

# ECOEMPOWER

## D6.1 Quantitative and qualitative assessment criteria for the evaluation of energy communities



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<b>ABBREVIATION</b>	<b>DEFINITION</b>
DoA	Description of Actions
DSO	Distribution System Operator
ESCO	Energy Service Company
GHG	GreenHouse Gas
ICT	Information and Communication Technology
KPI	Key Performance Indicator
OSS	One Stop Shop
PU	Public
EC	Energy Community
RES	Renewable Energy Source
ToC	Table of Contents
WP	Work Package
WPL	Work Package Leader

## Executive summary

This deliverable describes Key Performance Indicators (KPIs) to be defined within the ECOEMPOWER project. The document also outlines the methodology followed to identify and define KPIs according to the aims to assess the degree of achievement of the different objectives defined in the ECOEMPOWER project within in the pilot sites.

The document collects all KPIs, divided by class, their definitions and measurement methodology to monitor the progress of the ECOEMPOWER project and to make a comparative assessment of the OSS (One Stop Shop) developed in each region to support all pilot sites in that region. This makes it possible to quantify the improvement over previous phases and to compare sites.

About the methodology for defining the list of KPIs, we started with the list of mandatory KPIs from the LIFE programme, then a literature analysis of KPIs from various European projects was carried out, and additional KPIs to the mandatory ones were then proposed. Finally the selection of additional KPIs was done by means of a vote by all partners involved.

The KPIs described in this document can be classified as social, energy, economy, environmental and evaluation for OSS and EC.

This document serves as base for the KPIs that should be considered throughout the project. As the pilot sites differ among each other, so do the available data. Therefore, not all KPIs are applicable for all pilot sites.

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# 1 Introduction

The main objective of WP6 is to test the effect of the ECOEMPOWER support mechanisms to facilitate the emergence and growth of energy community projects, by running extensive real-life evaluation tests in the 15 pilot sites (3 energy communities x 5 regions). The following objectives are identified:

- To evaluate the ecosystem impact of the project in the pilot sites.
- To measure the energy and environmental benefits triggered by the project.
- To analyse the social, policy and economic drivers for the success (or failure) of the measures.

These will be determined by means of qualitative and quantitative analysis.

## 1.1 Objectives of the deliverable

This deliverable results from work carried out in T6.1 – *Definition of quantitative and qualitative assessment criteria*. In this task, through collaboration between all project partners, both technical and regional ecosystems, the aim is to define a list of evaluation criteria that will then be used throughout the duration of the project to monitor the pilot sites.

The present deliverable will produce the final set of project KPIs through which ECOEMPOWER pilot sites and OSSs will be monitored throughout duration of the project.

The specific objectives of this deliverable, which are related to the objectives of the reference task, are as follows:

1. To confirm the KPIs required by the LIFE programme at the proposal stage and describe them in more detail.
2. To identify additional project KPIs, if necessary or useful to ECOEMPOWER.
3. To develop further the consolidated set of final project KPIs, in order to provide context and guidance for their utilization.

## 1.2 Structure of the deliverable

D.6.1 is structured in four main chapters as follows:

- **1 Introduction** – Overview of the document with objectives: description of the purpose, the structure of the deliverable, and its relationship to the other ECOEMPOWER tasks.
- **2 Methodology for KPIs identification** – Description of the method used to achieve the objective of the deliverable, i.e. the determination of the final set of KPIs.
- **3 Description of ECOEMPOWER KPIs** – Description of the identified criteria categories and the final list of KPIs, degree of importance, measurement methods and impact in the project.
- **4 Conclusions** - Conclusions and considerations on the deliverable.

## 1.3 Relation with other activities in ECOEMPOWER

This deliverable is the basis for *WP6 – Testing the project mechanisms in pilot sites*, as the evaluation criteria defined here will guide the activities of the other WP6 tasks and define what data to collect and how to evaluate an energy community during the project. Thus, this deliverable relates to every single Task of WP6, from the definition of the baseline (T6.2) to the analysis of the results (T6.4), via the monitoring of the pilot sites (T6.3).

