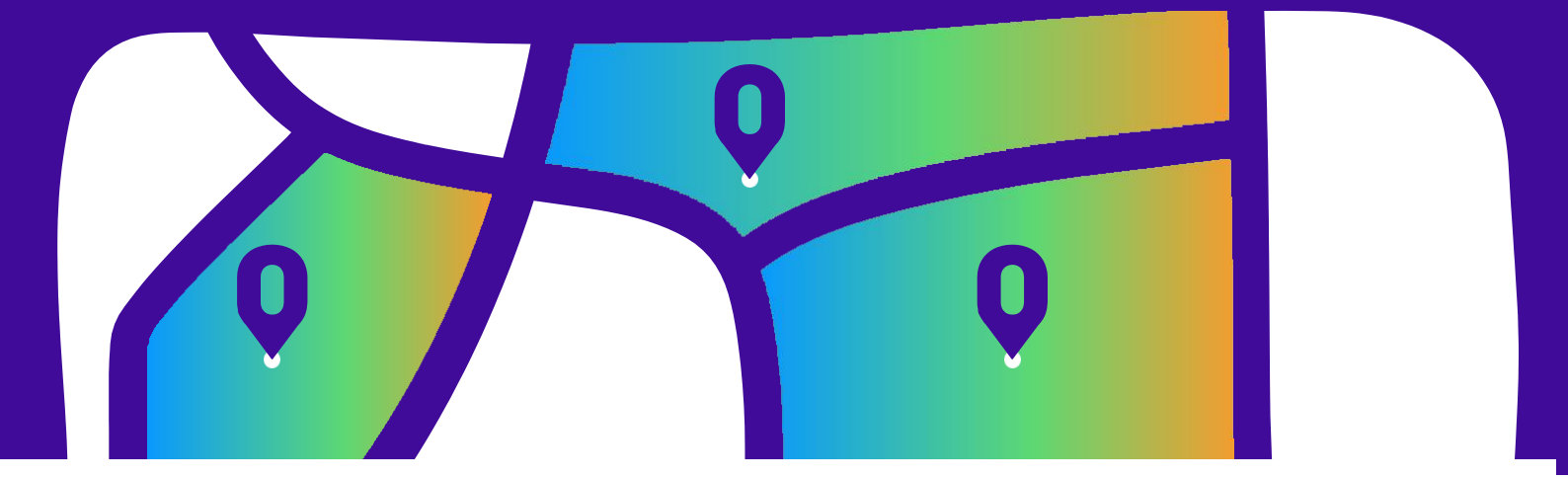
A capacity-building set for digitally-enabled district renovation processes

WP3 – Local Economic Development

September 2024



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About the drOp project

Digitally enabled social district renovation processes for age-friendly environments driving social innovation and local economic development, or drOp, is a Horizon Europe project. As the name shows, the core ambition of the project is the development of an integrated renovation methodology aiming to transform social housing districts into inclusive smart neighbourhoods. It mainly aims to promote social innovation and boost the local economy and with that purpose drOp will adopt a human-centred approach, integrate innovative technologies and explore the growth creation potential of cultural and creative industries.

The end purpose is to create an integrated renovation methodology (IRM), which will be modelled through a case study in the Santa Ana neighbourhood in Ermua, Spain. Two peer cities will contribute to these efforts: Matera (Italy) with its expertise of a former European Capital of Culture (2019), and Elva (Estonia), as a digitally advanced city. The process of co-creation, meaning the active involvement of the neighbourhood's citizens, will be an important element in the development of the IRM.

Executive summary

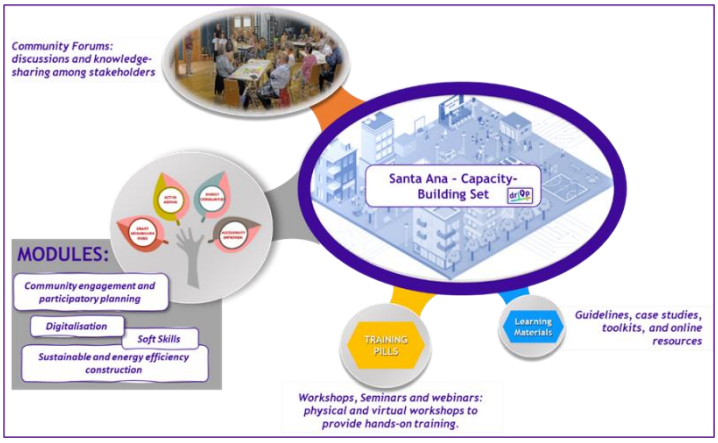
This document offers insights into a comprehensive capacity-building set designed to support **digitally enabled district renovation processes**, focused on fostering local economic development and social innovation. It elaborates on a **structured framework** that includes methodologies, training module insights, and best practices to equip local stakeholders—such as public authorities, businesses, and residents— with the skills and knowledge required to implement renovation or urban regeneration projects effectively.

Throughout the document, readers can find guidance and examples on capacity assessments, stakeholder engagement, capacity building set content development, and how to tailor these approaches and methodologies to the specific needs of urban regeneration and target groups.

The **multidisciplinary approach** has allowed the elaboration of an integral and tailored capacity-building set to address district renovation projects as ambitious as those proposed by drOp. The current needs of the demo case in Ermua, derived from the Santa Ana neighborhood were explored to define a **demanded capacity assessment**. In collaboration with the Ermua council, the authors of this report discovered the main capacity gaps regarding energy efficiency, digitalisation, participation and engagement and urban regeneration. By also examining the current training programs of the municipality, the authors have been able to delineate comprehensive capacity-building content and tailor these approaches and methodologies to the specific needs of urban regeneration according to a variety of target groups: residents, local stakeholders and technicians from the council.

Innovative energy efficiency and renovation financing models jointly with many inspirational examples of capacity-building sets specifically tailored to district or urban renovation are presented in the document. The wide variety of existing EU instruments at the local and regional levels, tailored to facilitate the implementation of renovation projects have been explored and they provide the municipality with the main policy frameworks and funding instruments available at the EU level. The drOp project is particularly interested in the revised version of the EED, as it mandates Member States to prioritise vulnerable customers and social housing in their energy-saving initiatives.

The overall goal of the capacity-building set is to **empower communities to drive sustainable, inclusive, and smart neighbourhood transformations, using a human-centered approach and innovative technologies**. Built upon the context of the pilot case, the main components are shown in the following figure:



All modules have been tailored to each targetted group. Consequently, Santa Ana residents—both employed and unemployed—local businesses, and council technicians will benefit from the modules designed to address their specific capacity gaps. Residents have taken part in some training pills arranged under the drOp project regarding energy efficiency awareness, the neighbourhood office and digital applications for participatory process in recovering the built environment. They will also receive professional learning from one educational centre selected by Ermua in District Renovation skills. Additionally, other educational companies will provide courses on Energy Communities, digital skills as well as in entrepreneurship. The second module of the capacity-set, oriented to Local Commerce, has been also designed to improve their digital , innovation management and energy efficiency knowledge and skills. Finally, the third group receiving tailored training programmes, the municipal technicians will benefit from a participation and engagement module and from a multidisciplinary program combined with external stakeholders. Overall, the tailored capacity-building set presented in this document empowers citizens, technicians and SMEs and microenterprises to enhance their skills, fosters adaptability to changing environments, improves overall efficiency, and strengthens teamwork for the digitally enabled district renovation processes. It also promotes targeted growth, ensuring that resources are maximized for optimal local impact and long-term sustainability, that is, promoting local economic development and social innovation.

The capacity-building set described in this document offers a versatile framework for other urban and regional contexts. By customizing methodologies, training modules, and stakeholder engagement to local needs, it helps regions, cities, and communities develop the skills necessary for sustainable district renovation and urban regeneration. Emphasizing digitalization, collaboration, and long-term capacity development, it empowers local actors to create inclusive, innovative, and economically resilient communities. **This approach can be replicated across Europe and beyond, utilizing the provided insights, best practices, and innovative models**.

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1. Introduction

Within the context of the drOp project, Local Economic Development (hereafter LED) deals with **industrial urban symbiosis to be fostered amongst the most relevant partners engaged in the construction and renovation of social housing facilities**. Moreover, LED has been considered one of the two main strategic dimensions of the integrated methodology (IRM) being deployed in WP1 and the Santa Ana neighbourhood should demonstrate how it can be achieved at the district level while the two follower cities, Matera and Elva will replicate same strategies at definition level.

Therefore, the objective of the WP3 is twofold:

1. to provide conceptual inputs to WP1 alongside the different design levels of the integrated methodology in those aspects,

2. to help the lighthouse demonstrator develop new local symbiotic renovation projects that will serve other districts of the project (Matera and Elva).

Those local renovation projects, rooted in social innovation and designed within WP1, should provide the district or even the municipality with new products, services or solutions enhancing smart neighbourhoods, active ageing, energy communities and accessibility improvements.

With such objectives in mind, the stages of the IRM development process have received specific guidance allowing local governments (municipalities) or decision markers at the municipal level to align planning, strategy, and project priorities **encouraging LED**. Hence, the three stages of IRM have been affected and activities in WP3 were structured accordingly (Figure 1).

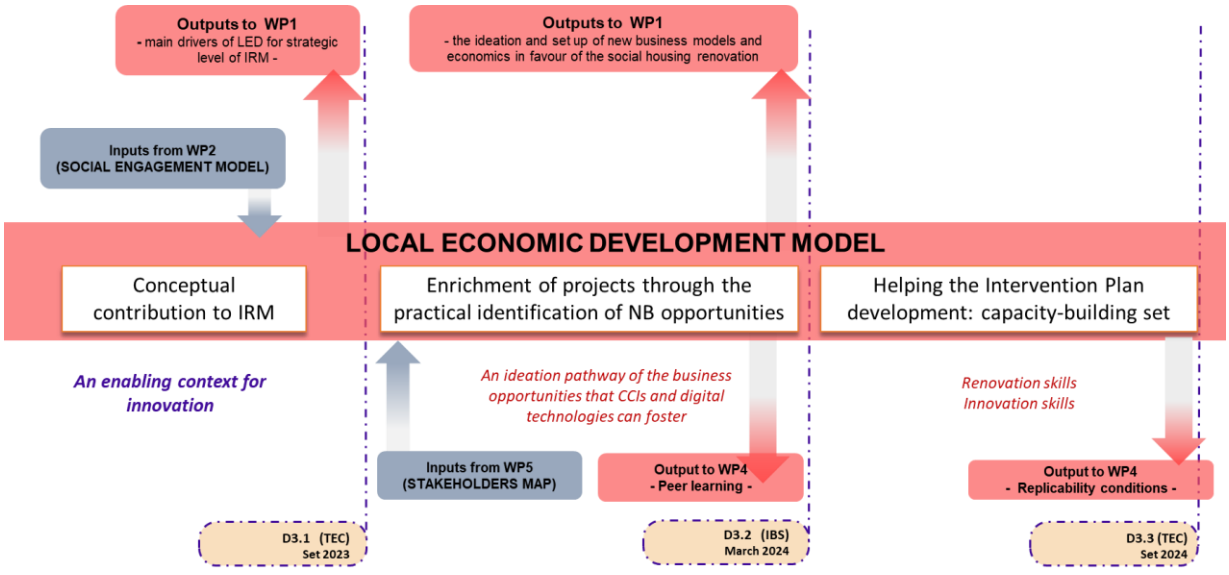

Figure 1: Role of Deliverable 3.1 within the WP3 and interactions among WP1, WP2 and WP4

At the strategic level, the IRM development process is being drawn upon the inputs coming from both drOp models, the Social Innovation and the Local Economic Development models. As far as LED is concerned, the first deliverable of WP3, D3.1 "Conceptual definition of the local economic development strategic plan for a smart neighbourhood" provided the "strategic" guidance to fuel local economic growth at the district level **exploring the main drivers for local economic development and identifying their potential within the demo case neighbourhood and peer cities.** As for the design level, an ideation pathway of the business opportunities that CCIs and digital technologies can foster should be provided. Under a bottom-up human-centred approach, the activities of task 3.2 were focused on **making the designed projects fit for purpose and tailor-made** and resulted in the D3.2 "Recommendations for identifying integrated renovation approaches and new business models". Finally, to support the implementation stage and ensure the success of the selected initiatives, **a tailored capacity-building set** has been designed to enhance the enabling context.

This deliverable is the third report of the WP3 describing a robust capacity-building framework aimed at enhancing digitally driven district renovation efforts, with an emphasis on promoting local economic growth and social innovation. The capacity-building set tailored to the Santa Ana demo case has been built upon current knowledge and best practices from similar projects focused on the same intervention areas planned in the drOp project. Furthermore, it includes insights into training modules designed to equip local stakeholders—such as public authorities, businesses, and residents—with the skills and knowledge necessary to effectively implement renovation or urban regeneration projects.

Throughout the document, readers will find **guidance on the multidisciplinary approach** required to address district renovation projects as ambitious as those proposed by drOp. The current needs of the demo case in Ermua have been explored to define a demanded capacity assessment. By also examining the current training programs of the municipality, the authors have been able to delineate comprehensive capacity-building content and tailor these approaches and methodologies to the specific needs of urban regeneration and target groups.

Including innovative energy efficiency and renovation financing models as well as many inspirational examples of frameworks specifically tailored to the district or urban renovation, the capacity-building set has been presented in the document. The overall goal of the capacity-building set shown in this report is to empower communities to drive sustainable, inclusive, and smart neighbourhood transformations, using a human-centered approach and innovative technologies.

To address the planned goals of Task 3.3, this document has been structured as follows:

- Chapter 3 explains the research methodology followed to deal with the development of the capacity-building set. The methodology is described in the most generic way to guarantee the foundations for further replication in other cities and districts embarked on a similar renovation journey.
- Chapter 4 provides a global overview of those key elements for capacity development in the district renovation research field evaluated for the Santa Ana demo case. The

final objective is to select the most appropriate elements for its tailored capacity-building set. Several areas have been explored and grouped into: a multidisciplinary approach of technological and non-technological skills, and, the policy and financing context, to have a wide scope of the main mechanisms to facilitate the creation of capacity programmes for regional sustainable development.

- To explore successful case studies and examples from around the world to inspire and inform any municipal authority interested in district renovation, Chapter 5 summarises those best practices and innovative approaches in district renovation around Europe.
- Chapter 6 outlines a capacity-building set for district renovation specifically tailored to the Santa Ana neighbourhood's unique needs. It takes into account the local context, stakeholders, and objectives. This comprehensive plan equips local stakeholders with the skills, knowledge, and resources needed to successfully implement renovation projects.
- Chapter 7 shows the main elements for the replication in other contexts, either at the municipal level or for other districts of the two peer cities in drOp project using the main lessons learnt extracted from the results of this deliverable.

2. Objectives

Based on the global objectives of WP3, this deliverable aims to **guarantee the success of the initiatives selected within the Strategic and Design stages of the IRM. Hence, a capacity-building set will be deployed that will take part in the enabling context**.

This set will be based on providing the al the local stakeholders (municipal public authorities, local enterprises and residents) of the lighthouse demonstrator with methodologies, insights into training modules, and best practices to equip them with the skills and knowledge required to effectively implement renovation or urban regeneration projects.

The contents presented in this deliverable aim **to guarantee that flexible learning resources and programs are offered** by existant educational centres in the municipal context but also ensure innovative knowledge developed in the project and accessible to a variety of stakeholders Additionally, some new skills and approaches, in the realm of creativity, entrepreneurship and innovation management have been described.

3. Methodological approach

The research methodology followed to deal with the aforementioned objectives is based on the following:

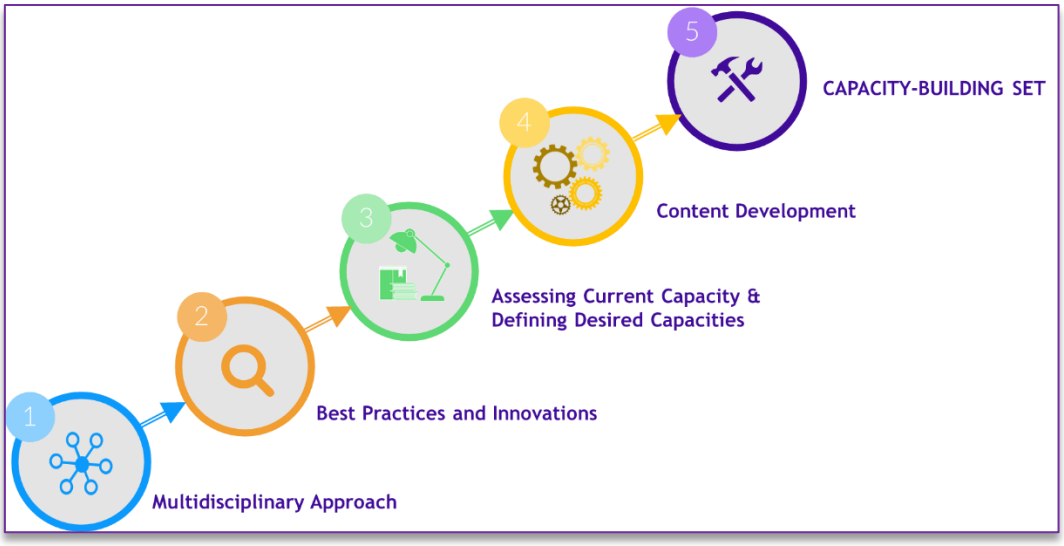

Figure 2: Research methodology for capacity building set development

1. **Multidisciplinary Approach:** District renovation requires expertise from various disciplines, including urban planning, architecture, engineering, environmental sustainability, social sciences, economics, and community development. One of the main objectives is to ensure that the capacity-building set integrates insights and perspectives from these diverse fields.

2. **Best Practices and Innovations**: The drOp project will benefit from existing examples and best practices, innovative approaches, and emerging trends in district renovation. The capacity-building set for the drOp context will be based on successful case studies and examples from around the world to inspire and inform participants.

3. **Assessing Current Capacity**: The local strengths, weaknesses, and necessary areas for improvement should be identified. This involves examining the current training programmes supported by municipal and/or regional public bodies. Moreover, if necessary, the capacities and skills of municipal staff concerning participation processes and digitalisation could be explored to improve the efficiency of the processes related to district renovation.

4. **Defining Desired Capacities**: After assessing the current capacity, the desired state of skills and resources has been defined. This has involved setting specific goals and milestones within the project's lifetime and beyond.

5. **Content Development:** Based on the needs assessment and stakeholder inputs, the contents for the capacity-building set have been formed. This includes a selection of the main target groups requiring specific capacities, training programmes adapted to each group (including details of required materials and workshops), and other resources tailored to address the identified knowledge and skill gaps.

4. Context of Capacity Development for drOp project

As aforementioned, the intervention plan for the neighbourhood renovation requires the elaboration of a specific plan for capacity development within the drOp context.

Capacity building at local and regional levels is a critical aspect of enhancing governance, economic resilience, and community development. It involves strengthening the abilities of local governments, institutions, and communities to effectively manage resources, implement policies, and foster sustainable development at the neighbourhood level.

The process requires considering several aspects that directly affect the drOp context such as:

- *Infrastructure and Human Capital*: Investing in infrastructure and human capital is necessary but not sufficient for sustainable capacity building. Effective capacity building also requires research and initiatives that are relevant to the local context and foster a supportive cultural environment (Braun et al., 2014).

- *Economic Development and Resilience*: Local economic stimulation, such as through 'economic gardening' principles, is key to regional resilience. Programs tailored to the specific needs of local enterprises can significantly enhance innovative capacity and performance (Braun et al., 2014).

- *Citizen Participation and Governance*: Local governments play a crucial role in facilitating citizen participation in governance. Effective capacity building should support community groups and citizens to engage in local sustainability issues, although a robust framework for this should be developed (Cuthill & Fien, 2005).

- *Challenges and Recommendation*s: Capacity-building initiatives often face significant challenges. One of the most relevant relates to the lack of absorptive capacity in organisations or associations located in the municipality. Usually, the firms located in the districts cannot absorb and commercialise recent technological and knowledge trends, which sometimes is crucial for generating local economic growth. Addressing these barriers requires tailored strategies (Papamichail & Robertson, 2005).

- *Community-Driven Development*: Community capacity building involves participation and ownership at the local level. Effective programs should consider the interconnected development of capacities at individual, institutional, and community levels (Fallov, 2010; Loss et al., 2020; Williamson et al., 2020).

The process of implementing capacity-building strategies at local and regional levels will involve investment in infrastructure and human capital, economic development, citizen participation, and adaptive governance. Therefore, overcoming common challenges requires, among others, tailored strategies and fostering a supportive cultural environment (Braun et al., 2014).

Effective capacity building undoubtedly enhances local governance, economic resilience, and community development, ultimately leading to sustainable and inclusive growth. Nevertheless, it must consider different levels of application depending on the changes required. In the case of the drOp project, the levels considered are based on the main target groups involved in the intervention phase or, more concretely, on the renovation actions planned. Hence, those levels are **residential** (involving all neighbours, employed

and non-employed), **municipal** (affecting staff of the council involved in urban regeneration), and **local business environment**.

To better address the development of capacity building in this project, this section aims to provide a global overview of those key elements for capacity development in the districts renovation research field. They have been evaluated for the Santa Ana demo case with the final objective of selecting the most appropriate elements for the capacity-building set in the Ermua case. They have been grouped into two subsections: multidisciplinary approach, involving the set of skills and capacities relevant for district renovation and local economic development; and, policy and financing context, to have a wide scope of the main mechanisms to facilitate the creation of capacity programmes for regional sustainable development.

4.1 Multidisciplinary approach

District renovation requires expertise from various disciplines, including urban planning, architecture, engineering, environmental sustainability, social sciences, economics, and community development. Ensure that the capacity-building set integrates insights and perspectives from these diverse fields.

In drOp project, the main technical fields required to implement the Integrated Renovation Methodology (IRM) and achieve the neighbourhood renovation and regeneration goals are the following:

Figure 3: Technical knowledge considered in drOp project.

In addition to those technical fields, innovation management, soft skills as well as citizen participation have been included as transversal competencies required to guarantee local economic development and social innovation.

4.1.1 Digitalisation

Capacity building in digitalization refers to the process of enhancing individuals', organizations, and societies' abilities to leverage digital technologies effectively. It involves

acquiring new skills, knowledge, and resources to adapt to the rapidly evolving digital landscape. Capacity building in digitalization is important not only for **economic growth since it** drives job creation and increased productivity but also for social inclusion (bridging the digital divide, social inclusion and equality are promoted), for **innovation** (fostering a culture of innovation and problem-solving), and for **global competitiveness**.

Several ways can be used for capacity building in digitalization:

- **Training Programs:** physical or virtual courses on digital skills, coding, and data analysis.
- **Mentorship and Coaching:** guidance and support to individuals and organizations about digital capacities and programmes that they can use to promote their businesses or launch a new one.
- **Digital Literacy Campaigns:** communication and awareness campaigns that would raise awareness about the benefits of digital technology among the citizens and stakeholders.
- **Infrastructure Development:** Investing in broadband access and digital infrastructure.
- **Policy Reform:** Creating enabling environments for digital innovation.

Considering the target audiences (stakeholders including citizens) identified in Santa Ana small businesses and unemployed people appear as the most relevant to receive digital training and several strategies have been identified to deploy and propose different training modules appropriate to address the lack of digital skills among those stakeholders. They often face significant hurdles in the digital age.

A lack of digital skills, limited resources, and a complex digital landscape can hinder their ability to thrive in professional development. Moreover, digitalization also presents immense opportunities for growth, innovation, and job creation. By investing in capacity building for small businesses and unemployed individuals, governments, businesses, and communities can contribute to economic growth, social inclusion, and a more equitable digital society.

The following capacity-building strategies have been selected for both target groups—small businesses and unemployed residents—and should be incorporated into any capacity-building initiatives for neighbourhood regeneration:

Small Businesses	Unemployed residents
Digital Skills Training: workshops and online courses covering essential digital skills such as e-commerce, digital marketing, social media, and cybersecurity. Focused on practical applications and real-world examples relevant to their businesses.	**Digital Literacy Training**: basic computer skills training, including internet navigation, email, and online safety.
Mentorship and Coaching: experienced entrepreneurs offering guidance and support.	**Digital Skills Development**: focused on training unemployed individuals in-demand digital skills such as programming, data analysis, and digital marketing. Those skills can lead to immediate job opportunities.
Access to Finance: low-interest loans and	**Entrepreneurship Development**: training and

grants that help small businesses invest in digital technologies.	support for potential entrepreneurs, aiming to start their businesses. Provide access to incubation programs and mentorship.
Digital Infrastructure: reliable and affordable internet access for small businesses and specific support in setting up digital infrastructure, such as websites and online payment systems.	**Job Placement Assistance**: to connect trained individuals with potential employers through job fairs and online platforms. Offer career counselling and job search support.
Networking Opportunities: networking events to connect small business owners with potential customers, partners, and investors.	

