ProLight

1st annual implementation report

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D3.3

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Summary

This deliverable is the first annual implementation report for the demo districts within the ProLight project. It is the first of three planned reports to be delivered throughout the project's duration. The report outlines the progress and status of work completed during the first year of ProLight (Months 1 to 13). As noted, D3.3. focuses on the first-year implementation. Subsequent reports, D3.5. and D3.6., will cover further developments and any changes that may occur in the demo districts during the following periods. The information provided in this report will be updated in Month 25, with the next implementation report scheduled for Month 37.

The work detailed in this report is conducted under Task 3.3 (T3.3), which is dedicated to the demonstration actions within Work Package 3 (WP3), focused on the demonstration of the two district innovation clusters (describing 6 refurbished demo sites & energy communities in 6 member states). This report provides a detailed plan of all the demonstration actions undertaken by ProLight in the demo districts located in Carcavelos, Gernika, Kozani, Rovereto, Vaasa, and Vienna. At the time of publishing D3.3., the Italian Demo District was Rovereto, as initially planned, where the Italian Demo Leader was actively conducting activities and effort. Consequently, the first year of implementation for the Italian Demo District centered on Rovereto, with a possible change already being considered. This change will be further documented in D3.5., the second implementation report. The Portuguese Demo District change was already effective from the project start. For this reason it was already reported on this document.

The document starts with a general plan for ProLight in its first year of execution and identifies the primary objectives set up to be achieved. Subsequently, the following section provides a concise description of ProLight, as well as some insights into its demo districts. The main part of this deliverable is dedicated to describing separately the work carried out by the district leaders (DLs) and its teams in the different project phases. The fourth section of the deliverable provides a comprehensive comparison and a final overview of all the demo districts. The final chapter contains the summary on the deliverable outputs.

In overall, ProLight project is mainly on track according to plan however there are some deviations identified. During the first year, the demo districts experienced drawbacks, causing a need to revise the project plans.

Disclaimer

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1. Introduction

1.1. Objectives and scope

The present document constitutes Deliverable 3.3 (D3.3) - 1st annual implementation report - developed in the framework of Work Package 3 (WP3) - Demonstration of the district Innovation clusters. The aim of D3.3 is to establish a reliable and consolidated information base for sustainable lighthouse and pocket districts in the two demonstration domains, the so-called innovation clusters to establish optimised procedures for detailed planning, and proper design, realisation, and operation.

The purpose of this document is to outline the progress achieved during the first reporting period of the ProLight project (M1-M13). This report provides an overall overview of the demonstration actions realised in the six demonstration districts of ProLight, namely, Carcavelos, Gernika, Kozani, Rovereto, Vaasa, and Vienna. It covers an extensive range of activities, including procurement and decision-making aspects, design, optimisation methods, construction initiatives, monitoring efforts, and analysis of the performance.

The content of the implementation report allows to have a complete picture of all developments in ProLight. District leaders (DLs) have communicated the refurbishment progress they made in the reporting period. For example, DLs have included brief descriptions of major results and achievements in the reporting period and information about the implementation status. In addition, partners have reported deviations from the original project plan and other unforeseen changes during the implementation of the project and foreseen or conducted corrective measures in the reporting period.

The annual implementation report helps to regularly monitor the progress of the project in a simple, useful, and transparent way. It enables fast and efficient communication between project partners, the European Commission (EC), and all interested parties. Furthermore, it encourages constructive discussions among partners and others on any issues, so that corrective solutions can be quickly found.

It should be highlighted that this document will be updated through the lifecycle of the project, by extending the information provided in this document. ProLight has three mandatory reporting periods covering M1-M13, M13-M25 and M25-M37. These updates follow the dynamic nature of implementation processes where the presence of unforeseen events often lead to project adjustment and to the implementation of mitigation measures. This report, together with the two that will follow, serve as a reliable and consolidated project monitoring information base. They are pivotal in providing an overview and necessary enhancements within the ongoing project.

1.2. Relation to other activities

This deliverable is related to the work done in WP2 and T3.2 since the tools and methods developed within them will be adopted and used for the demonstration.

WP2 is the ProLight's scientific and investigative framework, focusing on setting the definitions and requirements for the ProLights' six lighthouse and pocket districts. It creates a communication layer for knowledge transfer and consultation among stakeholders, ensuring that the project has the largest possible impact at the local, national, and European levels. This framework helps to identify intervention measures for each city by laying out blueprints for spreading lighthouse and pocket districts in urban and suburban areas. In this context, D3.3 complements WP2 by providing a tangible implementation report that reflects the progress made within the ProLights' demo districts. It turns

the framework's objectives into practical actions and outcomes, offering an overview of how the projects' established requirements and goals are being met over the first reporting period (M1-M13).

On the other hand, T3.2 covers innovation procurement aspects, emphasizing early market interaction to support innovation. It follows EC norms and guidelines while conducting market sounding activities to achieve three primary goals: providing advance market knowledge about forthcoming projects, establishing market intelligence, and assessing the supply-chain's capacity, capability, and appetite. D3.3 complements T3.2 by putting the principles and goals of innovation procurement procedures into action within ProLight. It will show how the tools and approaches created in WP2 and T3.2 are implemented and embraced throughout the demonstration phase. D3.3 describes how each demo district has developed a distinct work plan that adheres to the concepts of early market participation and innovative procurement. During online meetings, these district-specific strategies are subsequently shared and reviewed among project partners, promoting knowledge sharing.

1.3. Structure of the deliverable

The ProLight's implementation report is structured into several chapters as described below.

As the first annual implementation report, D3.3 is introduced, outlining its main objectives and its overall structure. Following the introduction, the report proceeds with an overview of ProLight in order to outline the tailor-made project objectives as well as the specified work and time-plans that the project intends to follow to materialise these objectives.

The next section focuses on the methodological approach used to collect and combine information on the demonstration districts. It not only describes the approaches and tools employed, but it also explains why they were developed. It also gives insights into the decision-making processes that resulted in the development of these tools. This section establishes the framework for the report's detailed analysis by highlighting the importance of a shared perspective that allows for comparisons among demo districts.

Thereafter, for each demo district, the report presents the actions undertaken by the demo district leaders (DLs) during each pre-defined project phase. This includes a description of significant highlights, such as major activities, main decisions, achieved milestones, risks, obstacles and solutions. Additionally, it outlines the roles played by various stakeholders, displays the results obtained, and any research that has been conducted so far.

A complete comparison of demonstration activities and progress across all demo districts is provided in the final overview section. This section offers a viewpoint on collective results, allowing to see the common aspects and differences among the different districts while addressing critical issues such as project delays.

Finally, the report summarises the major results, lessons learned, and implications of the demo districts during the first reporting period.

2. ProLight overview

2.1. Objectives

ProLight is motivated by the need to solve major challenges connected to building energy efficiency and sustainability, given their significant effect on the European Union's energy consumption and greenhouse gas (GHG) emissions. Buildings account for 40% of EU energy consumption and 36% of GHG emissions, according to the EC. To align with the EU Climate Target Plan 2030, a fundamental shift in the design, construction, and retrofitting of buildings is required. Recognising the importance of this urgency, the European Green Deal has prioritized the development of positive energy districts (PED) and nearly energy-zero buildings (nZEB). The financial expenditures necessary for such a ground-breaking process, however, are significant, raising concerns about how socially vulnerable individuals who rely on affordable housing can be included in this transition.

To address these difficulties, ProLight aims to establish an open-innovation ecosystem by integrating concurrent research and innovation processes within a public-private partnership to establish lighthouse and pocket districts for advanced housing renovation in EU cities, while assembling and closely aligning the needs of all relevant stakeholders. ProLight foresees a multi-actor strategy that is supported by a methodological framework that explicitly recognises the integration of energy as a natural resource into all targeted lighthouse and pocket districts. This approach is intended to greatly increase energy efficiency and overall quality of life for all end users.

To achieve this goal, a planned selection of various buildings has been conducted each representing multiple common archetypes. The strategic selection guarantees access to all energy users, suppliers, and other pertinent stakeholders required for a successful deployment. Furthermore, it allows for the dissemination of the projects' findings to an international audience as well as other European markets.

The project will also create new networking structures for cooperation across district/city borders in order to continually implement sub-projects that are fully integrated and coordinated under the leadership of ProLight's team. ProLights' proposed initiatives are examples of creative renovation, with the possibility for the immediate replication to other buildings of the municipalities and social houses involved.

2.2. Case studies

ProLight is demonstrated in 2 so-called innovation clusters, which describe 6 refurbished demo sites and energy communities in 6 member states, allowing for a smart neighbourhood approach and providing blueprints for replication. With this, ProLight aims to facilitate the exchange of experiences and of in-depth knowledge among the demo districts, enabling exploration of alternative business models and benchmarking market conditions. The demo districts include:

1) **Innovation cluster 1: Building and renovating in an energy and resource efficient way in Austria, Finland, and Greece.**

The Austrian demo district in Vienna represents a residential building block that underwent extensive renewal before the start of ProLight. Two out of 13 residential buildings have already been refurbished and are currently under monitorization. The demo district introduced an innovative quarter energy concept through the implementation of an energy network and shared geothermal probes. It features

a wide range of smart solutions, technologies, and systems, including PVT Hybrid collectors, solar mats, soil-heat pump, and a stand-alone district heating grid.

The demo district in Vaasa, Finland, is dedicated to student housing, with a focus on promoting sustainable living and energy awareness among students through a mobile app and various activities. Plans for long-term Living Lab research activities are in development. Currently, two potential locations for demonstration houses are awaiting implementation.

The Greek pilot project in the city of Kozani, hosts approximately 500 dwellings that have been donated by the Greek State to the lower income population. It aims at renovating 1 out of 500 apartments by installing energy efficiency solutions and smart net metering to improve the living standards and energy performance of vulnerable parts of Kozani's population. With this demo district, ProLight strives motivated public institutions to promote major refurbishments for all these apartments and for the envisaged city's climate neutrality in 2030.

2) **Innovation cluster 2: Energy communities in Spain, Italy, and Portugal.**

The energy community in Gernika, Spain, has already been established and is operational. It has 200 solar panels installed on the school's roof. These panels will allow the supply of renewable electricity, not only to the school but also to the 150 homes and businesses located around the school.

The Italian demo district is in Rovereto in the northern part of the country. It is a unique social housing project comprised of two wooden buildings, one nine stores high and the other five stores high. These buildings consist of total of 68 social housing units. However, challenges have arisen related to hot water supply, potentially necessitating a site relocation.

In Portugal, the demo district is Carcavelos, which is constituted by a mix of building typologies that include ones with commercial and residential purposes. The transition from the previous demo district in Bairro do Chouso was motivated by the fact that Carcavelos has already implemented energy efficiency measures in the envisaged building, leading to a more timely robust project implementation. Moreover, Carcavelos has a larger population and greater gross floor area, offering increased project visibility and a higher likelihood of achieving the contractually agreed one-year monitoring goals.

2.3. Project time-plan

The detailed Gantt chart, in Figure 1, shows the overall project's timeframe, and acts as progress visibility tool for following the overall project situation and reflecting the status of the main implementation actions. ProLight's activities have been planned to be executed in 48 months, starting on 1st October 2022. The Gantt chart also displays the duration of each work package and task within the project's timespan.