This particular deliverable of WP6 does not have so many relationships outside this work package, yet it is essential within WP6, which will have so many relationships with the other tasks. For example, in order to define the general and specific KPIs for each pilot site and to supervise them over the duration of the project, WP6 will work in close cooperation with WP5 ("Design and Setting up of One Stop Shops"). While WP5 will set up or further develop 5 regional One-Stop Shops (OSSs), which will provide assistance to the local energy communities in the regions concerned, WP6 will ensure their effective testing and evaluation through continuous data collection for the validation of the different project KPIs. Another relationship is between WP6 and WP2 when defining the baseline of the various pilot sites, where certain inputs are required both for the definition of the baseline and for the definition of the current scenarios at the pilot site level for the creation of the ICT platform (T2.1), and thus collaboration between the tasks is required.

## 2 Methodology for KPIs identification

A Key Performance Indicator (KPI) is a value that can be measured, evaluated and demonstrated in order to assess the performance to reach a specific target. Initially, several KPIs from different areas had already been identified in the proposal, which were mandatory to evaluate for the LIFE programme. Later, during Task 6.1, other KPIs of various types were added to increase the level of the list of project KPIs in addition to those of the LIFE programme.

The steps that were followed to define the list of KPIs are as follows:

1. Description of mandatory KPIs in the LIFE Programme (in the proposal writing phase).
2. Brainstorming on what other KPIs should be included in the project, based on previous deliverables and project objectives (in the first month of the project).
3. Division of KPIs into various macro areas that have an influence on the development of energy communities.
4. Addition of a list of new KPIs divided into the different areas of competence and which may have an impact on project development.
5. Definition of information on new KPIs proposed about measurement, assumptions and unit of scale.
6. Review by all project partners of the newly added KPIs with the inclusion of evaluations and comments regarding the individual KPIs proposed, to complete a skimming for a final list of the project KPIs.

For developing the criteria assessment for ECs, it is required to identify the broad areas affecting the community and identify the KPIs for the specific targets. In ECOEMPOWER these areas were identified in post-proposal stage by skimming other projects, and are the following:

- Social
- Energy
- Economy
- Environmental

Considering the goals of the ECOEMPOWER project to create energy communities and One Stop Shop support mechanisms within regional ecosystems, the addition of two new categories was considered to assess the degree of maturity of the created energy communities and OSSs. These two new areas are:

- EC quality and maturity
- OSS evaluation

Therefore, after the initial review of the KPIs required by the LIFE programme and the subdivision into different macro areas of competence, additional KPIs were added for all partners involved to obtain a well-developed final set of KPIs. Throughout the process of defining the KPIs the following questions were evaluated:

- What areas affect an EC?
- What objectives should be measured?
- How relevant is the KPI for an EC?
- What is the impact of an EC on the environment?
- What are the expected effects on people from social point of view?
- Do ECs really increase the amount of renewable energy in the system?
- How can the effects of an EC be measured?

During activity 6.1, the entire consortium worked together via a shared Excel template provided to all partners, with the aim of providing evaluation input, proactive comments or doubts on all the various proposed KPIs. At the end of this collaboration a final set of KPIs emerged with the addition of the new KPIs to the mandatory LIFE Programme KPIs.

Once the final set of project KPIs is completed, it is important to provide information on the individual KPI in question, such as to provide a definition of the KPI, to identify whether it is a quantitative or qualitative value, the units of measurement, the data source, the calculation or methodology to obtain the KPI. In case of the ECOEMPOWER list of KPIs, the data source that will be used in the estimation process will be mainly one of the followings:

- Real data metered on site
- Calculated data (based on more input values)
- Technical data (technical parameters)
- Estimated data (common practices, assumptions, statistics etc)
- Collected data (surveys, interviews, workshops etc)

As the ECOEMPOWER support mechanisms will be deployed in the 5 regions, measurements and analysis will be performed to determine the impact of the various energy-environmental-socioeconomic aspects. In fact, after finalising the final list of KPIs, its technical parameters will be collected every year while the social and OSS parameters will be collected every six months throughout the project, via a shared file with all regional ecosystems representing the pilot sites. The expected result of WP6 is not only a set of measurement data but, rather, a series of explanations on the results obtained by a "list" of important parameters to facilitate the emergence and growth of energy community projects. Finally, based on the findings above, suggestions for social measures, market design and regulatory frameworks necessary to further promote the set-up of sustainable energy projects through energy communities will be given.

