RENEWABLE INTEGRATION & SUSTAINABILITY IN ENERGY COMMUNITIES

D6.2 – ASSESSMENT OF AND RECOMMENDATIONS TOWARDS THE DEMONSTRATOR SITES

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Executive summary

The RENAISSANCE Demonstration sites started operating in full mode only mid-2021, due to delays caused by COVID-19. These delays refer to both administrative procedures and constructions as well as to the real operation of the sites with actual users. The start of optimized pilots meant the start of monitoring of operations and also data collection (mainly real data, in certain cases facilitated by synthetic data). These data have been used as a direct input to the RENERGISE tool and into the comparative framework developed.

The comparative framework aim.s to analyse specific parameters (KPIs, as chosen by each site) on a technical, economic, social and environmental level. As the four sites are very different and so are their KPIs, the comparison and analysis use mainly common KPIs, but also focuses on qualitative data and information.

Conclusions and first lessons learned on the operation on the sites, but also more general e.g. on the development of LECs and stakeholder engagement, are being drawn at this point; these will be taken under consideration and used as a reference for D6.4.

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ACRONYM	
KPI	Key Performance Indicator
LEC	Local Energy Community

Table 1 – List of acronyms

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1. Introduction

Demo sites are key enablers of Renaissance's approach towards testing the applicability of its methodology. Therefore, the development of a comparative framework, allowing to analyse and compare the different KPIs selected in each one of the Pilot sites, is a crucial step towards extracting conclusions and learning from the application of the methodology.

This deliverable reports on the up-to date work developed on the different pilot sites. Therefore, the time constraints of the deliverable itself have been a limiting factor in the development of the comparative framework. Nevertheless, further work on deliverable 6.4 will allow the possibility of a second assessment to extend the work carried out in the present document.

Chapter 2 will develop a comparative framework for the different sites and their KPIs, comprising the different dimensions defined in T2.3: technical, economic, social, environmental. The four different sites, as well as their KPIs, have been extensively discussed in D5.1 Output Data Framework. Additionally, as pointed out in D5.4 Validation Report, it is important to note that the four Renaissance Demonstration Sites are different cases and as a result, each demo site targets a certain set of KPIs.

In Chapter 3, the actual results of the comparison of each KPI category are presented. Furthermore, Chapter 4 will present the conclusions from the comparative framework. The Belgian pilot site is currently taken out of the framework due to various reasons. On the one hand the pilot is defined on the university hospital but is only tested through a digital twin and hardware in the loop, and not in real-life conditions. This is because the objective is to use the hospital grid in a more intelligent way, particularly after black outages, taking into account maximum comfort of the personnel and safety of the patients, a goal that is hardly comparable to those of the other sites.

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On the other hand, the Belgian pilots contains the Enerjettic project in the neighbouring student housing. Since its scope is different than that of the actual pilots (research on awareness-building for energy efficiency in general, versus a specific focus on energy community set-up) it is not taken into account in the KPI comparison framework of this deliverable. More details and conclusions on the Belgian site will be found in D5.5 and D6.4., although preliminary conclusions on the Enerjettic project have been included in Chapter 4.

In Table 2, below, there is an overview of which KPIs have been initially selected for which pilot site. It is important to remark that, in this selection, each pilot site stakeholder community decided which KPIs were relevant for them. Therefore, the KPIs are aligned with the objectives of each site and not necesserally with the goal of running a global comparison between all of them. However some of the KPI's overlap.

KPI Number	Description	Spanish Pilot	Greek Pilot	Dutch Pilot
KPI 1	Overall system efficiency		X	
KPI 2	Single vector efficiency		X	
KPI 3	Asset efficiency	X	X	
KPI 5	Curtailed RE	X		
KPI 6&7	Predictability of energy demand and supply			
KPI 8	Peak load reduction			
KPI 9	Load factor change		X	

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KPI 10	Self-sufficiency ratio	X	X	
KPI 11	Number of accidents	X	X	
KPI 16	Reliability of smarts contracts			
KPI 18	Increase of EV chargers	X		
KPI 20	Total costs	X	X	
KPI 21	Smart contract execution cost		X	
KPI 22	Net present value (NPV)	X	X	
KPI 23	Return of Investment (ROI)	X	X	
KPI 25	Levelized Cost of Energy (LCOE)	X	X	
KPI 26	Capital expenditure (CAPEX)	X	X	
KPI 27	Operating expenditure (OPEX)	X	X	
KPI 29	Job Creation	X	X	
KPI 30	Cost savings	X	X	X
KPI 31	Opportunity Costs			
KPI 34	Acceptance	X	X	X
KPI 36	LEC size	X	X	X
KPI 37	Participation	X	X	X
KPI 45	Customer satisfaction	X	X	X
KPI 46	Energy consumption	X	X	X

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KPI 47	Rate of RE production	X	X	X
KPI 48	Emissions	X	X	X

Table 2 – Overview of KPIs selected per Pilot site.

2. Establishing a comparative framework

2.1. Objective of the comparison

Given the overview of the KPIs selected by each Pilot site in Table 2 of the previous chapter, the difficulty of running a comparison comprising all the sites becomes obvious due to different KPIs of PSs. Therefore, the objective is to compare the different sites on those KPIs that are shared by one or more of the pilot sites.

2.2. Data input: available KPIs per site

The description of the Renaissance's KPIs was carried out in chapter 4 of D2.3. The introduced KPIs for each objective were described and calculation or assessment methods were given when applicable. Therefore, this subchapter will focus on the measurements and values received for each one of the KPIs.