Concerning public authorities, competence in using digital tools, data analytics, and smart technologies to manage renovation projects and optimize infrastructure should be considered in the capacity-building in the drOp context. Public authorities should use data-driven insights to improve the efficiency and sustainability of district renovations. In this sense, smart city technologies (e.g., IoT, AI, digital twins) enable real-time monitoring of energy use, transportation, and public services.

4.1.2 Urban regeneration: generic concepts in Building Renovation

In recent years, urban regeneration has come to encompass a range of concepts, from urban development projects and local initiatives to both bottom-up and top-down strategies. The roots of this debate in Europe can be traced back to the late 1980s, with a particular focus on the "Integrated Area Development Approach." This approach sought to revitalize neighbourhoods through a coordinated set of multi-sectoral actions, addressing physical, economic, environmental, social, and cultural dimensions. Local development was promoted through neighbourhood-specific initiatives, active public participation, and the engagement of private actors through public-private partnerships.

When referring to capacity building in urban regeneration, involves enhancing the skills, knowledge, and resources of individuals, organizations, and communities to effectively participate in and contribute to the redevelopment and revitalization of urban areas. A broad range of essential skills is required for this process, with some already aligned with the existing capabilities of public staff, while others may not be formally included in their training. Based on the analysis conducted in previous tasks (Task 3.1 and 3.2), certain skills were identified as either lacking or needing reinforcement to meet drOp's goals for neighbourhood regeneration. Several of these skills have been prioritized for their inclusion in the capacity-building set:

- **Urban Planning and Design** including ‘Spatial Planning’ (understanding land use, zoning, and the spatial organization of urban areas); ‘Sustainable Design’ (knowledge of sustainable development practices, including green building, energy efficiency, and environmental protection).
- **Project Management** including ‘Time and Resource Management’ (organizing, planning, and executing urban regeneration projects within budget and time constraints); ‘Stakeholder Coordination’ (managing and coordinating multiple stakeholders, including government agencies, private developers, and community

groups); 'Risk Management' (identifying, analyzing, and mitigating risks associated with urban regeneration projects).

- **Community Engagement and Social Inclusion** including 'Public Participation'(techniques for involving local communities in the decision-making process); 'Conflict Resolution' (skills to manage conflicts that arise during regeneration projects); 'Social Inclusion' (understanding the importance of inclusive development that benefits all community members, including marginalized groups).
- **Economic Development** which involves skills related to 'economic analysis' but also to 'Funding & Finance' which is relevant to increasing knowledge about funding mechanisms, grants, public-private partnerships, and financial modelling for urban projects as well as 'Entrepreneurship and Innovation', skills that help promote local business development and innovation within the regeneration areas.
- **Cultural and Historical Sensitivity** involving 'Heritage Conservation' (skills in preserving and integrating historical and cultural assets into regeneration projects) and 'Cultural Competences' (knowledge about cultural dynamics of urban areas and respecting diverse cultural heritages in regeneration efforts).
- **Leadership and Governance which concerns** 'Strategic Visioning' (ability to develop a long-term vision for urban regeneration); 'Governance Structures' (knowledge of effective governance models and frameworks for urban projects); and, 'Leadership' (skills to inspire, motivate, and lead teams through complex regeneration processes).
- **Monitoring and Evaluation** including 'Performance Metrics': Establishing and tracking key performance indicators (KPIs) to measure the success of regeneration efforts; 'Impact Assessment' (ability to assess the social, economic, and environmental impact of regeneration projects); 'Continuous Learning' (skills to adapt and improve strategies based on evaluation outcomes and feedback).

Developing these skills ensures that urban regeneration initiatives are sustainable, inclusive, and successful in transforming urban spaces into thriving, vibrant communities.

Urban regeneration is a multifaceted process that needs many different capacities. In the case of the Santa Ana neighbourhood, the actions that will be implemented during the execution of the drOp project (but also after the project ends) need all these capacities as shown in Table 1.

Table 1: Urban regeneration capacities fitting into the drOp context

CAPACITY	ADDED VALUE SKILLS FOR SANTA ANA REGENERATION PROCESS
Urban Planning and Design	Urban planning and **redesign of urban neighbourhood areas** to align with the evolving needs of contemporary populations and societal dynamics. Additionally, leveraging sustainable design principles to **assist homeowners in the refurbishment** and retrofitting of their residential buildings
Project Management	Having a project manager who can **organize, plan, and execute the projects** resulting from the co-creation process in Santa Ana is crucial for ensuring the success of the initiative. Effective **management of time and budget**, coordination of multiple stakeholders, and **anticipation of potential risks** to implement necessary measures are essential skills that can **guarantee the success** of the process in Santa Ana, making it sustainable over time **and ensuring its future replication** in other neighbourhoods of Ermua.
Community	In a neighbourhood regeneration process like the one ongoing in Santa

Engagement and Social Inclusion	Ana, which has been designed as a co-creative initiative involving neighbours and other relevant stakeholders at all stages, it is essential to have techniques for **engaging local communities** and **managing conflicts** that arise **during co-creation, co-design, and project implementation**. To achieve a truly **inclusive neighbourhood**, the process must propose actions that benefit all community members, including those who do not or cannot participate for various reasons.
Economic Development	One of the project's goals is **to encourage the retrofitting of residential buildings** to enhance their energy efficiency and accessibility. This requires expertise in 'Funding & Finance,' which is crucial for understanding **funding mechanisms, grants, and public-private partnerships**. Additionally, the integrated renovation process aims to **stimulate local economic development**. Skills in financial modelling for urban projects, along with 'Entrepreneurship and Innovation,' are essential for fostering local business growth and innovation within the Santa Ana neighbourhood.
Cultural and Historical Sensitivity	Although the Santa Ana neighbourhood lacks historical buildings, it possesses **significant historical and cultural origins and specificities** that should be considered in the regeneration process. Additionally, having 'Cultural Competences' could be beneficial for involving **cultural and creative industries in the renovation efforts.**
Monitoring and Evaluation	A set of KPIs has been established **to measure** the success of the renovation process in Santa Ana, in line with the Integrated Renovation Methodology. Additionally, it is essential **to assess the social, economic, and environmental impacts** of the process and to follow the methodology as a **continuous improvement process**, adapting and enhancing strategies based on evaluation outcomes and feedback.

4.1.3 Energy Efficiency, renewable energy generation and local energy communities

The capacity to integrate environmental sustainability into all aspects of renovation, from design to implementation, ensuring energy efficiency, use of renewable resources, and circular economy principles represents one of the key capacity areas on which the public authorities should focus. Public authorities are increasingly requested to **achieve climate goals, reduce carbon footprints, and create resilient, energy-efficient districts**. This involves knowledge of sustainable construction, green technologies, and environmental regulations. Within the drOp context, capacities and skills around energy efficiency have been included in the capacity-building set. However, based on the municipalities' strategic priorities, others focus on sustainability are to be developed and included too such for instance circular economy.

The promotion of Energy Efficiency in buildings and local generation of their renewable energy are some of the measures taken to reduce the environmental impact of the building sector, establishing ambitious goals through various regulations directed by the EU.

Recently, the revised Energy Performance of Buildings Directive[1] (hereinafter EPBD) has been approved to help increase the rate of renovation in the EU, particularly for the worst-performing buildings in each country, while dedicating a specific article for solar energy in buildings. This directive must be transposed into national law by EU member states within 2 years through National Building Renovation Plans, which replace the Long-Term Renovation Strategies (ERESEE). Also, the Renewable Energy Directive[2] updated in 2023, established specific goals for buildings on local energy generation.

Therefore, capacity building in Energy Efficiency and Renewable Generation in buildings is a comprehensive approach to adopt and promote sustainable energy practices, ultimately leading to reduced energy consumption, lower emissions, and increased sustainability in the built environment. In addition, in dense urban areas and multi-home blocks, this type of initiative is boosted through energy community establishment (with special relevance for shared photovoltaic self-consumption in Spain). The following skills are critical to effectively design, implement, and manage energy-efficient practices and sustainable technologies:

1. Technical knowledge of building physics for designing buildings that minimize energy demand, enable renewable energy consumption and maximize comfort.
2. Knowledge of Energy-efficient technologies and systems related to both passive measures to improve the building envelope as well as active measures (technical building systems) such as HVAC systems, lighting, renewable energy systems (i.e. solar thermal and PV systems, biomass, micro-wind turbines), and smart building technologies (automated controls, sensors).
3. Project management to plan, coordinate and manage energy efficiency and building integrated renewable energy projects in compliance with related standards and regulations.
4. Energy modelling and software simulations to predict buildings' energy performance
5. Data analysis of monitoring techniques to track energy consumption and savings
6. Local Energy Communities: organizational and business models, usual projects.
7. Communication and Stakeholder Engagement skills for engaging and educating stakeholders, including energy community members, building owners, occupants, policymakers, and the public, about the benefits and implementation of energy efficiency and local renewable energy measures.
8. Ability to innovate and adapt to new technologies and methods in energy efficiency and renewable energy systems staying current with industry trends, innovative technologies, and best practices.

Particularly, based on the actions prioritised in Santa Ana demo case, these capacities are quite relevant to the intervention action named as “Energy Community”. This action entitled, in addition to the design and analysis of the intervention, two workshops with the residents and the council members will be arranged to provide them with generic concepts concerning energy community concept, their organisational governance and property

[1] https://energy.ec.europa.eu/topics/energy-efficiency/energy-efficient-buildings/energy-performance-buildings-directive_en
[2] https://energy.ec.europa.eu/topics/renewable-energy/renewable-energy-directive-targets-and-rules/renewable-energy-directive_en

models, as well as, technical introduction to collective PV self-consumption systems (see Chapter 6.4.2 for more information). In the second workshops, the results of the analysis of Santa Ana's solar resource and renewable potential, along with implementation opportunities identified, will be presented.

4.1.4 Soft skills

Entrepreneurial competences are increasingly recognized as vital tools for empowering communities within urban environments, fostering not only economic growth but also stronger civic engagement and collaboration between civil society and political institutions. In this context, the development of such competences becomes a crucial mechanism for enhancing the agency of citizens, enabling them to play a more active and constructive role in local governance and urban transformation processes. A strategic approach to capacity building that effectively addresses these needs can be found in the EntreComp (Entrepreneurship Competence Framework), a comprehensive and flexible model developed by the European Commission to promote entrepreneurial thinking and behavior across diverse sectors and disciplines.

EntreComp is built around 15 competences, which include creativity, vision, ethical and sustainable thinking, and mobilizing resources, structured into three key areas: "Ideas and Opportunities," "Resources," and "Into Action." This framework moves beyond traditional definitions of entrepreneurship, extending its relevance to individuals and communities by focusing on their ability to transform ideas into value for others, whether that value is social, cultural, or economic. For urban communities, especially those that are marginalized or facing socio-economic challenges, EntreComp provides a pathway to foster a culture of innovation, problem-solving, and collaboration. It encourages a mindset that sees challenges as opportunities for positive change, equipping citizens with the skills to identify, initiate, and manage projects that benefit their neighborhoods and cities.

Within the context of drOp project, by integrating EntreComp into capacity-building programs, Ermua and Santa Ana will be able to cultivate a new generation of residents who are not only capable of launching entrepreneurial ventures but are also adept at co-creating solutions for urban problems, engaging constructively with public institutions, and participating in the shaping of inclusive, resilient, and sustainable communities.

The framework's emphasis on personal initiative, resilience, and collective value creation is particularly important in urban contexts, where collaboration between different stakeholders—citizens, policymakers, private sector actors, and cultural institutions—is critical for addressing complex and interconnected challenges.

Thus, EntreComp should be used as a powerful tool for fostering the entrepreneurial skills necessary for residents to take leadership roles in their communities and for building stronger alliances between civil society and political actors, ultimately contributing to the co-design of urban spaces and the common good.

Besides a complete guide targeted to those individuals and organisations who want to use the EntreComp framework to foster entrepreneurial learning, the European Commission also provides a playlist on the JRC YouTube channel where the 15 competencies of the framework are introduced and coupled with ideas on how to embed them into training activities devoted to unemployed residents for instance.

4.1.5 Innovation management

Innovation management capacities for public authorities involved in district renovation

projects are crucial for **ensuring that these projects are efficient, sustainable, and socially beneficial**. These capacities help manage complex **stakeholder ecosystems**, **leverage new technologies**, and **address environmental, economic, and social goals**. Aligned with the drOp project's objectives, all the renovation stages, ideation, co-design and intervention would require specific managerial capacities to deal with innovative initiatives for district renovation in which the public authorities will be involved, as key members of the innovation-enabling ecosystem.

The IRM that the project is deploying implies some of the stages of a generic innovation process which tackles: Innovation strategy, Ideation, Selecting and Designing, and Implementation. In the IR methodology, the first stage links to how to figure out an innovative strategy and vision for the district; the design stage concerns the ideation, selection and design of innovative solutions, projects, action plans or others; and the intervention stage could imply managing innovation to implement innovative action plans of the projects identified. Meanwhile, innovation culture and people ready for innovation are also relevant aspects to foster innovative interventions at the neighbourhood level. Innovation is primarily a question of leadership and change – how to encourage people to find a new and better way of doing – a process of learning and unlearning. Innovation belongs to all kinds of stakeholders. Capacities to support public authorities and their staff in deciding what kind of leadership and management is needed and how to develop a culture of continuous innovation should be considered in the capacity-building set. Here are key innovation management capacities that are particularly relevant for public authorities in district renovation according to the context of the drOp project as well as the :

Table 2: Innovation Management capacities fitting into the drOp context

CAPACITY →IRM stage	DESCRIPTION	RELEVANCE	TOOLS/METHODS
Strategic Foresight and Visioning (The strategic plan definition)	The ability to anticipate future trends, needs, and challenges, and to align district renovation projects with long-term urban development goals.	Public authorities need to envision how districts will evolve in the next 10-20 years, taking into account factors such as climate change, population growth, and technological advancements.	PESTLE analysis, SWOT + action plans, Scenario Planning, Prioritization matrices, Creativity tools, Trends Scanning, Prospective methods, Value Proposition Canvas, Design Thinking, among others
Stakeholder Engagement and Collaboration (The strategic plan definition and implementation)	The ability to build and maintain partnerships across different sectors (public, private, and civil society), as well as with local communities.	District renovation projects involve multiple stakeholders, including residents, local businesses, utility companies, and developers. Effective collaboration is essential for aligning interests, sharing resources, ensuring broad-based support to co-create solutions and ensuring inclusive	Stakeholder Mapping and Analysis, Participatory Budgeting (This method can be used to involve communities directly in decision-making about which renovation projects are prioritized, increasing transparency and public buy-in),

		decision-making.	
Cross-sectoral Coordination (The design level and Intervention, helping co-design and co-implementation of action plans)	The ability to coordinate actions across various sectors (energy, mobility, housing, social services) to ensure cohesive and integrated urban development.	District renovation touches on multiple aspects of urban life, including infrastructure, housing, mobility, and public spaces. Public authorities need to ensure that efforts in these areas are coordinated to maximize overall impact.	Urban Living Labs, Collaborative ideation toolkits,
Innovation Ecosystem Building (Strategic and Design levels)	Ability to foster innovation ecosystems by creating an enabling environment for startups, research institutions, and businesses that can contribute innovative solutions.	In district renovation, innovative building materials, renewable energy systems, or new urban mobility solutions can be sourced from local innovators and enterprises. Public authorities should act as facilitators of such ecosystems.	Public-Private Partnerships (PPP) Models, Triple Helix Model (Government, Academia, Industry Collaboration),
Project Management and Financing Innovation (Intervention level)	Capacity to manage complex, large-scale renovation projects and explore innovative financing mechanisms such as public-private partnerships (PPPs), green bonds, or EU funding.	District renovations require substantial investment, often beyond the means of local authorities. Innovation in financing models and project management tools helps ensure financial viability and efficient use of resources.	Crowdsourcing and Civic Platforms
Social Innovation and Inclusion (Strategic, Design and Intervention levels)	The ability to design and implement socially innovative solutions that enhance community involvement, equity, and access to services.	Renovation projects should improve physical infrastructure, promote social cohesion, and address the needs of vulnerable populations. Public authorities must be capable of incorporating inclusive practices and fostering community-	*Design Thinking, Particpatory budgeting, Social Impact Assessment, Asset-Based Community Development (ABCD)*

		driven innovations.	
Performance Monitoring and Evaluation (Intervention level)	Capacity to set up systems for tracking the progress and impact of renovation efforts, ensuring continuous learning and improvement.	Effective monitoring helps measure whether district renovation goals (e.g., energy savings, social impact) are being met and provides feedback for adjusting strategies in real-time.	Innovation Maturity Assessment Tools (e.g., Innovation Radar, Oslo Manual),
Innovation Culture and Change Management (transversal to the whole IRM)	Fostering a culture of innovation within public institutions, where staff are encouraged to think creatively, take calculated risks, and embrace change.	District renovation projects often require public authorities to rethink traditional processes and embrace new ways of working. A culture that supports innovation makes it easier to implement cutting-edge solutions and drive continuous improvement.	Practising theory of change; Change Management Models (such as ADKAR-Awareness, Desire, Knowledge, Ability, Reinforcement or Kotter's 8-Step Process for Leading Change.

4.1.6 Participation and engagement

Two main target groups may require capacity updates. On the one hand, residents must develop a diverse set of competencies that enable them to engage in decision-making, co-create solutions, and collaborate with a wide range of stakeholders (including public authorities, private entities, and civil society organizations) to effectively participate in urban co-governance. On the other hand, public administration workers would require an up-to-date of their knowledge concerning citizens' participation and engagement.

Beginning with the first group—residents—it is important to emphasize that urban co-governance, by nature, requires a deep understanding of governance processes, as well as the skills to navigate complex social, political, and economic systems. The competencies necessary for residents to take part in co-governance can be grouped into several core areas:

- ***Collaboration and networking*** are equally essential for co-governance, as they allow citizens to work effectively with diverse groups and across sectors. Urban co-governance is often a multi-stakeholder process that requires the ability to negotiate, build consensus, and manage conflicts. Competence in communication, empathy, active hearing and teamwork are key in this context, as they foster trust and understanding among citizens, public officials, and other urban actors. Additionally, the ability to build and mobilize networks of support, including grassroots organizations, advocacy groups, and local businesses, is crucial for amplifying voices and pooling resources in co-governance efforts.
- ***Leadership and initiative*** are also critical competencies in urban co-governance, as citizens are often required to take the lead on projects or initiatives that benefit their communities. Leadership in this context is not about top-down authority but about fostering collective action, inspiring others, and facilitating participatory

processes. Citizens need the capacity to organize others around shared goals, navigate complex governance environments, and take responsibility for the outcomes of co-created solutions. Leadership in urban co-governance also requires ethical and transparent decision-making, ensuring that actions taken in the name of the community are inclusive, equitable, and aligned with broader urban sustainability and justice goals.

- ***Adaptive problem-solving*** and critical thinking are competencies that allow citizens to respond to the dynamic and often unpredictable nature of urban challenges. Cities are complex ecosystems where issues such as climate change, migration, economic inequality, and digital transformation intersect. Citizens involved in co-governance must be able to assess problems from multiple perspectives, identify innovative and context-sensitive solutions, and remain flexible as circumstances evolve. This also includes the capacity for systemic thinking, which helps citizens understand the interconnections between different urban issues and the long-term implications of their actions.

The training for public administration staff has two key objectives. Firstly, it aims to raise awareness of the importance of empathizing with, listening to and collaborating with citizens. Secondly, it aims to provide training in methods and techniques for designing, coordinating, and facilitating participation and co-governance processes in the future. Hence, three disciplines have been selected as the most relevant for the context of the drOp project:

Participation processes: citizen-centred cities prioritize enhancing the quality of life, well-being, and satisfaction within urban environments by designing them with and for the people who live in or pass through them (Lim et al., 2018). To achieve this, it is crucial to understand, implement, and train public administration technicians in the processes of citizen participation.

This area focuses on involving stakeholders, particularly citizens, in the co-creation and decision-making processes. It is a structured approach to decision-making and problem-solving that actively involves community members, in shaping outcomes that affect them. It aims to ensure that diverse voices are heard and considered in the development, implementation, and evaluation of policies, programs, or projects. Participatory processes provide tools that help engage stakeholders and facilitate inclusive decision-making and collaboration among citizens.

In this regard, the knowledge areas that should be considered for the capacity-building development are:

- ***Awareness of Participatory Processes and Basic Principles of Participation***: This involves educating stakeholders about the value and impact of participatory processes and ensuring a comprehensive grasp of the foundational concepts that underpin effective civic engagement.

- ***Tools and Techniques to gather meaningful insights from the community***: various tools and techniques that help investigate, define, and understand the needs, behaviours, and perspectives of citizens (interviews, surveys, observational studies, and data analysis).

- ***Facilitation of Co-Creation Sessions:*** These include skills and techniques to effectively lead co-creation sessions. Participants learn how to plan and structure

collaborative sessions, create an environment conducive to active participation and idea generation, manage group dynamics, and facilitate consensus and decision-making within multidisciplinary teams.

- ***Guided Implementation Workshop***: addressing the initiation of the development of a pilot project, this module provides personalized guidance and support to ensure the successful implementation of the project, addressing any challenges that may arise and ensuring alignment with overall goals.

Design Thinking: As a human-centred approach to innovation, this discipline emphasizes understanding the user's needs and designing the solution based on those needs. Moreover, it encourages creativity and collaboration among multidisciplinary teams to solve complex problems and create user-centric solutions.

Applying Design Thinking implies the use of different creative activities that through stakeholder collaboration solve problems in human-centered ways. It is based on a five-phase process that helped generate human-centred solutions: empathize, define, ideate, prototype and test (Brown, 2008) and drives on three characteristics to achieve innovative solutions (Clatworthy, 2017): human desirability, business viability and technological feasibility.

Understanding this discipline provides clear benefits for municipal technicians who are promoting and working under the perspective of citizens collaboration. Through design thinking, they learn to place citizens at the centre of the process, empathize with them, and explore their needs, habits, and issues. Additionally, it equips them with techniques and tools that allow them to interact with citizens, listen to them, and observe their behaviours, thereby fostering a better understanding of the citizens for whom they are developing products, services, policies, or solutions. Taking into consideration the context of the drOp project and the co-design and co-governance processes established with residents, training in Design Thinking would allow for enhancing and encouraging creativity and divergent thinking, as well as promoting prototyping and testing with citizens throughout the process.

All activities that have been carried out or will be conducted in collaboration with citizens or stakeholders, aimed at identifying needs, generating ideas, or collecting feedback, will benefit from the knowledge of the principles, methods, and tools of design thinking for several reasons. On the one hand, Design thinking prioritizes the needs and experiences of users or stakeholders. When identifying needs, this approach ensures that the perspectives of citizens and stakeholders are at the core of the process, leading to more relevant and meaningful outcomes. In addition, empathy is a key pillar of design thinking, ensuring that the experiences, emotions, and motivations of stakeholders are deeply understood. This empathy-driven approach enriches the process of identifying needs, making the solutions more relevant and sustainable in the long term. Furthermore, design thinking has an interactive problem-solving mindset. By using iterative cycles of prototyping, testing, and refining, design thinking helps collect and incorporate feedback in real time. This ensures that feedback from citizens and stakeholders is not only heard but actively used to improve and adapt ideas or solutions throughout the process. Finally, Design thinking encourages collaboration among diverse participants. This is crucial in activities like idea generation, where multiple viewpoints can spark creativity and innovation, ensuring that solutions are well-rounded and inclusive.

In this regard, the knowledge areas to include in the capacity building set for neighbourhood renovation should be:

- **Sensitization and Understanding**: Introduction to Design Thinking and Citizen-Centered Design, focusing on raising awareness and understanding among municipal technicians about these principles and approaches.

- **Citizen Research**: In-depth exploration of research fundamentals in design and the use and application of qualitative citizen research tools to uncover citizen needs, behaviours, and preferences.

- **Creativity and Co-Creation**: Understanding creative processes and utilizing tools and methods for co-creation to engage citizens effectively in the design and development of products, services, policies, or solutions.

- **Prototyping**: Emphasizing the importance of iteration and testing through rapid prototyping techniques to refine ideas and solutions in collaboration with citizens.