### 3 Description of ECOEMPOWER KPIs

After all the methodology steps for the identification of the different KPIs, a final template including all the KPIs is created. The template for the definition of the KPIs and the variables is composed of the next information:

- Name of the KPI and short description.
- Unit of scale.
- Type of KPI (qualitative or quantitative).
- Specific assumptions for the variables considered.
- Data source.
- Methodology or KPI formula (if necessary).

Although some of the project KPIs were already included in the Grant Agreement from the LIFE programme, within the work performed in T.6.1, new KPIs emerged to contribute to the overall evaluation of the project targets. The final list of KPIs is of particular importance for monitoring the project implementation and its main outcomes.

The KPIs utilized in the ECOEMPOWER project have three scopes (three kinds of KPIs):

- 1- KPIs identified to measure and monitor the project targets already identified at the proposal stage (social, energy, economic and environmental).
- 2- KPIs identified to assess the quality and maturity of an energy community.
- 3- KPIs identified to assess and monitor the project's support mechanisms (the OSSs), quality and the services they provide.

It follows from the Grant Agreement that no other forms of energy than electricity are considered in the calculation of the project KPIs, taking into account only factors and values relating to electricity. Furthermore, in the pilot sites considered in the project, energy sharing (and thus the Energy Community approach) only takes place via electricity grids, and it is for this reason that KPI assessment is focused only on the electrical domain.

Given the above points, and thanks to the methodology used, the final complete list of project KPIs was drawn up and can be seen in Table 3.1. Some KPIs have the designation 'LIFE KPI' in front of them, representing the mandatory KPIs for the project's LIFE programme.

*Table 3.1 - List of all project KPIs*

Key Performance Factor (KPI)	Type
LIFE KPI: Number of citizen-led initiatives supported and/or created	Social
LIFE KPI: Number of citizens taking part in energy communities	Social

<b>LIFE KPI:</b> Number of actors with increased skills in the area of community energy	Social
<b>LIFE KPI:</b> Number of jobs created in FTE	Social
Overall satisfaction for ECs	Social
Number of people participating in Workshops	Social
Diversity in the distribution of people involved in the EC	Social
<b>LIFE KPI:</b> Primary energy savings (GWh/year)	Energy
<b>LIFE KPI:</b> Final energy savings (GWh/year)	Energy
<b>LIFE KPI:</b> Renewable energy generation (GWh/year)	Energy
RES electricity self-consumption level	Energy
Flexibility – Storage power and capacity (P2P, P2H)	Energy
<b>LIFE KPI:</b> Investments in sustainable energy	Economic
<b>LIFE KPI:</b> Development of local community energy investment pipelines	Economic
Cost of reduction of GHG emissions	Economic
Ratio of public investment against private investment	Economic
Electricity bill reduction	Economic
<b>LIFE KPI:</b> Reduction of GHG emissions	Environmental
Engagement of a core team	EC Quality and maturity
Management	EC Quality and maturity
<b>LIFE KPI:</b> Number of operational integrated service hubs at the end of the project	OSS evaluation
Number of users of physical OSSs	OSS evaluation
Number of users of virtual OSSs	OSS evaluation
Overall satisfaction for physical OSSs	OSS evaluation
Overall satisfaction for virtual OSSs	OSS evaluation
New services offered by physical OSSs	OSS evaluation
New services offered by virtual OSSs	OSS evaluation

The above-mentioned targets will be foreseen during the project with the cooperation and commitment of the local partners in the 5 different regions: PAT, ACV, eza!, PSOE and ROCG respectively regional coordinators in PROVINCE OF TRENTO, AURA, ALLGAU, PRAGUE and CENTRAL GREECE. In each region, the ECOEMPOWER OSSs will assist in an experimental way a limited number of pilot sites in the three years of the project (3 pilot sites) while in the following 5 years they will be able to assist a greater number of pilot sites, an average of 10 each year. The 5 ECOEMPOWER regional coordinators are committed to these targets which will significantly expand the results and benefits of ECOEMPOWER by 2030.