2.2.1. Spanish pilot: Manzaneda

KPI Number	KPI Description	Date for Benchmark (October '21)	Second measurement (April '22)
KPI1	Overall system efficiency	Data not available at the present time.	
KPI2	Single vector efficiency	Data not available at the present time.	
KPI3	Asset efficiency	PV: 82,6%	Biomass: 92% PV: 78,8%
KPI5	Curtailed RE		5,1 MWh

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KPI6&7	Predictability of energy demand and supply	Data not available at the present time.	
KPI8	Peak load reduction	Data not available at the present time.	
KPI10	Self-sufficiency ratio	CT1: 62,5%	CT2: 93,6%
KPI11	Number of accidents	0	0
KPI16	Reliability of smarts contracts	Data not available at the present time.	
KPI18	Increase of EV chargers	1	1
KPI20	Total costs	PV: 266.094 €	PV: 266.094 €
KPI22	Net present value (NPV)	78.603 €	25.904 €
KPI23	Return of Investment (ROI)	6 years	6 years
KPI25	Levelized Cost of Energy (LCOE)	0,0434 €/kWh	0,0541 €/kWh
KPI26	Capital expenditure (CAPEX)	156.375 €	156.375 €
KPI27	Operating expenditure (OPEX)	2.000 €/yr	2.000 €/yr
KPI29	Job Creation	2	2
KPI30	Cost savings	3,05%	2,40%
KPI34	Acceptance	-	-
KPI36	LEC size	Consumers, producers, others (Meisa + political and social aspects)	Consumers, producers, others (Meisa + political and social aspects)
KPI37	Participation	3 meetings	3 meetings
KPI38	Ownership	PV system by Exeleria under an ESCO model Electric vehicle and charger by Exeleria under an ESCO model Electric battery by Stark energy as a battery service model Data platform by ATOS Thermal battery by Sunamp	

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KPI45	Customer satisfaction	-	-
KPI46	Energy consumption	824153 MWh	867083 MWh
KPI47	Rate of Renewable energy Production	CT1: 29,1%	CT2: 6,5%
KPI48	CO 2Emissions	51769 kg/yr	41415 kg/yr

Table 3 - Manzaneda: Overview of KPIs and measurements

2.2.2. Greek pilot: Kimmeria

KPI Number	KPI Description	Date for Benchmark (October '21)	Second measurement (April '22)
KPI1	Overall system efficiency	88,53%	28,99%
KPI2	Single vector efficiency	Thermal 93,31% - Electrical 7,85%	Thermal 53,11% - Electrical 6,45%
KPI3	Asset efficiency	Bimass boiler 95,67% - ORC 89,29%	85,81%
KPI9	Load factor change	Ppeak=2,35MW	Ppeak=2,357 MW
KPI10	Self-sufficiency ratio	93,38%	33,25%
KPI11	Number of accidents	5	4
KPI20	Total costs	52.172,42 €	13.950,04 €
KPI21	Smart contract execution cost		
KPI22	Net present value (NPV)	981.738,81 €	981.738,81 €
KPI23	Return of Investment (ROI)	11,61%	19,14%
KPI25	Levelised Cost of Energy (LCOE)	0,02€/kWh	0,02€/kWh
KPI26	Capital expenditure (CAPEX)	952.761,78 €	952.761,78 €
KPI27	Operating expenditure (OPEX)	52.172,42 €	52.172,42 €
KPI29	Job generation	-	3

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KPI30	Cost savings	16,47%	3,62%
KPI34	Acceptance		
KPI35	LEC size	bef.:0, dur.:100	
KPI37	Participation	16,67%	16,67%
KPI45	Customer satisfaction		
KPI46	Energy consumption	0,02 MWh	0,01 MWh
KPI47	Rate of Renewable energy Production	27,36%	47,23%
KPI48	Emissions	48270 kg/yr	24135 kg/yr

Table 4 – Kimmeria: Overview of KPIs and measurements.

2.2.3. Dutch pilot: Eemnes

KPI Number	Description	Date for Benchmark (October '21)	Second measurement (April '22)
KPI30	Cost savings	40%	40%
KPI34	Acceptance		
KPI36	LEC size	48	143
KPI37	Participation	0.53%	1.57%
KPI45	Customer satisfaction		
KPI46	Energy consumption	Total purchased energie: 194.079 MWh of which is localy produced energy: 28.605 MWh	Total purchased energie: 60.981 MWh of which is localy produced energy: 12.834 MWh
KPI47	Rate of Renewable energy Production	14.74%	21.04%
KPI48	Emissions	8107 kg/yr	3637 kg/yr

Table 5 – Eemnes: Overview of KPIs and measurements.

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2.2.4. Belgian pilot: Brussels

As explained in the Introduction, given the completely different objective and status of the Belgian pilot site - being a hospital, it will remain out of the scope of this comparative framework.

2.3. Methodology

Given that each demo site has chosen different KPIs to monitor their operation, according to their type, level, topology and scope, the comparison will be performed at the objectives level, which, as per D2.3, are divided into four pillars: technical, economic, social and environmental. The demo sites are managed by their owners and site managers and whenever it is possible two measurement sets are provided. An example of nomenclature:

- SP-1: Spanish Pilot - Manzaneda, measurement at date of benchmark in October 2021.
- GR-2: Greek Pilot - Kimmeria, second measurement in April 2022.

2.3.1. Technical comparison

The technical comparison comprises the KPIs 1, 2, 3, 5, 6&7, 8, 9, 10, 11, 16, 18.

Table 6 contains the available KPIs for comparison.

Technical KPIs	SP-1	SP-2	GR-1	GR-2
KPI 3 (PV - Electric)	82,60%	78,80%	7,85%	6,45%
KPI 3 (Biomass - Thermal	-	92,00%	93,31%	53,11%
KPI 10	62,50%	93,60%	93,38%	33,25%
KPI 11	0	0	0	0

Table 6 - Measurements of technical KPIs.