WP/Task	WP/Taks name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	WP/T lead
WP1	**Project Management**																																																	**FHTW**
T1.1	Legal and Contractual Management																																																	FHTW
T1.2	Financial and administrative management																																																	FHTW
T1.2	Organisation of kick-off and periodic meetings																																																	FHTW
T1.4	Internal document sharing and communication system																																																	FHTW
T1.6	Gender and Ethics Management																																																		GAIA
WP2	**ProLight backbone and scientific framework**																																																		**CluBE**
T2.1	Assessment of city requirements, ambitions, risks and barriers																																																		UNIVAASA
T2.2	Framing the site ecosystems																																																		EDP NEW
T2.3	Planning citizen and district engagement																																																		CluBE
T2.4	Benchmarking the planning and implementation processes																																																		FHTW
T2.5	ProLight service package for demonstration, replication and knowledge transfer																																																			MAT
WP3	**Demonstration of the lighthouse district Innovation clusters**																																																		**TF**
T3.1	Advanced urban planning for the roll out in the neighbourhood																																																		TF
T3.2	Innovation procurement																																																			MAT
T3.3	Demonstration actions																																																			EDP NEW
T3.4	Validation of performance & economic parameters																																																		FHTW
WP4	**Awareness creation towards replication**																																																		**GAIA**
T4.1	Awareness campaign																																																		GAIA
T4.2	Socio-economic aspects of performed interventions																																																	FHTW
T4.3	Stakeholder and citizen engagement																																																	CluBE
T4.4	Capacity building via knowledge exchange																																																	CluBE
WP5	**Upscaling and Replication**																																																		**BI**
T5.1	Exploitation and Replication Key Performance Indicators																																																	BI
T5.2	Comparative analysis of selected model sites																																																	BI
T5.3	Internal Exploitation & Replication																																																	4ER
T5.4	External Exploitation and Replication																																																	BI
WP6	**Monitoring and impact assessment**																																																		**EURAC**
T6.1	Setting up the data collection format and monitoring procedures																																																	EURAC
T6.2	KPI-based performance evaluation																																																	BI
T6.3	Comprehensive Life cycle sustainability assessment																																																	EURAC
T6.4	Impact mapping and multiple benefits approach																																																	EURAC
WP7	**Dissemination and communication**																																																		**ESCI**
T7.1	Dissemination, Exploitation and Communication Plan																																																	ESCI
T7.2	Dissemination Actions																																																		EURAC
T7.3	Communication Actions																																																		ESCI
T7.4	Clustering with Sister Horizon Europe, Green Deal and H2020 Projects																																																		GAIA

Figure 1 - ProLight Gantt chart

3. Methodological approach

The development of this deliverable began with discussions between the ProLight team and the demo district leaders (DLs). Customized questionnaires were designed for each demo location to collect relevant data and enable comparable analyses. These surveys were the primary method for gathering detailed information on each demo district's development progress and activities. This methodological approach was established to ensure a systematic and coordinated process for data collection from the DLs. The goal was to produce a comprehensive report on each demonstration district's progress and achievements, ensuring alignment with the overall ProLight project timeline. Additional evidence and insights will be provided to strengthen the findings and recommendations. The report includes the following components:

- **Gantt Chart:** This chart captures and displays project timelines for each phase, using a common structure of “macro” project phases. Demo district leaders (DLs) outlined their specific tasks for each phase, including past and future activities. Shaded cells indicate the planned, executed, or implemented months. This Gantt chart serves as a baseline to ensure alignment with the project's contractual schedule, promoting coordination and minimizing discrepancies across demo districts.
- **Status Sheet:** DLs documented their progress in this section for each project phase during the reporting period. It included major activities, significant decisions, achieved milestones, encountered risks, solutions devised, stakeholder involvement, and other relevant details.
- **Images (Pics_Ph1 to Pics_Ph7 and Pics_Gen):** These sheets incorporated visual elements such as images to illustrate project activities and the development status of each demonstration district. Images related to specific project phases were placed in their corresponding sheets, while general images not linked to any specific phase were added to the "Pics_Gen" sheet.

This structured approach provides evidence of comprehensive project planning, design, and monitoring, ensuring consistent progress tracking and alignment with overall project objectives.

A table of contents (TOC) has been drafted, aligning with the extensive information gathered and presenting a comprehensive overview of the progress of the various demo districts from M1 to M13.

4. Vienna demo district (M1-M13)

4.1. Development summary

The project area in Vienna's 17th district underwent an extensive renewal by following the planning, design, tendering, and contractual processes. The implementation was completed before the ProLight project began.

Operating and monitoring activities involve collecting data on energy network components for performance assessments and optimization measures. Furthermore, the End-Users Advisory & Interest Group (EAIG) come together to keep residents and local stakeholders informed about the project progress and foreseen data collection.

Dissemination activities included site visits organized by FHTW, and in collaboration with the ProLight partner ESCI, an interview with the architect of the demo district project was conducted and published. Notably, the Viennese demo district has received numerous national and regional awards, including the State Prize for Architecture and Sustainability.

Lastly, there are ongoing discussions about replication initiatives in neighbouring areas, with the EAIG being responsible for negotiating with the construction firms for the extended implementation actions in the other pending 11 buildings of the block [1].

4.2. Project phases

4.2.1. Initiation, planning and design

The project area is situated in Vienna's 17th district, which is distinguished by a densely built-up Wilhelminian-style development. The neighbourhood is mainly characterised by residential use, with a small amount of space required for retail, mainly on the ground floors. The demo district underwent a comprehensive renewal, and an innovative quarter energy concept has been implemented by means of an energy network and jointly used geothermal probes. Figure 2 presents pictures of before, during, and after renovation phases of the Viennese demo district.

(a) *(b)* *(c)*

Figure 2 - Viennese demo district before (a), during (b), and after (c) renovation [2, 3]

As part of the urban planning efforts by the responsible Viennese Municipal Department of 2017, a "pilot block" redevelopment was foreseen, whereby a joint approach to thermal and structural redevelopment with cross-property, alternative energy supply as well as sustainable mobility, greening and open space concepts for residents was envisaged.

At present, two of the 13 buildings have already been rehabilitated and serve as a demo light-house project in Vienna. The space heating, along with partial domestic hot water demand, are covered by a brine-water heat pump connected to a low-temperature network. Heating energy is produced in part by 80 m² hybrid sun collectors, as illustrated in Figure 3, and partly with 41 m² solar thermic absorber mats installed on the roofs of the multi-family houses, which are also shown in Figure 4. Solar thermal and photovoltaic technologies are combined in these hybrid modules.

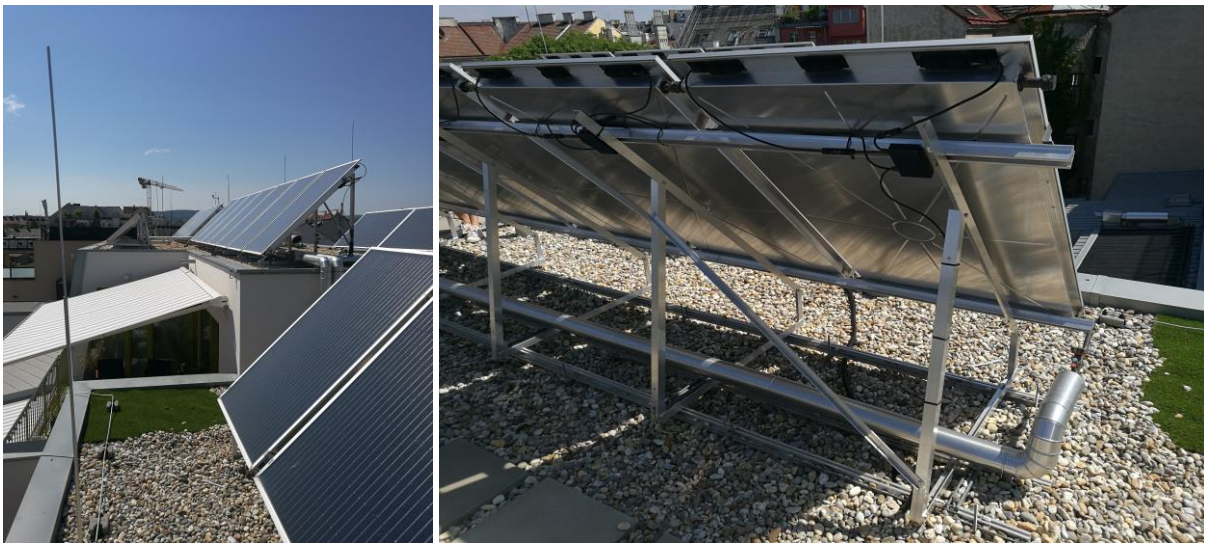


Figure 3 - PVT – collectors in Vienna

Figure 4 - Solar thermal mats in Vienna

The electricity produced is used to supply the heat pump, with any surplus benefiting the residents. The overproduction of heating energy throughout the summer is transferred to the natural underground storage that consist of 18 earth probes with a depth of 130 m each. This is important for ground regeneration and for using this heat in the winter to reach a higher heat pump performance. The cooling temperature control in summer is ensured by the heat pump.

Through a combination of heat pumps, PVT-collectors, and heat energy grid interconnecting households, the Viennese demo district achieves a flexible, energy-efficient way of solar electricity and heat production while also supplying neighbouring households.

A smaller portion of the area is allocated for commercial activities, mainly at the ground level. Currently, the project is undergoing strategic densification and experimentation with community-driven energy concepts, as given above. At the heart of the initiative is the comprehensive renovation of our demo district, where an integrated approach to energy-efficient building upgrades is being explored. This includes cross-property alternative energy solutions and innovative mobility, greening, and open space concepts designed to benefit residents. The buildings under focus—Geblergasse 11, and Geblergasse 13, include courtyard structures—are being assessed in terms of their architectural and environmental efficiency. Key to this assessment is understanding why particular construction choices were made, evaluating the effectiveness of spatial usage through 2D ground floor plans.

On a broader scale, this project raises essential questions about neighbourhood dynamics—how buildings "communicate" with one another and where green spaces and social interaction zones are strategically placed. The transformation of these 2D ground floor plans into intergenerational, mixed-use housing and accessible architecture rests on three primary principles:

- Intergenerational Housing: In the view of one house owner and architect is creating flexible spaces that accommodate residents of all ages, fostering interaction through shared spaces, and ensuring adaptable layouts for evolving needs.
- Mixed Housing: According to the civil engineering team it important designing modular units that cater to various housing types, supported by shared amenities that promote community living.
- Accessible Design: “Ensuring barrier-free and step-free access throughout the development”, along with wide pathways and features tailored for individuals with mobility or sensory needs.

While these three principles lay a clear foundation for transforming 2D plans into inclusive, forward-thinking architectural models, the FHTW ProLight team also addresses a crucial social dimension. It emphasizes where and how interfaces between residents are created, where social spaces are positioned, and how these can enhance community well-being illustrated in Figure 5.

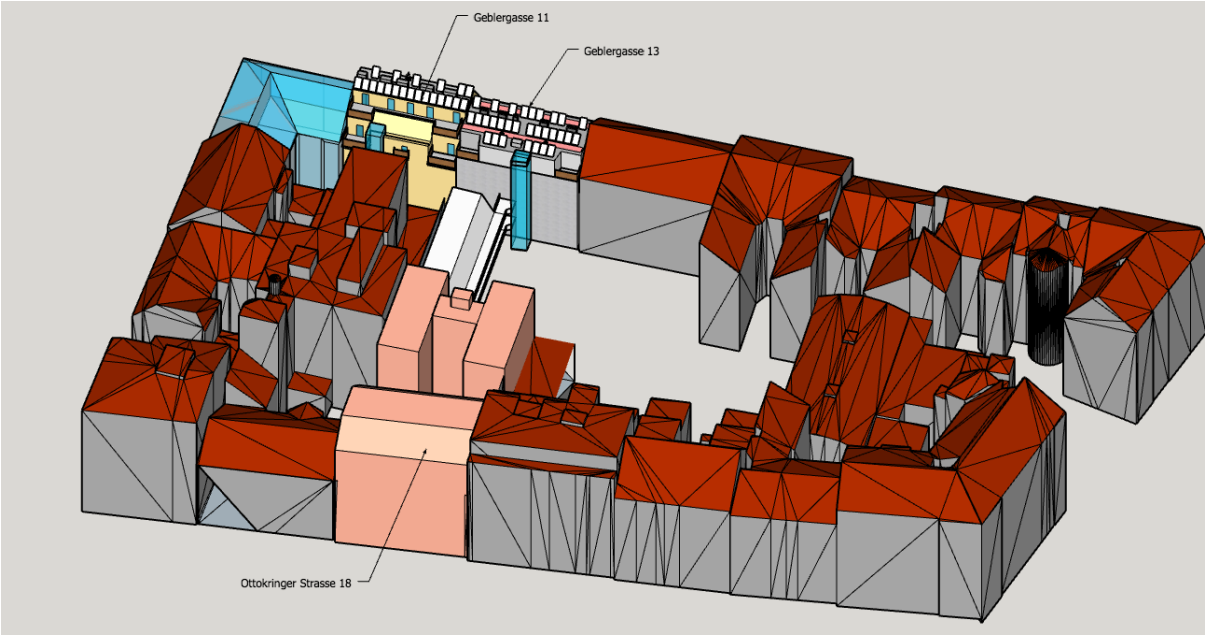


Figure 5 - Viennese demo district Geblergasse

According to the civil engineering team our demo exemplifies a holistic approach to urban renewal, merging technical innovation with social sustainability. It not only fosters energy efficiency but also seeks to redefine community living through accessible, intergenerational, and mixed-use spaces, making it a model for future urban developments.

4.2.2. Tendering and contractual process

The tendering and contractual processes were completed prior to the commencement of the ProLight project.

4.2.3. Implementation

The implementation of the pilot was completed before the start of ProLight.

4.2.4. Operating/Monitoring/Modelling and simulation studies

Monitored data are collected for key components of the energy network, including deep drilling, heat pump reheating, PVT - combined solar electricity and heat energy generation, and heating demand from the energy storage.

