KPI 6.23		Name	Euros saved	d				
Busines System		Optimization t SUC LEC 4.0 SUC LEC 5.0 SUC LEC 6.0	Local Energy Cor hrough prosumer Benchmarking Provide Data Ana Prosumer behavi ETL of smart met	engagement alytics and KPI ors	gy Consump	otion				
Use Cas	se	Renewables	Energy communities⊠	Electromob	ilit Flexibility	□ N/A□				
Descrip	tion		ros that the consu		ved due to ac	ction taken by				
Formula	a	$ \mathfrak{E}_{saved} = \frac{\sum_{t} \min\left(E_{produced}(t), E_{consumed}(t)\right) \cdot E_{\mathfrak{E}}(t)}{\sum_{t} E_{consumed}(t) \cdot E_{\mathfrak{E}}(t)} $ $ E_{\mathfrak{E}}(t): \text{ energy costs at specific time interval t} $								
Monitor	ing	 Start monitoring at WP3 Use Cases and Services definition Continuing on WP6 T6.3 implementation of services at LEC Use Case Family for the verification of the KPI target Finalising on WP6 T6.6 KPI elicitation, where the resulting values will be collected and analysed 								
Units		%	·	Parent KPI	[KPI Name/I	ID]				
Reporti DWH]	ng [to	Data upload	rate Other		"Other" upload rate	End of pilot				
		Information of	display	Cumulated value□	Trend⊠	N/A□				
KPI calculat trigger (target		15%								
			LATION/EXTRACT	TION METHOD						
Ste p ID		Ste	p description		Respons	sible Data ID				
	•	mpute minimum between energy consumed and duced in the LEC for each time interval REVOLT med								
2 Ob	Obtain the energy cost for a specific time instant REVOLT $E_{ m e}(t)$									
		out from pilot o ge reduced	wners and compu	ite energy cost	REVOLT	\in_{saved}				
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	Document name: D3.5 KPIs applicable in OMEGA-X Page: 149 of 161 Reference: OMEGA-X_D3.5 Dissemination: PU Version: 1.0 Status: Final									



			DATA COL	LECTIC	N				
Dat a ID	Data descript ion	Data source (entity/respon sible)	Data sink (entity/respo nsible)	method		Dat collec upda rate	tion ite		llection range
1	Energy Consum ption	Pilot owners	REVOLT	Database		Monthly or weekly		· ·	
2	Energy Producti on	Pilot owners	REVOLT	API a Datab	-	Monthly or weekly		Year, M	onth
			BASEL	.INE					
BASE	CE CE	Literature□	Historical data	ı□	□ Measurements Sin □ □			ulations	Other
	"Other" BASELINE s								
Resp	onsible	Pilot owners							
Desc	Description Energy consumption and production in the LEC								

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Table 84 KPI 6.24 definition.