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2.3.2. Economic comparison

The economic comparison comprises the KPIs 20, 21, 22, 23, 25, 26, 27, 29.

Table 7 contains the available KPIs for comparison.

Economic KPIs	SP-1	SP-2	GR-1	GR-2	DU-1	DU-2
KPI 20	266.094 €	266.094 €	52.172,42 €	13.950,04 €	–	–
KPI 22	78.603 €	25.904 €	981.738,81 €	981.738,81 €	–	–
KPI 23	6 yr	6 yr	11,61%	19,14%	–	–
KPI 25	0,0434 €/kWh	0,0541 €/kWh	0,02€/kWh	0,02€/kWh	–	–
KPI 26	156.375 €	156.375 €	952.761,78 €	952.761,78 €	–	–
KPI 27	2.000 €/yr	2.000 €/yr	52.172,42 €	52.172,42 €	–	–
KPI 29	2	2	–	3	–	–
KPI 30	3,05%	2,40%	16,47%	3,62%	40%	40%

Table 7 – Measurements of economic KPIs.

Given the values obtained, there is no added value on a comparison of KPIs 26 and 27.

2.3.3. Social comparison

The social comparison comprises the KPIs 34, 36, 37, 45, 50, 51, 52, 53, 54, 55.

Table 8 contains the available KPIs for comparison.

Social KPIs	SP-1	SP-2	GR-1	GR-2	DU-1	DU-2
KPI 34	–	–	–	–	–	–
KPI 36	Consumers, producers, others (Meisa + political and social aspects)		–	–	48	143
KPI 37	3 meetings	3 meetings	16,67%	16,67%	0.53 %	1.57 %
KPI 45	–	–	–	–	–	–

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Table 8 – Measurements of social KPIs.

2.3.4. Environmental comparison

The environmental comparison comprises the KPIs 46, 47, 48, 49.

Table 9 contains the available KPIs for comparison. KPI 46' indicates de locally produced energy.

Environmental KPIs	SP-1	SP-2	GR-1	GR-2	DU-1	DU-2
KPI 46	824.153 MWh	867.083 MWh	0,02 MWh	0,01 MWh	194.079 MWh	60.981 MWh
KPI 46'					28.605 MWh	12.834 MWh
KPI 47	29,1%	6,5%	27,36%	47,23%	14.74%	21.04%
KPI 48	51.769 kg/yr	41.415 kg/yr	48.270 kg/yr	24.135 kg/yr	8.107 kg/yr	3.637 kg/yr

Table 9 – Measurements of environmental KPIs.

3. Results

3.1. Technical comparison

3.1.1. KPI 3 Asset efficiency:

The results of the comparison of KPI 3 are shown in Figure 1. For both sites, Manzaneda and Kimmeria, there is a visible reduction of the efficiency of the assets between both measurements:

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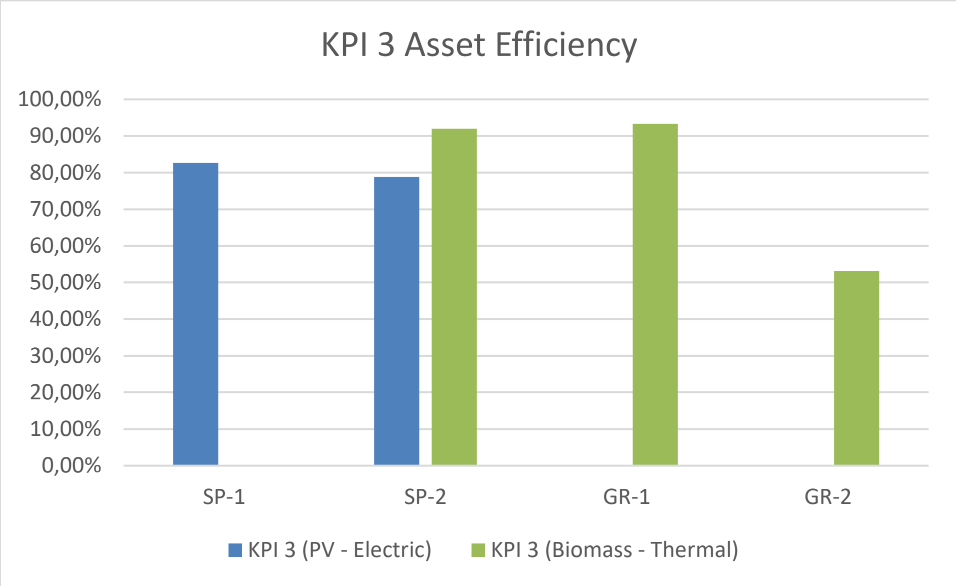

Figure 1 – Comparison KPI3.

In the case of Manzaneda, the biomass installation efficiency data was provided by the manufacturer of the production system and verified in the maintenance tests, only available at the second period. The efficiency of the photovoltaic installation was calculated by simulation for the first measurement, recalculated from the actual production data – which was very close to the simulations.

In the case of Kimmeria, the LEC has high shares of renewable thermal energy. The second reporting period was not only shorter (6-months in contrast to 12-months of the first period), but was also calculated during winter season, where the thermal energy production assets of the LEC are not performing at their nominal capacities.

3.1.2. KPI 10 Self-sufficiency ratio:

The results of the comparison of KPI 10 are shown in Figure 2.