The data is collected online every minute, which can be changed to 15-minute intervals. Data export is done in various formats like .csv or .txt files. Within ProLight, the data is analysed to optimize the system performance. To illustrate the impact of this analysis, one specific day was closely examined. The key findings from this analysis include the following recommendations:

- Heating demand during the night when no solar electricity is generated should be shifted to the daytime, if not needed;
- The solar-driven pump supplying water regeneration for deep drilling should be redirected to the energy storage;
- Re-heating of the energy storage, along with inlet temperature adjustments, is carried out during times with little production and should be shifted to midday.

4.2.5. Engagement/Co-creation activities

The End-Users Advisory and Interest Group (EAIG) has been established in collaboration with house and apartment owners. Its major goal is to guarantee that the refurbishment properly fits with the societal and economic needs for Energy Efficiency measures and the integration of Renewable Energy Sources (RES) in building objects. Regular meetings have been held, and this practise will be maintained. These sessions provide an environment for exchange of knowledge from and to the other ProLight demonstration districts.

4.2.6. Dissemination and Communication activities

During the Vienna kick-off meeting, FHTW organized a site visit, and in collaboration with ProLight partner ESCI, conducted and published an interview with the architect of the demo district project. It is worth mentioning that the demo district has been awarded several national and regional prizes, including the State Prize for Architecture and Sustainability [1].

4.2.7. Exploitation and Replication activities

As part of urban vision teams, frequent discussions were and will be held with the Viennese Municipal Department 20 - Energy Planning (MA 20), with the purpose of initiating new replication initiatives in neighbouring areas. The EAIG is responsible for negotiations with the construction firms for the extended implementation actions in the other pending 11 buildings in the block.

5. Vaasa demo district (M1-M13)

5.1. Development summary

Due to project delays, the Finnish demo case has undergone substantial revisions, with two alternative sites currently being considered. In option 1, plans for a smart student apartment project were initiated in 2021, but funding challenges delayed the progress. A funding application was submitted in June 2023, awaiting approval as of September. Option 2 is currently in the permitting stage. The demonstration site will be the one where construction begins first.

The project's tendering and contractual process have begun in autumn 2022, with a redesign phase scheduled from January to April 2023. The financing approval phase, crucial for the project, is planned from June to September 2023. Building construction is expected to begin in autumn 2023, however winter weather conditions may affect the scheduling of key building constructions.

Furthermore, there have been modelling and simulation studies, including a 3D building model and energy simulations. The Living app, which is intended for resident's engagement and energy savings, was launched in August 2023. It will deploy additional features over the following months.

Dissemination and communication activities, as well as scientific articles, are planned post-construction. The smart house model will offer insights for future projects, including a student village. Furthermore, the Living App promotes energy awareness and sustainable living. It is also planned to be used in older buildings to some extent.

5.2. Project phases

5.2.1. Initiation, planning and design

The Finnish demo case had to be altered, and this change has been already incorporated in the first contract amendment request to the EC. This adjustment became necessary due to the evolving circumstances concerning the original target. Despite careful planning and meticulous work, the development of the student village faced a significant delay of a couple of years due to complaints by a citizen activist group. The Finnish city planning system includes the possibility to complain, which has now caused significant delays, due to the citizen's resistance. As a result, VOAS expressed concerns that the initial target might not be implemented within the project's timeframe. This delay also mean that the project would not obtain energy data from the site. Consequently, two new potential sites were considered for the construction of a new student housing building close to the University Campus.

Wolffintie 24, depicted in Figure 6, is the first option for the demo site, with the empty lot at the centre where the student apartments will be built. These modern studio apartments offer convenient access to the University campus, seaside landscapes, and the city centre.

Figure 6 - Option 1 for the Finish demo site in Wolffintie 24

The planning of the smart student apartment building project started at the end of 2021 and the first offers for the house were received in 2022. However, due to a substantial increase in costs and challenges related to the availability of some building material caused by the war in Russia and Ukraine, the Housing Finance and Development Centre (ARA) did not grant funding yet. New plans have been completed in early 2023, and new offers have been received in the spring of 2023. By following contract negotiations, a new funding application has been submitted to ARA in June 2023. As of September, VOAS is still waiting for their approval for the project. Construction can begin as soon as ARA grants the loan and provides the financial support.

The following Figure depicts the base floorplan for the Wolffintie 24. The explained cost reduction process led to having to reduce the ambition level of the project in common spaces (including sauna) and the size of the rooms was slightly reduced. That being said, the current project aims at high standards in what concerns the modern standards of student housing. The wish to have studio apartments instead of shared apartments will be fulfilled. The building design was thought as to allow every accommodation to have access to direct daylight and also considers the accessibility for wheel chair users. While being designed for a student residence, the building easily allows to be used for other types of accommodation, making it flexible in case of a use change

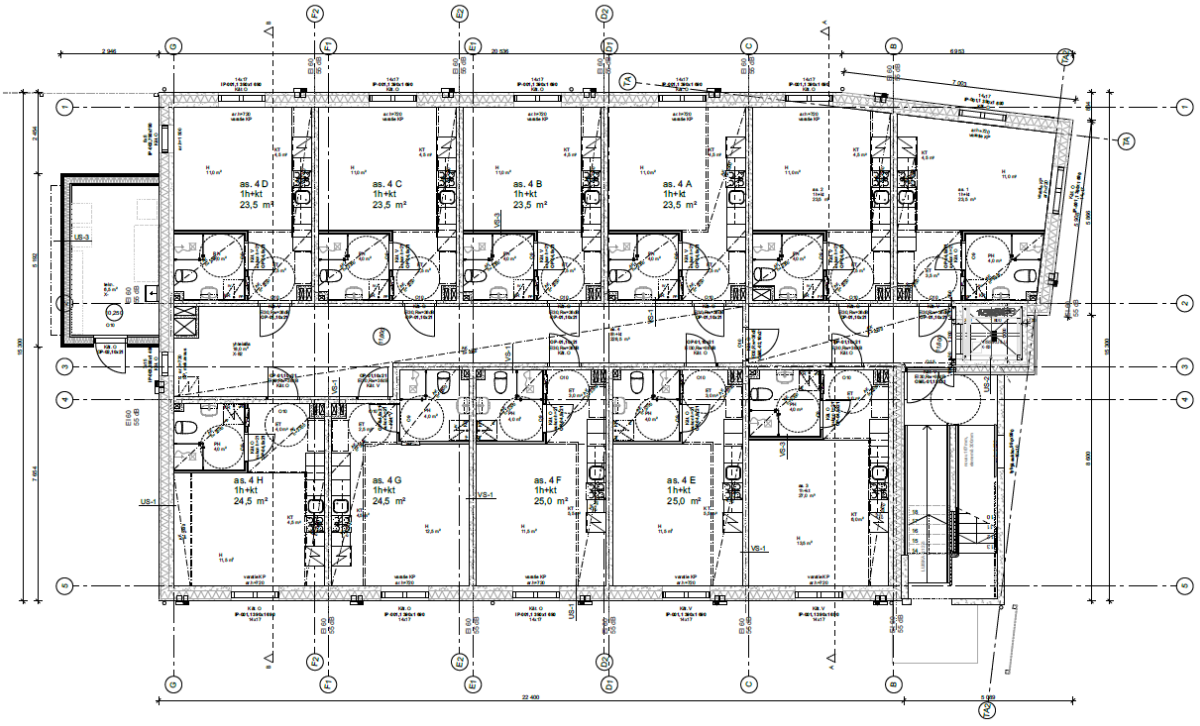


Figure 7 - Wolffintie 24 base floorplan

As of September 2023, Palosaarentie 58, the second alternative, is currently in the process of obtaining a building permit. This new construction project aims to replace the old, energy-inefficient student dormitory built in 1968, which is currently in a deteriorated state. The existing building faces indoor air problems and has numerous unusable spaces. The new building will feature 66 modern student apartments and shared areas that will also provide benefits to other students in the area.

The one where construction commences first will be designated as the demonstration site to maximize the monitoring period within the project timeframe and if the EC will agree on related amendment request.

The Palosaarentie 58 site (marked with blue in the next Figure's map) is conveniently located in Palosaari only 200 meters away from the campus area of University of Vaasa, University of Applied Sciences in Vaasa and Swedish University of Applied Sciences in Vaasa (the area marked with black in the map). In the area, there are several shops and possibility for outdoor recreation by the seaside. The city centre (including train and bus station) can be easily reached by walking or cycling. Also, some other VOAS buildings are situated in the same area.

This location will also allow for reduced mobility needs for the student population while making public transport alternatives easily available for any day-to day further transportation need.

Figure 8 - Finish demo site district location

5.2.2. Tendering and contractual process

The project tendering and contractual process is carefully planned to ensure a smooth and efficient progression. The initial tendering process began in autumn 2022. Following that, a redesign phase was scheduled from January to April 2023. The financing approval phase, which has been planned to take place from June to September 2023, is a critical milestone in the implementation process.

5.2.3. Implementation

Everything is carefully planned, and the construction is expected to begin once the crucial funding decision for the foreseen social housing construction will be received. It is worth noting that Finnish winter conditions may impose some limitations and adaptations on the timing of the foreseen construction tasks.

5.2.4. Operating/Monitoring/Modelling and simulation studies

Modelling and simulation studies, such as the elaboration of a 3D model of the buildings and comparative calculations on the life cycles of heating systems, have been carried out. The 3D model for Wolffintie 24 is depicted in Figure 9.

Figure 9 (a) shows a draft view of a room interior. Figure 9 (e) presents information of relevance for the ProLight project about the Wolffintie 24 demo site. This includes 21 individual studio apartments, each approximately 29m² in size, with an Energy Class A rating. Heating options include ground heating

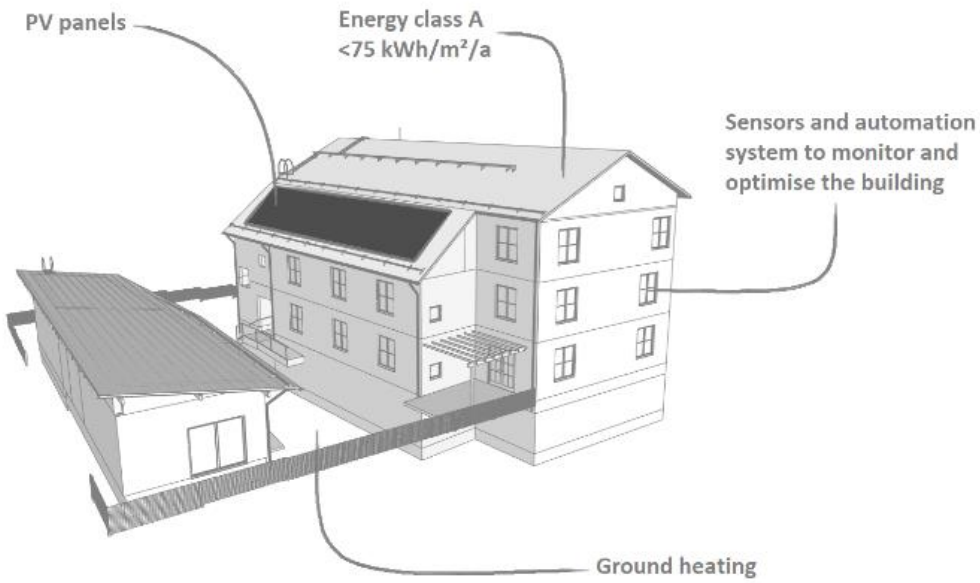
or district heating, sourced from a high-efficiency waste plant and a waste heat recovery unit. The site will also feature solar panels and room sensors for monitoring purposes.

(a)

(b)

(c)

(d)



(e)

Figure 9 - The student housing in Wolffintie 3D model

Additionally, energy simulations have been conducted to assess the performance of solar panels and the heating envelope.

5.2.5. Engagement/Co-creation activities

In August 2023, the first version of the Living app, a mobile application aiming to engage residents in energy-related topics and encourage energy savings, has been launched. Within the specialty group, extensive preparation for resident engagement and co-creation has taken place, including both the introduction of the LivingApp and additional engagement activities with smart house occupants. These events, however, have been postponed ensuring an accurate implementation time schedule. Following the reporting period, further features will be deployed in the following winter, taking into consideration the reorganisation of work processes. The software provides a user-friendly visualisation of energy usage and seeks to promote awareness of energy-related issues and inspire behaviour adjustments, particularly among young people living on their own.

5.2.6. Dissemination and Communication activities

The Capacity Building Workshop held in June 2023 focused on LivingApp and applications. Activities for dissemination and communication have already been planned but will not be carried out until all features are fixed, construction begins, and the house becomes operational. Additionally, the planning of publishing scientific articles has begun, requiring evident data to be awarded by the scientific peers.

5.2.7. Exploitation and Replication activities

In terms of technology and community involvement strategies, the smart house model will give useful insights for replication in future projects, including the envisaged student village project. The Living App mobile application's initial phase has been launched, with plans to integrate further features. The application is crucial in promoting properly and credible energy consumption awareness and encouraging energy-saving practises and sustainable living patterns. Furthermore, the Living App is being used and will be to some extent used in other existing older residences.