Inclusive design: Inclusive design refers to the approach of designing products, services, environments, and systems that are accessible and usable by as many people as possible, regardless of age, ability, or situation. It goes beyond traditional accessibility considerations by aiming to accommodate diverse user needs and preferences from the outset of the design process.

Understanding that the Santa Ana neighbourhood in Ermua is ageing and has a relatively high number of immigrants, the knowledge of inclusive design will help technicians gain a deeper insight into the specific challenges faced by this community during participation and co-creation processes.

In this regard, the knowledge areas that should be included are:

- **Principles of inclusive design**: to focus on sensibilization an introduction to Design Thinking and Citizen-Centered Design, focusing on raising awareness and understanding among municipal technicians about inclusive design

- **Qualitative Research and Diversity Visualization Tools**: These sessions cover qualitative research methodologies to collect citizen needs and problems and information visualization tools to synthetize and identify insights.

- **Specific Tools for Inclusive Design**: This module focuses on practical specific tools to foster empathy and evaluate inclusivity using tools like INKLUGI and INKLUDIRE, aiming to enhance products and services to be more inclusive.

- **New Services for the Silver Economy**: Discussions and ideation sessions centred around developing new services catering to the needs of ageing populations and the Silver Economy where long-term care services, active and connected ageing and lifelong learning are included.

- **Classification of Agetech by User Persona and Needs, and by Technology Type**. This session involves categorizing Agetech products based on user personas, their specific needs, and the types of technologies they utilize.

4.2 Policy and Financing Frameworks

Existing EU instruments at the local and regional levels are tailored to facilitate the implementation of renovation projects. In this chapter the main policy frameworks and funding instruments available at the EU level are briefly summarised, introducing the major directives and their relation to building renovations and energy poverty. The drOp project is particularly interested in the revised version of the EED, as it mandates Member States to prioritize **vulnerable customers and social housing in their energy-saving initiatives**. Additionally, paragraph (78) of the directive highlights that *"[c]urrent building renovation rates are insufficient, and buildings occupied by low-income citizens facing energy poverty are the most difficult to address"* (European Parliament & Council of the European Union, 2023)[3].

Aligned with the objectives of the EC concerning reducing energy consumption (-11.7% by 2030 compared to 2020) in a multitude of sectors where renovations are among the most prominent measures featured by the *Energy Efficiency Directive*[4], the *Renovation Wave*[5] also aims at boosting the renovation rate across all types of buildings from currently about 1% to 2% per year. Among the key drivers to foster district renovation, the policy and financial context appears as highly relevant (European Committee of the Regions . Commission for the Environment, Climate Change and Energy. et al., 2022). In this sense, the EC mentions [pag. 4]: *"To tackle technical barriers, support should be provided to Local and Regional Authorities (LRAs) by mainstreaming assistance to wider EU structures, in a similar way to the ELENA Facility.* ***National governments should support the LRAs) in providing regular training to their staff to keep up to date with the latest developments regarding building renovations, support mechanisms and other aspects necessary for designing, implementing and monitoring renovation projects."*** (European Committee of the Regions . Commission for the Environment, Climate Change and Energy. et al., 2022).

According to the EC, the effective design, implementation, and monitoring of renovation strategies by LRAs require several key components. These include: establishing a comprehensive knowledge base of current conditions (such as building stock and energy performance), using decision-making tools for scenario analysis and cost-benefit assessments, identifying suitable financial mechanisms for local needs, developing projects to secure funding, understanding citizens' attitudes towards deep renovations, and finally, **assessing the availability of local professional skills and workforce** (European Committee of the Regions . Commission for the Environment, Climate Change and Energy. et al., 2022, p. 67).

As far as the policy context is concerned, the **Regulatory and Policy Innovation Capacity** is relevant to creating and adapting policies and regulations that support new technologies, sustainable practices, and innovative business models. Public authorities often need to update zoning laws, building codes, and energy standards to enable modern, sustainable district renovations. Flexible, innovation-friendly regulation encourages experimentation and the adoption of cutting-edge solutions. Sometimes, a policy sequencing process is

[3] Energy Efficiency Directive (europa.eu)
[4] Energy Efficiency Directive (europa.eu)
[5] Renovation wave (europa.eu)

required to encourage and foster not only residents' involvement (social innovation) but also companies' and professionals' involvement in innovative action plans (business innovation).

In order to mitigate energy poverty and enhance the well-being of European citizens and residents, the EU has committed to actions focusing on improving energy efficiency. It is nevertheless a great challenge ahead. There is a lack of capacity and knowledge about renovation opportunities and how to access them and evidence-based guidance on investments in affordable housing to promote social inclusivity.

The magnitude of the issue of energy poverty in the EU is challenging, and it must support energy transition efforts without exacerbating existing social inequalities. In this context, energy-efficient renovation has an important role to play, especially since **even the energy-efficient retrofit of windows in a building could reduce the annual heating demand by about 16%.**[6]

There is no doubt that the efforts of the EU, including **the Fit-for-55, the Climate Action Social Facility, the Next Generation EU package, the increased Cohesion Policy budget and the National Recovery plans funded by the Recovery and Resilience Facility**, are significant steps toward the alleviation of energy poverty. Let's look closer at these EU funding opportunities for building renovation for 2021- 2027, with a global envelope of €1,074 billion.

It is key to mention that while the structure of some EU programmes remains the same compared to 2014-2020, many have been altered. This includes changes in eligibility criteria, co-financing or minimum capital investment levels, as well as changes in the scope and focus of some programmes. See a summary below:

Table 3: Changes in EU-level funding opportunities

Funding scheme	Period 2014-2020 (highlighted in D4.5 and/or D4.6)	Period 2021-2027 (Current status of the funding opportunity)
European Regional Development Fund (ERDF)	- provides several housing opportunities. This is notably the case for activities related to promoting energy efficiency and use of renewables.	- Unchanged, but with a **broader scope**
European Social Fund (ESF)	- provide education and training to those struggling with employment or social inclusion - This could come in the form of providing employment and training within circular development and renovation projects, including in follower buildings	- **Restructured**, became ESF+ (comprising the old ESF, EaSI and Fead programme)
Cohesion Fund (CF)	- Available to countries whose Gross National Income (GNI) per inhabitant is less than 90% of the EU average. - For the 2014-2020 cycle, this excludes both Spain and Austria, both of which are	- **Unchanged**

[6] https://www.housingeurope.eu/resource-1683/tackling-energy-poverty-to-boost-building-renovation

	relatively high GNI per capita countries	
Urban Innovative Actions (UIA)	- Provides urban areas throughout Europe with resources to test new and unproven solutions to address urban challenges. - In terms of housing, an added value is that housing associations can work with cities as partners and the nature of financing is small-scale (max €5 million) with a maximum co-financing rate of 80%. Thus, it would be particularly well suited to future renovation projects.	- **Restructured,** and became European Urban Initiative (EUI) that has a broader scope (supporting capacity building, innovative actions, knowledge, policy development and communication)
Horizon 2020	- Funds a broad range of research and innovation activities in participating countries	- **Restructured**, became Horizon Europe - calls for affordable housing will be found in the 'Climate, Energy and Mobility' Cluster[7], along with energy efficiency research and innovation activities - energy efficiency market-uptake activities will move to the new LIFE programme[8]
LIFE Programme	- Focusing on the environment and climate action (especially nature conservation and biodiversity)	- **Restructured** (going to support some energy efficiency market-uptake activities)
Innovation Fund	- Fund on innovative technologies focusing on the decarbonisation of energy-intensive industries (for example construction material, hydrogen) and the energy sector, through innovative production and use of renewable energy or storage solutions. The Fund has a budget of €1.5 billion	- **Unchanged**
European Energy Efficiency Fund	- Supports energy efficiency and renewable energy-related operations up to €5 million. - Eligible organisations include only local, regional and (if justified) national public authorities or public or private entities acting on their behalf - The nature of financing is debt or equity which can be combined with other Funds such as the European Structural and Investment Funds (ESIF)	- **Unchanged**
European Investment Bank (EIB) loan	- EIB can fund social and public housing projects (no funding available for 'for-profit' housing) - Funding available for energy efficiency and circularity projects (*both public and*	- The EIB remains an option for the funding or upscaling of energy-efficient or circular renovation solutions

[7] See: https://ec.europa.eu/info/research-and-innovation/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/cluster-5-climate-energy-and-mobility_en

[8] See: https://ec.europa.eu/growth/industry/strategy/hydrogen/funding-guide/eu-programmes-funds/life-programme_en

	private entities) - EIB typically provides funding at 50% of the total capital requirement - EIB does not fund 'small-scale' projects – *for example, when funding public projects it usually only allows projects of €25 million or more* - 'Joint Initiative on Circular Economy' providing co-financing of circular projects of €10 billion (*only available in Poland, France, Italy, Spain, and Germany*)	- Scope and ambition of funding **unchanged**
European Fund for Strategic Investment (EFSI)	- EFSI can finance projects of more than €25 million or smaller ones through a suitable intermediary. - Co-financing should represent 50%, but blending of funds is possible: - EFSI can support parts of projects which are not eligible under Structural Funds, but which are part of a larger investment.	- **Restructured**, and became InvestEU – a single EU investment support mechanism for internal action, replacing all existing financial instruments (including EFSI). - From 2022, a **dedicated vehicle that targets circular economy** will be established under the programme
European Local Energy Assistance (ELENA)	- Programme of the EIB and European Commission providing grant support for technical assistance during the preparation (*not implementation*) of investment programmes, including the business model and the design of the financing scheme - It focuses on energy efficiency measures (renovation/renewables/district heating and PV). - The grant covers up to 90% of costs related to project development support and should be linked to a planned investment programme of a minimum €20 million in size	- The **minimum size of the linked investment increased** from €20 million to €30 million, meaning fewer projects will now qualify for assistance
InnovFin	- a joint initiative launched by the European Investment Bank Group in cooperation with the European Commission under Horizon 2020 - InnovFin is available across all eligible sectors under Horizon 2020-including energy-efficient construction and refurbishment and the use of renewable energy. - loan guarantees or equity-type financing goes typically between €7.5 million and €75 million to innovative demonstration projects in the fields of energy system transformation, including, but not limited to, renewable energy technologies, smart energy systems, energy storage, carbon capture and storage or carbon capture and use, helping them to bridge the gap from demonstration to commercialisation.	- A **thematic window for innovative Circular Economy projects was created in 2021** as a pilot under the Thematic Instrument for EDP (Energy Demo Projects)

Council of Europe Development Bank (CEB) loan	- Financing for social and public housing schemes available - Eligible activities involve the renovation, construction or refurbishment of housing and the conversion of existing buildings to residential use to provide decent and affordable housing for people on low incomes - Combination is possible with other Funds (and EIB support) - Not all EU Member States are members of the CEB (e.g., Spain is a member, but Austria is not)	- The CEB remains an option for the funding or upscaling of energy-efficient and circular renovation solutions - Scope and ambition of funding **unchanged**

Several EU-level funding instruments provide financial support for activities aligned with the goals of the dropped project. However, to be accessible to homeowners, these funds usually need to be converted into national programs and policies. In the next sections, available funding instruments at the European Level are described as well as the national context of the demo case in drOp project (Spain).

- **Building renovation-aligned funding opportunities under the MFF**

In the period 2021-2027, the Multiannual Financial Framework (MFF) represents a total funding envelope of €1,074.3 billion. This includes a strong focus on activities related to regional development and cohesion, as well as environmental issues and mitigating climate change.

Table 4: Allocation of Funds under the MFF 2021-2027

Funding Priority	Funding allocation
Single Market, Innovation and Digital policies	€132.8bn
Cohesion, Resilience and Values	€377.8bn
Natural Resources and Environment	€356.4
Migration and Boarder Management	€22.7bn
Security and Defence	€13.2bn
Neighbourhood and the World	€98.4bn
European Public Administration	€73.1bn
Total MFF	**€1,074.3bn**

Source: European Commission

Structural Funds (ESIF)

Structural Funds (ESIF) have been increased for the period of the new MFF, with a total of €378 billion to be spent. Although, the priorities for the funds are 'narrower' now than in the previous MFF period.

The "priorities" for Structural Funds have also been modified under the new MFF. These are summarised under five points[9]:

1. a more **competitive** and **smarter** Europe

[9] https://ec.europa.eu/regional_policy/en/policy/how/priorities

2. a **greener**, low-carbon transitioning towards a net zero carbon economy
3. a more **connected** Europe by enhancing mobility
4. a more **social** and inclusive Europe
5. Europe closer to **citizens** by fostering the sustainable and integrated development of all types of territories

Priority 2 is clearly the one most closely associated to building renovation-type solutions. Activities that fall under this Priority include:

- promoting **energy efficiency measures**;
- promoting **renewable energy**;
- developing smart energy systems, grids and storage at local level;
- promoting climate change adaptation, risk prevention and disaster resilience;
- promoting sustainable water management;
- promoting the **transition to a circular economy**;
- enhancing biodiversity, green infrastructure in the urban environment, and reducing pollution;

It is important to comprehend that 'Structural Funds' is the 'umbrella' term used by the EU in order to describe five interlinked funding schemes. These are outlined in the table below. The funding allocation is only what is covered under the MFF. As will be shown in the dedicated section, the Next Generation EU recovery package also includes top-up funding for some of the Structural Funds schemes.

Table 5: Structural Funds programmes - 2021-2027

Funding scheme	Link to the five 'priorities'	Available funding
European Regional Development Fund	- Supports all five (but special focus on 1 and 2)	€226.1bn
European Social Fund+	- Focused on priority 4	€99.3bn
Cohesion Fund	- Priorities 2 and 3	€36.6bn
Just Transition Fund	- provides support under dedicated specific objectives (art. 8 of JTF regulation)	€8.5bn
European Territorial Cooperation - Interreg	- have 2 additional policy objectives at their disposal (art. 14, Interreg regulation) : 'A better cooperation governance' and 'A safer and more secure Europe'	€9.0bn

Any EU region can apply for Structural Funds. However, the allocation conditions vary between regions, based on their level of economic prosperity. This is measured via 'Gross Domestic Product (GDP) per capita'. The most 'developed' regions can avail of co-financing rates of 40% to 50%, while 'less developed' regions can avail of rates as high as 85%. Thus, in the latter case, for every one euro spent, 85 cent will be provided directly from Structural Funds, versus 15 cent from the national or regional partner.

Table 6: Structural Funds Co-financing Rates

Region Type	Definition	Co-financing rate applied
More Developed Regions	GDP per capita > 100% of EU-27 average	40% to 50%

Transition Regions	GDP per capita between 75% and 100% EU-27 average	60% to 70%
Less Developed Regions	GDP per capita < 75% EU-27 average	85%

- European Regional Development Fund (ERDF)[10]

The ERDF finances programmes in cooperation between the European Commission and national and regional authorities in Member States. The Member States' administrations choose which projects to finance. They also take responsibility for day-to-day administration linked to these projects. Thus, there is a role for local circular stakeholders in advocating for ERDF funding for their projects. Of course, **in order for this to happen, these local innovators must first be aware that such financing is available**.

The new ERDF puts a strong focus on projects related to "greener, low-carbon transitioning towards a net zero carbon economy and resilient Europe"; Priority 2. This must make up **a minimum of 30% of all ERDF funding allocated to a region**. This could be useful for developing and funding circular projects, provided national or regional authorities are convinced by the value of such initiatives.

- European Social Fund Plus

The European Social Fund Plus (ESF+) is the EU's main instrument for investing in people. This includes programmes related to employment, social, education and skills policies; including structural reforms in these areas. ESF+ has the potential to fund **jobs training programmes related to developing and implementing energy efficient or circular solutions**. For example, it could help to retrain or upskill workers in the construction sector to improve their knowledge of innovative circular building and renovation practices.

- Cohesion Fund[11]

The Cohesion Fund provides support to Member States with a Gross National Income (GNI) per capita below 90% of the EU-27 average. Its ambition is to strengthen the economic, social and territorial cohesion of the EU. Thus, not all member states are eligible for the Cohesion Fund. For the 2021-2027 period, the Fund concerns 15 of the EU's 27 Member States.

[10] https://ec.europa.eu/regional_policy/en/funding/erdf/#2
[11] https://ec.europa.eu/regional_policy/en/funding/cohesion-fund/

Encouragingly, **37% of the overall financial allocation of the Cohesion Fund need to contribute to climate objectives**. Indeed, the Fund aligns itself to Priority 2 – 'a greener, low-carbon and circular economy'. Although, the Cohesion Fund is not allowed to support investment in housing unless it is related to the promotion of energy efficiency or renewable energy use.

- Just Transition Fund (JTF)[12]

The JTF is a new funding mechanism introduced under the MFF. The JTF supports the territories most affected by the transition towards climate neutrality, in order to avoid regional inequalities growing, in line with EU cohesion policy's aim to reduce regional disparities and to address structural changes in the EU. In other words, it seeks to compensate regions who face the greatest 'burden' in shifting towards climate neutrality, such as regions with a low-quality housing stock or where the local economy is based on the exploitation of fossil fuels and other finite resources.

The JTF can finance projects related to a number of areas potentially linked to circularity. This includes reskilling of workers, investments in clean energy and research and innovation projects.

- European Territorial Cooperation - Interreg

Interreg is the European Union's instrument to support cooperation across regions and countries: a new generation of Interreg programmes in and outside the EU will further develop joint services and strengthen solidarity. Interreg provides funding for projects between Member States, their outermost regions, the EU accession countries and neighbourhood countries.

Interreg projects must align with the five priorities of the Structural Funds, as discussed earlier in this section. **One of the specific aims of Interreg under the new MFF is to work to promote circularity; specifically the re-use of materials**. However, Interreg has so far not funded projects related to circularity in building design or renovation. This, of course, may change during the current funding cycle. Thus, potential follower buildings would be encouraged to follow the project funding announcements[13] of their local Interreg bureau.

Review of Structural Funds

Having looked at the five sub-components of EU Structural Funds, some analysis and review is required to assess their potential use to renovation-type projects.

Table 7: Potential Circular Allocations from Structural Funds

Funding Programme	Potential Circular Allocations	Linked to building renovation
European Regional Development Fund	- Minimum 30% allocation to Priority 2 - Offers potentially broad use for building renovation	All
European Social Fund+	- fund jobs training programmes related to developing and implementing energy efficient and circular solutions	All (via labour inputs in circular design and use)

[12] https://www.europarl.europa.eu/factsheets/en/sheet/214/just-transition-fund

[13] Calls for projects can be found via the Interreg online portal: https://interreg.eu/call-for-project/

Cohesion Fund	- promotion of energy efficiency or renewable energy use	S10, S11
Just Transition Fund	- reskilling of workers, investments in clean energy, and research and innovation projects	All (but especially S11)
European Territorial Cooperation - Interreg	- Will prioritise circularity, though not yet related to development and renovation of buildings	TBD

While Structural Funds have the potential to fund a broad spectrum of building renovations, they would appear to be suited to some solutions more than others. Solutions related to renewable energy generation and energy efficiency within buildings seems to be particularly interesting.

It is also important that we develop a critical perspective on the potential use of structural funds. To that end, the SWOT analysis is a useful tool to those thinking of using this funding channel.

Table 8: SWOT Analysis of Structural Funds

Strengths	Weaknesses	Opportunities	Threats
✓ Both energy efficiency and RES-related investments are supported ✓ Offers significant grants and financial instruments (FI) are available ✓ Combination with other programmes is encouraged	- Time-consuming processes of application - Some operations are partly covered for specific Beneficiaries - Co-financing is often necessary	✓ Enhances social inclusion (European Social Pillar) ✓ Numerous financial instruments for more people ✓ to benefit from ✓ Address energy and fuel poverty	- Beneficiaries discouraged by partly covered operations - Co-financing not always available

- **<u>European Urban Initiative (EUI)</u>**

The European Urban Initiative will be financed by €500 million from ERDF. It replaces a number of now discontinued programmes, such as the Urban Innovative Actions (UIA) and URBACT.

The EUI aims to strengthen integrated and participatory approaches to sustainable urban development. It will do so by facilitating and supporting innovative actions, capacity and knowledge building, policy development and communication on sustainable urban development.

In terms of the budget division, the support for capacity-building will represent 20% of the budget, the support for innovative actions will be 60% (which is based on the former UIA programme), and knowledge support will represent another 20% of the budget.

In terms of eligibility, building owners (including providers of social housing) are not directly eligible, but they can work with cities as partners in the different projects.

The third call for projects -with a 90 million eur budget-and funding under the EUI is open until 13 October 2024.[14]

Table 9: SWOT Analysis of the EUI

Strengths	Weaknesses	Opportunities	Threats
✓ Supports small-scale projects ✓ Offers significant grants ✓ Does not require co-financing ✓ Able to co-finance projects already supported by ESIF/Horizon Europe	- Requires an experienced, technical project team - Housing providers cannot lead the project	✓ Supports complex projects that support the district approach (includes innovative projects focusing on energy efficiency, renewables, adaptation, circularity, social accompanying) ✓ May serve as seed capital for InvestEU to provide additional investments ✓ Can fund piloting new technologies ✓ Capacity building is strongly supported	- Co-financing may become necessary - Very competitive funding allocation process

- **Horizon Europe**

Horizon Europe is the EU's key funding programme for research and innovation (the continuation of the Horizon 2020 programme) in 2021-2027, with a budget from the MFF of €95.5 billion.

The Horizon Europe programme introduces new simplified rules that can benefit faster and more efficient project implementation such as:

- Up to 100% funding rate of direct costs
- Increased use of simplified forms of funding where appropriate (building on the H2020 lump sum pilot experience)

[14] Call link: https://www.urban-initiative.eu/calls-proposals/third-call-proposals-innovative-actions

- Broader acceptance of usual cost accounting practices
- Enhanced cross-reliance on audits benefiting beneficiaries taking part in several EU programmes

Unlike in many other funding streams under the MFF, Horizon Europe projects must fit within the parameters for projects defined by the European Commission under each 'call'. Thus, relevant funding will not always be available at every moment in time.

Relevant calls

- Calls for proposals for affordable housing providers will be found in the **'Climate, energy and mobility' cluster** under Pillar II.
- Energy efficiency market-uptake activities will move to the new **LIFE programme**. A dedicated LIFE sub-programme 'Clean Energy Transition' will aim at continuing to break market barriers and at facilitating the transition towards an energy-efficient, renewable energy-based, climate-neutral and resilient economy by funding coordination and support actions across Europe.
- The energy efficiency research and innovation activities move to Horizon Europe's Cluster 5 '**Climate, Energy and Mobility**' in the Pillar 2 *Global Challenges and European Industrial Competitiveness*, where the Built4People partnership is supported between industry and the European Commission and continue with innovating energy efficiency products and methods. Built4People brings together the whole construction value chain and aims at developing sector-relevant innovation clusters across the EU, which could extend to circularity clusters.

Therefore, sustainable energy projects will not only get support from the new Horizon Europe, but also from LIFE Clean Energy Transition, Innovation Fund, Connecting Europe Facility Energy and from the Renewable Energy Financing Mechanism.

Another new element in Horizon Europe is the European Innovation Council[15], which will give support for innovations with potential breakthrough and "disruptive" nature with scale-up potential that may be too risky for private investors. The European Innovation Council will work as a one-stop-shop:

- helping researchers and innovators create markets of the future, leverage private finance, scale up their companies
- Innovation centric, risk taking & agile, pro-active management and follow up
- Mostly 'bottom up', but also targeting strategic challenges
- EIC Programme Managers to develop visions for breakthroughs and steer portfolios
- New approach to partnerships: Objective-driven and more ambitious partnerships with industry in support of EU policy objectives.

The **relevant Partnerships for renovation-related activities**:

1. **People-centric sustainable built environment (Built4People)**

The vision of the partnerships is high quality, low carbon, energy and resource efficient built environments which drive the transition towards sustainability. The partnership brings together the whole value chain and it will develop sector-relevant innovation clusters across the EU.

[15] https://eic.ec.europa.eu/index_en

The objectives are scientific (generate holistic innovation for sustainability), economic (revitalise the sector via sustainable operation) and societal (induce behavioural change towards sustainable living). The objectives will be reached through a user-centric approach.

2. European Partnership – driving urban transitions to a sustainable future (DUT)

The partnership will engage and enable the whole spectrum of urban stakeholders (local authorities, municipalities, business and citizens) to co-create innovative, systemic and people-centric approaches, tools, methods and services in support of urban transformative transitions.

This will lead to more efficient and decarbonised use of energy, sustainable and people-friendly mobility systems, circular and environmental-friendly use of resources, for the well-being of citizens and preservation of biodiversity.