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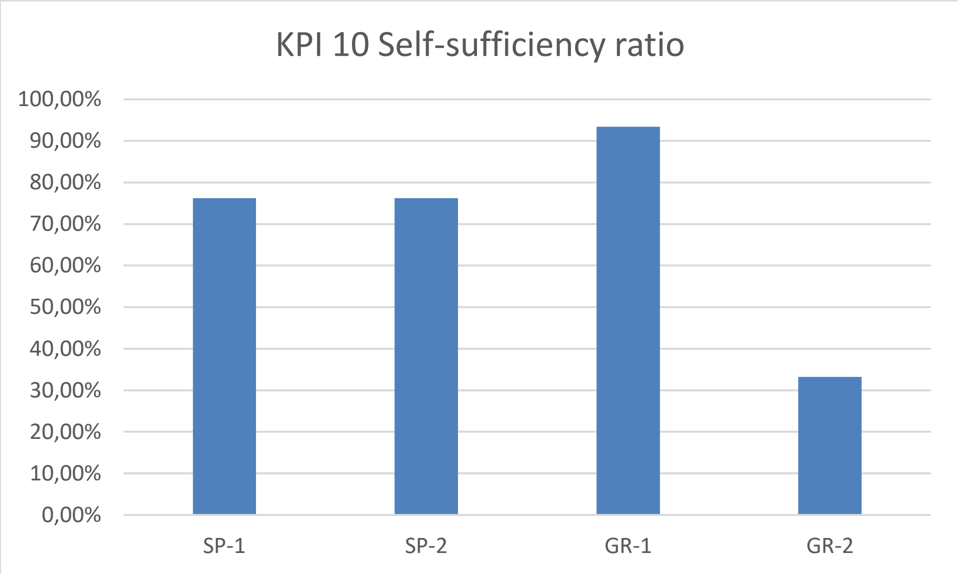

Figure 2 – Comparison KPI10.

The tendency between both sites is quite different. In the case of Manzaneda, the increase of investment on the PV installation is highly raising the rate of self-sufficiency which remains stable between both measurements.

In the case of Kimmeria, as mentioned, thermal energy is the major contributor to the LEC's pool of renewable energy. Therefore, the self-sufficiency of the LEC is expected to be lower during wintertime -second reporting period, due to the lack of renewable thermal energy.

3.1.3. KPI 11 Number of accidents

The number of accidents remains zero for all measurements and sites.

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3.2. Economic comparison

3.2.1. KPI 20 Total costs:

The results of the comparison of KPI 20 are shown in Figure 3.

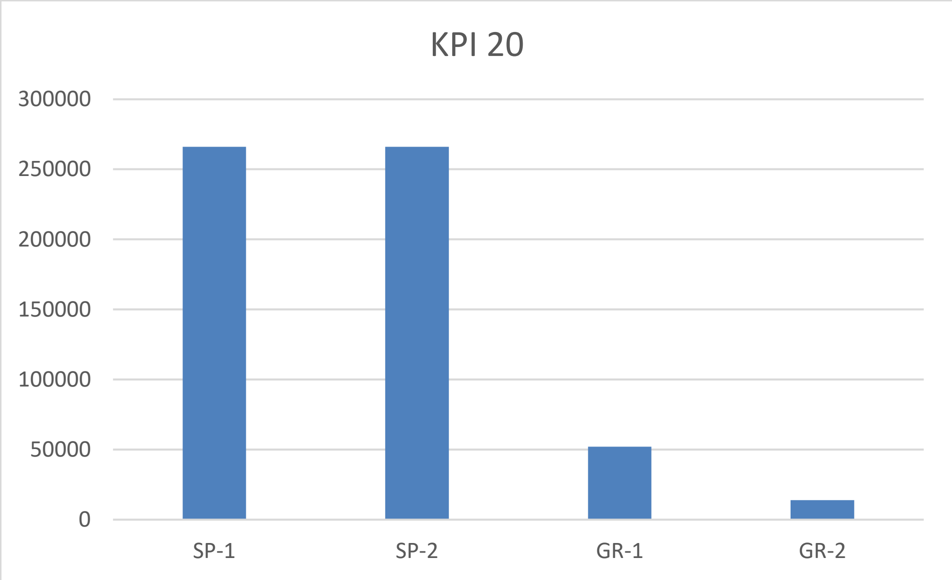

Figure 3 – Comparison KPI20.

In the case of Manzaneda, the values are given on a yearly basis. Meanwhile, for Kimmeria, the total costs are lower during the second reporting period because the time frame of the period is reduced, and less equipment are operating: only biomass boiler.

3.2.2. KPI 22 Net present value (NPV)

The results of the comparison of KPI 22 are shown in Figure 4.

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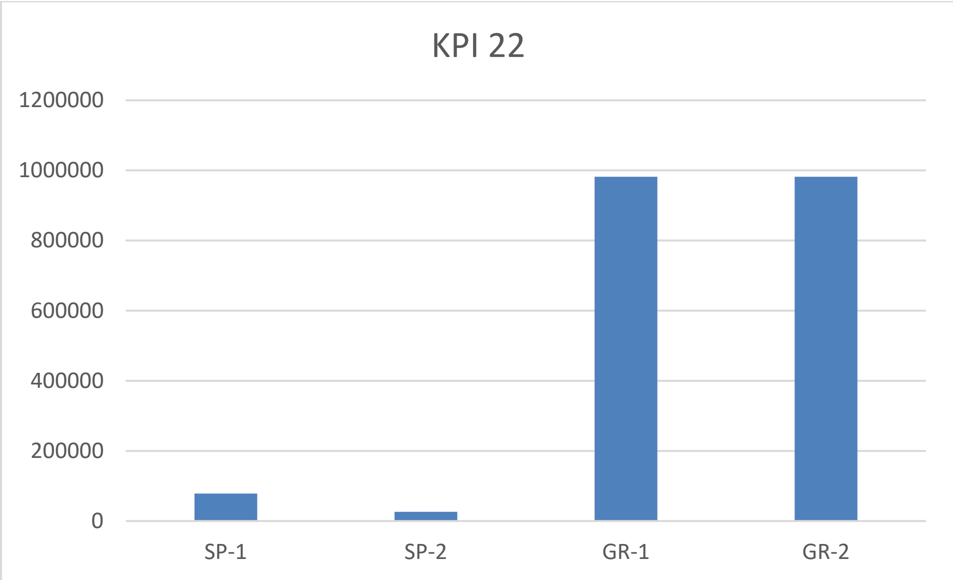

Figure 4 – Comparison KPI22.