6. Kozani demo district (M1-M13)

6.1. Development summary

Collaborating closely with CluBE, the Municipality of Kozani (MoK) has conducted a survey to assess energy poverty in Kozani's social housing sector, aiming to identify suitable units for renovation. The results will be available after local elections in October 2023. The established energy community has already installed a PV capacity of 6 MWp, and discussions are ongoing to acquire additional capacities for lower-income households.

CluBE is actively managing the planning and implementation of demonstration activities in Kozani while securing funding for renovating a selected household. Initial steps for the tender documentation have been completed in M11, as seen in Figure 10, and the tender launch for the new PV system has been already started. Furthermore, the permit requests are scheduled for M19 to M22, transforming then in the beginning of the PV plant implementation, from M23 to M25.

Operating and monitoring work and analyses will start in M16, considering solar thermal energy supply and smart monitoring sensors, and the connection to the municipal solar PV park.

In addition, the Greek demo district has been showcased to energy experts at the 87th Thessaloniki International Fair (TIF Helexpo 2023), on 13th September 2023. Upcoming co-creation sessions with residents are planned to start in M14.

Moreover, CluBE plans to promote the effectiveness of construction works in improving living conditions and economic prospects for the vulnerable population through local and regional initiatives. The campaign will target construction companies, promote applicability across Kozani and the region of West Macedonia, and reach all cities in Greece through KEDE[2]. Additionally, a scientific article will be produced in M46.

While, no exploitation or replication activities have been conducted yet, replication potential assessments are expected to begin in M30, and pre-feasibility studies for other sites will begin in M43.

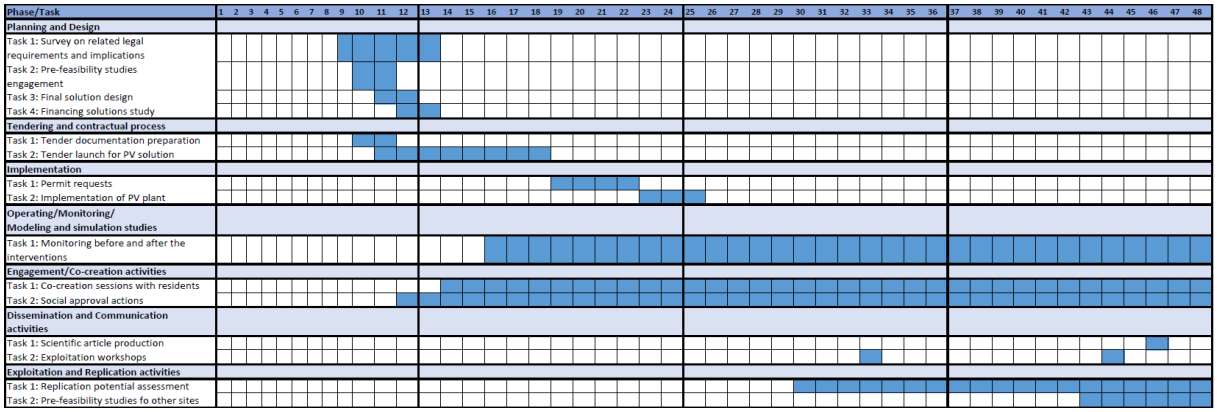


Figure 10 - Kozani's Gantt chart

[2] https://kede.gr/en

6.2. Project phases

6.2.1. Initiation, planning and design

The pilot project aims to design and implement energy-efficient solutions and smart net metering of one residential flat among those provided by the Greek State to individuals with lower income in Kozani. Within this demo district pilot, the ProLight project involves renovating a social dwelling of people with lower income, which will be selected based on specific criteria from a pool of 500 such publicly owned units. The renovation includes enhancing thermal insulation, installing solar thermal equipment, and incorporating smart devices and sensors to measure and adapt to behavioural patterns. Figure 12 and Figure 12 illustrate examples of the Greek social dwellings and their surroundings.

Figure 11 - Social dwelling and surroundings near the army facility area in Kozani

Figure 12 - ZEP's social dwelling and surroundings in Kozani

The main objective of this pilot is to bring in motivation for public institutions to undergo a major refurbishment project for all these dwellings in line with the city's goal of achieving carbon neutrality by 2030.

In conjunction with CluBE, MoK has conducted a survey to assess energy poverty within the city's social housing sector. The objective has been to identify the most suitable housing units that meet the specified criteria for renovation set by MoK. The survey has included a call for expressions of interest from the citizens who would like to participate in the renovation process, stating details of their residence. The survey results were made available to the public after Greece's local elections of October 2023.

Following the announcement of the call for expressions of interest to participate in ProLight, 22 residents of social housing registered. After the call closed, CluBE and MoK assessed the participants based on technical, economic, and social criteria to identify the most relevant cases for further evaluation through site visits. Ultimately, the residence that met all the criteria was selected for an energy upgrade. The chosen residence is a 110m² apartment located in a social housing area in Kozani (ZEP area), built in 2003.

Figure 13 - Front view and Rear view of the chosen residence

Additionally, to facilitate the renovation process, CluBE explored sponsorship opportunities to fund the renovation, achieving great success. National and local construction companies offered to supply the necessary materials, equipment, and services to complete the project.

The renovation will include adding thermal insulation to the external walls and roof, installing thermally efficient external windows, and installing solar thermal equipment for hot water. The most significant measures are the installation of PV panels on the roof, a heat pump to reduce energy and electricity consumption, and the integration of smart home devices and sensors for monitoring electricity consumption.

Figure 14 presents the floor plan for the apartment selected for renovation, located on the 2nd floor of a multi-storey building with a total of 6 apartments. This home is designed to accommodate a family with three children. The layout features a combined kitchen and living room area, which serves as the central gathering space for family activities. Additionally, the apartment includes a bathroom that caters to the needs of the household. To provide ample personal space for each family member, the residence is equipped with three separate bedrooms. This arrangement ensures both communal and private areas are thoughtfully integrated, aiming to enhance functionality and comfort for the family.

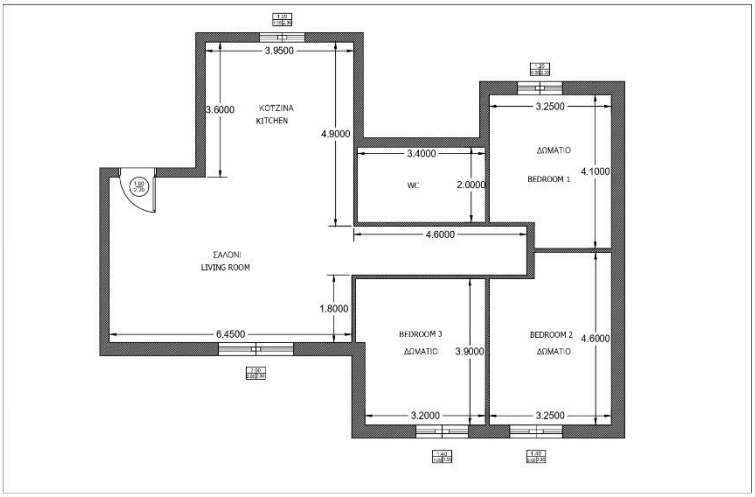


Figure 14 - Floor plan

The pilot project presents a highly valuable initiative by focusing on energy efficiency, smart net-metering, and sustainability in social housing, especially for individuals with lower income. Its scope is well-suited to achieving its primary goals, and the project makes significant strides in demonstrating energy-efficient solutions. However, there are additional dimensions that could have further enriched the project's impact, examining potential new housing concepts like intergenerational housing, mixed forms of housing, and accessible architecture.

Intergenerational Housing: While the pilot selected a specific dwelling for renovation based on a set of well-considered technical and social criteria, introducing intergenerational living arrangements could have fostered greater community resilience, as people from different age groups cohabit or live in close proximity, encourages social interaction, mutual support, and shared responsibility. Including such arrangements could enhance the social sustainability of the initiative, complementing its environmental goals. However, in this specific case, the pilot focuses on renovating an existing social housing unit rather than designing new housing models. Given that the project's primary aim is energy

efficiency, restructuring living arrangements may have complicated the selection process and gone beyond the renovation's scope.

Mixed Forms of Housing: The pilot's focus on renovating a social residence is an important step towards achieving energy efficiency and smart housing solutions. Expanding this to include mixed forms of housing—where units vary by household size, income level, or family structure—could provide more holistic benefits. Mixed housing communities often see more efficient use of shared resources and services, such as communal areas for solar panels or heat pumps. This could further optimize the use of technologies introduced and foster a more diverse and dynamic social environment. However, the goal of the pilot is to demonstrate energy-saving measures and motivate large-scale refurbishments in existing social housing. Integrating mixed housing would involve changes to the housing allocation and community structure, which is beyond the scope of this energy-focused retrofit.

Accessible Architecture: The energy upgrades in the project are impressive in their scope, addressing key sustainability features like thermal insulation and solar energy. Incorporating accessibility in the design—such as ensuring that spaces are adaptable for individuals with disabilities or mobility challenges—would make the renovation more inclusive for all demographics. This could be a valuable addition to future projects, but accessibility has not been the main priority in this particular case. The selected residence, built in 2003, was chosen based on technical, economic, and social criteria that prioritized energy efficiency. Retrofitting for accessibility would have involved more substantial changes to the building's infrastructure, potentially detracting from the energy-focused objectives.

Finally, while the abovementioned housing concepts are valuable for broader urban development, they were not the immediate focus of this pilot. The project's primary mission is to showcase energy-efficient solutions within the existing framework of social housing, and the selected criteria and interventions are well-suited to that context. Incorporating these concepts in future stages could increase the social and environmental impact, making the initiative even more forward-thinking and inclusive.

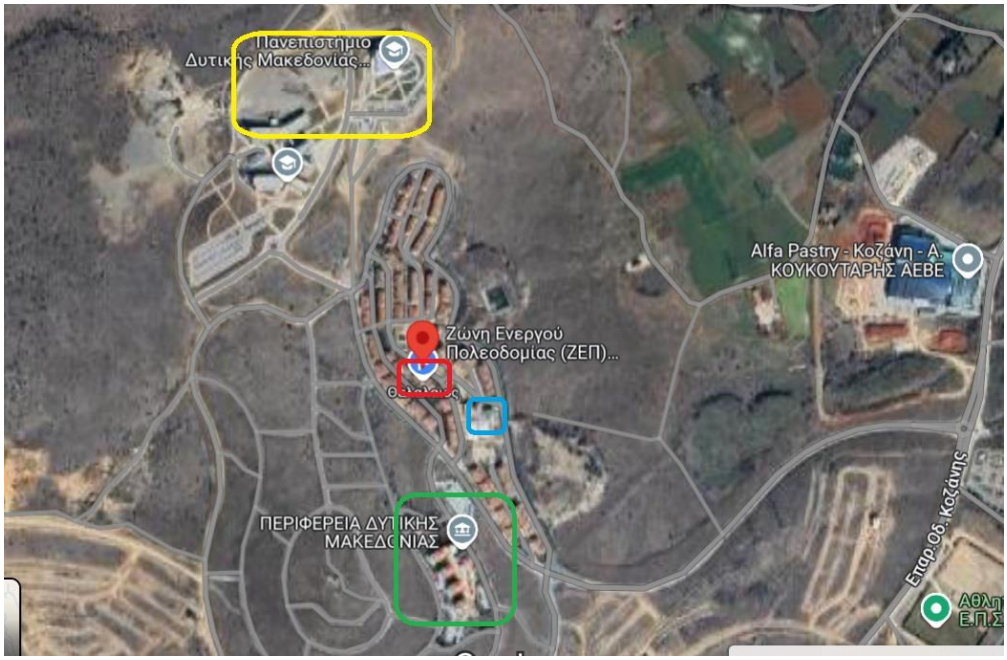


Figure 15 - ZEP Area Kozani, Neighborhood Map

The selected residence is centrally located in the social housing area ZEP, surrounded by several notable buildings. Nearby, the Bioclimatic Primary School (blue square), stands out as a significant innovation, utilizing new technologies and renewable energy sources (RES). Additionally, two key public buildings, the Region of Western Macedonia premises (green square) and the University of Western Macedonia (yellow square), are in close proximity. Simultaneously, the energy community of Kozani has installed a 6 MWp solar capacity to power municipal buildings, and discussions with MoK are ongoing regarding the acquisition of additional solar capacity, which could potentially be "donated" to lower-income households as municipal support.

6.2.2. Tendering and contractual process

The tendering and contractual negotiation process has not yet started. However, CluBE is actively taking on the responsibility for the planning and implementation process of the demonstration actions in the Kozani site, as well as seeking investments and funding to complete the renovation of the selected household.