All values in the KPIs measurement methodology, both for those measured directly from real data and those to be calculated indirectly, are to be provided as input by the relevant partners of the various pilot sites both in the definition of the baseline in the first months of the project (Task 6.2 ending at M6) and during the project itself for testing and monitoring the implemented solutions (Task 6.3 ending at M33).



### 3.1 Social KPIs

Renewable energy communities have a really strong social component and impact. One of the main objectives of ECs is to involve citizens to actively participate in the energy sector: producing, consuming and selling their own electricity and gaining autonomy. For this purpose, it is interesting to evaluate the awareness-raising and knowledge sharing to fully understand how to participate in EC and energy transition, by assessing the number of citizens involved, the general satisfaction of being part of an energy community and the number of jobs created by this initiative.

The tables below show all the social KPIs that will be considered and monitored in the assessment criteria used for ECOEMPOWER project:

*Table 3.2 – KPI\_SOC\_1. Number of citizen-led initiatives supported and/or created*

<b>SOC_1. Number of citizen-led initiatives supported and/or created (LIFE)</b>	
<b>Definition</b>	Number of citizen-led initiatives supported by OSS
<b>Unit of scale</b>	[#]
<b>Type</b>	Quantitative
<b>Data source</b>	Collected data on-site
<b>Methodology calculation</b>	or Direct measurement in the pilot sites

*Table 3.3 - KPI\_SOC\_2. Number of citizens taking part in energy communities*

<b>SOC_2. Number of citizens taking part in energy communities (LIFE)</b>	
<b>Definition</b>	People who joined the energy community as members
<b>Unit of scale</b>	[#]
<b>Type</b>	Quantitative
<b>Data source</b>	Collected data on-site
<b>Methodology calculation</b>	or Direct measurement in the pilot sites

Table 3.4 - KPI\_SOC\_3. Number of actors with increased skills in the area of community energy

SOC_3. Number of actors with increased skills in the area of community energy (LIFE)	
Definition	People who have increased their knowledge and skills in the energy community sector
Unit of scale	[#]
Type	Quantitative
Data source	Collected data on-site
Methodology calculation	<p>or</p> <p>Direct measurement in the pilot sites:</p> <p>In the context of WP5, task T5.3 ("Peer learning tailored to local needs") has as its main target to conduct peer learning and exchange sharing activities between experienced partners (AURA-EE, ACV, BAUM) and learning partners to strengthen their capacities in designing, creating and developing the OSS and its integrated services. The representatives of the pilot sites (PAT, ACV, eza!, PSOE, ROCG) should then conduct small workshops/courses for each pilot site involving at least 5 people from each pilot to pass on the knowledge received from the experienced partners.</p>

Table 3.5 – KPI\_SOC\_4. Number of jobs created

SOC_4. Number of jobs created (LIFE)	
Definition	Number of jobs created in the pilot site as a result of the project interventions and the creation of the OSS providing services for energy communities
Unit of scale	[FTE – Full Time Equivalent]
Type	Quantitative
Data source	Calculated data
Methodology calculation	<p>or</p> <p>Considering an Average Employment (AE) of 7 jobs/M€, it can be indirectly calculated as follows:</p> $\text{Number of jobs} = AE * ECO\_2$ <p>Where:</p> <p><i>AE</i> is the Average Employment value [jobs/M€];</p> <p><i>ECO_2</i> is the economic KPI refers to the total amount of investment in the energy sector [M€];</p> <p>Considering that the AE value refers to full-time jobs, it is assumed that 1 Job = 1 FTE</p>