The first value provided by the Manzaneda site was based on simulations. The second one was based on actual measurements. There is no variation reported on Kimmeria.

3.2.3. KPI 23 Return of investment (ROI):

The return of investment in Manzaneda has been initially provided by its payback rate, which is 6 years, indicating an annualized ROI of 16,6%. However, for Kimmeria two different annualized values arose. The ROI deviates in the second reporting period due to the addition of several equipment: ORC engine, PCM batteries and electric boilers, occurred during Renaissance. This equipment helps the community to exploit its energy production more efficiently and thus, to return an increased percentage of the investment.

Economic KPIs	SP-1	SP-2	GR-1	GR-2	DU-1	DU-2
KPI 23	6 yr	6 yr	11,61%	19,14%	–	–

Table 10 – Comparison KPI23

3.2.4. KPI 25 Levelized cost of energy (LCOE)

The results of the comparison of KPI 25 are shown in the Figure 5.

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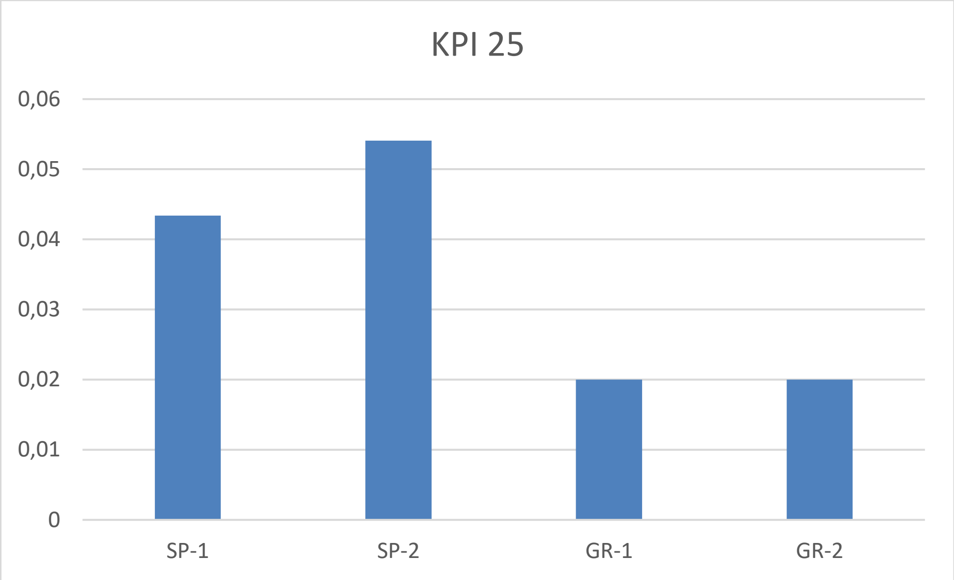

Figure 5 – Comparison KPI25.

As shown with other measurements, the value for Manzaneda was recalculated from the first measurement, based on simulations, to the second one: The real production data obtained are slightly lower than those calculated by simulation. Therefore, the LCOE value obtained in the second case is relatively higher.
There is no variation reported on Kimmeria.

3.2.5. KPI 29 Job creation

Two jobs were created in Manzaneda from the beginning of the Project. Meanwhile, in Kimmeria three jobs were created by the second measurement.

3.2.6. KPI 30 Cost savings

The results of the comparison of KPI 30 are shown in Figure 6.

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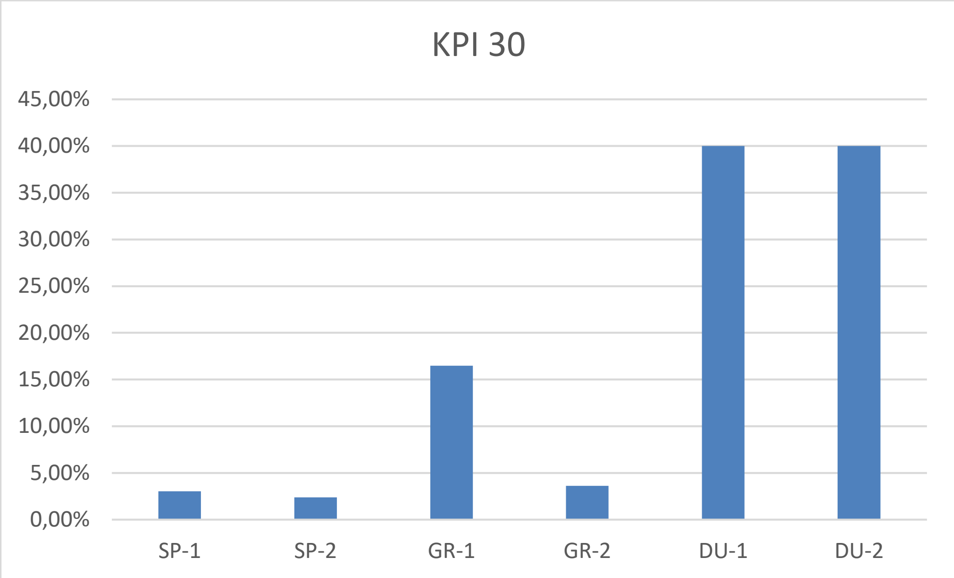

Figure 6 – Comparison KPI30.