While the broader tendering and contractual process is still pending, it is important to note that specific phases have already begun. In July 2023, preparations for tender documentation have been initiated and successfully completed in August 2023. Subsequently, the tender launch for the PV solution has been promptly set online, with an anticipated completion date of March 2024. These milestones signify a proactive approach in preparing the forthcoming stages of the tendering process. CluBE will seek potential financial support through sponsorships with local construction companies and nearby material stores.

6.2.3. Implementation

The implementation process is set to begin in the following months. Permit requests are scheduled for M19 to M22, indicating the implementation start of the PV plant from M23 to M25.

6.2.4. Operating/Monitoring/Modelling and simulation studies

The Operating/Monitoring/Modelling and simulation studies phase are planned to start in M16. Although it has not yet been executed, the envisaged technological advancements for the selected dwelling set for renovation are noteworthy. In addition to the upgrades and the inclusion of solar thermal energy, the apartment will incorporate sensors for performance monitoring and optimisation. Moreover, it will establish a connection to a municipal solar PV park through virtual net metering.

6.2.5. Engagement/Co-creation activities

During an event organized by CluBE on 13th September 2023, dedicated to the ProLight dissemination activities on the 87th Thessaloniki International Fair (TIF Helexpo 2023), the Greek pilot has been introduced to energy experts from the Technical Chamber of Greece (Figure 16). The subsequent discussion has focused on topics such as affordable housing, energy consumption reduction solutions, and ProLight's potential scalability to an aggregated level within the city of Kozani.

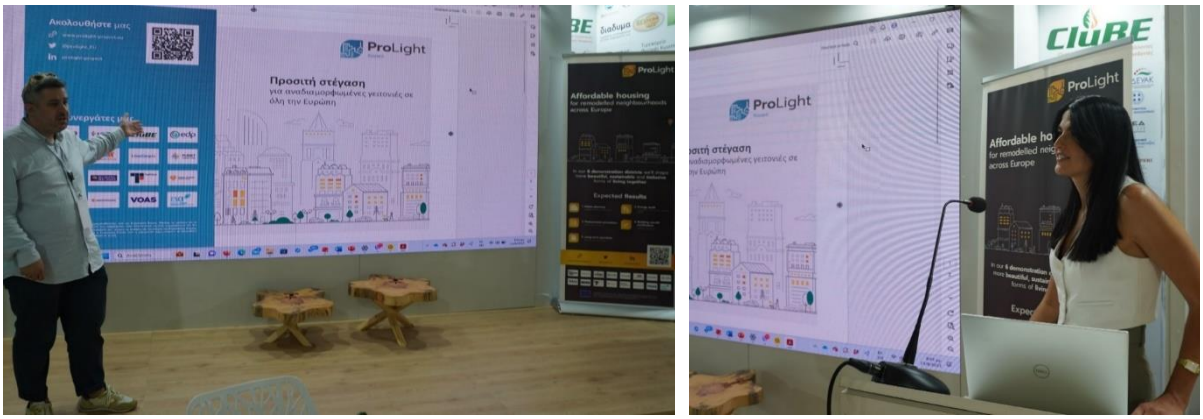


Figure 16 - TIF HELEXPO - 13th September 2023

Additional co-creation sessions with residents are scheduled for the upcoming months, starting from M14 onwards.

6.2.6. Dissemination and Communication activities

Dissemination and communication activities have not yet begun due to the ongoing finalisation of the housing selection process. Despite of that, CluBE's envisage activities include local and regional dissemination initiatives aimed at showcasing the construction works and demonstrating their effectiveness in improving living conditions and economic prospects for the vulnerable population. Additionally, a parallel campaign will target the local ecosystem of construction companies to enhance their understanding of the benefits and scope of work involved in such interventions.

Special emphasis will be given to promoting its applicability in similar houses across Kozani and the whole region. Furthermore, through one of its members, the Association of all Municipalities in Greece (KEDE), the scheme will be promoted to all cities in the country.

In addition to these initiatives, it is planned to organise exploitation workshops scheduled for M33 and M44 and to elaborate a scientific article in M46.

6.2.7. Exploitation and Replication activities

There have been no exploitation and replication activities conducted thus far. Nonetheless, the replication potential assessment is expected to begin in M30, and pre-feasibility studies for other sites will begin in M43.

7. Gernika demo district (M1-M13)

7.1. Development summary

The San Fidel Teaching Center has established an energy community, employing Edinor's TEK-CEL[3] model, under the leadership of Ikastola San Fidel. This community comprises of the roof owner, residents, small businesses, and Gernika Casa de Cultura-Kulturetxea. The eligibility of energy communities ranges usually from 30 to over 1000 members who live within 500 meters in the surroundings of the facility. Edinor provides comprehensive support, covering public aid and the selection of local installation companies.

Gernika TEK relies on 200 solar panels at Colegio San Fidel to provide renewable energy to 150 homes, shops, and the Kultur Etxea. Community decisions are made by the Assembly, with equal voting for all members, and a five-member Board of Directors managing the day-to-day operations. The San Fidel Tek APP helps to monitor the consumption of the member dwellings, while ongoing R&D projects focus on new solutions. The latter encourages commitment-free, shared self-consumption projects under the Royal Decree 477/2021, with an entry fee of €150 and a €9 monthly fee. Comprehensive details of the tasks performed in each project phase are provided in Figure 17.

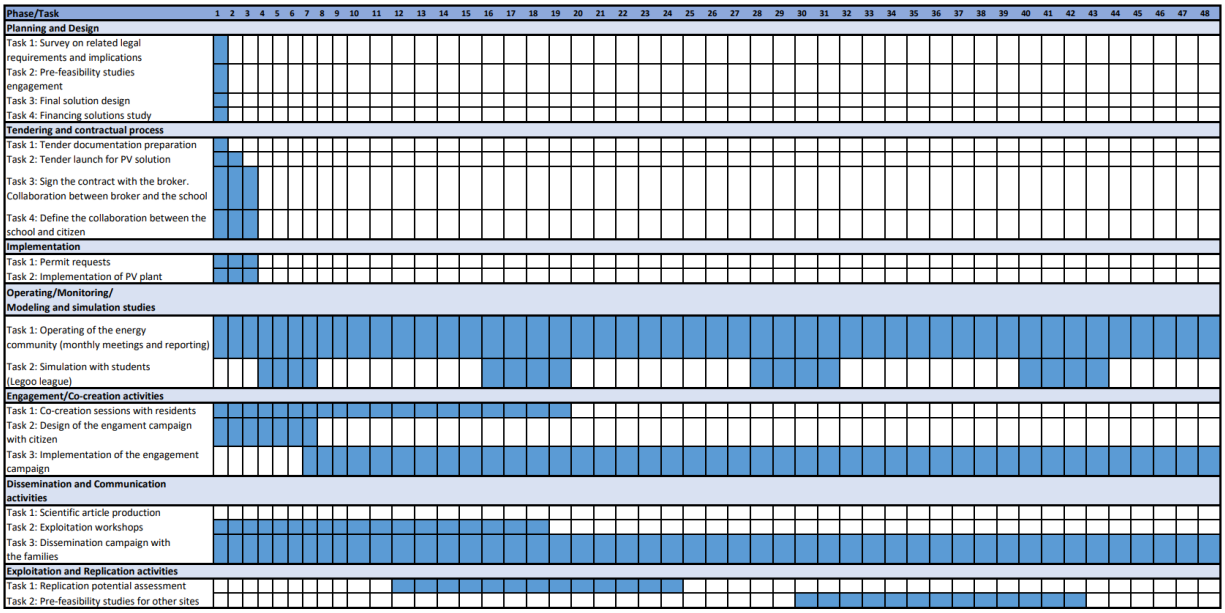


Figure 17 - Gernika's Gantt chart

[3] Tokiko Energia Komunitateak (TEK) in "Communidad Energia Local (CEL)"

7.2. Project phases

7.2.1. Initiation, planning and design

The San Fidel Teaching Center is driving an energy community based on the TEK–CEL model developed by Edinor (Energy Broker Entity). The responsibility for the impulse and promotion of this initiative lies with the entity that owns the roof, namely, Ikastola San Fidel. Participants in the San Fidel Tek include not only the roof owner but also citizens, small businesses, and the Gernika Casa de Cultura-Kulturetxea. Those whose residences, businesses, or companies are within 500 metres of the facility are eligible. The total number of members might range from as little as 30 to more than 1000. The location of the PV system relating to the neighbourhood map can be observed in Figure 18 (yellow square, centred in the picture), illustrating the neighbouring green area and the urban mesh including residences and small businesses potentially connectable to the energy community.

Figure 18 – Gernika Tek neighbourhood map

The Figure 19 depicts San Teaching Center floor plan, and the constituting buildings. The “4. Kiroldegia” (gym) building houses the PV system for the Renewable Energy Community. The other buildings, called “X. Eraikuntzak” are the different school buildings for primary school and secondary school students. The PV panels placement makes the system very visible from the nearby public spaces which contributes for the community recognition of the project. Also, Ikastola San Fidel promotes further sustainability activities, such as a pupil managed greenhouse (in front and left side of 4.kiroldegia, as well as activities together with the community taking advantage of all the grey and “fronton” areas.

Figure 19 – Floor plan of San Fidel Teaching Center

7.2.2. Tendering and contractual process

Edinor provides support to the Ikastola San Fidel during the constitution of the TEK-CEL (San Fidel TEK) and in the campaign for the adhesion of members. Following this, Edinor continues to assist the San Fidel Tek in obtaining public aid, securing financing, selecting suitable companies (with a preference for local businesses) for the PV system installation and its maintenance services. They also guide them through the necessary procedures and actions for facility implementation and legalization.

7.2.3. Implementation

Gernika TEK relies on the Colegio San Fidel's local energy community. For this purpose, the educational centre has installed a total of 200 solar panels with a capacity of 90 kWp on its roof (Figure 20). These solar panels enable the supply of renewable energy, benefiting not only the school itself but also the surrounding dwellings. This includes 150 homes, shops, and public buildings like the Kultur Etxea (Culture House).

Figure 20 - Gernika's installation in the roof of the school (a). Photovoltaic panels (b)

7.2.4. Operating/Monitoring/Modelling and simulation studies

The highest decision-making body is the Assembly, comprising of all members, and it is governed by the principle of one member, one vote. Ordinary management is entrusted to a five-member Board of Director board, elected annually by a lottery among the members. During the first three years, Edinor aids the Board of Directors with operational, administrative, and energy management services of the TEK-CEL.

7.2.5. Engagement/Co-creation activities

The San Fidel Tek APP enables partners to monitor consumption and facility usage. Additionally, R&D projects target new aggregation solutions, demand management, and flexibility.

Gernika-TEK distinguishes between four types of public and private beneficiaries:

- Colegio San Fidel - As the facility owner, it directly benefits from energy savings;
- The Gernika Cultur House- A municipal building that directly benefits from energy savings;
- Homes for private use;
- Businesses for public and private retail use.

7.2.6. Dissemination and Communication activities

The proposed model emphasizes accessibility, ensuring that the participation at the San Fidel Tek is commitment-free and does not require any upfront investment. These shared self-consumption projects, eligible for public aid programs under Royal Decree 477/2021, allow San Fidel Tek partners to benefit from solar energy without incurring tolls or electricity charges. A San Fidel Tek member pays a maximum entry fee of €150 and a monthly fee of €9. These fees cover the credit amortization for installation, maintenance, insurance, and operational and energy management services provided by Edinor to San Fidel Tek.

7.2.7. Exploitation and Replication activities

The Gernika demo district's goal is to develop additional Energy Communities within the Municipality and in the surrounding area. To achieve this, the following activities are being implemented:

- Continuously applying energy efficiency measures in its own facilities, as demonstrated by San Fidel Tek;
- Encouraging the adoption of energy efficiency measures in the municipality through increased assistance and accompaniment of people with ongoing implementations;
- Investigate the feasibility of implementing more ambitious economic incentive systems than the present ones for the implementation of energy efficiency and renewable energy initiatives in the municipality. Environmental taxes are one method that can help achieve this goal;
- Monitoring the consumption of the municipal energy generation facilities and support the inclusion of management and control systems for the facilities.

8. Rovereto demo district (M1-M13)

8.1. Development summary

The Gantt chart with the planned timeframe for Rovereto's pilot is displayed in Figure 21.