				GENER	AL INFO	ORM <i>A</i>	ATION				
ID			KPI 6.24			Nam	e	Ener	rgy rankin	g	
Busin Syster	ess UC m UC	/	BUC LEC 2 SUC LEC 4 SUC LEC 5 SUC LEC 6	.0 Benchm .0 Provide	Data Ar			(PI			
Use C	ase		Renewabl es□	Ener commun	-	Ele	ctromob	oility	Flexibility		N/A□
Descr	iption		Position of sterms of bot	•			•		•	•	
Formu	ıla		Ranking pos $E_{\%selfconsum}$	E_{so}	core = 1	E _{%selj}			, %saved $\frac{E_{cons}}{E_{LECco}}$	sumed ^{(t} onsumed	;,i)
			where i is the $E_{\%saved} =$ Where E_{act} historical data	ne i^{th} cons $rac{E_{actual}}{E_{previous}}$ ual is the a	umer actual e	nergy					
Monito	oring		Continu FamilyFinalisi	for the veri	6 T6.3 in the fication of the first term of the	imple of the	mentation E KPI ta	on of rget	services	at LE	n C Use Case g values will
Units			#			Pare	nt KPI	[KPI	Name/ID]	
Repor DWH]	ting [to)	Data uploa	d rate		Othe	r	"Oth uplo	ner" pad rate	End	of pilot
			Information	n display		Cum value	ulated :□	Tı	rend⊠		N/A□
	alculation r (targe		N/A								
			CALCU	LATION/E	KTRACT	ION	METHO	DOLO	OGY		
Step ID			Sto	ep descrip	tion				Respons	sible	Data ID
1	1 Collect consumption data Pilot owner						er	$E_{consumed}$			
2	consur	mer	the amount of over his over	rall consur	nption				REVOLT		$E_{\%selfconsur}$
3	Comp	ute	the amount o	of saved er	nergy by	/ cons	sumer		REVOLT		E _{%saved}
4	Comp	ute	the energy s	core					REVOLT		E_{score}
Docume	ent name:	D3.	5 KPIs applicable	e in OMEGA-X	(Page:	151	of 161
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			DATA COL	LECTIC	N				
Data ID	Data descript ion	Data source (entity/resp onsible)	Data sink (entity/respon sible)	colle	ata ection thod	Data collecti update	on	Data co time ı	llection range
1 Energy consump tion		Pilot owner	REVOLT	API and Database		Monthly or weekly		Year, M Week	onth,
2	Energy productio n	Pilot owner	REVOLT	API a Datab	-	Monthly or weekly		Year, Mo Week	onth,
			BASEL	.INE					
BASEL		Literature□	Historical data□] Meası ⊠		ırements	Sim	ulations	Other
		"Other" BAS	ELINE source						
Respo	nsible	Pilot owners							
Descr	iption	Energy consumption and production in the LEC							

Table 85 KPI 6.25 definition.

	GEN	IERAL INFORM	ATION						
ID	KPI 6.25		Name	Energy cos	sts				
Business UC/ System UC	BUC LEC 3.0	LEC Planning	Services						
Use Case	Renewables	Renewables Energy Electromobility Flexibility□ N/A communities⊠ □							
Description	sources. Pro	otal energy costs per year, including all the different energy ources. Projections of these costs under the different demand and upply scenarios (KPI 6.26 & KPI 6.27)							
Formula	∑ Energy sou	∑Energy source (kWh/year) * Costs (€/kWh)							
Monitoring	No monitoring	g - Calculation	of costs for c	different sce	narios				
Units	€/year for ead	ch scenario	Parent KPI	N/A					
Reporting [to DWH]	Data upload	rate	N/A	"Other" upload rate	N/A				
	Information display Cumulated value□ Trend□ N/A⊠								
KPI calculation trigger (& target value)	N/A								

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	C	ALCULATIO	N/EXTRACTION	METHODOL	OGY		
Step ID		Step d	escription		Resp	onsible	Data ID
1	Define scenar	rios for energ	gy system in 203	0	TECN	IALIA	1
2	Calculation of	energy cost	s for each scena	rio	TECN	IALIA	2
			DATA COLLECT	ION			
Data ID	Data description	Data source (entity/res ponsible)	Data sink (entity/respon sible)	Data collection method	Data collect updat rate	ion co te tir	Data Ollection ne range
Current electricit y cost	Cost of the electricity in the current situation	Pupin		Bills	Monthly		orical e 2016
Future electricit y cost	Cost of the electricity in the future	Pupin	TEC	Monitoring	Hourly	Hou	rly
Mazut consum ption	Mazut tank level	Pupin		Monitoring	Hourly		
Mazut cost €/Kg	Cost of the fuel used. Current and expected in the future	Pupin		-			
			BASELINE				
BASELIN	E source	Literature □	Thotorical data =				
		"Other" BA	SELINE source				
Respons	sible	PUPIN, TE	CNALIA				
Description Historical energy use and costs for different energy sources. Description of overall system, including equipment and buildings.							

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Table 86 KPI 6.26 definition.