The higher cost saving is shown in the Dutch site, however there is no variation between both periods. The size of the group of participants does not seem to influence this KPI, nor does the shift towards more local energy consumption. Obstacles in legislation and regulations (taxation) may play a role here.

In the other two cases, the seasonality of both measurements seems to be the answer for a lower cost saving value. The benefits are reduced due to the LEC's lower self-sufficiency rate and thus, less renewable energy production. This led to more expensive solutions which mostly are more electrical energy purchased from the grid and more wood pellets used in the biomass boiler.

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3.3. Social comparison

3.3.1. KPI 34 Acceptance

Data is not available at this moment: this specific KPI will be measured at the end of operation of the pilot sites for the full project duration (start date: start of operation of each site, end period: M41). The results will be reported and analyzed in D5.5 Final Validation Report.

3.3.2. KPI 36 LEC size:

In terms of the Local Energy Community size there is only available data for the Dutch Pilot site, which has shown an increase of about 100% in the time between both measurements, from 48 to 143.

3.3.3. KPI 37 Participation

Participation is measured by the number of asset owners, participating member in e.g. cooperative / total population within the community. The results of the comparison of KPI 37 are shown in the Figure 7.

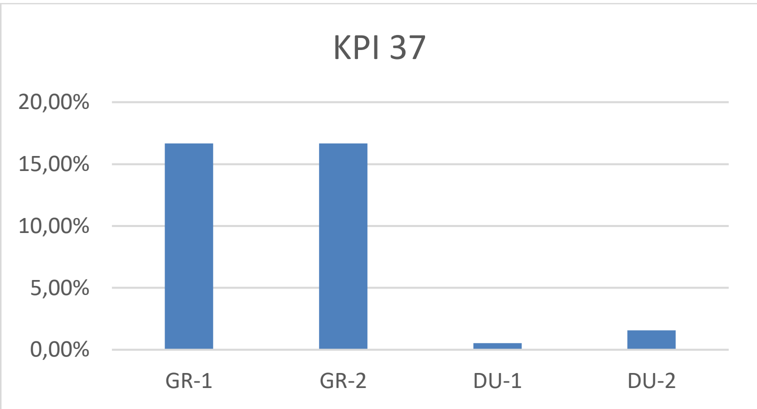

Figure 7 – Comparison KPI37.

No relevant increase is found in any of both cases measured. Although, the participation in Kimmeria is substantially higher than in Eemnes, whose increase is directly related to the increase on the LEC size.

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3.3.4. KPI 45 Customer satisfaction

Data is not available at this moment: this specific KPI will be measured at the end of operation of the pilot sites for the full project duration (start date: start of operation of each site, end period: M41). The results will be reported and analyzed in D5.5 Final Validation Report.

3.4. Environmental comparison

3.4.1. KPI 46 Energy consumption

The results of the comparison of KPI 46 are shown in Figure 8.

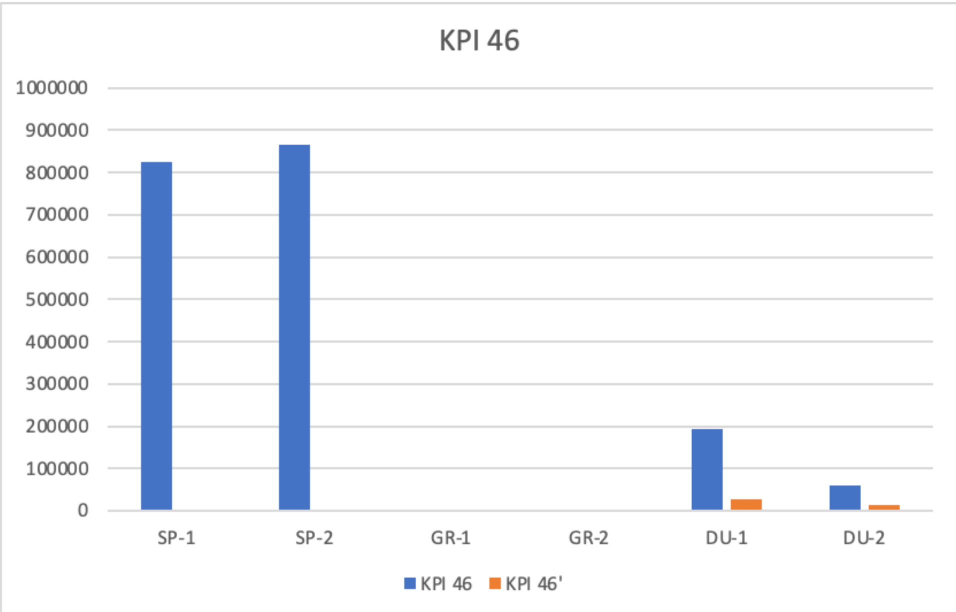

Figure 8 – Comparison KPI46.

Given the different order of magnitude of the measurements of the three different sites, direct comparisons are not possible. However, both Emnes and Kimmeria have shown a reduction of their energy consumption – which in the case of Kimmeria is around 50 %. For Emnes, the reduction is even higher, almost 70%, in this particular case, the orange bar on KPI 46' shows the variation on the locally produced energy. Finally, in the case of

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Manzaneda, the energy consumption shows an increase between both measurements. However, this is not a real increase but a readjustment of the value from simulation (SP-1) to the real measurement (SP-2).

3.4.2. KPI 47 Rate of RE production

The results of the comparison of KPI 47 are shown in Figure 9.