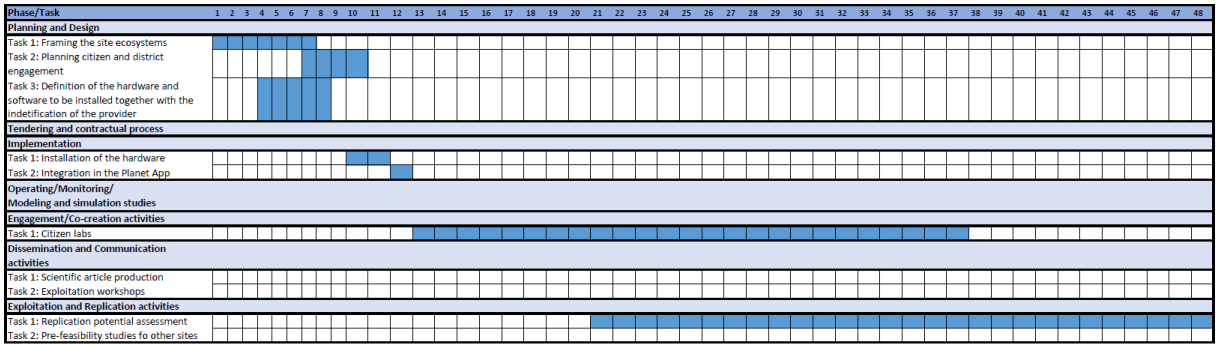


Figure 21 - Rovereto's Gantt chart

In Rovereto's Ex-Marangoni area, a unique social housing project has emerged, featuring two wooden buildings, nine and five storeys high, with 68 social housing units. Sustainability is a key focus, utilizing Renewable Energy Sources (RES) and reclaimed wood from a storm for construction. Smart solutions enhance the environment, including urban gardens, lockers, a library-of-things, intelligent irrigation, and free Wi-Fi, where residents have begun moving in at the beginning of 2022.

Planet Idea's role involves raising awareness and building capacity among residents through digitized tools. Hardware installation commenced in February 2023, but engagement issues related to hot water supply pose challenges, with a potential site relocation.

Dissemination and communication activities are delayed, while replication assessments will start in M21 and continue throughout the ProLight.

8.2. Project phases

8.2.1. Initiation, planning and design

The pilot is located in the Ex-Marangoni area, in the southern part of Rovereto, as depicted in Figure 22. The property has an area of 4300 m^2, and it is situated within a larger 18100 m^2 lot called the Ex-

Marangoni Meccanica, which is intended to accommodate various functions, including commercial, residential, and services.

Figure 22 - Ex-Marangoni area

After an extensive reclamation operation and involving numerous stakeholders, both private and public, it has been finally created an innovative living setting. It is almost unique in Italy, consisting of two wooden buildings, one with nine storeys high and the other five, counting a total of 68 flats which are entirely designated for social housing purposes (Figure 23).

(a) (b)

Figure 23 - Rovereto's two social housing complexes (a). Rovereto nine-storey wooden building (b).

From an architectural and construction point of view, these renovated buildings were conceived to meet modern concepts that enhance a social and lively atmosphere, while paying close attention to the project's environmental footprint, both embedded and operational, as well as its economic viability throughout the construction and operational phases. This can be seen in Figure 24, which illustrates the use of sustainable materials in the interior of the buildings.

Figure 24 - Architectural design of the social housing in Rovereto

Sustainability in building materials has been a key consideration throughout the whole life cycle, along with the provision of RES is to meet thermal and electrical energy needs for the residential part of the real estate.

In addition, by authorizing this real estate investment, the Municipality of Rovereto wanted to ensure a new opportunity to young people and families who wish to live in a balanced and green environment, as illustrated in Figure 25. The intervention is unique as it involves the tallest building with a wooden structure in Italy, moreover the wood used in its construction comes from the trees knocked down by the Vaia storm on the 29th of October, 2018.

Figure 25 - View of the surrounding area of the social housing in Rovereto

The reclamation intervention can leverage on about 20 smart solutions in different macro-areas including environment, social innovation, planning and architecture, and technological systems. On top of the property redevelopment, these solutions, such as urban gardens, lockers, a library-of-things, intelligent irrigation, free Wi-Fi, and so on, have been designed for the Ex-Marangoni area. The first inhabitants moved in at the beginning of 2022.

8.2.2. Tendering and contractual process

In the context of the tendering and contractual process, Planet Idea offers the district the expertise of its community managers' team, serving as a catalyst for raising awareness and buildings capacity for sustainability among residents. Digitized tools play a pivotal role in equipping residents with the awareness and skills necessary to use services and/or to promote social or economic initiatives.

8.2.3. Implementation

In February 2023, Planet Idea initiated the process of purchasing and installing hardware, including smart electrical and thermal meters, and software, such as an energy management smart platform, in the Ex-Marangoni district. These digital tools support awareness activities and enable the collection of energy data.

8.2.4. Operating/Monitoring/Modelling and simulation studies

Currently, Planet Idea lacks access to energy data, specifically energy consumption data at the district level.

8.2.5. Engagement/Co-creation activities

Since the beginning of ProLight in October 2022, consistent complaints regarding the domestic hot water supply have been raised within the Ex-Marangoni district. In March 2023, the property owner officially declared that the issues had been resolved. However, during the most recent site inspection in June 2023, several residents within the district apprised Planet Idea that the issue was persistently ongoing.

Despite the persistent efforts to engage with the property owner to determine the current status and establish a definite timeline for problem resolution, Planet Idea has not received a comprehensive response from them. Furthermore, it has been noticed, in collaboration with the local community manager, that similar difficulties have reoccurred several times during the summer months, leading to increased discontent among the residents towards the property owner.

Considering the seriousness of this situation and the potential threat it poses to the successful execution of ProLight on the Italian demo district, Planet Idea is contemplating the possibility of relocating the demonstration district.

Activities for engagement and co-creation were originally scheduled to begin in September 2023, however these activities are currently not feasible, and the installation of hardware is on hold due to the uncertainty surrounding the situation. Citizen labs are provisionally scheduled to run from M13 to M37, subject to uncertainty.

8.2.6. Dissemination and Communication activities

Dissemination and communication activities have not yet started, and there is currently no scheduled timeframe for their launch due to the aforementioned circumstances and concerns.

8.2.7. Exploitation and Replication activities

Exploitation and replication activities, specifically the assessment of replication potential, are scheduled to begin in M21 and will continue until the project end.

9. Carcavelos demo district (M1-M13)

9.1. Development summary

The request to change the Portuguese demo case, now incorporated into the 1st contract amendment request, is driven by several key factors:

1. Carcavelos, unlike Chouso, has already implemented energy efficiency measures, avoiding potential delays associated with public tendering and renovation works, hindering ProLight project outcomes in due time (Figure 26).
2. Carcavelos, located centrally in the city of Matosinhos, offers more significant social engagement opportunities due to its urban environment and proximity to key infrastructures.
3. Carcavelos includes a mix of building types (residential and commercial), enriching the demo district's diversity.
4. Carcavelos encompasses 278 dwellings across two blocks with a living area of 24 325 m^2 and 690 residents, promising enriched project outcomes and replicability potential.
5. Carcavelos offers larger solar PV capacity and potential synergies with an under-development Positive Energy District (PED) of the city.

Figure 26 - Carcavelos' renovation works (in 2021) and currently

Carcavelos, a social housing district in Matosinhos, a coastal city in the Porto district, consists of two building blocks which underwent refurbishment in 2021. Now, the main goal is to transform these buildings into energy hubs by generating renewable electricity through rooftop solar panels. The project, included into the city's larger ambition of developing a positive energy district in the city centre, also explores mobility charging options, local demand-side management, and storage possibilities.

Carcavelos' Gantt chart is illustrated in Figure 27. Technical feasibility studies and permitting procedures for PV installation are work in progress and its installation is expected to begin shortly. Data monitoring and engagement activities are planned, with communication initiatives scheduled for the next months, at the same time as the PV installation process is officially launched. While replication activities are yet to occur, alternative funding options for PV installation have been discussed and assessed over the last months and discussions with the municipality have shown positive results.

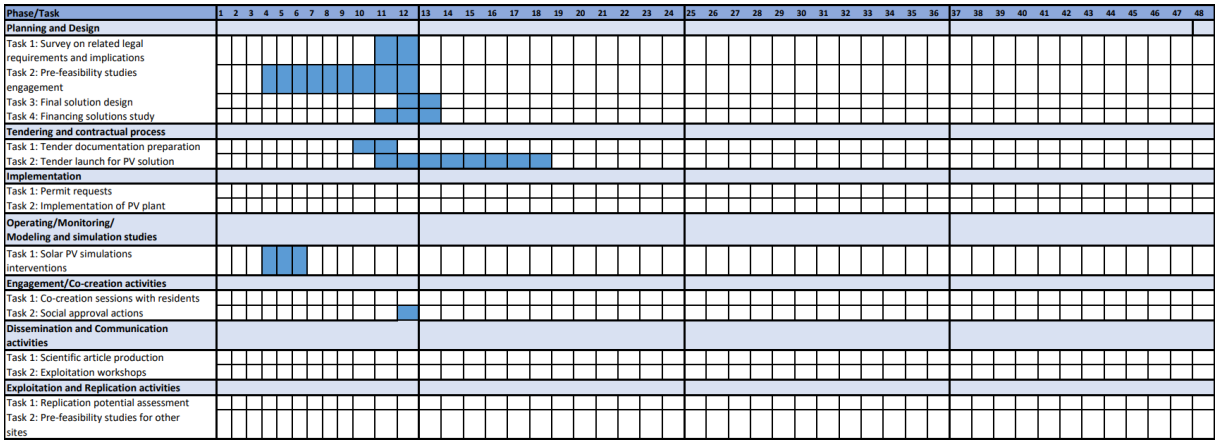


Figure 27 - Carcavelos' Gantt chart

9.2. Project phases

9.2.1. Initiation, planning and design

The request to the EC for replacing the Portuguese demo case has already been incorporated into the first contract amendment Draft. The main reasons for this change can be outlined as follows:

- The change has been mainly caused by the fact that Carcavelos neighbourhood had already implemented energy efficiency measures, unlike Chouso, where the tender process for implementation has only been recently closed and works still need to be initiated. This initial driver for the demo district change has been to avoid potential delays related with public tendering and associated processes. Furthermore, the Carcavelos neighbourhood is located in the city centre of Matosinhos, offering extended social awareness and engagement opportunities. This urban and dynamic environment allows the expanded involvement, not only from neighbourhood residents, but also from more diverse and larger samples of Matosinhos' residents and visitors. Its proximity to key public and private infrastructure (e.g., city hall, schools, etc.) adds to its appeal. Also, Carcavelos is located at the heart of the

Matosinhos Living Lab area[4] which fosters the engagement of local citizens into energy and sustainability related initiatives.

- Carcavelos comprises a mix of building types, including commercial and residential, whereas Chouso consists solely of residential buildings. This diversity in building types contributes to the demo district's load diversity.
- In terms of size and population, Carcavelos stands out, with 278 dwellings distributed across two blocks, a living area of 24 325 m^2, and a resident population of 690. In contrast, Chouso consists of 60 dwellings distributed among 5 blocks, with a living area of 5 250 m^2 and a local population of 150 residents. This increase in area and population promises to enrich the project's outcomes and replicability potential.
- Additionally, the forecasted solar PV installed capacity in Carcavelos is 185 kWp, while in Chouso, it is 90 kWp. Carcavelos also benefits from its integration into an under-development Positive Energy District (PED) boosted by the already existing Matosinhos Living Lab infrastructure, in which since 2018, technological, organizational, and social solutions are tested in a real setting, covering areas as mobility, energy, environment, buildings and connectivity aimed at the decarbonization of the city, configuring itself as a "smart neighbourhood". Building on that, the city is now assessing the possibility of developing in the coming years a PED taking advantage of several PV installations in the area. Thus, although the PED itself falls outside the scope of the ProLight demo district, it is expected to comprise 18 public buildings, including 4 social housing districts, with an installed PV capacity of around 2.2 MWp (Figure 28). Finally, Carcavelos, situated in the heart of Matosinhos, is located in a coastal city in the Porto district. Comprising two building blocks with 278 dwellings and various small businesses on the ground floor, it was constructed in the 1980s. These buildings underwent deep refurbishment in 2021, with an investment of nearly four million euros, significantly improving housing conditions. The overall objective is to leverage the extensive rooftop spaces of municipal buildings in the area to generate renewable electricity for self-consumption and surplus sharing with nearby entities. This initiative capitalizes on existing mobility charging infrastructure, explores local demand-side management options, and evaluates storage possibilities.