Table 3.6 – KPI\_SOC\_5. Overall satisfaction for ECs

SOC_5. Overall satisfaction for ECs	
Definition	Qualitative benchmark provided by members of the ECs on satisfaction to be part of it and on the resulting benefits. The aim is to account for the overall degree of satisfaction of the user belonging to the EC in terms of participation, contribution to green transition and energy justice
Unit of scale	Likert scale
Type	Qualitative
Data source	Collected data on-site (Survey)
Methodology calculation	or Evaluate through questionnaire to EC members within the pilot sites to which degree the citizen feels he is contributing to green transition by belonging to the EC, by means of collecting information on a survey

Table 3.7 – KPI\_SOC\_6. Number of people participating in Workshops

SOC_6. Number of people participating in Workshops	
Definition	Number of people participating in knowledge activities such as events and dissemination workshops
Unit of scale	[#]
Type	Quantitative
Data source	Collected data on-site
Methodology calculation	or Direct measurement in the pilot sites

Table 3.8 – KPI\_SOC\_7. Diversity in the distribution of people involved in the EC

SOC_7. Diversity in the distribution of people involved in the EC	
Definition	Proportion of people under 40 involved in EC and proportion of women involved
Unit of scale	[% of people under 40 on the total number of people involved in EC] [% of women on the total number of people involved in EC]
Type	Quantitative
Data source	Collected data on-site
Methodology calculation	or Direct measurement in the pilot sites

## 3.2 Energy KPIs

KPIs in this category aim to measure the performance of the energy community from an energy point of view, e.g. by monitoring the integration of renewable energy and its self-consumption, or primary or final energy savings.

The tables below show all the energy KPIs that will be considered:

Table 3.9 – KPI\_EN\_1. Primary energy savings

EN_1. Primary energy savings (LIFE)	
Definition	The reduction in primary energy consumption respect to the national energy mix due to energy efficiency and RES applied during the project
Unit of scale	[GWh/year]
Type	Quantitative
Data source	Real data metered on site or calculated data
Methodology or calculation	$PD_{t0} - PD_{EC}$  $PD_{t0}$ = Baseline primary energy demand* at time 0 [GWh/year] $PD_{EC}$ = New primary energy demand* due to participation in the project [GWh/year]  *Considering an appropriate EU Primary energy factor for electricity (EU PEF)

Table 3.10 – KPI\_EN\_2. Final energy savings

EN_2. Final energy savings (LIFE)	
Definition	The reduction in electricity consumption from the grid due to energy efficiency applied during the project
Unit of scale	[GWh/year]
Type	Quantitative
Data source	Real data metered on site or calculated data
Methodology or calculation	$ED_{t0} - ED_{EC}$  $ED_{t0}$ = Baseline electricity demand from the grid at time 0 [GWh/year] $ED_{EC}$ = New electricity demand from the grid due to participation in the project [GWh/year]

Table 3.11 – KPI\_EN\_3. Renewable energy generation

EN_3. Renewable energy generation (LIFE)	
Definition	Quantity of electrical energy produced from renewable energy sources
Unit of scale	[GWh/year]
Type	Quantitative
Data source	Real data metered on site
Methodology or calculation	<p>Calculated from energy flows metered directly in pilot sites</p> $\sum_{i=1}^n E_{el_i}$ <p>Where <math>E_{el_i}</math> represent electric energy flows produced by different renewable energy sources (solar, wind, hydro, etc.) over one year [GWh/year]</p>

Table 3.12 – KPI\_EN\_4. RES self-consumption level

EN_4. RES electricity self-consumption level	
Definition	Level of self-consumption of electricity produced internally in the/by the EC compared to production from renewable energy sources. It measures the percentage of RES generation which is used for self-supply.
Unit of scale	[%]
Type	Quantitative
Data source	Real data or estimation
Methodology or calculation	$\frac{EC_{RES}}{ET_{RES}}$ <p><math>EC_{RES}</math> = Energy consumed from the Community RES locally, so the energy self-consumed [GWh/yr]</p> <p><math>ET_{RES}</math> = Total production from the community RES [GWh/yr]</p>

Table 3.13 – KPI\_EN\_5. Flexibility – Storage power and capacity

EN_5. Flexibility – Storage power and capacity (Power-to-Power, Power-to-Gas)	
Definition	Amount of Storage capacity and power installed
Unit of scale	[kW] for power [kWh] for capacity
Type	Quantitative
Data source	Real data metered on site
Methodology or calculation	Direct measurement in the pilot sites

### 3.3 Economic KPIs

This category of KPIs assesses the economic efficiency of investments within a EC. When developing an EC, it is very important that the proposed solution is economically viable and sustainable for the stakeholders involved in this type of project.