		GENERAL INFORMA	ATION					
ID	KPI 6.26		Name	Production Scenarios				
Business UC/ System UC	BUC LEC 3.0 L	EC Planning Servic	es					
Use Case	Renewables□	Energy communities⊠	Electromobility□	Flexibility□	N/A□			
Description		Local energy production to supply different energy demand scenarios for 2030 (as per KPI 6.27)						
Formula	\sum Local energy production systems (kWh/year)							
Monitoring	No monitoring - Calculation of energy production for different scenarios							
Units	kWh Parent KPI N/A							
Reporting [to DWH]	Data upload ra	ite	N/A	"Other" Nupload rate	I/A			
	Information di	splay	Cumulated value□	Trend□	N/A⊠			
KPI calculation trigger (& target value)	N/A							
	CALCULAT	ION/EXTRACTION	METHODOLOGY					
Step ID	Step description Responsible Da							
1 Define so	enarios for energ	gy system in 2030		TECNALIA	1			
2 Calculation	on of local energy	production for each	h scenario	TECNALIA	2			

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		D	ATA COLLECTIO	N				
Data ID	Data descriptio n	Data source (entity/respon sible)	Data sink (entity/respon sible)	Data collect on metho	cti collect update	ion	Da collec time r	ction
PV product ion	Electricity production from the PV panels	Pupin	TEC	Monito ng	ori		Hourly 2021	from
Electric ity cost	Cost of the electricity in the future	Pupin	TEC	Monito ng	ori Hourly		Hourly	
Mazut cost €/Kg	Cost of the fuel used	Pupin	TEC	Bills			Month year	or
Energy system data	Characteri stics of the energy system, like efficienty	Pupin	TEC	N/A	None		N/A	
Buildin g energy needs	Hourly energy consption profile of the buildings	Pupin	TEC	Monito ng	Dri		Hourly	
			BASELINE					
BASELIN	E source	Literature□	Historical data⊠	nta⊠ Measureme Simulati nts⊠ ns⊠				Other
		"Other" BASELI						
Respon		PUPIN, Tecnalia						
Description Historical energy use and costs for different energy sources. Description of overall system, including equipment and buildings.								

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Table 87 KPI 6.27 definition.

			GENERAL INFORM	MATION					
ID		KPI 6.27		Name	Dema	nd scena	rios		
Business UC		BUC LEC 3.0 L	EC Planning Servio	ces					
Use Case		Renewables□	Energy communities□	Electromobi	lity□	Flexibilit	ty□	N/A□	
Description	n	Energy demand scenarios for 2030.							
Formula		\sum Energy demand of diffierent systems , by energy source (kWh/year)							
Monitoring]	No monitoring - Calculation of energy demand for different scenarios							
Units			Parent N/A KPI						
Reporting DWH]	[to	Data upload ra	N/A	"Other" upload rate		N/A			
		Information di	splay	Cumulated value□	Tre	end□	N	/A⊠	
KPI calculation trigger (& target valu		N/A							
	CALCULATION/EXTRACTION METHODOLOGY								
Step ID		Step description Responsible Da							
1 Defi	ne sc	enarios for ener	gy system in 2030		TE	CNALIA		1	
2 Calc	culation	on of energy der	nand for each scen	ario	TE	CNALIA		2	

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		DAT	A COLLECTION				
Data ID	Data descriptio n	Data source (entity/responsi ble)	Data sink (entity/respon ble)	Data collecti on method	Data collecti on update rate	Data collectior time range	
Hourly energy demand	Hourly energy demand (electricity and thermal)	Pupin	TEC	Monitori ng		Hourly	
PV producti on	Electricity production from the PV panels	Pupin	TEC	Monitori ng		Hourly from 2021	1
Fuel cost	Cost of the fuel used (Mazut)	Pupin	TEC	Monitori ng		Monthly or year	
Electrici ty cost	Cost of the electricity in the future	Pupin	TEC	Monitori ng	Hourly	Hourly	
Energy system data	Characteris tics of the energy system, like efficienty	Pupin	TEC	N/A	None	N/A	
			BASELINE				
BASELIN	E source	Entire data is a second		nts Simu s⊠	ulation Othe	∍r	
		"Other" BASELIN	E source				
Respons	sible	PUPIN, TECNAL	IA				
Descript	escription Historical energy use and costs for different energy sources. Description of overall system, including equipment and buildings.						

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Annex 3 Communication and dissemination KPIs

Quantitative KPIs

To capture the results of different tactics deployed during the project lifecycle, several measurements and indicators are set for each of the activities (as stated in the OMEGA-X DoA [1]). The earlier in the project these tactics are implemented the better. The table below outlines quantitative targets for tracking and measuring progress.