Table 10: SWOT Analysis of Horizon Europe

Strengths	Weaknesses	Opportunities	Threats
✓ Supports energy-related projects (energy efficiency, renovations, renewables, adaptation, circularity) ✓ Supports small-scale projects ✓ Offers significant grants ✓ Does not require co-financing ✓ Able to co-finance projects already supported by ESIF	- Requires an experienced, technical project team	✓ May serve as seed capital for InvestEU to provide additional investments ✓ Addresses energy and fuel poverty ✓ Can fund piloting new technologies	- Co-financing may become necessary - Very competitive funding allocation process

- **LIFE programme**

As mentioned under Horizon Europe, the LIFE programme is going to support some energy efficiency market-uptake activities. Co-financing up to 40 % might apply depending on the specific call.

Table 11: SWOT Analysis of the LIFE Programme

Strengths	Weaknesses	Opportunities	Threats
✓ Circular district approach ✓ Supports energy-related projects (energy efficiency, renovations, renewables, adaptation, circularity)	- Requires an experienced, technical project team	✓ A new programme that supports energy efficiency related activities ✓ Can fund piloting new technologies	- Highly competitive - Co-financing might be necessary

✓ Supports small-scale projects ✓ Able to co-finance projects already supported by ESIF			

- **Innovation Fund**

The Innovation Fund (IF)[16] is one of the world's largest funding programmes for demonstration of innovative low-carbon technologies. The IF focuses on **highly innovative technologies and large flagship projects** with European value added that can bring significant emission reductions; focusing on the following areas:

- innovative low-carbon technologies and processes in energy-intensive industries, including products substituting carbon-intensive ones
- carbon capture and utilisation (CCU)
- construction and operation of carbon capture and storage (CCS)
- innovative renewable energy generation
- energy storage

Both large- and small-scale projects are supported:

- Large scale projects with a capital expenditure above €7.5 million.
- Small scale projects with total capital costs below €7.5 million.

Projects will be selected based on the effectiveness of greenhouse gas emissions avoidance, degree of innovation, project maturity, scalability and cost efficiency.

The Innovation Fund will support **up to 60% of the additional capital and operational costs of large-scale projects and up to 60% of the capital costs of small-scale projects.** The grants will be **disbursed in a flexible** way based on project financing needs, taking into account the milestones achieved during the project lifetime. **Up to 40% of the grants can be given based on pre-defined milestones** before the whole project is fully up and running.

The Executive Agency for Innovation and Networks is the implementing body of the Fund. The European Investment Bank is responsible for the provision and management of the Project Development Assistance (PDA) support.

Table 12: SWOT Analysis of the Innovation Fund

Strengths	Weaknesses	Opportunities	Threats
✓ Supports energy-related projects (energy efficiency, renovations, renewables, adaptation, circularity)	- Supports highly innovative technologies - Requires an experienced, technical project team	✓ Addresses energy and fuel poverty ✓ Can fund piloting new technologies ✓ Offers 40 % grants based on pre-defined milestones	- 40 % co-financing is necessary - Very competitive funding allocation process - Unstable regulatory/

[16] Innovation Fund page: https://climate.ec.europa.eu/eu-action/eu-funding-climate-action/innovation-fund_en

✓ Supports small and large-scale projects ✓ Eligible organisations can be both public and private entities			market environments - Issues in mobilising capacity

- **Affordable Housing Initiative**

The Affordable Housing Initiative (AHI)[17] is part of the European Commission's renovation wave strategy, which aims to green buildings, create jobs and improve lives. This strategy intends to at least double renovation rates in the EU by breaking down long-standing barriers to energy and resource-efficient renovation as well as improving reuse and recycling. By 2030, the construction sector could see 35 million renovated buildings and up to 160,000 additional green jobs.

The AHI begun in 2022 and runs until 2026 to make sure social and affordable housing can also benefit from the renovation wave. It will guarantee local social housing projects' access to necessary technical and innovation capacity and project support by:

- piloting 100 lighthouse renovation districts with a smart neighbourhood approach focused on liveability and innovation, also providing blueprints for replication
- mobilising cross-sectoral project partnerships and linking them to local actors, such as social economy, SMEs, local authorities, housing associations and civil society
- promoting efficient access and **use of innovative processes such as circular and modular building** as well as social innovation and engagement models to empower residents in the renovation process

4.2.1 Funding opportunities under NGEU

As a result of the COVID pandemic, which has had a profound impact on our economies and societies, the EU agreed to establish an unprecedented unified recovery programme – Next Generation EU (NGEU).

[17] The AHI page: https://single-market-economy.ec.europa.eu/sectors/proximity-and-social-economy/social-economy-eu/affordable-housing-initiative_en

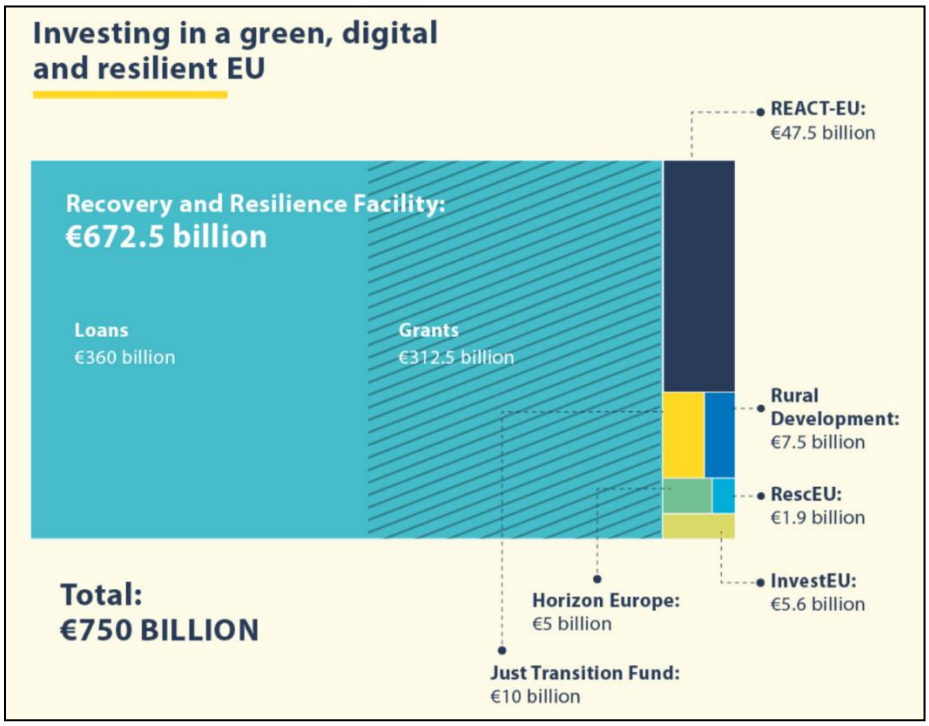

Figure 4: Overview of allocations under the NGEU programme – Source: European Commission

As shown in Figure 4, the €750bn (in 2018 prices; €806.9bn in 2021 prices) funding allocation is divided amongst different packages. This includes 'top-ups' for the Just Transition Fund (€10bn) and Horizon Europe (€5bn). Allocations with be relative to the economic impact of COVID on Member States (based on declines in GDP, and increases in unemployment), as well as the relative size of the Member State.

4.2.1.1 Recovery & Resilience Facility (RRF)18

The main component of NGEU is the *Recovery & Resilience Facility* (RRF). The RRF is aimed at delivering a timely and significant boost to the EU Member States most impacted by the pandemic. The structure of the RRF provides many advantages to Member States. Firstly, it offers up to €312.5 billion in the form of grants. **This is money that the Members States will not have to repay, and it is therefore not included in the calculation of their national debt.**

At the same time, Member States must agree with the European Commission and the European Council how they will spend RRF money before funds are allocated. Spending must meet a number of conditions. Firstly, **at least 30% must be allocated to tackling climate change, which could benefit building renovations, production of renewable energy, and increased circularity**. In addition, RRF funding must address the Country Specific Recommendations (CSR)[19] made each year as part of the European Semester[20] process. In

[18] https://commission.europa.eu/business-economy-euro/economic-recovery/recovery-and-resilience-facility_en

[19] See : https://ec.europa.eu/info/business-economy-euro/economic-and-fiscal-policy-coordination/eu-economic-governance-monitoring-prevention-correction/european-semester/european-semester-timeline/spring-package_en

[20] See : https://ec.europa.eu/info/business-economy-euro/economic-and-fiscal-policy-coordination/eu-economic-governance-monitoring-prevention-correction/european-semester_en

recent years, the CSRs have put a lot of focus on the need for building renovations and the development of more sustainable energy and resource management.

Table 13: SWOT analysis of the RRF

Strengths	Weaknesses	Opportunities	Threats
✓ Offers significant grants and financial instruments	- New funding programme that is not sufficiently stress-tested - Each country will use its own eligibility criteria	✓ Opportunity for small-housing providers that are not eligible for large-scale programmes to ensure finance	- Absorption capacity is likely to be low in the coming years - Impact is not clear on State Aid the Stability and Growth Pact (SGP)

4.2.1.2 REACT-EU 21

After the RRF, the most significant part of the NGEU package is 'Recovery Assistance for Cohesion and the Territories of Europe' (REACT-EU), which provides funding of €47.5 billion (in 2018 prices, €50.6b

n in 2021 prices).

REACT-EU has two main functions. Firstly, to provide additional resources for projects that foster crisis repair capacities in the context of the coronavirus crisis, and secondly investments in operations **contributing to preparing a green, digital and resilient recovery of the economy**.

The allocation methodology for this funding takes full account of the economic and social impact of the crisis on the EU countries, reflecting the GDP drop and rise of unemployment, as well as the relative wealth of the countries.

The funds were distributed in 2021 and 2022 via funds established under the previous MFF – primarily the ERDF and ESF.

From the ERDF, the additional resources shall primarily be used to support investment in products and services for health services and to provide support in the form of working capital or investment support to SMEs.

In order to create the right conditions for recovery, it should also be possible to support investments contributing to **the transition towards a digital and green economy** as well as in infrastructure providing basic services to citizens, or economic measures in the regions that are most dependent on sectors most affected by the crisis (e.g. tourism, culture, hospitality services, etc.).

From the ESF, the additional resources shall primarily be used to support job maintenance, including through short-time work schemes and support to self-employed. The additional resources shall also support job creation, in particular for people in vulnerable situations, youth employment measures, skills development, **in particular to support the twin green and digital transitions**, and enhanced access to social services of general interest, including for children. Thus, as with the old ESF programme, and the new ESF+, the main interest from a

[21] https://ec.europa.eu/regional_policy/en/newsroom/coronavirus-response/react-eu

renovation point of view is with regard to **training people to carry out renovations**.

Table 14: SWOT analysis of the React-EU

Strengths	Weaknesses	Opportunities	Threats
✓ The allocation methodology takes account of the economic and social impact of the crisis	- New funding programme that is not sufficiently stress-tested - Time-consuming processes of application - Some operations are partly covered for specific Beneficiaries - Co-financing is often necessary	✓ Offers additional resources to the green transition ✓ Opportunity for small-housing providers that are not eligible for large-scale programmes to ensure finance	- The resources could be allocated by the central level to the health sector - Impact is not clear on State Aid the Stability and Growth Pact (SGP)

4.2.1.3 InvestEU

The programme[22] will act as a single EU investment support mechanism for internal action, replacing all existing financial instruments (including the former EFSI). Its overall objective is to support the policy objectives of the Union by mobilising public and private investment within the EU that fulfil the criterion of additionality, thereby addressing market failures and sub-optimal investment situations that hamper the achievement of EU goals regarding sustainability, competitiveness and inclusive growth.

The InvestEU Fund is expected to mobilise more than €372 billion of public and private investment through an EU budget guarantee of €26.2 billion that backs the investment of financial partners such as the European Investment Bank (EIB) Group and others.

The eligibility of projects is similar than in the case of EFSI in the previous period. Projects must:

- Address market failures or investment gaps and be economically viable
- Need EU backing in order to get off the ground
- Achieve a multiplier effect and where possible crowd-in private investment
- Help meet EU policy objectives

In terms of combination with other funds, InvestEU can be combined with grants or financial instruments (or both), funded by the centrally managed EU budget or by the Innovation Fund.

Such combinations can create advantages for project promoters. When a project uses EU grants and InvestEU, the InvestEU rules will apply for the entire project. This means a single rulebook and a major simplification.

Table 15: SWOT Analysis of InvestEU

Strengths	Weaknesses	Opportunities	Threats
✓ Supports the quick and cost-effective	- Lends under a less stable	✓ Increase the number of beneficiaries in	- Lack of mobilising capacity in numerous regions

[22] InvestEU programme page: https://investeu.europa.eu/investeu-programme_en

construction of new dwellings and long-term investment schemes. ✓ Supports energy saving investments ✓ Supports the Energy Performance Contracting (EPC) model ✓ Easily combined with other funds	regulatory/market environment - Takes higher risks that generally accepted by banks	the Eastern region ✓ The higher risk accepted, creates an opportunity ✓ for the smaller social-housing organisation to access financing sources	- Lack of dedicated intermediaries in - countries with housing systems in transition, to facilitate access to the funding

4.2.1.4 RePowerEU

In May 2022, the European Commission introduced the REPowerEU package, amounting to €300 billion, as an important modification to the Recovery and Resilience Facility (RRF) regulation[23]. This adjustment allows Member States to integrate a dedicated REPowerEU chapter into their national recovery and resilience plans (RRPs) under the NextGenerationEU framework. This chapter secures funding for investments and reforms aligned with the REPowerEU Action Plan's objectives, which include **fostering EU energy independence, reducing CO2 emissions, and mitigating energy costs for citizens and businesses**. Member States can also access **technical assistance** from the European Commission via the Technical Support Instrument (TSI). Notably, 17 Member States have already benefited from REPowerEU-related support. REPowerEU chapters can draw from diverse funding sources, including the Emissions Trading System (ETS), Brexit Adjustment Reserve (BAR), structural funds, and loans.

Eligible investments are for example those **in energy renovations of public buildings and a scaled-up measure on energy renovation of private housing**. The primary objective is to provide financial assistance for the energy renovations of public and private buildings, resulting in a reduction in energy consumption within the building sector in the short run, as well as a decrease in the reliance on fossil fuels.

Table 16: SWOT Analysis of RePowerEU

Strengths	Weaknesses	Opportunities	Threats
✓ Supports energy renovation of public and private buildings. ✓ Supports energy saving investments ✓ Provides technical assistance	- Each country will choose their planned investments - Part of the new funding programme that is not sufficiently stress-tested	✓ Part of RRF, therefore EC can control the process ✓ Opportunity for energy poor households to mitigate their costs	- Social/Affordable housing providers can be excluded from eligibility - Impact is not clear on State Aid the Stability and Growth Pact (SGP)

[23] Modification of RRF: https://commission.europa.eu/publications/recovery-and-resilience-facility-annual-report-2023_en

✓ Easily combined with other funds			

4.2.2 The Just Transition Mechanism (JTM) and its "Just Transition" scheme

The JTM is a mechanism that is being implemented with the support of the EIB. It includes the Just Transition Fund (JTF), the "Just Transition" scheme under the InvestEU programme, as well as the Public Sector Loan Facility (PSLF).[24] The Just Transition Mechanism is focused on addressing social, employment, economic and environmental impact of the transition in a list of 112 NUTS3 regions from the Member States. However, it is up to the MSs to determine the most affected territories, subject to Commission's approval.

- **The JTF**[25] is equipped with €19.2 billion in current prices. This amount corresponds to fresh money made available to support EU countries in their green transition, out of which €7.5 billion will be financed under the EU's 2021-2027 budget, while the remaining €10.87 billion under NGEU will constitute external assigned revenue stemming from the European Recovery Instrument.
- **The "Just Transition" scheme** is implemented under the InvestEU programme. InvestEU can thus support investments in the framework of the Territorial Just Transition Plan (TJTP) in a wider range of projects, such as projects for energy and transport infrastructure, including gas infrastructure and district heating, but also decarbonisation projects, economic diversification and social infrastructure. The European Commission will provide a budgetary guarantee to implementing partners to provide financing directly or indirectly to project promoters located in just transition territories with an approved TJTP.

In terms of the eligibility under the Just Transition scheme, it should enable investments in a wide range of projects, in line **with the eligibility criteria of the InvestEU Programme**. Projects in territories identified in territorial just transition plans, or projects that benefit the transition of those territories, even if they are not located in the territories themselves, may benefit from the Scheme, but only when funding outside the just transition territories is key to the transition in those territories.[26]

4.2.3 The Social Climate Fund

The SCF is managed directly as per Art. 12 Regulation (EU) 2023/955, involving the transfer of funds to Member States by the Commission. Member States, the beneficiaries of these funds,

[24] Art. 6 Regulation (EU) 2021/523)
[25] https://commission.europa.eu/funding-tenders/find-funding/eu-funding-programmes/just-transition-fund_en
[26] Regulation (EU) 2021/523

must adhere to State aid rules when using them.

The **co-financing represents up to 25%** and a maximum of 15% of the national investments from the Social climate plans (can be combined with Cohesion Policy programmes).

The SCF is part of the EU's Fit for 55 legislative package, specifically **addressing the social impacts of a new emissions trading system for the building** and road transport sectors proposed for 2026-2032. This fund will be **financed by revenues from the ETS Buildings and Transport**, expected to amount to EUR 65 billion from auctions.

In order to be eligible, **Member States are required to submit a 'Social climate plan'** by 30 June 2025, detailing measures and investments to mitigate the impact of the new emissions trading system on vulnerable households. Eligible measures include **building efficiency improvements, renovations, decarbonization of heating and cooling systems, integration of renewable energy, promotion of zero-emission mobility, and temporary direct income support** (up to 37% of a Member State's total fund usage).

For social and affordable housing, relevant measures may include:

- support building renovations
- support access to affordable energy-efficient housing
- contribute to the decarbonisation, such as through electrification, of heating and cooling
- support public and private entities, including social housing providers, in particular public-private cooperatives, in developing and providing affordable energy efficiency solutions and appropriate funding instruments in line with the social goals of the Fund

Financial support from the SCF is conditional upon Member States achieving set milestones and targets. Member States must also **co-finance 25% of the measures**, and up to 15% of national investments can be combined with Cohesion Policy programmes.

Table 15: SWOT Analysis of the Social Climate Fund

Strengths	Weaknesses	Opportunities	Threats
✓ Support building renovations, electrification, of heating and cooling, access to affordable energy-efficient housing ✓ Both public and private entities are eligible ✓ 15% of national investments can be combined with Cohesion Policy programmes	- To be eligible, Member States are required to submit a 'Social climate plan' detailing investments - 25% of co-financing is necessary - It is a new funding programme that is not sufficiently stress-tested	✓ EC directly manages and controls the process ✓ Opportunity for energy poor households to receive support	- Social/Affordable housing providers can be excluded from eligibility if Member state chooses not to invest in the sector - State Aid rules apply

4.2.4 Modernisation Fund

The Modernisation Fund (MF)[27] aims at **supporting investments proposed by the beneficiary Member States, including the financing of small-scale investment projects**, to modernise energy systems and **improve energy efficiency** for the period from 2021 to 2030.

It is funded from revenues from the auctioning of 2% of the total allowances for 2021-30 under the EU Emissions Trading System (EU ETS) and additional allowances transferred by beneficiary MSs.

10 Member States can benefit from this fund: Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania and Slovakia.

The MF provides **direct funds to invest in projects that meet specific criteria**. Investments are **submitted by the beneficiary EU countries**, who are responsible for the implementation of the Fund. This means that the fund leaves the beneficiary Member States the freedom to decide on the form of support: they can use **grants, premium, guarantee instruments, loans or capital injections**.

At least 70% of the funds must be invested in "**priority areas**" such as:

- generation and use of electricity from renewable sources;
- improvement of **energy efficiency** (including in transport**, buildings**, agriculture, waste, and except in energy efficiency related to energy generation using solid fossil fuels);
- energy storage;
- modernisation of **energy networks** (including district heating pipelines, grids for electricity transmission, increase of interconnections among Member States); and
- support to a just transition in carbon-dependent regions in the beneficiary Member States (including support to the redeployment, re-skilling and up-skilling of workers, education, job seeking initiatives and start-ups, in dialogue with social partners).

Investments that meet the requirements for the MF but do not fall within the designated priority areas are categorized as "non-priority investments". For such investments, the MF can provide **financial coverage for up to 70% of the associated costs**, **on the condition that the remaining costs are covered by private funding sources.**

Table 17: SWOT Analysis of the Modernisation Fund

Strengths	Weaknesses	Opportunities	Threats
✓ Support generation and use of electricity from renewable sources; improvement of energy efficiency; energy storage; modernisation of energy networks	- Only 10 countries can benefit - Member States decide the form of support: grants, premium,	✓ Support also small-scale investments ✓ Covers up to 70% of the associated costs, on the condition that	- Member States manage the funds and decides on projects - State Aid rules apply

[27] How it works - Modernisation Fund

✓ At least 70% of the funds must be invested in priority areas ✓ Both public and private entities are eligible	guarantee instruments, loans. - It is a new funding programme that is not sufficiently stress-tested	remaining costs are covered by private funding.	

4.2.5 Other high-level funding schemes of interest

Outside of the MFF and activities directly linked to NGEU, there are numerous other funding opportunities that have the potential to be accessed across a number of member states in the EU. Many of these schemes are wholly or partly administered by the European Investment Bank (EIB) and its national and regional counterparts.

EIB loan

The EIB contributes to the provision of social and affordable housing (since it is key to integrated urban development), inclusive growth, and social and economic cohesion.

EIB support is eligible for a wide range of operations, including energy efficiency or circularity, however it does not support ordinary maintenance of homes. The scale of project support can vary. However, above €25 million, the negotiations should be carried out with the EIB directly, otherwise it will be handled by designated national financial intermediaries.[28]

The EIB is seeking to position itself as the 'Green Bank' in the EU, in order to back the European Commission's commitment to the EU Green Deal. As part of this, it will aim for at least 50% of its investments to be 'Green' by 2025. Thus, in the field of social housing, EIB funded projects will need to be of the highest standards when it comes to environmental sustainability.

Table 18: SWOT Analysis of EIB loans

Strengths	Weaknesses	Opportunities	Threats
✓ Supports affordable social-housing ✓ Supports a wide range of affordable housing-providers ✓ Eligible organisations can be both public and private entities ✓ Provides significant financial ✓ support (€25 million)	- Difficulties in providing the continuously increasing funds demanded by EIB (projects should be min €25 million)	✓ Reinforce the EIB's position in the EU market environment, through providing greater funding in the Western EU countries. ✓ New countries in Eastern Europe	- Unstable regulatory/ market environment threatens the investments expected of EIB - The nature of finance includes loans - Not enough mobilising capacity

[28] A list of EIB intermediaries can be found on their website: https://www.eib.org/intermediarieslist/search/index

✓ Combination with other funds is optional			

ELENA

ELENA[29] is the PDA programme of the EIB and European Commission, which provides grant support for the preparation (not implementation) of investment programmes and which is focused on energy efficiency measures (renovation/renewables/district heating and PV). **The grant covers up to 90% of costs related to project development** and should be **linked to a planned investment programme of a min €30 million in size** (with a minimum of 3-year implementation period) for energy efficiency (residential projects included).

Eligible entities are not only public (local, regional, national authorities) but also entities from the private sector.[30]

ELENA encourages and supports the aggregation of different projects to increase the attractiveness for contractors and financers. The minimum ratio/leverage factor between the total investment amount and the amount of the ELENA grant is as follows:

- For "Sustainable Energy" envelope Investment Programmes, the total investment amount must be at least 20 times the amount of the ELENA grant.
- For "Sustainable Residential" envelope Investment Programmes, the total investment amount must be at least 10 times the amount of the ELENA grant.

Eligible costs include both internal and external costs. In terms of payment, **40% of pre-financing is possible at the beginning of the project.**

A relevant example from Belgium illustrates the potential of ELENA in project development. The **ASTER project[31]** has been implemented by VVH, the Flemish social housing agency, which created a special purpose company to manage and finance investment programmes tackling energy poverty. Social tenants will be enabled to reduce energy use and to access the benefits renewable energy.

In practice, the project is the **retrofit of existing social housing with solar panels**. Tenants will benefit from a minimum 20% net saving on their energy bill. Investments are repaid as a proportion of the gross saving which the tenant receives. This is the so-called 'split-incentive' model.[32] ELENA was essential to ASTER, financing a part of the research and preparatory work needed to get the project off the ground.