Therefore, sustainable energy investments and the relationship between public and private investments are to be measured and monitored, and from the end user's point of view, it is also important to measure the savings members will achieve on their energy bills by joining the EC.

The tables below show all the economic KPIs that will be considered:

Table 3.14 – KPI\_ECO\_1. Investments in sustainable energy

ECO_1. Investments in sustainable energy (LIFE)	
Definition	Amount of investment in sustainable energy sector for renewable energy production (RES installation)
Unit of scale	[M€] throughout the duration of the project
Type	Quantitative
Data source	Real data metered on site
Methodology or calculation	Direct measurement in the pilot sites

Table 3.15 – KPI\_ECO\_2. Development of local community energy investment pipelines

ECO_2. Development of local community energy investment pipelines (LIFE)	
Definition	Total amount of investment in the energy sector (considering RES installation, but also infrastructure such as electricity grids, electric charging stations, storage)
Unit of scale	[M€] throughout the duration of the project
Type	Quantitative
Data source	Real data metered on site
Methodology or calculation	Direct measurement in the pilot sites

Table 3.16 – KPI\_ECO\_3. Cost of reduction of GHG emissions

ECO_3. Cost of reduction of GHG emissions	
Definition	Cost of reducing CO <sub>2eq</sub> emissions equivalent by investment in energy sector made by private or public entities
Unit of scale	[€/ton <sub>CO2eq</sub> ]
Type	Quantitative
Data source	Calculated data
Methodology or calculation	<p>Indirect calculation from two different inputs:</p> $\frac{ECO_2 \text{ [€]}}{\text{Reduction of GHG emissions [ton}_{CO2eq}\text{]}}$ <p>Where:</p> <ul style="list-style-type: none"> <li>• <i>ECO_2 (KPI)</i> = <i>Development of local community energy investment pipelines</i> comes from Table 3.15 [€]</li> <li>• <i>Reduction of GHG emissions</i> is calculated from Table 3.19 [ton<sub>CO2eq</sub>]</li> </ul>

Table 3.17 – KPI\_ ECO\_4. Ratio of public investment against private investment

ECO_4. Ratio of public investment against private investment	
Definition	Total public investment over total private investment ratio
Unit of scale	[%]
Type	Quantitative
Data source	Calculated data
Methodology or calculation	<p>Indirect calculation:</p> $\frac{Inv_{pub}}{Inv_{pri}}$ <ul style="list-style-type: none"> <li>• <math>Inv_{pub}</math> : Amount of public investment in energy sector [M€] respect to ECO_2 (KPI, Table 3.15)</li> <li>• <math>Inv_{pri}</math> : Amount of private investment in energy sector [M€] respect to ECO_2 (KPI, Table 3.15)</li> </ul>

Table 3.18 – KPI\_ ECO\_5. Electricity bill reduction

ECO_5. Electricity bill reduction	
Definition	Monetary savings for the end-user derived directly from his/her belonging to the EC and consuming renewable energy
Unit of scale	[€/kWh]
Type	Quantitative
Data source	Collected data (request an electricity bill of the user before and after belonging to the EC) or estimated (if bill is not available; estimation of new electricity bill considering the savings for consuming EC locally produced energy)
Methodology or calculation	<p><math>EB_0 - EB_{REC}</math> for electricity</p> <p>Where:</p> <p><math>EB_0</math> is the average cost of electricity, from Electricity Bill before EC [€/kWh]</p> <p><math>EB_{REC}</math> is the average cost of electricity, from Electricity Bill after EC [€/kWh]</p>



### 3.4 Environmental KPIs

The environmental KPI category aims to assess the performance of an energy community from the point of view of its environmental impact. In the development of an EC, it is important to assess and measure the impacts on the environment, as the energy communities potentially play a pivotal role in the energy transition. Therefore, we want to measure the positive impacts that investments in RES can bring by reducing GHG emissions.