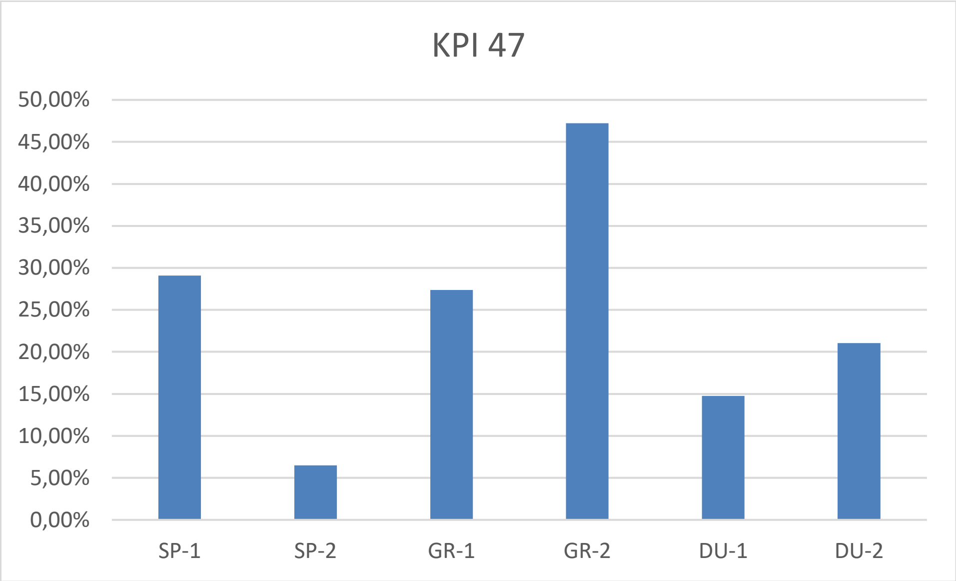

Figure 9 – Comparison KPI47.

In regards of the Renewable Energy production rate, the data are showing three completely different scenarios for the three sites.
In the case of Manzaneda, the impact of the seasonality with a lower photovoltaic power is showing a lower penetration. Meanwhile, the Greek site which shows a cumulative measurement, is giving a much higher value for the second measurement as only the first quatrimester is counted.
Finally, Eemnes, displays an increase of the relative share of consumed local energy.

3.4.3. KPI 48 Emissions

The results of the comparison of KPI 48 are shown in Figure 10.

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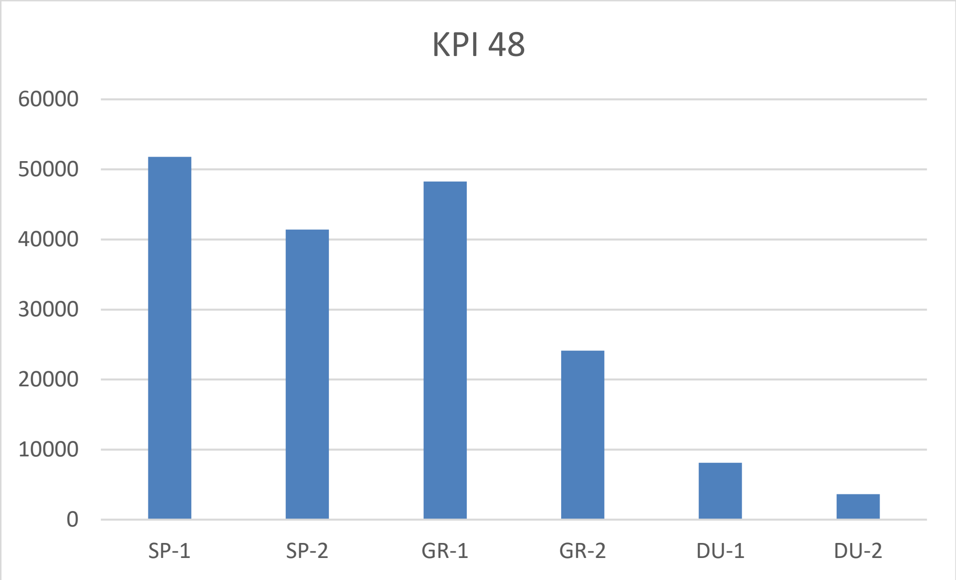

Figure 10 – Comparison KPI48.

The impact of the LEC on the emissions is overall positive in all sites with a global reduction of the yearly emissions.
The Spanish site has shown a yearly reduction of 20%, meanwhile the data on the Greek and Dutch sites seem to be affected by the different time frame of both values, once again, as the reduction shown is around 50 and 55% – corresponding to a time frame of just half a year in the second value.

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4. Conclusions

4.1. Methodology:

There have been three major difficulties encountered when developing the comparisons:

1. Diversity of pilot sites:

As explained above and in previous deliverables in great detail, the Project concept includes 4 demonstration sites that are of different type and nature, in order to be able to test the Renaissance methodology under different conditions. This is the main reason why KPIs ae diverging somewhat for all sites, what does not facilitate the comparison. However, some key KPI's are comparable and hence the comparisons developed on Chapter 3.

2. Availability and dimension of measurements:

Data collection throughout the project duration and pilot sites operation has been challenging, mainly due to COVID-19 and other external conditions:

- Data collection started with a great delay due to the suspension of the operation of the sites (Covid pandemic) and different technical problems due to the complexity of the system.
- Data was required to be simulated in many cases, as number of users remained low (due to pandemic)
- When it comes to the Spanish site, conditions were challenging also due to weather conditions: there was no snow for season 2021-22, so operation of the ski resort was minimum

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- Regarding the Dutch site, changing from peer-to-peer to peer-to-pool energy trading changed the methodology, and consequently the measured data.
- Energy prices (due to external conditions) were unusually high in 2021-2022

3. Time frame of measurements:

A strategic decision was made to split the data collection into 3 periods, in order to manage to have enough data to implement analysis. For this specific deliverable, the data that was used resulted from the first period (start of operation-October 2021) and from the second period (November 2021-March 2022).
Thus, there has been a big influence not only from the seasonality of each site, but also the impact of the second measurement referring to a shorter time frame.