Table 19: SWOT Analysis of ELENA funding

Strengths	Weaknesses	Opportunities	Threats
✓ Provides grants to help local and regional authorities	- At least 10% of the co-financing should be	✓ Expected to provide the necessary tools for facilitating the	- Obligation to link the project to a min €20 million investment

[29] ELENA programme page: https://www.eib.org/en/products/advising/elena/index.htm
[30] Contact details of the Support: elena@eib.org
[31] See: https://aster.vlaanderen/nl
[32] More on ASTER: https://www.housingeurope.eu/blog-1279/improving-access-to-renewable-energy-for-social-tenants-with-eib-elena

launch large-scale sustainable energy investment ✓ The support scale may cover up to 90% of the technical support costs needed ✓ Allows up to 40% pre-financing	ensured by the beneficiary	implementation of energy-related interventions (e.g. buildings' inspections and energy audits)	- Lack of dedicated financial intermediaries in different countries - Lack of mobilising capacity

European Energy Efficiency Fund

The EEEF[33], which is managed by the EIB, supports energy efficiency and renewable energy related operations up to €5 million. **Eligible organisations include only local, regional and (if justified) national public authorities or public or private entities acting on their behalf**. The nature of financing is debt or equity which can be combined with other funds, such as the European Structural and Investment Funds (ESIF).

InnovFin

InnovFin[34] is a joint initiative launched by the European Investment Bank in cooperation with the European Commission under Horizon 2020. InnovFin consists of a series of **financing tools and advisory services**, covering the entire value chain of R&I to support investments from the smallest to the largest enterprise. InnovFin is available across a wide range of sectors, including **energy efficient construction and refurbishment, and use of renewable energy.**

InnovFin provides debt and equity financing as well as advisory services, though co-financing is an obligation. The loans, guarantees or equity-type financing range from typically between €7.5 million and €75 million to innovative demonstration projects in the fields of energy system transformation, including, but not limited to, renewable energy technologies, smart energy systems, energy storage, carbon capture and storage or carbon capture and use. This helps them to bridge the gap between demonstration and commercialisation.

The technologies demonstrated in the project should be innovative in relation to others in the market. Innovation may relate to a specific technology, processes, products or services. The innovative aspect may consist of the innovative combination or innovative application of existing technologies.

As of 2021, EIB can approve new operations only under InnovFin Thematic Financing, targeting key policy sectors facing particularly significant financing gaps.[35] **A thematic window for innovative Circular Economy projects was recently created as a pilot under the**

[33] EEEF programme page: https://www.eeef.lu/home.html
[34] https://www.eib.org/en/products/mandates-partnerships/innovfin/index.htm
[35] Please see details in InnovFin EU Finance for innovators (eib.org)

Thematic Instrument for EDP (Energy Demo Projects)[36].

The first operation financed under this circular pilot thematic window was in Sweden,[37] though others are now following.

In addition to Thematic Financing, InnovFin Advisory[38] is providing guidance to promoters on how to structure their R&I projects in order to improve their access to finance.

Table 20: SWOT Analysis of InnovFin

Strengths	Weaknesses	Opportunities	Threats
✓ Provides not only loans but also advisory services ✓ Covers the entire value chain of R&I	- At least 50% of the co-financing should be ensured by the beneficiary - Supports larger - scale projects (min €7.5 million)	✓ Supports highly innovative technologies ✓ Including but not limited to renewable energy technologies, smart energy systems, energy storage, carbon capture and storage/use	- Lack of dedicated financial intermediaries in different countries - Lack of mobilising capacity

4.2.6 Funding opportunities at national level

As far as the demo case of Santa Ana is concerned, several types of financial instruments are available to support renovations' projects. These instruments are managed at both the national and regional levels, offering up to 100% funding for economically vulnerable households. However, technical and administrative challenges can sometimes discourage households from moving forward with renovations, despite the potential for high funding.

There exists also a lower depth programme of aid for actions to improve the energy efficiency of dwellings, which – in addition to the measures targeted at reducing consumption of non-renewable energy sources by 30% – also includes a reduction of energy demand for heating or cooling by at least 7% or the replacement of windows. Under this program, the maximum funding quota is 40%, with a cap of €4,000. Renovations must be completed by June 30, 2026, and the efficiency gains achieved must be documented with an energy efficiency certificate reflecting the improvements made. The program aims to reduce non-renewable energy consumption by 30% and includes measures such as lowering energy demand for heating or cooling by at least 7% or replacing windows. However, there is an inconvenience. Although the deadline of the programme has been extended to the 31st of July 2024, it is difficult to utilize it within the drOp project since at regional leve, the Basque Country already met its objectives and therefore does not allow the acceptance of more application. The regional area should wait till the reorganization of remaining funds.

The applicable current financial aid measures in the Basque Country are those provided by the

[36] Please see InnovFin Energy Demo Projects (eib.org).
[37] Sweden: EU backs Renewcell to boost circularity in the fashion industry (eib.org)
[38] See: https://www.eib.org/en/products/advising/innovfin-advisory/index.htm

Basque Government for energy efficiency and accessibility improvement of the building stock which can be found under the *ORDER of July 21, 2021, from the Minister of Territorial Planning, Housing, and Transport, on financial measures for protectable actions in the field of rehabilitation in housing and buildings, accessibility, and energy efficiency* (https://www.etxebide.euskadi.eus/ayudas-rehabilitacion/)

Within private works (Line 1) in the private elements of the building, energy efficiency improvement works (Type 2) finance heating, cooling, ventilation, domestic hot water, lighting, self-consumption of electrical energy, thermal-acoustic envelope, indoor air quality; thermal-acoustic insulation; replacement of exterior carpentry; window and boiler replacements.

Within community works (Line 2) in the common elements of the building, energy efficiency improvement works (Type 2) finance new execution or renovation of heating, cooling, ventilation, domestic hot water, lighting, self-consumption of electrical energy, thermal envelope, indoor air quality; thermal insulation, replacement of exterior carpentry, enclosure of terraces and balconies throughout the building.

Interventions in Line 3 (comprehensive and efficient community rehabilitation works) must address, at a minimum, and in a global and simultaneous manner, actions to improve energy efficiency, accessibility, and fire safety. Energy efficiency improvements include: passive actions on the envelope as long as they reduce the annual heating energy demand by at least 50%; active actions that reduce non-renewable primary energy consumption by at least 20% (e.g., high-efficiency thermal installations, installation of solar collectors, mechanical ventilation with heat recovery, …); energy monitoring; and implementation of advanced energy management systems linked to the monitoring system as long as at least 80% of homes are monitored.

The following table summarizes the type of renovation works supported by this order of grants

<table>
<tr><th colspan="2">Líne</th><th>Type</th><th>Concept</th></tr>
<tr><td rowspan="4">PRIVATE WORKS</td><td rowspan="4">Line 1: financial measures for interventions in single-family homes or in private elements of buildings under horizontal property regime</td><td>Type 1</td><td>Conservation and habitability works</td></tr>
<tr><td>Type 2</td><td>Energy efficiency improvement works (installations, envelope)</td></tr>
<tr><td>Type 3</td><td>Accessibility improvement works</td></tr>
<tr><td>Type 4</td><td>Works to adapt the general finish of the building to the principles of good construction</td></tr>
<tr><td rowspan="6">COMMUNITY WORKS</td><td rowspan="3">Line 2: financial measures for community works: in common elements</td><td>Type 1</td><td>Conservation, safety, and habitability works</td></tr>
<tr><td>Type 2</td><td>Energy efficiency improvement works (installations, envelope)</td></tr>
<tr><td>Type 3</td><td>Accessibility improvement works</td></tr>
<tr><td rowspan="5">Line 3: financial measures for comprehensive and efficient community renovation works</td><td colspan="2">Energy efficiency improvement
50% reduction in energy demand
20% reduction in non-renewable primary energy
80% monitored homes</td></tr>
<tr><td colspan="2">Accessibility improvement</td></tr>
<tr><td colspan="2">Fire safety improvement</td></tr>
<tr><td colspan="2">Exterior habitability improvement (optional)</td></tr>
</table>

Energy efficiency objectives are established as requirements to access these grants. For all lines, if marked energy efficiency objectives are not met, the grants are proportionally adjusted downwards based on the actual savings obtained, and in any case, the minimums required by regulations regarding energy efficiency improvement must always be met.
The Basque Energy Board, EVE, provides support for renewable energy installations and energy efficiency improvements in the private housing sector through different programs such as self-consumptions renewable energy installations in the residential sector through annual grants subsidies up to 20%-50% of the eligible costs depending on the project type and renovation of old power plans.

More Information available at https://www.eve.eus/Programa-de-ayudas?lang=es-es
The municipality of Ermua as many other municipalities within the Basque Country offer local subsidies to complement national and regional programs which include thermal insulation, window replacement, renewable energy installations, efficient heating systems and other housing adaptations actions (https://abiapuntu.ermua.eus/abiapuntu/Tablon_ver_doc.aspx?id=4790&fichero=9250) (https://www.ermua.eus/sites/default/files/repositorio-archivos/ordenanza_ayudas_economicas_fachadas_definitivo2_02_07_2012_10_12_44%5B1%5D.pdf)

Social services of the Provincial Government of Bizkaia (Diputacion Foral de Bizkaia, DFB) offer subsidies to remove architectural barriers in residential buildings where people with disabilities or with serious mobility problems live.
The municipality of Ermua as many other municipalities within the Basque Country offer local subsidies to complement national and regional programs which include thermal insulation, window replacement, renewable energy installations, efficient heating systems and other housing adaptations actions (https://abiapuntu.ermua.eus/abiapuntu/Tablon_ver_doc.aspx?id=4790&fichero=9250) (https://www.ermua.eus/sites/default/files/repositorio-archivos/ordenanza_ayudas_economicas_fachadas_definitivo2_02_07_2012_10_12_44%5B1%5D.pdf)

Social services of the Provincial Government of Bizkaia (Diputacion Foral de Bizkaia, DFB) also offer subsidies, to complement the Basque Government's, to remove architectural barriers in residential buildings where people with disabilities or with serious mobility problems live.

5. Best Practices and Innovations

Best practices, innovative approaches, and emerging trends in district renovation have been explored and described in this chapter. The main objective is to highlight successful case studies and examples from around the world to inspire and inform any municipal authority interested in district renovation.

Several organizations and institutions have developed capacity-building sets or frameworks specifically tailored to district or urban renovation. These sets often include a combination of training programs, tools, and resources designed to enhance the skills and knowledge of stakeholders involved in urban development. Some examples have been selected as inspirational for the drOp context and its main characteristics concerning focus, components and applicability are described as follows:

Renovation of the Fasa Residential District in Valladolid, Spain.

This project was mainly focused on empowering citizens to enhance active participation, particularly in the design phase, to enhance urban resilience. It is ensured through a strong engagement strategy. The key was to build trust using straightforward and clear messages and to better include them in the decision-making process. While it's primarily focused on resilience, the principles and methodologies can be applied to broader district renovation efforts, particularly in integrating resilience into urban planning and development.

UN-Habitat's City Resilience Profiling Tool (CRPT)

This tool focuses on building the capacity of city authorities to enhance urban resilience, which is crucial for sustainable district renovation. The CRPT provides a comprehensive framework that includes methodologies for data collection, analysis, and action planning. It also offers training workshops, technical support, and online resources.

World Bank's Urban Development and Resilience Program

This program offers capacity-building resources aimed at urban planners, local governments, and communities to strengthen urban resilience and development, which includes district renovation. It includes training modules, workshops, and toolkits on topics such as urban planning, infrastructure development, governance, and community engagement. The resources are adaptable to different contexts, making them suitable for district renovation projects in various urban settings.

European Union's URBACT Program

URBACT is a European exchange and learning program promoting sustainable urban development, which includes district renovation. It provides capacity-building through networks, workshops, and action planning tools that support local authorities in urban development projects. The program offers case studies, good practice guides, and tools that are particularly useful for European cities undertaking district renovation.

ICLEI Local Governments for Sustainability

ICLEI has developed several capacity building sets for different contexts. In the energy efficiency field, the capacity-building initiatives aimed at promoting sustainable urban development, with a focus on climate action, resilience, and inclusive governance. ICLEI's capacity-building includes training programs, peer-to-peer learning, and technical support, which can be adapted for district-level renovation projects. Their frameworks are particularly useful for integrating sustainability and climate resilience into district renovation efforts.

The Rockefeller Foundation's 100 Resilient Cities (100RC) Initiative

Although the 100RC initiative is focused on urban resilience, it provides tools and resources that can be applied to district renovation. The initiative offers city-level support, including capacity-building for planning and implementing resilient infrastructure and urban design. Many of the tools and strategies developed under this initiative can be used to enhance district renovation projects, particularly in building resilience against environmental and social challenges.

National Association of City Transportation Officials (NACTO)

NACTO offers resources and capacity-building for transportation planning and street design, which are critical components of district renovation. The Global Street Design Guide[39] and training workshops help local authorities and planners implement sustainable and people-centered street designs. These tools are valuable for district renovation projects focusing on improving urban mobility and public spaces. These capacity-building sets and frameworks are designed to empower local authorities, planners, and communities to effectively plan and implement district renovation projects. They can be adapted to different contexts and scaled according to the needs of specific districts.

Following, a summary of the review of case studies included in Annex I that describe several real examples focused on the district or municipal level is presented. This summary aims to inspire public authorities to adapt their capacity-building strategies:

Aalborg East: Ensuring co-creation in the process of renovating social and affordable homes.

The Aalborg East project, led by Himmerland Boligforening (HB) from 2011 to 2021, focused on enhancing the district through a long-term strategy fostering resident co-creation and ensuring quality of life improvements through a comprehensive, integrated approach. HB managed administrative tasks, institutionalized cross-sector support and investment, and actively involved tenants. This integrated approach, supported by a robust national financial structure, enabled significant regeneration efforts, reflecting the broader success of social housing initiatives in Denmark

Mustamäe: renovation of multi-apartment blocks, including multi-ownership challenges

[39] Global Street Design Guide | National Association of City Transportation Officials (nacto.org)

The Mustamäe district in Tallinn, built in 1952, went through a series of renovations including the renewal of heating units and insulation of facades and community initiatives such as awareness raising of the homeowners and apartment managers on how to implement renovations through consultations organised by EKYL. Initially constructed using the "Khrushchyovka" model, the district's functionality evolved with the establishment of Tallinn University of Technology in 1962, leading to rapid population growth. By the 1990s, deteriorating conditions prompted a wave of renovations, including improved insulation, heating systems, solar panels, and new ventilation. Awareness campaigns and events motivated apartment associations to initiate renovations, supported by a standardized renovation model from the Technical University of Tallinn. These efforts resulted in healthier indoor climates, quicker renovation processes, and a safer, more family-friendly environment. The district now boasts over 210 fully renovated apartment buildings, reduced crime rates, and a nearly Zero Energy Building dormitory, showcasing the success of collaborative capacity building.

Caserne de Reuilly: an urban regeneration project providing affordable housing in Paris' city centre

The Caserne de Reuilly project in Paris exemplifies capacity building through its comprehensive urban regeneration efforts. By transforming a former military barracks into a mixed-use neighborhood, the project increased the supply of affordable and social housing while preserving architectural heritage. Key interventions included the construction and renovation of accessible dwellings, the reuse of over 600 tons of materials, and the integration of sustainable systems like rainwater management and renewable energy sources. Community engagement was fostered through public meetings, consultations, and co-design workshops, ensuring active resident participation. The project also promoted urban agriculture and created new pedestrian paths, enhancing the neighborhood's livability. These efforts not only improved daily life and social mix but also set a precedent for circular renovation practices in Paris.

Wir inHAUSer: Temporary accommodation for tenants during renovation period.

The Wir inHAUSer project in Salzburg is a comprehensive renovation initiative aimed at transforming a residential housing complex built in 1985 by the social housing provider "Heimat Österreich." The project focuses on minimizing the carbon footprint through energy-efficient upgrades and innovative mobility solutions. Key interventions include improving building insulation, upgrading heating systems to incorporate renewable energy sources, and establishing a Mobility Point with shared e-mobility options to reduce private car use. The project also ensured temporary accommodation for tenants during renovations and maintained high construction standards through the Klimaaktiv building certification. Collaborative planning with residents and stakeholders, supported by academic research and EU funding, played a crucial role in the project's success, resulting in improved living conditions and reduced environmental impact.

Sociale Energie Sprong: Ensuring cost-neutrality for residents after the renovation operation

The Sociale Energie Sprong renovation model accelerates energy-neutral renovations through economies of scale, making the process faster and more affordable. Key aspects related to capacity building include utilizing prefabricated external cladding and energy modules for quick on-site work, ensuring cost-neutrality for residents by balancing energy production and consumption, and providing technical and financial support through partnerships and funding. The model aligns with 2050 climate objectives by promoting energy-efficient solutions and

reducing the carbon footprint, collectively enhancing the capacity of the social housing sector to undertake large-scale, sustainable renovations while maintaining affordability for residents

Innovation city Ruhr: social housing district renovation at an old coal mining area

The InnovationCity Ruhr competition choose Bottrop, a typical industrial town located in the northern Ruhr district, in a multi-stage selection process among a group of 16 applicants, after submitting a participatory governance plan for a low-carbon transition approach. Key aspects of the project include establishing Innovation City Management GmbH (ICM) to manage the project, collaborating with local stakeholders, and adopting a bottom-up approach for community engagement by organizing open consultations with energy consultants and additionally 18 office quarters were established in each district as informative spaces for homeowners.

Vilawatt Project: setting up a public-private-citizen partnership (PPCP) to support renewable energy supply, fast renovation of private buildings & learning.

The Vilawatt UIA project in Viladecans, Spain, implemented a comprehensive capacity-building plan aimed at enhancing local expertise in energy efficiency and building renovations. This initiative trained around 200 individuals from various fields, equipping them with the necessary skills to meet the growing demand for energy-efficient building renovations. It also included Community Engagement training involving local residents and stakeholders in the planning and implementation phases, ensuring that the community was well-informed and actively participating in the energy transition.

Progetto Energheia, Turin: Improving the energy efficiency of buildings and creating an energy community for their inhabitants

Progetto Energheia aims to enhance energy efficiency in buildings and foster energy communities among residents. It actively engages residents in energy-saving behaviors and fosters a sense of community through gamification as a way of capacity-building so residents can understand their energy usage patterns and identify areas for improvement, change their behavior and increasing energy literacy among residents.

Renovation of 150 multi-apartment buildings in Silesia (POLAND)

The ELENA (European Local ENergy Assistance) Investment Programme in Silesia (POLAND), supported by the European Investment Bank (EIB), provided technical assistance and funding for energy modernization projects. Key actions included several capacity-building activities to support energy efficiency improvements in residential buildings such as energy audits, feasibility studies, and promotional activities to encourage energy-efficient refurbishments.

La farme du rail, Paris : “An agri-urban space open to All – to welcome, train and integrate the most fragile people”

La Ferme du Rail, part of the "Réinventer Paris" Innovative Urban initiative launched in November 2014, focuses on integrating disadvantaged individuals through urban agriculture and solidarity. The project provided training in relevant jobs to meet city needs such as involving participants and future tenants, mainly from vulnerable societal groups, in all construction phases, ensuring their employment on-site. The new workforce receives training to enhance their future employability. Collaborations with local partners, such as restaurants, for bio-waste collection and composting, increase the project's visibility and acceptance.

Matrycs

The MATRYCS or Modular Big Data Applications for Holistic Energy Services in Buildings is a Funded by the European Union's Horizon 2020 research and innovation program, implemented several capacity-building actions to enhance energy efficiency in buildings through big data applications. These actions included providing technical assistance and training for stakeholders on advanced data processing, machine learning, and AI tools. Workshops and webinars were conducted to educate participants on the use of the MATRYCS open, cloud-based data analytics toolbox.

Kalasatama Smart City District of Helsinki[40]

The Smart Kalasatama project, led by Forum Virium Helsinki, included agile piloting and co-creation workshops that engaged residents, companies, and city officials in developing and testing innovative solutions in real urban environments. Training sessions and participatory design methods were used to enhance the skills and knowledge of participants, promoting a user-driven approach to foster smart urban development.

[40] Smart Kalatama, (2021). *Sharing experiences from Smart Kalasatama.* https://fiksukalasatama.fi/en/sharing-experiences-from-smart-kalasatama/

6. Capacity-Building set for Santa Ana Context

Creating a capacity-building set for district renovation involves developing a comprehensive plan that provides local stakeholders with the necessary skills, knowledge, and resources to effectively implement renovation projects. This plan can be tailored to the specific needs of the district, considering the local context, stakeholders, and objectives. The structured approach elaborated for the drOp context, as shown in Figure 5, could serve as a useful roadmap for any other neighbour or district involved in an integrated renovation.

The process started with the **Needs Assessment.** This activity was focused first on the evaluation of the existing knowledge, skills, resources and training programmes related to district renovation and provided by the public bodies and the main educational centres at the municipal level. Thus, we have identified the **key gaps between current capacities and the skills needed for successful district renovation**. Secondly, the identification of **the main target groups of the capacity-building set** is key to defining tailored training packages for all of them. This is to identify key stakeholders, including public staff, local communities and associations, independent professionals (e.g. urban planners, architects, designers), and residents.

The development of **Training Programmes is** based on the gaps identified in close collaboration with the municipality. It will integrate the following core elements shown in Figure 5:

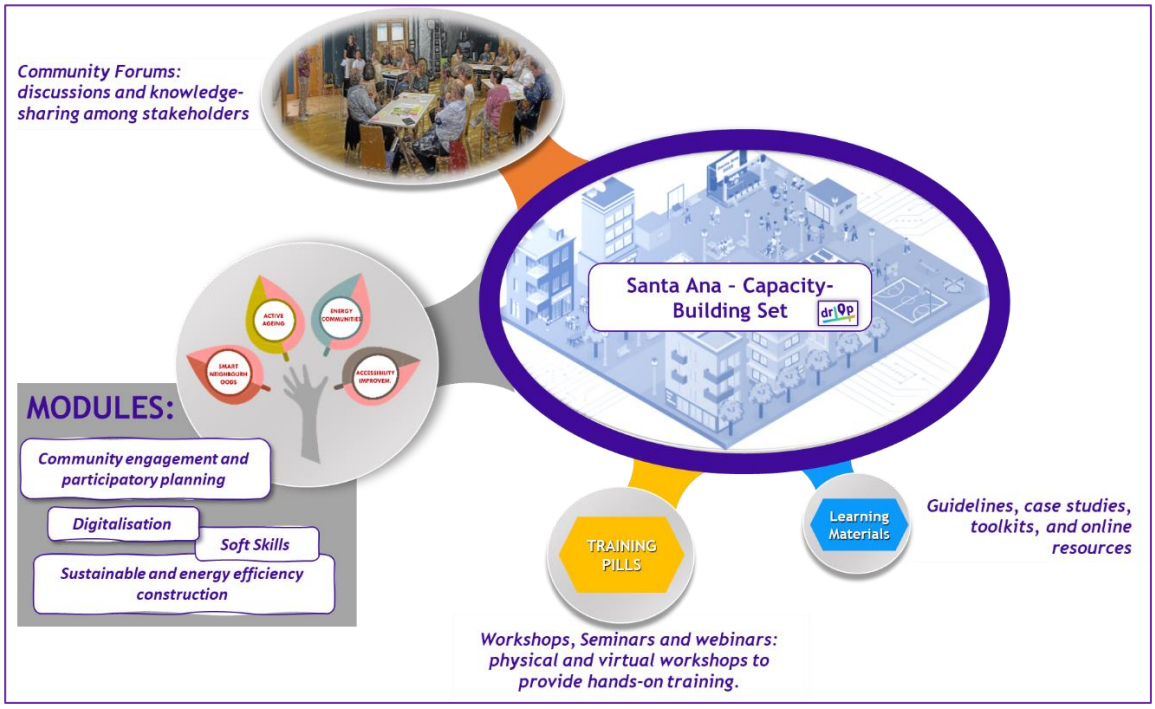

Figure 5: Scheme of capacity-building set for the drOp project

This set includes the following core elements:

- **Modules:** Develop training modules focusing on key areas such as:
  - Digitalisation
  - Sustainable and energy efficient construction practices

    - Community engagement and participatory planning
    - Soft Skills

- **Tailored Training:** Customized training sessions based on the roles and expertise of different stakeholders. For instance, the Human-Centred Business Model Canvas is included in D3.2 for those companies interested in exploring a new business model for their company.
- **Learning Materials:** All learning materials, including guides, case studies, toolkits, and online resources generated by the drOp project. All these materials are accessible through the web of the project knowledge - drOp (drop-project.eu).
- **Workshops, Seminars and webinars:** Conduct in-person or virtual workshops to provide hands-on training. Develop e-learning modules for self-paced learning.
- **Mentorship Programs:** experienced companies based in the district will receive tailored support from experts for guidance and support through this type of mentoring.
- **Community Forums:** Facilitate discussions and knowledge-sharing among stakeholders

Finally, the **budget allocation** is described in detail providing a cost estimation of all the core elements detailing the budget required for every capacity-building program, including training materials, facilitator fees, etc. Additionally, a list of the existing public funding programmes is provided. The potential funding sources, such as government grants, international organizations, or private sector contributions are identified.