[4] https://www.cm-matosinhos.pt/urbanismo/mobilidade-e-transportes/living-lab/onde-se-situa

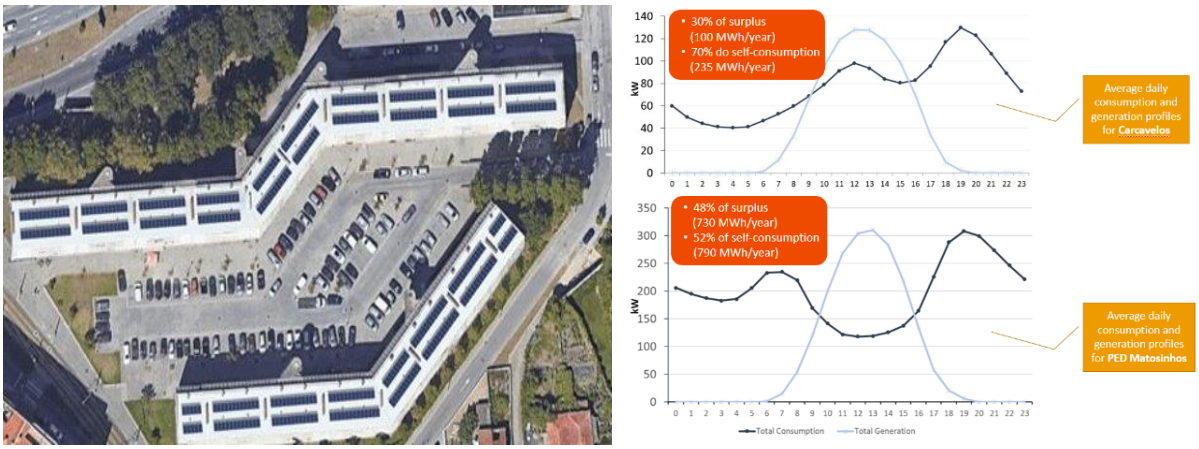


Figure 28 - PV technical feasibility studies

Figure 29 - Floor Plan

The ProLight project at the Carcavelos neighbourhood in Matosinhos has focused primarily on improving the existing housing infrastructure and enhancing the quality of life for residents. The primary goals have included increasing energy efficiency, reorganizing communal spaces, and addressing the deterioration of the housing units. However, the inclusion of concepts such as intergenerational and mixed forms of housing, as well as accessible architecture, appears to have been limited or not prominently featured in the initial project scope.

Consideration of Intergenerational and Mixed Forms of Housing: While the Carcavelos estate's renovation significantly improves living conditions, the project's focus has been largely on refurbishing the existing housing units rather than introducing new housing models. The renovation efforts have

primarily targeted improving energy efficiency and reorganizing communal spaces, without explicitly addressing the need for intergenerational or mixed-use housing.

Intergenerational housing involves creating spaces where people of different ages can live together, fostering community interaction and support across age groups. Mixed-use housing typically incorporates residential, commercial, and sometimes industrial spaces within the same area, promoting a more vibrant and self-sufficient community. Although the Carcavelos neighbourhood has a mix of residential and commercial uses, the project's primary aim has been to improve the existing social housing rather than expanding its scope to incorporate these broader housing concepts.

Regarding accessible architecture, which aims to ensure that buildings and spaces are usable by people of all abilities, the Carcavelos project has made strides in reorganizing communal areas. However, the documentation provided does not detail specific measures taken to enhance accessibility for residents with disabilities (e.g. no elevator available). This is a crucial aspect that could be further explored in future phases of the project to ensure that all residents, regardless of physical ability, can fully benefit from the improvements.

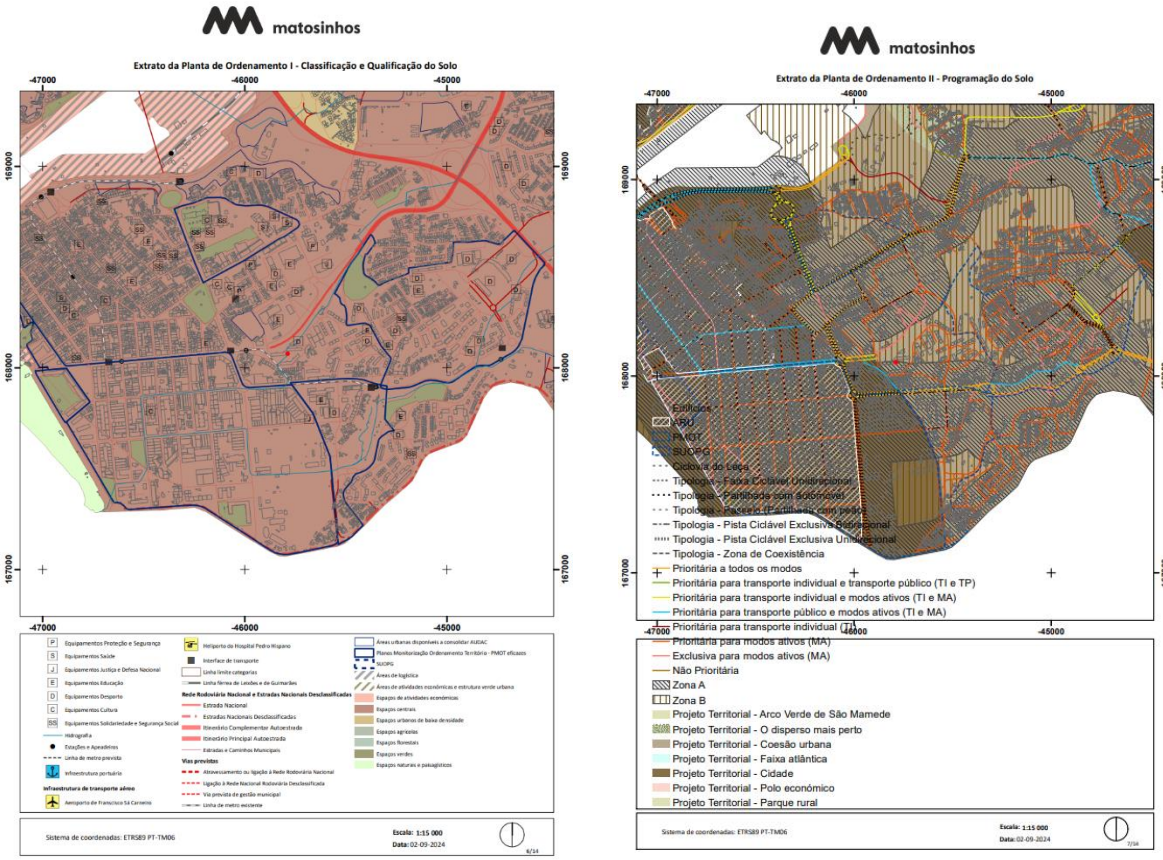


Figure 30 - Excerpts from Planning Maps I and II from the Municipal Master Plan of Matosinhos

The Carcavelos neighbourhood refurbishment is a part of the broader 'Being Close to People' program initiated by MatosinhosHabit and Matosinhos City Council. This program aligns closely with the strategic goals outlined in Matosinhos' Municipal Master Plan (Plano Diretor Municipal - PDM) and local housing policies. These plans and policies aim to improve urban living conditions, enhance socio-territorial cohesion, and promote sustainable urban development.

The Carcavelos Estate is classified as a 'central area' in the Matosinhos Municipal Master Plan, which designates areas of high density and compactness. This classification reflects the strategic importance of the neighborhood in urban development, positioning it as a focal point for implementing key urban policies. The renovation project directly supports the PDM's regulatory principles, particularly in increasing building capacity while maintaining urban cohesion, improving the land use index, and promoting urban amenities that encourage population settlement.

The emphasis on energy efficiency and the reorganization of communal spaces in the Carcavelos project aligns with the local housing strategy, which prioritizes the integrated management and requalification of urban districts, improving the urban housing stock, and promoting affordable housing. This alignment ensures that the project not only meets immediate needs but also contributes to long-term urban development goals.

The Carcavelos demonstration site's alignment with municipal plans highlights several points of interaction that could enhance the project's impact:

- Promotion of Mixed-Use Development: The PDM's focus on functional flexibility and plurality for job creation and population settlement could be leveraged to introduce mixed-use development in future phases of the Carcavelos project. This would involve integrating commercial and residential spaces more closely, potentially increasing the area's vibrancy and economic resilience.
- Enhancing Accessibility: While the project has made improvements to communal spaces, there is an opportunity to further align with the PDM's emphasis on urban cohesion by enhancing accessibility. This would ensure that all residents, including those with disabilities, can fully participate in the community and benefit from the upgrades.
- Sustainability Initiatives: The project's focus on energy efficiency directly supports the municipal goal of reducing carbon emissions and promoting sustainable urban development. Future initiatives could explore the integration of renewable energy solutions on a larger scale, contributing to the municipality's carbon neutrality goals and enhancing the project's sustainability.

In sum, the Carcavelos neighbourhood refurbishment project has made significant strides in improving the quality of life for its residents, aligning closely with municipal plans and policies. However, there remains untapped potential in exploring new housing concepts like intergenerational living and accessible architecture. Additionally, further interaction with municipal plans could always enhance the project's long-term impact, particularly in promoting mixed-use development, enhancing accessibility, and advancing sustainability initiatives. These considerations will be essential in ensuring that the project not only meets current needs but also contributes to a more inclusive, vibrant, and sustainable urban environment.

9.2.2. Tendering and contractual process

The construction tendering and contractual procedures have already been completed, however the solar PV panel installation tendering and contractual procedures are ongoing.

9.2.3. Implementation

Wall insulation, window replacement, roof insulation, and electric water heater replacement have all been completed as part of the renovation process. Such processes were completed in 2021. In turn, the installation of the solar PV panels has yet to begin, being scheduled for the first quarter of 2024 (Figure 31) (the licensing process for collective self-consumption is still quite lagging, which could cause the procedure to be delayed). Still, data for the licensing procedure is already being collected with the support of the municipality so that the process with the licensing entity progresses as quickly as possible. Also, the local consortium is pushing the Portuguese DSO to install smart meters in the neighbourhood as these enabling devices are key for self-consumption management.

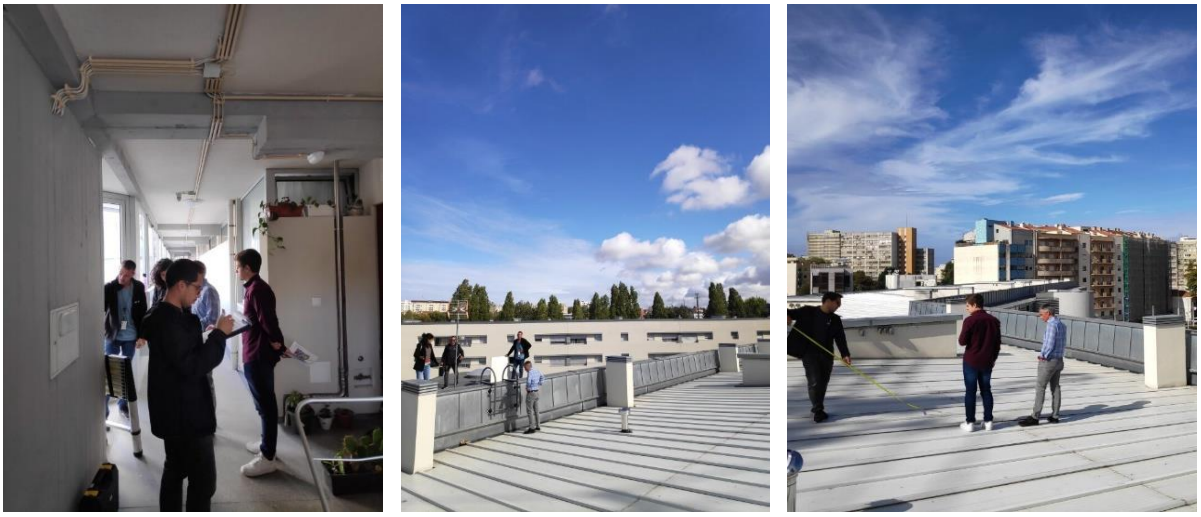


Figure 31 - Technical visit to Carcavelos neighbourhood to assess its technical availability

9.2.4. Operating/Monitoring/Modelling and simulation studies

Data monitoring will include the installation of 10 Shelly 3EM and Smart Plugs to gather information on dwellings' electricity consumption and to assess changes in energy consumption before and after the PV installation. The monitoring devices will be installed until the end of 2023. The PV system simulations have been conducted between M4 and M10.

9.2.5. Engagement/Co-creation activities

Although no engagement activities have yet taken place, related efforts are planned for the upcoming months to match the official launch of the PV installation. These activities aim to develop local communities' capacity and understanding through informative sessions emphasising the benefits of PV systems and offering guidance on energy usage adjustments to maximise the benefits of PV production.

9.2.6. Dissemination and Communication activities

Dissemination activities have not been initiated thus far, but a technical visit to assess the viability of solar PV has been conducted. Communication activities are scheduled to be implemented in the coming months.

9.2.7. Exploitation and Replication activities

While no replication operations have yet taken place, preliminary discussions with the municipality about the possibility for replication have been positively noticed.

10. Summarised preliminary results (M1-M13)

Vienna 17th district had already completed extensive pre-renewal efforts, including planning and design.