Table 88 Communication and dissemination quantitative KPIs.

Communication &	KPI target (cumulative)				
	Channels	M12	M24	M36	
Project	Leaflets	1	4	8	
documentation	Posters	1	2	3	
	Reference project presentations	1	3	5	
Publications	Newsletter	4	8	12	
	Scientific articles and	2	5	10	
	conference proceedings	Impact factor > 1,5			
	Videos	1	1	3	
	OMEGA-X Academy	Setup 10		courses	
Web and social media	Project website (visitors/month)	300	800	1.500	
	LinkedIn (monthly interactions)	1.000	2.000	5.000	
	Twitter prints (monthly interactions)	5.000	10.00	20.000	
Events	Fairs (booth), workshops and/or conferences attended	15 (5/year, energy related and/or IC related)			
	Organized workshops	3 (attendance of > 150 people to each)			

Qualitative KPIs

While quantitative targets are important, they are not enough to understand whether something is performing to the desired standard. For that reason, qualitative feedback is needed to paint a more complete picture.

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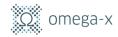


Table 89 Communication and dissemination qualitative KPIs.

Indicator	Objective	Means of verification
Relevance	Communication and dissemination messages should be relevant to stakeholders being targeted.	Contact form.Time lag between results creation and
Clarity	Communication and dissemination messages should be clear enough to be easily recognised.	announcement.Number of downloads.Click through rate.
Timeliness	Communication and dissemination tactics should follow the principle "strike while the iron is hot".	 Follow-ups, e.g. email exchanges, on/offline meetings.
Efficiency	The outcome of communication and dissemination tactics should be proportional to the amount of invested effort, time and resources.	Unsubscribe button.
Openness	Outreach efforts should include an option for target audience to provide feedback, complain, make suggestions or unsubscribe.	

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Annex 4 SSH KPIs

From the handbook on user engagement at D2.1 [9].

Human-centered solutions and pathways for societal impact

OMEGA-X Objective 9 [1] aims at integrating a user-centric and collaborative approach throughout the project's lifetime. This integration is targeted at three different levels in the project: At the pilot level, at the collaboration level, and at the impact level, as described in deliverable D2.1 [9]. As the findings of BRIDGE show [9], many EU funded projects addressing energy systems add a SSH approach and user engagement activities only in the final phase of the project. OMEGA-X strives for an early integration to ensure that the necessary activities and engagements are built in the pilots and the project and that not only a technological, but also societal impact can be achieved.

In the preparation phase of the pilots, SSH related activities will focus on four areas:

- Stakeholder and user engagement
- Ecosystem level
- Policy level
- Project level (internal)

Table 90 Preliminary overview of possible KPIs for societal impact.

OMEGA-X KPIs for Societal impact	OMEGA-X Use Case Families					
(DoA)	Renewables	Flexibility	Energy Communities	Mobility		
Number of stakeholders sharing data/services involved	>7	>7	>7	>7		
Number of locations involved	>2	>2	>2	>2		
Number of Energy Communities involved	#	#	#	#		
Collaboration with use cases in sister projects	#	#	#	#		
Services that increase quality of life in pilot site	#	#	#	#		
Incentives for communities & companies to adopt a collaborative approach	#	#	#	#		
Increased acceptance and participation of consumers on data sharing for energy services	>%	>%	>%	>%		
Trust in data sharing increased amongst stakeholders	>%	>%	>%	>%		
Energy affordability for citizens	>%	>%	>%	>%		

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OMECA V VDIa for Sociated improve	OMEGA-X Use Case Families					
· OMEGA-X KPIs for Societal impact (DoA)	Renewables	Flexibility	Energy Communities	Mobility		
Decrease of energy poverty	<%	<%	<%	<%		
Citizens' access to energy services	>%	>%	>%	>%		
Diversity amongst stakeholders (including gender balance)	>%	>%	>%	>%		
Increased consumer satisfaction.	>%	>%	>%	>%		
New energy services developed in collaboration with consumers and citizens.	#	#	#	#		
Policy recommendations delivered that have the potential to increase citizens quality of life.	#	#	#	#		

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