6.1 Needs assessment: exploring current capacities at the local level

A **comprehensive assessment to identify the specific knowledge gaps**, **skill deficiencies**, and **capacity needs** related to district renovation has been deployed in close collaboration with the Ermua partner as well as with MGEP as an academic partner. Through two interviews with the staff of the Employment Department and the analysis of existing data concerning municipal training initiatives, relevant information was discovered:

TRADITIONAL CAPACITY BUILDING PROGRAMMES AT THE MUNICIPAL LEVEL:

- **Construction** - to work on road infrastructure;
- **Mechanization of work processes** (maintenance and repair of public works machinery e.g. excavators);
- For those who had **administrative vocational training**: automation of procedures of the local public administration;
- A course on **photovoltaic**, **wind** and **hydraulic** solar energy (with several municipal installations) was proposed after the COVID pandemic that failed due to rejection by the citizens.
- **Telecommunications**: City Council's push to pull tube-gutters with a workshop school;
- **Proposed Wind turbines**: through the Univ of Eibar and Gamesa, they created the program for "wind turbine maintenance“, it also failed
- **Others**: Manufacture of Metal Elements; Vehicle maintenance; Hairdressing and

Aesthetics; Empowerment and Gender courses and workshops[41].

CURRENTLY:

- The strategic plan of the council in 2024 concerns three main areas **digital**, **social** and **green sustainability**. After several meetings between the Ermua partner, including technicians in charge of the employment plans for the council, as well as MGEP and TECNALIA, several areas for employment courses were identified. Fig…represents the key priorities of the council in this regard with the influence of the lessons learnt from the drOp project.

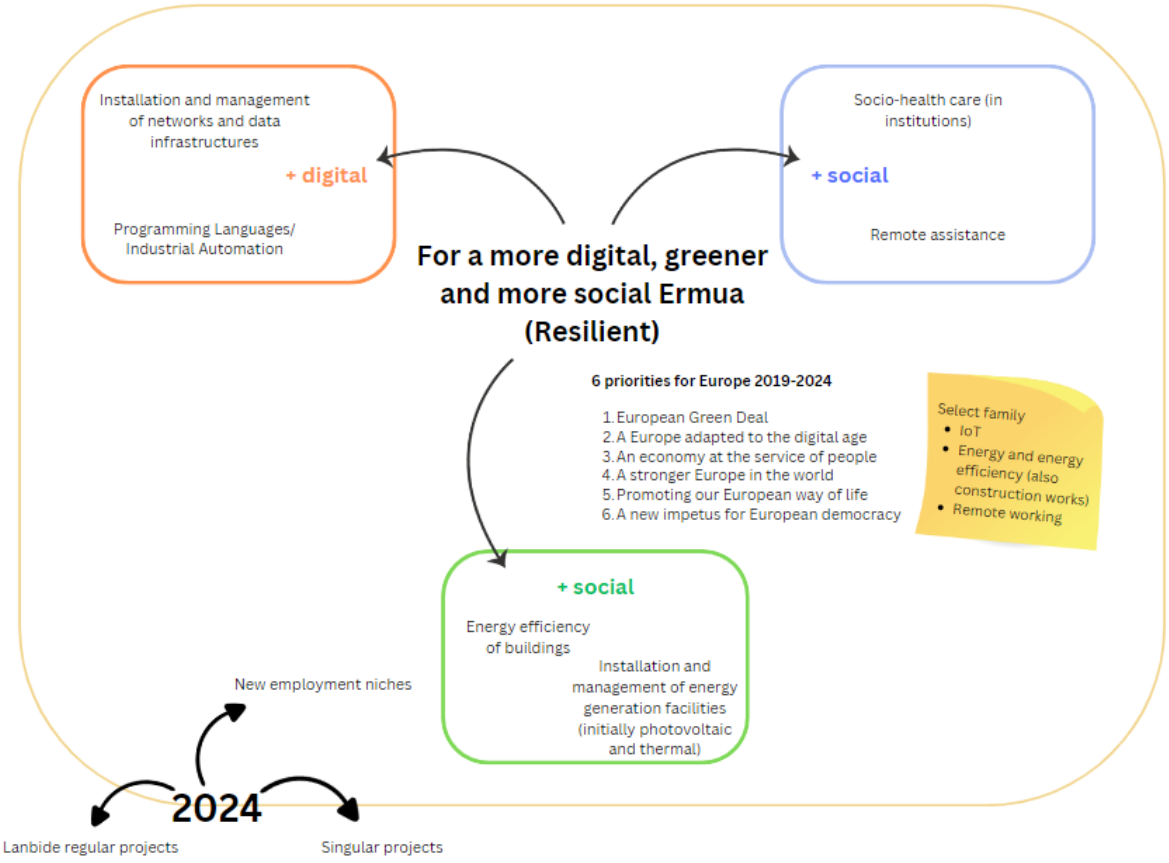

Figure 6: Municipal Employment strategy for 2024 - Source: Ermua elaboration adapted to drOp context

- Three **programs for women** (*ZainLab*) as **social workers in homes and with accreditation** (social and health).
- Upcoming a new law: **Employment Law (1/01/2025)**.
    - For municipalities of >100,000 population that have the training program proposing an agreement of 4 years extendable to 4 years

[41] C.EMPODERAMIENTO_CUATRIMESTRE_ERMUA.pdf

- **Problem**: difficulties (that can be solved) of continuity from the City Council and the accrediting seal of the training programmes
- **Possible solutions**: attract the business/sector associations and clusters to develop a tailored professional course

6.2 Defining Desired Capacities

After assessing the current capacity, the desired or required update of skills for district renovation should be established. From establishing collaborations to seeking funding to guarantee an effective implementation of the Intervention Plan, the Capacity-Building set will aim to equip public authorities, residents (employed and unemployed population), social entrepreneurs and current businesses commercially established at the neighbourhood level, with the knowledge and tools necessary to succeed in district renovation and economic development.

Some requirements in terms of training discovered through the Assessment tool included in Deliverable 3.1 should be highlighted and considered as desired capacities. Through a complete questionnaire, Ermua's needs from the LED perspective were evaluated and, derived from such an assessment, some capacities were discovered as necessary:

- **Advice and training facilities** organised, in particular in the field of **self-management**, empowerment and economic support.
- Available **research and development facilities for social business models** or socially useful products and services.
- The existence of **Public space and support structures for learning and working**, campaigning and project development.
- Promote and support the **development of businesses & SMEs** (e.g. business incubators)

Before defining the training goals, the **target audiences** were evaluated by Ermua municipality. Five main target groups will be prioritised to receive the tailored training within the Santa Ana neighbourhood:

- **Residents of Santa Ana neighbourhood**: this group is one of the key audiences which requires updates in energy efficiency, digitalisation and social innovation. This group is divided into three main categories: retired citizens, unemployed neighbours and employed neighbours that require updating their skills or adapting to the new job demands (freelancers, artisans, etc.)
- **Local commercial businesses**: the existing commercial activities operating in Santa Ana require updates in their digital capacities as well as in business innovation. Those professionals who are running a commercial activity in the neighbourhood could improve and guarantee the sustainability of their business if they receive mentoring regarding aspects such as digital marketing or social innovation to learn about how to design and offer new services.
- **Council staff**: public servants working in Ermua municipality also would require updated capacities to understand district renovation implying energy efficiency, smart neighbourhoods, active ageing and citizen participation and engagement.

Having identified those target groups, Ermua municipality established a list of specific goals and milestones in terms of training summarized in the tables below:

Table 21: Module 1 of Capacity Building Set - Professional Course

"Professional Course": A training program tailored to several skills and knowledge affected by building renovation which includes an official grade or professional title.	
Content:	• *Rehabilitation: focus more on quality in rehabilitation, for example, installation of windows to prevent infiltration.* • *Facilities: New decarbonisation solutions: Heat pumps; Aerothermal energy; Housing ventilation systems; Photovoltaic installation*
Target audiences:	*An "ad-hoc course" to encompass several professional fields around construction and renovation sectors such as envelopes, bricklayers, plumbers, electricians, etc. Aspects of energy efficiency (e.g. aerothermal energy).*
Main stakeholders:	*Professional Educational centre at the municipal or county level, main companies in the sector to come and give "practical" orientation talks in these clusters.*
Benefits:	*An official professional title and the possibility of doing internships would be offered.*

Table 22: Module 2 of Capacity Building Set - Capacitation for RESIDENTS

Capacitation Modules for Residents	
Content:	• *Training in local energy communities and collective photovoltaic self-consumption.* • *Energy efficiency "awareness" training (e.g. understand your electricity or gas bill); Energy efficiency mentoring linked to the recommendations from the municipal QLIK service* • *Digital training (different levels): digital capacitation to unemployed or employed residents*
Target audiences:	*Any type of residents lacking of digital skills as well as unemployed or employed population demanding updated digital capacitation.*
Main stakeholders:	*Professional Educational centers at the municipal level, private academies, public or private academic centers.*
Benefits:	*Benefits of Energy Efficiency Awareness Training:* - *Helps residents reduce electricity and gas bills through simple behavioral changes and energy-efficient appliances.* - *Reduces energy consumption and carbon emissions, contributing to a healthier environment.* - *Enables informed decisions about energy use, including choosing renewable sources and participating in local energy communities.*

	- *Fosters a sense of community and shared responsibility for energy usage.* *Benefits of Digital Training for Residents:* - *Reduces digital literacy gap* - *Improves employability of residents.* - *Covers the specific needs of different groups, enhancing their opportunities and competitiveness.*

Table 23: Module 3 of Capacity Building Set - Capacitation for LOCAL COMMERCE

Capacitation Modules for Local Commerce	
Contents:	• *Energy efficiency mentoring linked to the recommendations from the municipal QLIK service (which involves analysing the energy consumption data of the interested businesses in Santa Ana, to generate periodical consumption reports with the final objective of helping them make better decisions, save costs, and ultimately become more energy efficient).* • *Mentoring in other areas such as innovation management and design thinking or creativity tools.* • *Digital training: digital marketing and/or e-commerce*
Target audiences:	*Existing microenterprises and PYMEs placed in the neighbourhood (hairdressers, coffee-bars, restaurants, local shops).*
Main stakeholders:	*Public or private academia or training agencies*
Benefits:	*Enhanced Energy Efficiency: By implementing the recommendations from the municipal QLIK service, these businesses can significantly reduce their energy consumption, leading to lower energy costs and a reduced environmental footprint.* - *Increased Competitiveness: Mentorship in innovation management, design thinking, and creativity tools can help businesses develop new products, services, or marketing strategies, making them more competitive in the market.* - *Expanded Online Presence: Digital training in marketing and e-commerce can enable businesses to reach a wider customer base, increase sales, and adapt to the changing digital landscape.* - *Improved Business Operations: The program can help businesses optimize their operations, improve efficiency, and increase profitability.*

Table 24: Module 4 of Capacity Building Set - Capacitation for CITY COUNCIL TECHNICIANS

Capacitation Modules for City Council Technicians	
Contents:	• *Multidisciplinary approach (for Project Managers)* • *Digitalisation* • *Soft Skills* • *Citizens' participation and Engagement*

Target audiences:	*Municipal Staff from all departments involved in District Renovation and or Urban regeneration*
Main stakeholders:	*Public or private academia or training agencies*
Benefits:	• *can work in a multidisciplinary living environment of multi-apartment buildings* • *can acquire and apply skills and knowledge from different disciplines in professional problem-solving* • *excels at the systematic planning and organisation of administrative, financial and technical management of housing stock* • *is guided by the legislation in force in his/her activities, generally recognized good practice in the field of management of apartment buildings and the rules of procedure of the apartment associations* • *can adapt his/her communication style to different situations and people* • *is familiar with technological changes in society and the latest solutions for renovation in the housing sector, including district renovation*

6.3 Content Development

The set delves into the multidisciplinary approach mentioned before (see Chapter 4.1) and the funding sources (see Chapter 4.2). Furthermore, based on the needs assessment, gap analysis and required capacities for the Santa Ana context explored in the previous section, the development of the content for the capacity-building set includes the training programmes to be further elaborated and offered to the target groups.

6.3.1 Module 1: Professional Course

In collaboration with the **Edukeibar training centre**, the drOp project is committed to creating a **training itinerary in the field of housing construction and regeneration**. Specifically, this training aims to address the unique needs arising from older homes, not only in the Santa Ana neighbourhood of Ermua but also in numerous other neighbourhoods at the local, regional, and national levels.

Therefore, this intermediate-level training program seeks to cover various branches of construction and rehabilitation with a more innovative approach, focusing on energy efficiency and adapting to the needs and demands of the future market.

This course **will offer a professional qualification to students who complete it**. Additionally, the training will be linked to a local urban regeneration project, providing a highly practical format where students can apply what they have learned through the rehabilitation of a physical space in Ermua. This will be achieved not only through an internship period but also through temporary employment agreements.

The course is primarily targeted at residents of Santa Ana, but extending the opportunity to a wider geographical area is considered essential. Besides, the course is mainly intended for unemployed individuals, but it also opens the possibility for those currently employed in the construction industry to join, especially if they seek to enhance their knowledge in more specific and innovative areas to better face future job challenges.

Format: a theoretical-practical format in which the training is also **linked to a rehabilitation project of a public building in Ermua** (which remains to be defined), through internships or, if possible, a temporary contract. The course would be around **450 hours**, which is equivalent to **4-5 months.**

6.3.2 Module 2: Capacitation Modules for Residents

The drOp project Pills_ FREE TRAINING SESSIONS

Format: 2h/3h (in-person session)

These pills are small units of information and practical material on topics related to the drOp project objectives which seek to catch the interest of Santa Ana's citizens in the following topics:

- **HEALTH & WELLNESS (2024) conducted by Mondragon Unibertsitatea**

This training programme was named **"Integral Care Programme: promoting health and wellbeing at home".** The program aims to improve the safety, independence, and well-being of elderly individuals at home by developing and implementing innovative technological solutions. The program includes 3 actions that residents can join:

1. Personalized t for medication taking through a medical dispenser service
2. Preventive assessment of strength and balance
3. Development of the videoconference system

After the explanations, 2 of the actions were selected by the residents as prototypes in the project and are being implemented. By the end of the session, the following brochures were distributed to the participants and made available to the residents through the Neighbourhood Office to guarantee the promotion of these actions for the promotion of health and wellness.

Figure 7: Brochures of HEALTH & WELLNESS training pill led by drOp project (April 10th, 2024)

- **NEIGHBOURHOOD OFFICE (2024) conducted by TECNALIA and Debegesa**

Along with the opening of the renovation office in Santa Ana neighbour the pill entitled **"The neighbourhood office, your partner towards rehabilitation"** was held. During this information pill in addition to the presentation of the services offered by the neighbourhood office for Santa Ana residents and the experiences of other similar offices in the area, information on the renovation process (accessibility and energy efficiency or other) was provided by Debegesa.

Debegesa, as the Urban Society of Rehabilitation of Debabarrena (SUR) provides support to the residents of Debabarrena area throughout the process and in all phases of a Rehabilitation Work (facade, roof, elevator, improvement of accessibility...), whether private or community of neighbours.

The following brochure summarizes the service provided in the office as well as other relevant information regarding the training pills:

Figure 8: Brochure of "The neighbourhood office, your partner towards rehabilitation" training pill led by drOp project (25th April 2024).

- **DIGITAL APPLICATION FOR PARTICIPATION conducted by Mondragon Unibertsitatea and TECNALIA (2024)**

In the framework of the drOp project, a digital application is being developed so that citizens can report on incidences with geolocation. The first version of that application was used to identify areas of the neighbourhood suitable for renovation. This activity was named 'MAPATHON'.

In this activity, citizens from Santa Ana gathered in groups to walk through the neighbourhood and collect pictures and comments from different public areas (streets, squares, walls, roads, gardens ...) through the application. They collected numerous proposals for improvement, some of which are shown in Figure 9. The MAPATHON was the first step for the rehabilitation of Santa Ana's public space. A report was prepared with the information collected and shared with citizens and the municipality. The municipality intervened to solve many issues identified. In addition, this action has triggered other actions that are being implemented now (wall embellishment, tactical urbanism ...)

Additionally, the municipality of Ermua is exploring the potential of utilizing the developed app beyond the scope of the drOp project. In fact. The municipality is considering making this app a permanent tool for citizens to report public space incidents. The initial pilot case would be launched in Sant Ana, allowing reports to be directed to and handled by the appropriate municipal department.

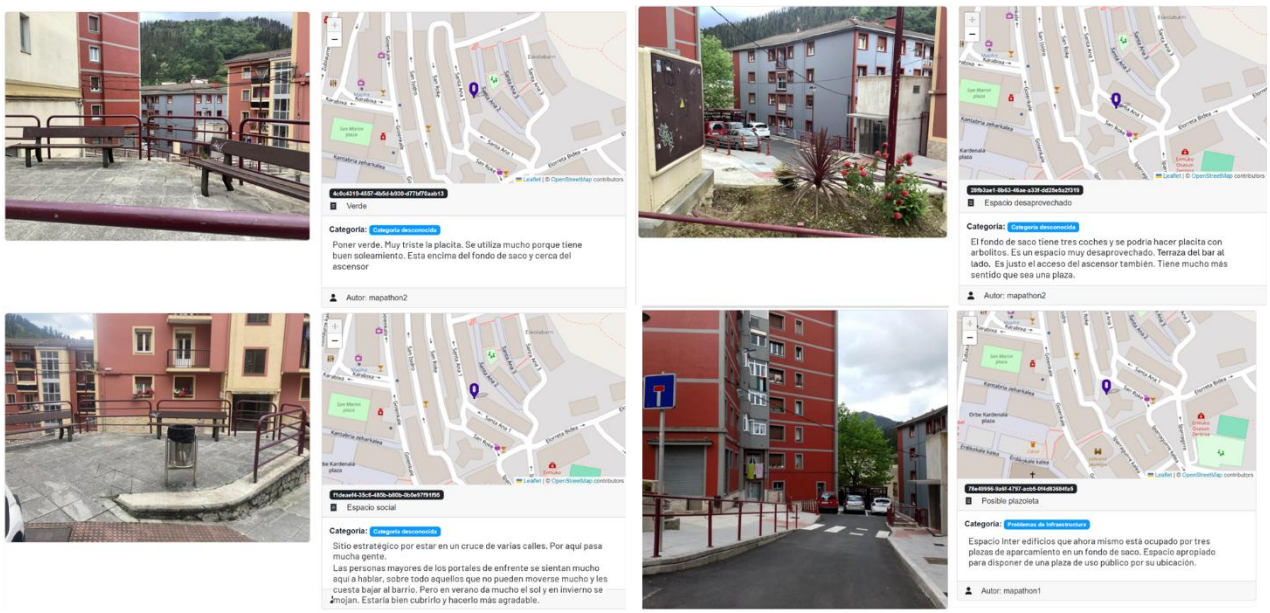

Figure 9: Maphaton as an action for Santa Ana's public space rehabilitation, led by drOp project (7th May, 2024).

Awareness program 1: Energy Communities and collective PV systems

- **<u>Introductory session (2h)</u>: Introduction to Energy Communities and collective PV systems (21st May, 2024) conducted by TECNALIA**

The aim of this pill named "What is an Energy Community?" was to provide basic information about energy communities to Santa Ana's residents so they could understand what they are, how can they produce monetary savings, which are the basic regulations, etc. This pill seeked to shed some light on the issue as a first step to co-create an Energy Community in Santa Ana where the residents of the neighbourhood can decide their involvement either by taking part in the initiative as well as by being members of the energy community itself.

The content of the session can be summarized in:

- What are the Local Energy Communities, governance and property models, related European directives and legal Spanish context
- Fundamentals of PV self-consumption (individual and collective) and potential savings in monthly electricity bills
- Ongoing similar projects and initiatives in the region

Figure 10: Brochure of the awareness pill led by drOp project "Introduction to Energy Communities and collective PV systems" (21st May, 2024).

- **<u>Energy Community stimulation (3h)</u>: Potential EC opportunities for Santa Ana neighbourhood**

Through digital tools and TECNALIA's own software, a solar resource analysis of the neighbourhood is being performed, which cross-checking with cadastral data gives as result an assessment of the PV deployment potential of each roofs (public and private). These results will be used to identified potential collective projects and will serve as main technical content of this session:

- Analysis of public and private roofs solar resource and PV deployment potential
- Identified opportunities and pre-projects definition for shared PV-facilities
- Diverse implementation proposals, both from technical and social perspectives

Awareness program 2: Reducing domestic energy bills

Format: 1,5 hours (in-person session)

- Raising awareness on energy efficiency, tips for not wasting energy on a non-technical language
- Understanding your energy bills, which type of rates are available, how to compare them and how to know if your rates are abusive or if you fit the conditions for social subsidies in your bills.

Training program in Digitalisation (for unemployed and employed residents)

Format: 120 hours (in-person session)

This training program aims to equip participants with essential digital skills that are increasingly in demand across various industries. By focusing on digital literacy, online job searching, and practical digital skills, the program will empower individuals to enhance their employability and adapt to the evolving digital landscape. The key objectives of the training program are:

- **Digital Literacy:** Build a solid foundation in computer basics, internet navigation, and online communication.
- **Job Search and Networking:** Develop effective online job search strategies, create professional profiles, and leverage digital platforms to build networks.
- **Digital Skills for Employment:** Acquire practical skills in programming, data analysis, digital marketing, and remote work, making participants more competitive in the job market.

Based on the scope and depth of the topics covered, the estimated total training hours for this program is **120 hours**. This estimate includes both theoretical instruction and practical exercises. The program could include the following topics depending on the profile and the final specific objectives:

- **Digital Literacy (30 hours)**
  - Basic computer skills (word processing, spreadsheets, presentations)
  - Internet navigation and search
  - Email communication
  - Online safety and security
- **Job Search and Networking Online (20 hours)**
  - Creating a professional online profile (LinkedIn)
  - Job search platforms and strategies
  - Online job applications and interviews
  - Building a professional network online
- **Digital Skills for Employment (70 hours)**
  - Introduction to programming (Python, HTML, CSS)
  - Data analysis and visualization (Excel, Google Sheets)
  - Digital marketing basics
  - Social media management
  - Remote work essentials

Training program in Entrepreneurship (for unemployed and employed residents)

Format: 80 hours (in-person session)

This training program is designed to equip participants with the foundational knowledge and skills necessary to launch and successfully operate their own businesses. By covering essential

topics such as business planning, digital tools, funding options, and effective pitching, the program will empower individuals to pursue entrepreneurial ventures. The objectives are:

- **Entrepreneurship Basics:** Understand the fundamental principles and concepts of entrepreneurship.
- **Business Planning:** Develop comprehensive business plans and feasibility studies to assess the viability of entrepreneurial ideas.
- **Digital Tools:** Learn how to utilize digital tools and technologies to streamline business operations and reach target markets.
- **Funding Options:** Explore various funding sources and strategies to secure financial support for entrepreneurial ventures.
- **Pitching and Presentation Skills:** Develop effective communication and presentation skills to effectively pitch business ideas to potential investors, partners, and customers.

Based on the scope and depth of the topics covered, the estimated total training hours for this program is **80 hours**. This estimate includes both theoretical instruction and practical exercises. The program could include the following topics depending on the profile and the final specific objectives:

- **Entrepreneurship Basics (80 hours)**
  - Entrepreneurship Basics: This includes Introduction to entrepreneurship, Entrepreneurial mindset and characteristics and Identifying business opportunities.
  - Business planning and feasibility studies: including Developing a business plan, Market research and analysis, financial projections and budgeting and Feasibility analysis.Digital tools for startups: including Essential digital tools for entrepreneurs, Online marketing and social media and E-commerce and online sales.
  - Funding options: including Sources of funding for startups and pitching for funding.
  - Pitching and presentation skills: including Effective communication and storytelling, Preparing and delivering presentations and Handling questions and feedback.