The table below shows the environmental KPI that will be considered in the assessment:

Table 3.19 – KPI\_ENV\_1. Reduction of GHG emissions

ENV_1. Reduction of GHG emissions (LIFE)	
Definition	GHG emissions (CO <sub>2</sub> , methane, nitrous oxide) avoided after the implementation of the solution. Reduced amount of GHG emissions through investments in sustainable energy sector
Unit of scale	[tonCO <sub>2eq</sub> /year]
Type	Quantitative
Data source	Calculated data from: $E_{RES}$ is real metered data or estimated $FC$ from countries' regulations
Methodology or calculation	$(E_{RES} + EN_2) * FC$  Where: $E_{RES}$ = total production of energy from the Community RES [GWh/year] $EN_2$ = final energy savings [GWh/year] $FC$ = Conversion factor of non-renewable energy to CO <sub>2</sub> (National values indicated by the EEA for 2020 were taken into account, i.e. Italy 213.4 gCO <sub>2eq</sub> /kWh, France 51.1 gCO <sub>2eq</sub> /kWh, Germany 311 gCO <sub>2eq</sub> /kWh, Czech Republic 436.6 gCO <sub>2eq</sub> /kWh, Greece 479,2 gCO <sub>2eq</sub> /kWh) <sup>1</sup>

<sup>1</sup> GreenHouse gas emission intensity of electricity generation in Europe - European Environment Agency (EEA) <https://www.eea.europa.eu/en/analysis/indicators/greenhouse-gas-emission-intensity-of-1>

### 3.5 EC and OSS evaluation

Considering the objective of ECOEMPOWER, which is the growth of community energy projects and OSS support mechanisms, it is important to consider in the analysis also KPIs that aim to assess the quality of ECs and OSSs, in addition to the performance-related ones described above.

As part of the evaluation of EC quality and maturity, with the aim of creating a strong link with relevant EU projects to ensure efficient dissemination of project results at European level, the ECOEMPOWER project is linked to the DECIDE project (Project H2020 - Development of energy communities through information and collective actions).

In the DECIDE project, an online tool was developed that supports leaders and members of energy communities and collective energy actions. This tool, through a series of targeted questionnaires, provides information on the level of readiness of their initiative, the potential for growth and the framework in which the developing energy community is located. It also provides useful suggestions and recommendations for areas of action where potential for improvement can be identified.

In ECOEMPOWER project we will use some of these questionnaires (as specified in the KPI methodology) to assess the level of quality and maturity of the energy community in development, from various points of view.

In the tables below are the qualitative evaluation criteria for the evaluation of the ECs:

*Table 3.20 - KPI\_EC\_1. Engagement of a Core Team*

<b>EC_1. Engagement of a Core Team</b>	
<b>Definition</b>	For the day-to-day business and the essential activities in management and technical support, committed members of the core team are needed. These can be professional staff or qualified volunteers. In any case, they should have the opportunity to actively participate and to further qualify themselves.
<b>Unit of scale</b>	Likert scale
<b>Type</b>	Qualitative
<b>Data source</b>	Collected data (survey)
<b>Methodology or calculation</b>	Quality parameter measured by questionnaire based on the DECIDE project. The questionnaire concerns the responsibility distribution, skills that core team has, communication, time dedicated to the EC per week.

Table 3.21 – KPI\_ EC\_2. Management

EC_2. Management	
<b>Definition</b>	The management of energy communities, their role in the market and their political and social standing are still subject to constant change. It is important to constantly observe the development and to adapt flexibly as a learning organisation.
<b>Unit of scale</b>	Likert scale
<b>Type</b>	Qualitative
<b>Data source</b>	Collected data (survey)
<b>Methodology or calculation</b>	Quality parameter measured by questionnaire based on the DECIDE project. The questionnaire concerns coaching activities of Core team, learning materials, transfer knowledge, evaluation of business model.

In addition to the criteria for the evaluation of ECs, considering one of the main targets of project, and thus the creation of these one-stop shops to support the creation of energy communities, it is necessary to consider and monitor evaluation criteria for these OSSs, such as the number of users and the services offered.