4.2. Conclusions of the analysis

When analysing the results on the techno-economic aspect, there are two factors that play a fundamental role on the performance of all the different LECs: seasonality and self-sufficiency, which are intrinsically related. In the case of Eemnes, the impact of the wintertime on its efficiency is bigger than for Manzaneda. The latter, being a winter resort, is presumably better prepared to cope with seasonality, showing a higher LCOE on the second measurement. This is also reflected on the cost savings, which despite being initially higher on the Greek site, decreased greatly for the second measurement.
The reason is found in the reduction of the benefits, which in the case of Kimmeria is more palpable than in Manzaneda as its self-sufficiency over winter is lower. Therefore, they rely on more expensive solutions, meaning

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more electrical energy purchased from the grid and more wood pellets used in the biomass boiler. Then, for the Dutch site, other factors like the size of the group of participants or the local energy consumption are analysed. However, the underlying reason to the higher cost savings percentage might be found in legislation and regulations (taxation).

4.3. The EnerJettic case

The EnerJettic research focusses on awareness raising among students on efficient use of energy. For this project, energy measurement devices were installed in one of the student housing buildings on Jette hospital premise. Through a series of challenges and competitions that are presented to its residents, the students are incentivized to become more aware of their own electricity and heat consumption and to learned more about energy measures in general. The measuring devices make it possible to evaluate whether the initiatives have had an influence on the students' actual energy consumption.

The project and its measurements run from November 2021 until June 2022, so the final assessment of the KPI results can not be finalised yet. This will be part of deliverable 5.5, which will contain a detailed analysis of the EnerJettic initiative. Intermediate results of the monthly challenges show that there is enthusiasm among most of the students to learn more on energy saving and to participate in the challenges. Group challenges seem to result in more participation than initiatives geared towards individuals. The total amount of energy saved can not be calculated yet, but intermediate assessments indicate that the average electricity used during the project is lower than that of the previous years, and that more students turn down their heating when they leave their rooms for the day.

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4.4. Lessons learnt & Suggestions

- Each LEC is different, approach needs to be adapted each time

It is clear from the conclusions that every LEC is different, and it is therefore a challenge to compare them with general KPIs, especially if the business models and amin objectives are not alike. However, some recurrence can be found on cost related KPIs, emission reductions and self-consumption rates, which are key indicators aligned with the polices encouraged by the directives of the European Commission: affordable renewable energy for everyone. For future comparisons it would be useful to find a benchmarked LEC for each studied LEC.

In the general context of LEC roll out and development, it's important to always keep in mind that each energy community is different, with different needs and objectives, so all tools (engagement, technical etc) need to be adjusted to each specific case; a "wooden", non-flexible methodology would not be efficient, nor effective.

As stated in the introduction, a better assessment with a wider availability of measurements will be provided in deliverable 6.4.

- User engagement/acceptance is highly important

What is also very clear from the outcomes of this deliverable is the importance of user engagement and acceptance within an LEC. Especially the Dutch pilot site in Eemnes and the EnerJettic projects have proven this. One example that can be referred to is the outcome that the participants are not really interested in having to engage daily with an energy trading platform. Instead, they would rather use an automated system that requires much less participation. This is important to take as a lesson for future LECs as it makes apparent that a peer-to-peer trading system for example must not require daily or even regular intervening by the stakeholders.

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- KPIs should be adjusted to ongoing circumstances and conditions

It would also be beneficial to circumstances when LECs change in the course of a project or development. An easy example is that COVID-19 changed all dimensions of everyday life, which as a result affected both KPIs and LECs operation. Another example that is obvious by the analysis, is that the raises in energy prices in 2021 and 2022 heavily affected the approach in some sites (e.g. Eemnes) and of course for all LECs, as prices, costs and benefits are important factors used in our tools.

- Data collection

Data collection and harmonisation seem to be a difficult task throughout all LECs. It seems to be more difficult than initially planned to measure energy data at private entities. Either the meters are insufficient or, adding to that, the privacy regulations are a barrier to sharing any data.
To this direction, an effective and efficient data management plan and tested platform (data collection, management and sharing platform) is required from the very beginning of an LEC development and operation, in order to have all requirements beforehand. This way, any given site has the time to ensure they can fulfil all requirements (technical, legal etc) and avoid any interruptions in data collection.

- Regulatory barriers

A basic conclusion not only from this specific analysis, but also from the work undertaken in the other WPs (e.g. WP6) is, that regulatory barriers can be the biggest deterrent in LEC development. Not only the actual development of a LEC is directly bound by local, regional, national and EU

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legislation, but tax legislation (e.g. VAT) is linked to benefits and cost efficiency.

- LECs create jobs

The analysis shows that LECs can create jobs in many fields, and not only technical. For the operation of the sites, a number of different positions were made available, such as managers, social researchers and engineers. The number of jobs created is quite low in the Renaissance cases, 5 as per the measurements in Manzaneda and Kimmeria – however, still highly dependent on the scale and size of an LEC.

- LEC shows to reduce CO_2 emission

From the above analysis (KPI 48), it can be stated, at least preliminarily, that LECs contribute greatly in the reduction of emissions. The result of the comparison shows reductions between 20-55%, which sounds quite large and might indeed be exagerated, due to partly simulated data. However, the scale of the results clearly shows that LECs can potentially provide great impact on emission reduction.
In addition, the increase of the relative share of local energy production is helping the communities to increase their self-sufficiency while reducing their dependency on the grid, and thus, their emissions. Given the relevance of this KPI, it will be further studied in future deliverables.

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