Due to finance issues, high cost increases in constructions, Vaasa faced delays and is considering two alternative sites.

In addition, the municipality of Kozani, in collaboration with CluBE, assessed energy poverty and initiated plans for suitable sponsored renovation units.

Gernika has established an energy community with 200 solar panels at Colegio San Fidel.

The Rovereto demo district has worked on social housing units in the Ex-Marangoni area and has addressed hardware installation and engagement issues.

Carcavelos, having previously implemented energy efficiency measures, has focused its engagement on renovation works and solar PV installation, bypassing potential tendering delays.

In the **tendering and contractual process phase** of ProLight, Vienna had already completed this phase. In Vaasa, this has begun in autumn 2022, including a redesign phase scheduled from January to April 2023, with the project's funding approval being a crucial element for the implementation phase. The tendering and contractual process in Kozani has not yet started. Gernika has actively managed the planning and implementation of demonstration activities during this phase, launching the tender for the PV solution. In Rovereto, Planet Idea provided community managers' expertise in tendering and contractual processes. Carcavelos is in the work in progress phase, with ongoing discussions and activities related to renovation work and solar PV installation.

In the **implementation phase**, significant progress and activities have been observed across the various demo districts. Vienna stood out as the exception, having already completed the implementation phase before ProLight start. In Vaasa, the plans for the building construction are set to begin in autumn 2023. The implementation process in Kozani is slated to begin in the following months. In Gernika, the implementation phase is underway, relying on 200 solar panels at Colegio San Fidel to provide renewable energy to homes, shops, and Kultur Etxea. Planet Idea has begun installing smart electrical and thermal meters, as well as the necessary software in Rovereto in February 2023. In Carcavelos, renovations such as wall insulation, window replacement, roof insulation, and electric water heater replacement have been completed, and solar PV panel installation will start on short-term.

Various activities have taken place across the demo districts in regard to the **operating, monitoring, modelling and simulation studies phase**. Vienna has focused on operating and monitoring activities to collect crucial data on energy network components for the envisaged performance optimization. In Vaasa, plans have been underway for modelling and simulation studies, which included the development of a 3D building model and energy simulations. Kozani is preparing operational and monitoring studies, which aim is to introduce solar thermal energy and smart sensors, along with a connection to a municipal solar PV park. Gernika has defined a decision-making body, while Rovereto

currently lacks access to energy data. The data monitoring plan in Carcavelos is already specified, and solar PV simulations between M4 and M6 have been done.

Multiple approaches have been adopted across the demo districts during the **engagement/co-creation phase**. Vienna, through its EAIG, has maintained an informed community in the 17th district. Vaasa has foreseen co-creation sessions with residents to foster their engagement. Kozani has showcased its demo district to energy experts and promotes collaboration with local stakeholders. In Gernika the San Fidel Tek APP enables the given project to monitor the consumption and facility usage. Planet Idea has not received a comprehensive response from the property owner regarding the domestic hot water supply issue, leading to potential relocation of the Rovereto demo district. In Carcavelos no activities have yet taken place.

Regarding the **dissemination and communication activities**, Vienna has conducted site visits and interviews with architects, gaining national and regional recognition. Vaasa has planned future dissemination and communication activities, including the publication of scientific articles. Kozani also intends to produce a scientific article, while Gernika focuses on ensuring that San Fidel Tek participation is commitment-free and does not require any upfront investment. In Rovereto, related activities are put on hold, and in Carcavelos, a technical visit to assess the viability of solar PV has been conducted and communication initiatives are foreseen in the near future, alongside discussions about replication.

Considering the **exploitation and replication activities phase**, the Viennese demo district leader is engaged in discussions about replication initiatives in neighbouring areas. Vaasa and Kozani intend to conduct exploitation and replication activities, with plans to assess replication potential on a later timeline. Gernika aims to promote replication through local and regional initiatives. Rovereto scheduled replication assessments to begin in M21.

11. Conclusions

This deliverable introduces the demonstration district activities within the ProLight project. It provides an overview of the demonstration districts, including Carcavelos, Gernika, Kozani, Rovereto, Vaasa, and Vienna. These districts have engaged in a wide array of activities, covering planning, design, tendering, contractual processes, implementation, monitoring, engagement and co-creation, dissemination, communication, and exploitation as well as replication activities.

During the initial reporting period of the ProLight project, the demo districts exhibited diverse progress and challenges. Vienna's advanced status has allowed them to bypass numerous stages, while Vaasa, Kozani, Gernika, and Rovereto have worked on different context-specific phases. As the project advances, the districts continue to navigate throughout these phases, contributing to a comprehensive understanding of how to develop and implement sustainable and efficient energy solutions in different contexts. These first reporting period results offer valuable insights into the challenges and opportunities in advancing towards energy sustainability and provide a foundation for further project developments and implementations in the coming phases.

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[2] J. Zeininger, “SMART Block Geblergasse Wien / Solare und Geothermische Wärme- und Kälteversorgung im Baublock der historischen Stadt,” *Transferstelle Bingen (TSB).*

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Annexes

A. Gantt Chart for ProLight

WP/Task	WP/Taks name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	WP/T lead
WP1	**Project Management**																																																	**FHTW**
T1.1	Legal and Contractual Management																																																	FHTW
T1.2	Financial and administrative management																																																	FHTW
T1.2	Organisation of kick-off and periodic meetings																																																	FHTW
T1.4	Internal document sharing and communication system																																																	FHTW
T1.6	Gender and Ethics Management																																																		GAIA
WP2	**ProLight backbone and scientific framework**																																																		**CluBE**
T2.1	Assessment of city requirements, ambitions, risks and barriers																																																		UNIVAASA
T2.2	Framing the site ecosystems																																																		EDP NEW
T2.3	Planning citizen and district engagement																																																		CluBE
T2.4	Benchmarking the planning and implementation processes																																																		FHTW
T2.5	ProLight service package for demonstration, replication and knowledge transfer																																																		MAT
WP3	**Demonstration of the lighthouse district Innovation clusters**																																																		**TF**
T3.1	Advanced urban planning for the roll out in the neighbourhood																																																		TF
T3.2	Innovation procurement																																																		MAT
T3.3	Demonstration actions																																																		EDP NEW
T3.4	Validation of performance & economic parameters																																																		FHTW
WP4	**Awareness creation towards replication**																																																		**GAIA**
T4.1	Awareness campaign																																																		GAIA
T4.2	Socio-economic aspects of performed interventions																																																		FHTW
T4.3	Stakeholder and citizen engagement																																																		CluBE
T4.4	Capacity building via knowledge exchange																																																		CluBE
WP5	**Upscaling and Replication**																																																		**BI**
T5.1	Exploitation and Replication Key Performance Indicators																																																		BI
T5.2	Comparative analysis of selected model sites																																																		BI
T5.3	Internal Exploitation & Replication																																																		4ER
T5.4	External Exploitation and Replication																																																		BI
WP6	**Monitoring and impact assessment**																																																		**EURAC**
T6.1	Setting up the data collection format and monitoring procedures																																																		EURAC
T6.2	KPI-based performance evaluation																																																		BI
T6.3	Comprehensive Life cycle sustainability assessment																																																		EURAC
T6.4	Impact mapping and multiple benefits approach																																																		EURAC
WP7	**Dissemination and communication**																																																		**ESCI**
T7.1	Dissemination, Exploitation and Communication Plan																																																		ESCI
T7.2	Dissemination Actions																																																			EURAC
T7.3	Communication Actions																																																			ESCI
T7.4	Clustering with Sister Horizon Europe, Green Deal and H2020 Projects																																																			GAIA

B. Vienna's Gantt Chart

Phase/Task	Phase/Tasks name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
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Task 1	Survey on related legal requirements and implications																																															
Task 2	Pre-feasibility studies																																															
Task 3	Final solution design																																														
Task 4	Financing solutions study																																														
Tendering and contractual process																																															
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Task 2	Tender launch for PV solution																																														
Implementation																																															
Task 1	Permit requests																																														
Task 2	Implementation of PV plant																																														
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Task 1																																															
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Engagement/Co-creation activities																																															
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Task 2	Social approval actions																																														
Dissemination and Communication activities																																															
Task 1	Scientific article production																																														
Task 2	Exploitation workshops																																														
Exploitation and Replication activities																																															
Task 1	Replication potential assessment																																														
Task 2	Pre-feasibility studies for other sites																																														

C. Vassa's Gantt Chart

Phase/Task	Phase/Tasks name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
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Exploitation and Replication activities																																															
Task 1	Replication potential assessment																																														
Task 2	Pre-feasibility studies for other sites																																														

D. Kozani's Gantt Chart

Phase/Task	Phase/Tasks name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
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Task 1	Survey on related legal requirements and implications									■	■	■	■	■	■																																				
Task 2	Pre-feasibility studies										■	■																																						
Task 3	Final solution design											■	■																																						
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Implementation																																																	
Task 1	Permit requests																			■	■	■	■																										
Task 2	Implementation of PV plant																							■	■	■																								
Operating/Monitoring/Modeling and simulation studies																																																	
Task 1	Monitoring before and after the interventions																■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
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Task 2	Pre-feasibility studies for other sites																																																

E. Gernika's Gantt Chart

Phase/Task	Phase/Tasks name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
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Task 2	Pre-feasibility studies	■	■	■	■	■	■	■	■	■	■	■	■																																				
Task 3	Final solution design	■	■	■	■	■	■	■	■	■	■	■	■																																				
Task 4	Financing solutions study	■	■	■	■	■	■	■	■	■	■	■	■																																				
Tendering and contractual process																																																	
Task 1	Tender documentation preparation	■	■	■	■	■	■	■	■	■	■	■	■																																				
Task 2	Tender launch for PV solution	■	■	■	■	■	■	■	■	■	■	■	■																																				
Task 3	Sign the contract with the broker. Collaboration between broker and the school	■	■	■	■	■	■	■	■	■	■	■	■																																				
Task 4	Define the collaboration between the school and citizen	■	■	■	■	■	■	■	■	■	■	■	■																																				
Implementation																																																	
Task 1	Permit requests	■	■	■	■	■	■	■	■	■	■	■	■																																				
Task 2	Implementation of PV plant	■	■	■	■	■	■	■	■	■	■	■	■																																				
Operating/Monitoring/Modeling and simulation studies																																																	
Task 1	Operating of the energy community (monthly meetings and reporting)	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Task 2	Simulation with students (Legoo league)				■	■	■	■									■	■	■	■									■	■	■				■	■	■	■	■	■	■			■	■	■	■			
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Task 1	Co-creation sessions with residents.	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■																													
Task 2	Design of the engament campaign with citizen	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Task 3	Implementation of the engagement campaign							■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
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Task 2	Exploitation workshops	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■																														
Task 3	Dissemination campaign with the families	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
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Task 1	Replication potential assessment												■	■	■	■	■	■	■	■	■	■	■	■	■					■	■	■	■	■	■														
Task 2	Pre-feasibility studies for other sites																																					■	■	■	■	■	■							

F. Rovereto's Gantt Chart

Phase/Task	Phase/Tasks name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
Planning and Design																																																		
Task 1	Task 1: Framing the site ecosystems																																																
Task 2	Task 2: Planning citizen and district engagement																																															
Task 3	Task 3: Definition of the hardware and software to be installed together with the indetification of the provider																																															
Tendering and contractual process																																																
Implementation																																																
Task 1	Installation of the hardware																																															
Task 2	Integration in the Planet App																																															
Operating/Monitoring/Modeling and simulation studies																																																
Engagement/Co-creation activities																																																
Task 1	Citizen labs																																															
Dissemination and Communication activities																																																
Task 1	Scientific article production																																															
Task 2	Exploitation workshops																																															
Exploitation and Replication activities																																																
Task 1	Replication potential assessment																																															
Task 2	Pre-feasibility studies for other sites																																															

G. Carcavelos's Gantt Chart

Phase/Task	Phase/Tasks name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
Planning and Design																																																	
Task 1	Survey on related legal requirements and implications																																																
Task 2	Pre-feasibility studies																																																
Task 3	Final solution design																																																
Task 4	Financing solutions study																																																
Tendering and contractual process																																																
Task 1	Tender documentation preparation																																																
Task 2	Tender launch for PV solution																																															
Implementation																																																
Task 1	Permit requests																																																
Task 2	Implementation of PV plant																																																
Operating/Monitoring/Modeling and simulation studies																																																
Task 1	Solar PV simulations interventions																																																
Engagement/Co-creation activities																																																
Task 1	Co-creation sessions with residents.																																															
Task 2	Social approval actions																																																
Dissemination and Communication activities																																																
Task 1	Scientific article production																																																
Task 2	Exploitation workshops																																																
Exploitation and Replication activities																																																
Task 1	Replication potential assessment																																																
Task 2	Pre-feasibility studies for other sites																																																