6.3.3 Module 3: Capacitation Modules for Local Commerce

Energy efficiency mentoring linked to the recommendations from the municipal QLIK service

Format: 1-hour session with local commerce

- **Improving local commerce and business competitiveness through energy efficiency**

This service involves analysing the energy consumption data of the interested businesses in Santa Ana, in order to generate periodical consumption reports with the final objective of helping them make better decisions, save costs, and ultimately become more energy efficient.

- Raising awareness on energy efficiency and energy-saving tips in diverse types of venues (i.e. shops, offices, etc.).

- Introduction to the municipality QLIK service and how they could get tailored recommendations
- Optimized energy rates and participation in Local Energy Communities as means for reduced energy bills and competitive businesses.

Mentoring in innovation management and creativity tools

Format: 80h (in-person session)

This engaging and attractive training session is designed specifically for microenterprises and small businesses. They can learn how to harness the power of innovation to boost their business and stay competitive in today's market. The main subjects of this training involve:

- **Understanding Innovation**: Exploring different types of innovation and why they matter for microenterprises.
- **Identifying Opportunities**: Learning techniques to spot opportunities for innovation within your business.
- **Creative Problem Solving**: Developing skills to overcome challenges and generate new ideas.
- **Implementing Innovations**: Discovering best practices for integrating innovative solutions into your existing operations.
- **Measuring Success**: Understanding key metrics to evaluate the impact of your innovations.

This training is beneficial to small business owners, entrepreneurs, and managers of microenterprises which are located in the Santa Ana neighbourhood. Anyone interested in enhancing their business through innovation would select the topics and the estimated training hours for this program would be adjusted. In total **80 hours** would be needed. This estimate includes both theoretical instruction and practical exercises.

Digital training: digital marketing and/or e-commerce

Format: 120h (in-person session)

This training program is designed to equip local businesses with the essential digital skills necessary to thrive in today's competitive online marketplace. By focusing on digital marketing fundamentals, e-commerce strategies, and digital financial management, the program will empower businesses to expand their reach, attract new customers, and optimize their operations. The key objectives are:

- **Digital Marketing Fundamentals:** Understand the digital landscape and develop effective strategies for building an online presence.
- **E-commerce:** Learn how to set up and manage an online store, optimize product listings, and streamline the customer experience.
- **Digital Financial Management:** Gain insights into digital accounting tools, online payments, and financial analysis to improve business efficiency and profitability.
- **Digital Customer Service:** Enhance customer satisfaction and loyalty through effective online communication channels and customer support strategies.

Based on the scope and depth of the topics covered, the estimated total training hours for this

program is **120 hours**. This estimate includes both theoretical instruction and practical exercises. The program could include the following topics depending on the profile and the final specific objectives:

- **Digital Marketing Fundamentals (40 hours)**
  - Understanding the digital landscape
  - Building an online presence (website, social media)
  - Search Engine Optimization (SEO) basics
  - Content marketing
  - Email marketing
  - Social media marketing
  - Digital advertising (Google Ads, social media ads)
  - Analytics and performance measurement
- **E-commerce (40 hours)**
  - Setting up an online store
  - Product photography and description
  - Payment and shipping options
  - Customer relationship management (CRM)
  - Online marketplaces
  - E-commerce logistics
- **Digital Financial Management (20 hours)**
  - Online accounting software
  - Digital payments and invoicing
  - Financial analysis and forecasting
  - Cybersecurity for financial data
- **Digital Customer Service (20 hours)**
  - Online customer support channels
  - Chatbots and AI for customer service
  - Building customer loyalty through digital channels

6.3.4 Module 4: Capacitation Modules for City Council Technicians

Participation and citizen engagement

Format: 14,5h (in-person session)

- **Module 1: Citizen-Centered Design and Co-Creation Processes (2 hours): Introduction to User-Centered Design**

This module provides an introduction to the principles and practices of User-Centered Design (UCD). It emphasizes designing with the needs and preferences of users in mind, ensuring that

the end solutions are tailored to their real-world contexts and experiences. Key topics include the importance of understanding citizen needs, existing methodologies: similarities and differences, success stories and application examples, exercises to evaluate the current application of these methodologies and integration opportunities into their daily practices (how, for what, where, who).

- **Module 2: Qualitative Research Tools and Active Listening (4 hours)**

This module explores qualitative research methods and emphasizes the importance of active listening in design. Participants will learn how to collect hidden needs and problems from citizens using tools and techniques such as interviews, focus groups, and observations. Additionally, the module will focus on information systematization and visualization tools, including personas, empathy maps, and customer journey maps. Success stories and examples will be presented, and exercises will be developed to provide hands-on experience with these tools.

- **Module 3: Inclusive Design Foundational and Specific Research Tools (4 hours)**

This module encompasses the objectives of Module 1 and Module 3 but from the perspective of inclusive design, where the processes and tools for understanding citizens involve specific considerations. This approach aims to better understand individuals with special needs, such as the elderly, people with various degrees of disability, and others.

- **Module 4: Facilitation of Co-Creation Sessions (4 hours)**

The aim is to equip a group of workers with the necessary skills and techniques to effectively lead co-creation sessions. Participants learn the different ways to include citizens in the participation and co-creation, how to plan, structure and develop collaborative sessions, the principles, capabilities and roles of the facilitator and tools for idea generation and decision-making. The module also includes exercises to train in the tools and techniques.

- **Module 5: Ethical Aspects in Participatory Design Processes (30 minutes)**

This module covers the ethical considerations essential in participatory design processes. It focuses on principles such as respect for all participants, ensuring informed consent, maintaining transparency, and safeguarding privacy. The module will discuss the importance of considering diverse perspectives, avoiding biases, and ensuring that the design process is inclusive and equitable.

Tailored programme for integrated renovation: multidisciplinary approach
Format: 120h (online training methods)

Taking advantage of the expertise of one of the project partners, “The Estonian Union of Co-operative Housing Associations (EKYL)”, its curriculum and a training program for managers and board members of non-profit housing or renovation associations in multi-apartment buildings to serve the emerging multidisciplinary skills and capacity building needs in renovation sector could be integrated into the capacity-building set. It will be analysed by Ermua municipality and be tailored to the municipal context. This training programme could help organize collaborative efforts of several stakeholders involved in building renovation projects, so not

only staff from the council would participate but also associations and SMEs of the sector could benefit from this training programme. The **120-hour training program** for managers of renovation associations has been developed and tested by EKYL through different pilot courses.

The purpose of such training is to provide professionals as well as residents with the opportunity to improve their knowledge and skills necessary to work as managers of renovation associations, coordinators of the local community, and initiators and facilitators of the renovation process; to improve work processes and quality of work of those in responsible roles in renovation associations.

The training is targeted to practitioners without previous education in renovation as well as in housing management. The manager of a multi-apartment association or a dwelling owners' community works in a very wide-ranging environment, which requires the knowledge and skills from various disciplines, including administration and management of the housing association, legislation, cooperative property maintenance and renovation management, financing of housing management and co-investing into energy efficiency, community building with resident-owners, communication with other stakeholders like municipalities, service companies etc.

7 principles of the multi-disciplinary approach in EKYL training

1. The training curriculum mobilizes practical expertise, skills, knowledge and perspectives from the housing sector and matches it with scientific, technological and political expertise to promote practical and innovative solutions for sustainable housing development and renovation;
2. The training provides a comprehensive selection of disciplines and a variety of lecturers and mentors from universities and municipalities; academics, practitioners, entrepreneurs etc., sharing their specific information necessary for successful work as housing managers and coordinator of the renovation process; different perspectives and methodological approaches are used to help develop a broader understanding on housing, energy-efficiency and renovation issues;
3. The training offers a variety of options for building a multi-disciplinary learning community, by engaging students in common discussions, supporting the knowledge exchange of people with different professional backgrounds and at different stages of their careers, who perceive the world in different ways, making them contribute into common goals as well as professional network to support each other in professional challenges after the end of the training;
4. The problem-solving approach has been integrated into all the disciplines, facilitating the interconnections of the disciplines in practice. Finding effective solutions requires a multidisciplinary examination of disciplines. The problem-based learning provides the students with real-life skills and competencies and encourages them to use the knowledge acquired from one discipline, in a new innovative area.
5. The process of change is at the core of multidisciplinary training – the multidisciplinary approach facilitates addressing urgent and topical questions, in which the people at the training are living and working; the curriculum leaves room for flexibility to support the students with additional skills and knowledge from new disciplines, when the need emerges.

Expected results of the multidisciplinary training

By attending and completing the training programme the participant:

- can work in a multidisciplinary living environment of multi-apartment buildings
- is able to acquire and apply skills and knowledge from different disciplines on professional problem-solving
- excels at the systematic planning and organisation of administrative, financial and technical management of housing stock
- is guided by the legislation in force in his/her activities, generally recognized good practice in the field of management of apartment buildings and the rules of procedure of the apartment associations
- can adapt his/her communication style to different situations and people
- is familiar with technological changes in society and the latest solutions for renovation in the housing sector, including district renovation

Practical organization of the capacity training

The training programme will preferably use online training methods to support multi-disciplinarity by selecting tools for all the disciplines according to the needs: innovative digital learning tools and e-learning courses are today the main training method, providing the opportunity to access the training for all interested stakeholders despite of their location. It could include:

1. **Collective Action & Cooperative Property Maintenance**: Principles of Co-operative Action and Community Development
2. **Administration and Communication**:
   - Principles of Administration of Condominium
   - Communication & Conflict Resolution in Community
   - Documentation in Condominium
3. **Management:**
   - Economic Principles of Management of Apartment Associations
   - Property Maintenance
   - Accounting and Financial Management of Condominium
4. **Legislation**:
   - Housing Legislation
   - Property Law
   - Relations with Debtors & Recovery of Claims
   - Law of Obligation
   - Labor Law
5. **Building & Renovation**:
   - Renovation of Apartment Building and Management of Construction Works
   - Urban planning and architecture
   - Sustainable living environment and sustainable housing

6.4 Budget and resource allocation

In this section, a comprehensive breakdown of the budget and resource allocation for drOp's Capacity Building set is outlined. This set, as previously explained, is divided into various training modules, each tailored to meet the specific needs of different target audiences.

The total amount destined for capacity building within the project is €100,000. However, it must be noted the cost breakdown presented below is tentative and may undergo modifications once the implementation of the capacity building progresses.

Module title	Tentative budget (€ in total)
MODULE 1: Professional Course	50.000
MODULE 2: Capacitation Modules for Residents	15.000
MODULE 3: Capacitation Modules for Local Commerce	30.000
MODULE 5: Capacitation Modules for City Council Technicians	2.000

7. Key takeaways for replication

This chapter outlines how the capacity-building set developed in this document can be effectively used for replication in other contexts beyond the Santa Ana district. The drOp capacity-building framework is designed to be adaptable, providing tools, methodologies, and best practices that can be tailored to fit the specific needs of various regions and communities undertaking district renovation processes. By leveraging this capacity-building set, other districts can enhance the capability of their local stakeholder groups to implement renovation initiatives, ensuring a cohesive approach to local economic development, digitalisation, and community empowerment. Regions and cities looking to develop their own capacity-building sets can draw on the comprehensive framework, strategies, and best practices outlined in this document. The replication of the capacity-building set developed for the drOp project and mainly for Santa Ana in Ermua city presents a valuable opportunity for other cities or districts to undertake similar initiatives. Some key takeaways for ensuring successful adaptation and implementation in diverse local contexts have been presented as follows.

This framework is customisable. The capacity-building set is designed to be flexible and adaptable to various socio-economic and cultural contexts. The document provides a clear path for setting capacity development goals, helping regions identify the desired competencies in areas such as digital skills, innovation management, and sustainable construction practices. For replication, first, **adapt the needs assessment**. Conduct a thorough assessment of local capacities, challenges, and opportunities to tailor the training programs, ensuring that they address the specific gaps in skills and resources within the target community. The training content, while comprehensive, should be customised to fit local conditions, including the specific regulatory environment, technological readiness, and local economic drivers.

Pay attention to stakeholder engagement and collaboration. A key lesson from the document is the emphasis on engaging diverse stakeholders in the capacity-building process. For replication to be successful, engaging local stakeholders - both public and private - is essential. Engage key stakeholders, such as local government officials, businesses, community leaders, and residents, from the initial stages. This fosters ownership and ensures that the capacity-building efforts align with local priorities. Also, foster collaboration between different groups (e.g., government, businesses, educational institutions, and civil society) to create a shared vision and pool resources for district renovation initiatives.

This document **offers a well-rounded collection of flexible potential training modules** that can be adapted to other contexts. For example, its customisable content includes training on digitalisation, sustainable urban planning, energy efficiency, co-governance, policy and financing schemes. These topics can be customised to address specific challenges or needs in different regions, making the training more relevant and impactful. Training programs include, for example:

- **Modules**: focus on key areas such as digitalisation, sustainable construction practices, community engagement, and soft skills.
- **Learning materials**: create or adapt materials, including guides, case studies, and toolkits.

- **Workshops & seminars**: use a blend of virtual and in-person workshops to facilitate hands-on learning and interaction.
- **Mentorship programs**: pair less experienced participants with experts to guide them through the process.

Focus is on digitalisation. Given the increasing importance of digital technologies in urban regeneration, digital literacy and infrastructure development are critical. Offer digital literacy programs tailored to the local population, including both residents and businesses, to ensure that they can fully engage with and benefit from the digital aspects of the renovation process. Also, investing in or improving local digital infrastructure (e.g., internet connectivity, digital platforms) to support the smooth implementation of digital-enabled renovation processes is important.

The document includes **valuable best practices and examples** from various European regions, which can be applied or adapted in other contexts. By providing these real-world examples of district renovation or capacity-building approaches the document offers a reference point that other regions can use to shape their capacity-building initiatives. Case studies highlight both successful strategies and challenges, offering actionable insights. The inclusion of innovative approaches, such as the use of cultural and creative industries (CCIs) to drive local economic growth, can inspire other regions to integrate creative solutions into their renovation efforts.

The document emphasises **creating sustainable, long-term capacity-building programs**. The strategies for capacity building and development presented in the document ensure that capacity-building efforts go beyond short-term goals. Create structures for ongoing training and development, ensuring that local actors continue to build their capacities as the project evolves. Not less important is establishing a system for monitoring progress and measuring the impact of capacity-building efforts, ensuring that the desired outcomes are achieved and maintained over time.

The capacity-building set outlined in this document provides a comprehensive, adaptable framework that can be successfully replicated in diverse urban and regional contexts. By tailoring the methodologies, training modules, and stakeholder engagement strategies to local needs, regions, cities and communities can foster the skills and knowledge required for sustainable district renovation and urban regeneration. The emphasis on digitalization, collaboration, and long-term capacity development ensures that local actors are empowered to drive inclusive, innovative, and economically resilient communities. As cities and districts across Europe and beyond look to replicate these approaches, they can leverage the insights, best practices, and innovative models provided here.

Future updates

This deliverable will not have future updates. Its contents will be transferred to the Integrated Renovation Methodology under the framework of WP1.

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List of abbreviations and acronyms

Table 25: Abbreviations used in the report.

Abbreviation	Description
drOp	Digitally enabled social district renovation processes for age-friendly environments driving social innovation and local economic development Project name
LED	Local Economic Development
ICC	Intelligent Cities Challenges
BM	Business Models
LRA	Local and Regional Authorities
IRM	Integrated Renovation Methodology

Partners logos

ANNEX I: List of case studies

Aalborg East: Ensuring co-creation in the process of renovating social and affordable homes.

LOCATION	
	Aalborg, Denmark
Pictures	*Source: Himmerland Boligforening* 
Innovation	**Social:** Ensuring co-creation in the process of renovating social and affordable homes.
	Project planning & management: Attracting and including private capital as a source for funding lighthouse districts.
	Project planning & management: Financial model and financial feasibility.
	Aalborg East is a project derived from a long-term strategy underpinned on resident co-creation to ensure quality of life for the residents. Between 2011 and 2021, the social housing company Himmerland Boligforening (HB) led the district regeneration with the support of a broad set of actors aiming to undertake an integrated approach. HB led the coalition's administrative tasks, led the institutionalisation of cross-sector support (and investment) needed for an integrated solution, and led tenant involvement. Aalborg, like many other social housing examples in Denmark, benefited from the effective financial structure in place at the national level to support large-scale renovation projects.

KEY FACTS	
Year of construction	1973
Renovation period	2011-2021
Area of intervention (m^2)	Before: 97.000 m^2 After: 114.000 m^2
Number of dwellings (before/after)	Before: 1050 After: 1220
Housing typology	☒Single-family homes

	☒ Row houses ☒Multi-apartment buildings
Housing tenure	Multi-ownership: ☒ Private rental housing (after) ☒Cooperative housing ☒Social (non-for-profit) rental housing
Number of residents	2,900
Shared facilities	Health centre with general practitioners, dermatologists, a pharmacy, a dental practice and other health services; Community centre; Fitness centre; The Himmerland Housing Association office; Kaffe Fair, a socially-responsible café, part of the FOKUS Folkeoplysning group (a cultural, creative and well-being service provider).

LOCAL PARTNERSHIP	
ROLE	**ORGANISATION**
Companies	ErhvervsNetværk 9220 (a business network created to foster collaboration, business opportunities and synergies between the companies in Aalborg East)
Municipality	Aalborg Municipality
Housing provider	Himmerland Boligforening
Other	The Danish National Building Fund

The 'Aalborg Model' was **a result of the beneficial relationship between the social housing association, the local business community, the municipality, the community association and social enterprises**. The project was underpinned in a long-term strategy based on co-creation to ensure quality of life for the residents which aimed to involve all local actors. The idea is to involve all the local actors. **HB took over the administrative functions of the business network** (180 members strong), which included Aalborg Portland, the University, and local companies and multinationals (Siemens). **The network aims at increasing the local educational and employment levels.** Universities and individual researchers were also involved to test tools and their replicability. Utility companies Aalborg Waste and Aalborg Sewage were also involved to lead on energy transition investments. The project was supported by Aalborg Municipality and received aid from the Danish National Building Fund.

FINANCIAL INFORMATION	
Funding of renovation	Significant financial support was provided by the Danish National Building Fund, financed solely by the 1 million tenants in the sector. As a type of revolving fund, it is solidary and circular and acts as a savings account for the entire affordable and social housing sector in Denmark. It us used for large renovation projects and social development plans in vulnerable housing areas. Financial support was complemented by low-interest loans designed to ensure rents remain affordable even after renovation. Both private and public investment were key for the overall renewal of Aalborg East, especially the new housing and service functions.
Total cost of renovation (€)	200.000.000 €
Subsidies received (€)	50% National Building Fund – 50% own Himmerland resources

Rent before and after renovation (€/month)	2011: 7€ per m² per month 2022: 10.5€ per m² per month
Energy bill (€/month)	2022 0.72€ per m² per month

CONTEXT	
Year of construction	1973
Renovation period	2011-2021
Area of intervention (m²)	Before: 97.000 m² After: 114.000 m²
Number of dwellings (before/after)	Before: 1050 After: 1220
Housing typology	☒Single-family homes ☒ Row houses ☒Multi-apartment buildings
Housing tenure	Multi-ownership: ☒ Private rental housing (after) ☒Cooperative housing ☒Social (non-for-profit) rental housing
Number of residents	2,900
Shared facilities	Health centre with general practitioners, dermatologists, a pharmacy, a dental practice and other health services; Community centre; Fitness centre; The Himmerland Housing Association office; Kaffe Fair, a socially-responsible café, part of the FOKUS Folkeoplysning group (a cultural, creative and well-being service provider).

In Denmark, in recent years, increasing focus has been given to reducing the number of vulnerable areas. In March 2018 the government proposed the strategy "No Parallel Societies in 2030" which classified socially vulnerable areas based on the number of foreign residents or descendants of non-western countries; residents with no access to the job market, number of residents with basic education and average income. **These were labelled 'ghetto areas' by the Danish government. Aalborg East, an area in the fourth largest city in Denmark, Aalborg, was one of them.** Primarily composed of social housing, the area was built as a satellite city in the 1970s. Construction from this period is characterised by large and uniform housing blocks, low energy efficiency, and widespread social disorder and rental-payment issues. **The district was unpopular with residents, who suffered from stigmatisation outside the neighbourhood.**

For the past 13 years a lot attention was dedicated to overturning the image of Aalborg East, primarily through tenant involvement and widespread and binding strategic partnerships.

GOALS

- Improve the living standards of households, address health-related issues and ensure the general well-being of residents.
- Minimise carbon footprint by increasing the energy efficiency of buildings and reducing the energy consumption.
- Change the image of the neighbourhood.
- Attract new residents to achieve a well-balanced residential mix.
- Collaborate with the private sector to stimulate economic growth and business opportunities.

INTERVENTIONS

- Preservation of the load bearing concrete structure of the existing homes, and the concrete façades were replaced by prefabricated wooden ones for higher quality homes and appealing architecture. Added insulation and new windows were installed.
- Addition or improvement of the green areas around the blocks.
- New contemporary design of the neighbourhood. Different materials in the building envelope (wood, brick, slade) were used in combination, selected to give the neighbourhood different architectural identities.
- Consideration of different dwelling typologies and sizes in the renovation to cater for the diverse population needs (single residents, families, etc.).
- Renovation of the city-owned district heating pipes. Radiators were replaced by larger ones. The Aalborg utility companies installed new waste grinders in the kitchens to produce biomass to power urban treatment plants. Rainwater began to be collected from roofs and streets with open basins to be infiltrated underground.
- Supply of alternative temporary accommodation options to tenants during renovation inside and outside the neighbourhood (different typologies were offered).
- Consideration of the principle of tenant democracy during the renovation process. Building committees were set up composed of tenants, who had a saying in every major decision.
- Creation of a health centre and community centre for residents, accessible to all. As the first intervention in the district, it aimed to show the investment potential of the project. The health centre welcomes 10.000 people yearly for training courses. This investment has succeeded in making the district visited by external people, who otherwise would not visit Aalborg East on a daily basis.
- Sale of the property to private investors. They redeveloped other parts of the districts, which contributed to current mix of functions, housing and ownership types.

IMPACT

Since the renovation, the district experienced significant progress, and has now become an attractive place in Aalborg where people wish to live.

After renovation, households reduced their energy use up to 50%. The dwelling types available to residents increased from 3 to 30. Biodiversity also increased as a result of the improved green spaces.

The number of active people rose, as well as the average household income (19%) in the period 2011-2017. Criminality fell by 50% in selected categories. The proportion of 20-24-year-olds who only completed primary school also declined from 25.2% to 18.4% in the period 2013 - 2017. As a result, the reputation of the district changed drastically.

Mustamäe: renovation of multi-apartment blocks, including multi-ownership challenges

LOCATION	
	Tallinn, Estonia
Pictures	*Source: Energy Cities* 
Innovation	**Project planning & management:** Tackling renovation of multi-apartment blocks, including multi-ownership challenges.
	Technical: Putting in place modular building systems.
	In the district, multi-ownership challenges were overcome through informative meetings and visits to best practices in the neighbourhood. The Tallinn University of Technology is developing different technologies to be used in renovations such as modular building systems, which have been tested on a pilot project.

ROLE	ORGANISATION
Company	Different SMEs
Municipality	Municipality of Tallinn
Housing provider	EKYL, apartment organizations
Other	Tallinn Technical University

In Mustamäe, each home renovation is part of a large project, as there are different elements which are developed in parallel. **The Mustamäe district administration is responsible for the urban planning and mobility and encourages apartment associations and private apartment owners to carry out renovations**. They carry out the renovations and decide which construction companies (usually SMEs) and technical consultants to contract. Furthermore, the Tallinn Technical University is involved in researching and developing new technologies and approaches to be used in renovations.

KEY FACTS	
Year of construction	1957 planning, 1964 first building

Renovation period	1990s first one, after 2010 more modern renovations
Area of intervention (m^2)	Inside districts there are different neighbourhoods, difficult to estimate
Number of dwellings (before/after)	The number of dwellings remained the same.
Housing typology	☒Multi-apartment buildings
Housing tenure	☒Multi-ownership
Number of residents	66,000
Shared facilities	Green areas and parks, district administration, cultural centre, library, and kindergarten.
FINANCIAL INFORMATION	
Funding sources	Different, depending on stakeholders. The district administration has its own funding. Apartment associations use loans (in Estonia there is a special financial product for renovation - KredEX) and state renovation grants. KredEX both facilitates access to bank loans and provides grants for renovations. The Tallinn Technical University receives EU funding by participating in European projects.
Total cost of renovation (€)	A typical 5 storey building costs around 2 million €
Subsidies received (€)	Usually, buildings in Mustamäe receive 30-40% of renovation costs as a grant from KredEx.
Rent before and after renovation (€/month)	The district is mostly resident owned. Prices of properties go up after renovations, and this is a reason for renovating for residents. Many young families move there because still more affordable than real estate projects.
Energy bill (€/month)	Lower after renovation. The amount varies according to the building typology and specific factors.