In the tables below are the qualitative evaluation criteria for the evaluation of the OSSs:

Table 3.22 – KPI\_ OSS\_1. Number of operational integrated service hubs at the end of the project

OSS_1. Number of operational integrated service hubs at the end of the project (LIFE)	
<b>Definition</b>	Number of hubs connecting various integrated services (Number of OSSs)
<b>Unit of scale</b>	[#]
<b>Type</b>	Quantitative
<b>Data source</b>	Real data
<b>Methodology or calculation</b>	Direct measurement in pilot sites

Table 3.23 – KPI\_ OSS\_2. Number of users of physical OSS

OSS_2. Number of users of physical OSS	
Definition	Number of users who used an OSS service in person
Unit of scale	[#]
Type	Quantitative
Data source	Real data
Methodology or calculation	Direct measurement of the number of users (citizens organizations, companies, municipalities, associations, etc.) using a service offered by the physical OSS

Table 3.24 – KPI\_ OSS\_3. Number of users of virtual OSS

OSS_3. Number of users of virtual OSS	
Definition	Number of users who used an OSS virtual service
Unit of scale	[#]
Type	Quantitative
Data source	Real data
Methodology or calculation	Direct measurement of the number of users (citizens organizations, companies, municipalities, associations, etc.) using a service offered by the virtual OSS

Table 3.25 – KPI\_ OSS\_4. Overall satisfaction for physical OSS

OSS_4. Overall satisfaction for physical OSS	
Definition	Appreciation of physical visitors of the OSS in terms of effectiveness, knowledge provided etc.
Unit of scale	Likert scale
Type	Qualitative
Data source	Collected data (survey)
Methodology or calculation	Quality parameter measured by questionnaire to OSSs users, in order to assess their degree of satisfaction with the service offered by physical OSS

Table 3.26 – KPI\_ OSS\_5. Overall satisfaction for virtual OSS

OSS_5. Overall satisfaction for virtual OSS	
Definition	Appreciation of virtual visitors of the OSSs in terms of effectiveness, knowledge provided etc.
Unit of scale	Likert scale
Type	Qualitative
Data source	Collected data (survey)
Methodology or calculation	Quality parameter measured by questionnaire to OSSs users, in order to assess their degree of satisfaction with the service offered by virtual OSS

Table 3.27 – KPI\_ OSS\_6. New services offered by physical OSS

OSS_6. New services offered by physical OSS	
Definition	How many services and what kind of services the physical OSS offers to users and members of the EC (technical/financial/juridical tools, or organisation of collective events etc.)
Unit of scale	[#]
Type	Quantitative
Data source	Real data
Methodology or calculation	Direct measurement based on the services offered by the physical OSS

Table 3.28 – KPI\_ OSS\_7. New services offered by virtual OSS

OSS_7. New services offered by virtual OSS	
Definition	How many services and what kind of services the virtual OSS offers to users and members of the EC (technical/financial/juridical tools, or organisation of collective events etc.)
Unit of scale	[#]
Type	Quantitative
Data source	Real data
Methodology or calculation	Direct measurement based on the services offered by the virtual OSS

## 4 Conclusions

This document aims to provide the main indicators influencing the support that an OSS can provide to renewable energy communities and prospect energy communities and to establish a methodology to quantify or qualify these impacts.

Partners' contributions and inputs have been considered in defining the evaluation criteria for monitoring pilot sites, in order to identify the main KPIs that will allow the performance of a community to be assessed.

The document provides the methodology that was used to identify the indicators together with the definition of each indicator, the calculation or measurement methodology.

KPIs will be calculated with actual meter data, or estimated when this is not possible. These criteria will guide the activities of the other tasks in WP6, such as the creation of the baseline in the pilot sites and the testing and monitoring of these in T6.2 and T6.3, respectively, and will define which data are to be collected for this purpose and how the energy communities are to be evaluated during the project.

The results of the KPIs will be crucial for the successful implementation of OSSs and energy communities and for the communication of project results.