CONTEXT

Mustamäe district, the « black hill » district in Estonian, was built in the South-West of Tallinn in 1952. It was the first soviet district to be built in the country after World War II, during which 53% of housing was demolished in Tallinn. The famous “Khrushchyovka” model (named after Nikita Khrushchev) was used for the construction of its 330 apartment buildings. These prefabricated panel buildings were spread all over the Soviet Union in the 1950s and the 1960s. The functionality of the district changed when Tallinn University of Technology was moved to Mustamäe in 1962. Along with the high immigration from other parts of the Soviet Union, setting up a university in the district contributed to an already fast growth of population. From 7,000 residents at the beginning of the construction, the neighbourhood reached 80,000 residents in 1972. At that time, living in the district was a synonym for modernity and comfort for the residing families and students. However, by the 1990s, the image of the district had deteriorated altogether, as well as the conditions of the buildings. This led to a first wave of renovation including the renewal of heating units and insulation of facades.

GOALS

Update the housing stock and improve the energy efficiency of buildings.

INTERVENTIONS

- Improvement of the insulation.
- Rebuilding of the heating systems.

- Installation of solar panels and heat pumps (but district heating remained the main source of energy).
- Installation of a new ventilation system.
- Awareness Raising of the homeowners and apartment managers on how to implement renovations through consultations organised by EKYL.
- Organisation of events to inform and motivate apartment associations to initiate renovations, by the district administration.
- Development of a standardized renovation solution model based on modular processes and prefabricated panels, which is often used in renovations by the Technical University of Tallinn. The pilot project was the renovation of a dormitory for postgraduate students, which became the first multi-apartment building renovated with prefabricated panels in Estonia. The project deployed prefabricated wooden modular elements and a 3D laser scanning technology to obtain highly precise geometry of the building façades and balconies. Solar panels for electricity and hot water were also installed, together with a greywater heat recovery system, sensors and internet-based logging system to monitor energy and water consumption. The dorm now classifies as a nearly Zero Energy Building (nZEB).

IMPACT

The objective of improving buildings' conditions in the district is being achieved, as more than 210 apartment buildings have undergone full facade renovation and 84 partial renovations (data from November 2022). Thanks to the installation of new ventilation systems compliant to today's standards, the apartments have now a healthy indoor climate. The use of the prefabricated models designed by the Tallinn Technical University makes renovation quicker and easier, and this enables inhabitants to stay home during the renovation works, given their short duration. Another effect of the renovations is that the district is considered to be safer, as crime level started dropping after the regeneration of the area, which is now more suitable for families.

LESSONS FOR THE FUTURE

- Financial incentives, even minimal, motivate people to move forward and make decisions in terms of renovations.
- Showcasing best practices has proved beneficial, especially to home-owners potentially interested in renovating their property. One should bear in mind though, reaching consensus is a lengthy process.
- Collaboration with local authorities is necessary.
- In Estonia it is not possible yet to apply for a reconstruction grant for an aggregation of apartment associations, which means that each apartment association has to apply for the grant separately, but, ideally, it is something that should be sought.
- In Estonia it is possible to access funding from three different sources: Kredex, the municipality or academia. The latter option was deemed the most effective, as academia connects scientific work with practical work.

Caserne de Reuilly: an urban regeneration project providing affordable housing in Paris' city centre

Location	Paris, France
Pictures	 *Source: Paris Habitat*
Innovation	**Project planning & management:** Teaming up with local authorities for the uptake of new technologies.
	Technical: Ensuring a combination of purposes possible (housing, economic, leisure, nature) through spatial planning and urban planning approaches.
	Technical: Maximize circularity in district renovation or construction.
	The Caserne de Reuilly is an urban regeneration project providing affordable housing in Paris' city centre. It forms part of the City of Paris long-term vision of a sustainable city. Formerly owned by the Ministry of Defense, the Reuilly military barracks was transformed to increase the supply of social and affordable housing in Paris. Public housing company Paris Habitat, the City of Paris, the State and other local stakeholders delivered the renovation of the barracks, favouring circularity principles while keeping the architectural heritage and the site's memory. In the context of a highly urbanized city, the Reuilly Barracks now houses affordable and social dwellings, a student residence, a nursery, common gardens, and commercial activities. A new neighbourhood emerged out of this previously inaccessible area.

LOCAL PARTNERSHIP	
ROLE	**ORGANISATION**
Company	Hh2o0 Architectures; Lin Architects Urbanists; Lacroix Chessex; Mir Architectes; Anyoji Beltrando; Charles- Henri Tachon; NP2F and Office Kersten Geers; David Van SeverenKGDVS; French Zero Waste House; Rotor.

Municipality	City of Paris
Housing provider	Paris Habitat (project management and development)
Other	French government; Architectes des Bâtiments de France (ABF); Action Logement ; Caisse des Dépôts et Consignations (CDC); CDC GPI ; European Investment Bank (EIB). CROUS de Paris (students housing), residents of the neighborhood

The City of Paris purchased the former military site from the French government for 40,000,000 €, and entrusted Paris Habitat as the manager and developer of the regeneration project. The City of Paris remained as the main advisor concerning urban planning rules and the design of public space such as gardens and nurseries. Paris Habitat then sold one of the renovated buildings to CDC GPI (French investor real estate group) for private rental housing, where rents are regulated by the City of Paris over a 20-year period. Throughout the project, Paris Habitat was responsible for meeting the financial and policy guidelines set by the French government for the acquisition of the site.
A competitive bid was organised to select the lead architect (H20 team) who was therefore entrusted with the development of the site and the coordination between the different architect teams. Additionally, 6 teams of architects were chosen for the different projects that compose the whole programme. “Architectes des Bâtiments de France (heritage architect, ABF)”, State architects in charge of preserving historical heritage. The young Belgian company Rotor also accompanied project stakeholders in adopting circularity by setting up an inventory of the materials on site, and analysed the life cycle of its components, the possible deconstruction of some elements, the conditions and potential for their re-use.

KEY FACTS	
Year of construction	17th century
Renovation period	2013-2020
Area of intervention (m^2)	20,000 m^2
Number of dwellings (before/after)	582
Housing typology	☒Multi-apartment buildings
Housing tenure	Multi-ownership: ☒Private rental housing (30% private rent-controlled accommodation units.) ☒Public rental housing (50% family accommodation, PLUS, PLS and PLAI, student accommodation) ☒Affordable rental housing (20% intermediary housing (PLI)
Number of residents	1,500-2,000
Shared facilities	Bicycle facility; public nursery; public garden and passageway; urban agriculture rooftops; shops and restaurants; facilities for local associations; artist workshops.
FINANCIAL INFORMATION	
Funding sources	City of Paris; Région Île-de-France; French government; Action Logement European Investment Bank (EIB); Caisse des Dépôts et Consignations (CDC); Paris Habitat.
Total cost of renovation (€)	149,000,000 € (including land cost)
Subsidies received (€)	16,038,581 € Public (assisted) loans: 37,750,650 €

Rent before and after renovation (€/month)	• Social and affordable rents: 7.30 - 13 €/m² • Affordable rental housing Private-controlled rents: 16.8 €/m² • Private controlled rents: 23-25 €/m² **in 2020 prices*
Energy bill (€/month)	N/A

CONTEXT

Formerly a royal mirror glass factory (XVII) and later owned by the Ministry of Defense (1830), the Reuilly barracks occupied over two hectares of land in the heart of Paris, between Place de la Bastille and Place de la Nation, a well-connected area, served by a dense public transport network (bus, metro) and cycle paths. Like a hundred other real estate and property lots in Paris, in 2006 these barracks had been marked for the development of 50% social housing in the Local Urban Development Plan. As time went by, the barracks no longer met the needs of the army. Hence, the State decided to sell them in order to rationalise its real estate holdings. In 2013, the Government voted the Duflot Law, enabling the State and other large public operators to sell real estate at prices below their market value in order to encourage the creation of social housing. This law allows social housing providers to acquire land or buildings below the local market price and therefore make their projects economically sound. The Reuilly Barracks became part of the goal to facilitate the creation of social housing in France, and particularly Paris. After extensive negotiations between the City of Paris authorities, the State and Paris Habitat, the housing programme and the financial conditions for the purchase of the property were agreed.

GOALS

- Preserve the cultural heritage and architectural character of the site.
- Reduce the carbon footprint of the renovation (through circular construction).
- Build new dwellings and increase urban density to meet the high affordable housing demand in Paris.
- Increase the quality of housing in the heart of Paris and improve the living conditions of Parisians.
- Increase natural / green spaces and shared places for residents and visitors.
- Open up the access to neighbourhood, in contrast with the enclosedness of the previous occupation.
- Promote social and functional mix in the district.

INTERVENTIONS

- Construction and renovation of mixed-use buildings: 50% social and student dwellings; 20% affordable intermediate dwellings; 30% private rent-controlled dwellings; and a nursery. Commercial premises and green areas were also included. All the accommodation units are accessible for people with reduced mobility.
- Preservation of materials on site: the Reuilly Barracks' iron gate, timber frame, emblematic wooden stairway and stone wall were kept along with the architectural and cultural heritage. In total, more than 600 tons of materials were reused.
- Installation of eleven different types of materials: radiators, sandstone pavements, wooden cupboards, steel grids, ceramic sinks, slate roofs, luminaires and laminate panels were reused on site, refurbished on site or elsewhere. Old cobblestones were recovered and adapted for public passageways and garden paths.

- Integration of rainwater management systems such as green areas and roofs, grass paving stones and valley gutters were implemented to recover rain water.
- Connection of the private building to the heating network of the Urban Heating Parisian Company, which includes an important and increasing part of recovered renewable energy – aerothermal and photovoltaic systems are in place.
- Usage of three roofs for urban agriculture: a small urban farm of about 170 m2, managed by an association, whose production is sold locally. The green areas include a shared garden.
- Creation of new pedestrian paths to allow passage between the buildings, through the garden and green places.
- Organisation of public meetings, open-door consultations and co-design workshops with local residents, project architects, ABF and the City of Paris to stimulate active engagement in the project. Awareness raising about social housing was emphasised. Anthropologists and urbanists were key in the facilitation of these activities. Citizen engagement actives have become common practice in Paris Habitat and are often a pre-condition to get building permission in France.
- During the time where the site was under study, rental of Paris Habitat ground floor spaces to associations, with the objective of opening up the site to the neighbourhood.

IMPACT

The regeneration of Caserne de Reuilly greatly improved the neighbourhood's daily life and social mix by providing a range of affordable housing options, 4,800 m^2 of public garden, basic services, retail and recreational space. A space that was once only reserved for military use has now been made accessible to Parisians.

The Caserne de Reuilly is now considered as reference of circular affordable housing in the City of Paris and France. Beyond Paris Habitat's housing operations, the project has brought some experience that can now be transferred to other housing projects interested in applying circular renovation practices.

LESSONS LEARNED FOR THE FUTURE

- Being the leading party in charge of the design, management and development of the project helped Paris Habitat in making the process more efficient and actively influence the decision-making process.
- The project faced some challenges related to the renovation of classified buildings (high heritage relevance) as it implied modernising and therefore altering some architectural features.
- As a brownfield development, assessing the degree of pollution in the soil and its later removal was required to include vegetation, which added complexity and additional costs.
- The Caserne de Reuilly renovation was a pioneering project in 2013, and adopting circular principles and the practice of reusing materials was only starting. Today, Paris Habitat would recommend including circularity obligations from the conceptual phase in the contracts.

Wir inHAUSer: Temporary accommodation for tenants during renovation period.

Location	Salzburg, Austria
Pictures	*Source: Heimat Österreich* 
Innovation	**Project planning & management:** Temporary accommodation for tenants during renovation period.
	Project planning & management: Ensure cost-neutrality for residents after the renovation operation.
	Technical: Ensuring a combination of purposes possible (housing, economic, leisure, nature) through spatial planning and urban planning approaches.
	Wir inHAUSer project can be described as remarkable in terms of its comprehensive concept to minimise carbon footprint through energy use, where the innovative mobility approach assumed a pioneering role. The aim was to reduce the use of private cars to a minimum through alternative means of transportation. Another outstanding feature of the Wir inHAUSer project was the management of temporary accommodation for tenants who had to move out for one and a half years during renovation works. The relocation process was facilitated by the cooperation of the five social housing providers in Salzburg who made available their stock. Tenants were guaranteed the opportunity to return after project completion (also to have a saying in the planning) or were helped to find an apartment. The renovation investment was not reflected on a rent hike. The cost of the refurbishment was funded with the national social housing system in Austria, where rents are calculated based on the cost of the refurbishment.

LOCAL PARTNERSHIP

ROLE	ORGANISATION
Company	Energy Consulting Austria (ECA); MO.Point (e-mobility sharing services); FAMILY OF POWER e-Carsharing; BERGFREUND GmbH SMART CITY PRODUCTS
Municipality	City of Salzburg
Housing provider	Heimat Österreich (project leader)

Other	Salzburger Institut für Raumordnung&Wohnen (SIR); Fachhochschule Salzburg, Applied Sciences University; Stadt Land Berg (Sociology expert); Klima- und Energiefonds

The buildings were property of the Salzburg municipality, later leased to developer Heimat Österreich for 100 years at a below-market rate under the condition of renovating the district. The Salzburg regional authority facilitated the grant through a regional subsidy mechanism specific to housing. A collaborative planning process was organised. Residents completed a survey to help identify issues and needs in the area and were given a say in the design of the floor spaces. A multi-stakeholder steering group was established to focus on common targets and agree on the goals for a successful renovation process through a quality agreement, used for the quality assurance throughout the project. Thanks to the accompanying research by the Salzburg University of Applied Sciences and the Salzburg Institute for Regional Planning and Housing (SIR) - financed by the Climate and Energy Fund as part of its “Smart Cities Initiative” - a comprehensive renovation concept for the project was developed. SIR is a competence centre for sustainable neighbourhoods. Based on two research projects, "ZeCaRe" (Zero Carbon Refurbishment) and "ZeCaMo" (Zero Carbon Mobility), they explored the question of how existing residential buildings could be upgraded with innovative mobility services with minimal negative ecological impact. In Austria, the system of limited-profit-housing associations often has SMEs as subsidiaries attached to the building company itself. In this case Energy Consulting Austria (ECA) designed the heating and power supply system for the project. MO.Point (e-mobility sharing services) designed the mobility point and the mobility-concept as a whole. Later the mobility point was run (and is still being run) by FAMILY OF POWER e-Carsharing, who at the same time subcontract the non-Carsharing options to other companies (bike-sharing, cargo-bike-sharing, etc.). For the actual construction phase, there was a general contractor, who himself worked with many SMEs to deliver the goal.

KEY FACTS	
Year of construction	1980s
Renovation period	2020-2022
Area of intervention (m²)	6,745 m²
Number of dwellings (before/after)	75 (before) 99 (after)
Housing typology	☒Multi-apartment buildings
Housing tenure	☒Social (non-for-profit) rental housing
Number of residents	200
Shared facilities	Room Pick-Up Box for Postal Service(s); Shared Mobility Point with Sharing-Options; Shared Rooftops

FINANCIAL INFORMATION	
Funding sources	Land of Salzburg housing subsidy scheme, of which limited-profit-housing associations are able to access. (regional) Klima-und Energiefonds: extra funding for innovative process as well as innovative parts of the investment costs EU funding (Horizon2020) – syn.ikia project: monitoring, data assessment
Total cost of renovation (€)	19,000,000 €
Subsidies received (€)	10,500,000 € (Region of Salzburg housing subsidy system: 60% loan, 40% grant) Klima-und: 100,000€ (pre-concept for scan of options)

	500,000€ (concept, planning and construction) 50,000€ (mobility in practice with focus on mobility point) 50,000€ (monitoring phase for 1,5 years after construction) 10,500,000 € EU funding (Horizon2020) – syn.ikia project
Rent before and after renovation (€/month)	Before: 9.50€ (2020) After: 10.50€ (2022)
Energy bill (€/month)	Not available yet

CONTEXT

The residential housing complex in Inhauserstraße was built in 1985 by the social housing provider "Heimat Österreich". The area accommodates low-middle income residents and sits within a wealthier district in the south of Salzburg. The housing estate was only around 30 years old, but its condition already reflected the low insulation concerns of the time, which had led to high costs of heating. The buildings in Inhauserstraße were not accessible to people with disabilities, lacked natural lighting, the sound insulation on the west side of the complex facing the train tracks were poor, and were overall in dire need of repairs. Balconies and roofs were poorly designed and the lack of adequate building envelope was prone to moulding and poor indoor air quality.

GOALS

- Reduce carbon emissions to a minimum with a focus on carbon-neutral construction and mobility.
- Contribute to inner-city densification (from 75 to 99 dwellings).
- Guarantee housing affordability in the Inhauserstraße area.

INTERVENTIONS

- Insulation of the exterior of the building with cellulose and an extra floor was constructed with hybrid material (wood and concrete). The architect also made the decision to keep the original wooden construction and shape of the building.
- Refurbishing of the heating system of the complex. Natural gas was switched to a heat pump which derives 45% of its energy from wastewater, 30% from waste air, and 25% from biomass pellets and photovoltaic panels on the roof with very low temperatures.
- Support to tenants during the duration of the renovation (one and a half years). The temporary accommodation of the tenants was ensured by five other social housing providers in the city, who offered their dwellings for the temporary accommodation.
- Offer for use by the tenants of the "Mobility Point", a room of approx. 25 m^2 (accessible to all residents using their own key), comprising sharing products (mobility modules): bicycle basket trailers, bicycle child trailers, e-scooters and e-bikes, an e-cargo pedelec and an e-car. The charging stations for the e-mobility modules are located directly in or in front of the Mobility Point. The number of parking spots was reduced.
- Set up of a parcel room to save unnecessary journeys and related CO_2 emissions. It contains the MYFLEXBOX, an intelligently networked and flexibly usable locker system in which parcels and other items can be safely deposited and picked up around the clock.
- Use of the Klimaaktiv building certification as a standard to guarantee the quality assurance of buildings and neighbourhoods through the construction process.
- Monitoring of the project (two-years) carried out to check whether the goals could be achieved (EU project Syn.ikia).

IMPACT

Wir InHAUSer has received multiple awards for their collaborative planning and design process as well as the carbon-neutral approach in construction and innovative mobility strategy. Notably, the project was recognised as klimaaktiv: GOLD award - quality mark for sustainable residential and service buildings for achieving 929 out of a possible 1000 points.
The project had positive externalities on the housing sector in Salzburg, having encouraged both social and private housing providers to adopting a similar heating system and mobility management strategy.

LESSONS LEARNED FOR THE FUTURE

- At the start of the Wir inHAUSer project, it was necessary to form a planning team. Having a cooperative planning process helped in creating team-spirit amongst stakeholders, minimising objections and creating a shared innovation pathway, outside of conventional renovation practices. Additional dedicated funding for the collaborative process was instrumental given the extensive time and resources required to foster local engagement. The relationship to the neighbours, future inhabitants and companies was ever improving.
- The cooperative planning process helped with resident buy-in. The process was difficult: at the outset, three different groups were objecting to the project. With their involvement in the process their expectations were successfully managed.
- The collaboration and exchange of ideas facilitated by an EU-funded project uncovered urban planning trends and practices at an international level which ended up informing the approach of Wir inHAUSer.
- Keeping the investment renovation costs down, in order to limit rent increases was challenging. In Austria limited-profit housing sector rents must be cost-based. So, if the costs of the project rise due to an innovative but costly approach, the rents would follow. For Wir inHAUSer, achieving cost-neutrality was only possible thanks to the municipality's wish to extend the lease of the property.
- The solution to accommodate the tenants was facilitated by the extensive network that the sociologist who managed the process had with other social housing organisations.

Sociale Energie Sprong: Ensuring cost-neutrality for residents after the renovation operation

LOCAL PARTNERSHIP	
ROLE	**ORGANISATION**
Company	BAM interbuild; energinvest; Enervalis; Veb
Municipality	Hoeselt
Housing provider	Cordium
Other	Flux50; Flanders Innovation and Entrepreneurship

Location	Hoeselt, Belgium
Pictures	*Source: Cordium* 
Innovation	**Project planning & management:** Ensuring cost-neutrality for residents after the renovation operation.
	Technical: Promoting industrialised packages (standardised renovation solutions.
	Technical: Putting in place modular building systems.
	Sociale Energie Sprong has set up an renovation concept based on economies of scale to speed up the retrofit of social housing buildings in Flanders, Belgium, while maintaining the overall cost affordable. The pilot project in Hoeselt was based on the usage of industrially prefabricated external cladding and energy modules, attached externally to the buildings' façades. This process took an extraordinary time 9 days allowing tenants to remain in the building during the renovation process.

KEY FACTS	
Year of construction	1970s
Renovation period	2021-2022
Area of intervention (m^2)	N/A
Number of dwellings (before/after)	4
Housing typology	☒Semi-detached homes
Housing tenure	☒Social (non-for-profit) rental housing
Number of residents	7
Shared facilities	Collective grey water recycling facility

FINANCIAL INFORMATION	
Funding sources	Cordium

Total cost of renovation (€)	460,000€
Subsidies received (€)	86,125€
Rent before and after renovation (€/month)	Before renovation: 319.16€ After renovation: 427.08€
Energy bill (€/month)	Before renovation: 210€ (2528€ per year) After renovation: 48€ (576€ per year)

CONTEXT

The Sociale Energie Sprong is a renovation model for the social housing sector in Flanders, currently struggling with a mostly antiquated building stock. 70% of the housing market in Flanders is owner-occupied, and 6% is social housing. Given a sustained demand for affordable housing, the last couple of years saw a refocusing of policy towards increasing supply of social housing, with a target to produce 50.000 new dwellings by 2025 as well as on refurbishment the existent ones. As a result, the available budget for social housing increased substantially. Nonetheless, the financial subsidies in Flanders are mostly directed to ownership. To date, the social housing sector has been lagging behind in terms of deep renovations. Additionally, as building owners, Flemish social housing companies are mandated to bear all the costs of the renovations, while the tenants benefit from the energy savings, which represents a considerable solvency risk for the companies.

GOALS

- Accelerate energy-neutral renovation of social housing in Flanders towards 2050 climate objectives.
- Relieve social housing companies of both technical and financial constraints during the deep renovation of their building stock.
- Ensure a balance between energy production and consumption at home to reduce energy costs.

INTERVENTIONS

- Energy renovation of four dwellings including electric power supply. Homes are heated with green electricity (100%), possibly also cooled. There is also the option of energy storage, individually or at district level. Flexible energy management ensures supply and demand are kept levelled.
- Usage of BIM modelling during the planning and design phase. At the start, preparatory research was carried out involving tensile and destructive tests and 3D scanning by drones.
- Installation of solar panels for energy generation.
- Installation of the anchor system to attach the prefabricated panels during renovation works.
- Integration of new technologies integrated in an 'energy module'. This energy module works exclusively within an electrical system (heat pump, balanced ventilation system, inverter, etc.). As a result, the building is zero-emission.
- Re-use of rain- and greywater through different recovery systems (i.e., Hydraloop; IBA treatment plant).
- Installation of an insulating building envelope with a prefabricated façade (including windows) and roof. The envelope was prefabricated. As the installation per se lasted just 9 days the tenants were able to stay at home during renovations.
- Installation of an intelligent energy monitoring system with daily reports and an alert mechanism.

- Usage of standardised prefabricated façades and energy modules. Tenants were able to stay at home during the renovation period, which lasted 9 days. Tenants were also given a schedule of the renovation works and consulted frequently.

IMPACT

After the renovation, the savings on energy costs balanced the rent increases. Residents are now saving approx. 2,000€ per year compared to their previous energy bill. The impact of the renovation was also reflected in the reduced energy demand. Heat demand decreased by 89% and a reduction of 80% on the energy bill as a result. Similarly, water demand decreases by around 35% by re-using the grey water, cleaned by IBA-systems (bacteria-based) and Hydraloop. Carbon emissions have nearly been nearly neutralised with a 90% reduction per household. Most importantly, today residents benefit from better living conditions in terms of thermal comfort, air quality and sound reductions. The project results convinced the Flemish government to upscale the Sociale Energie Sprong renovation concept to other social housing dwellings in the district.

ADVICE FOR THE FUTURE

- Strong collaboration ties with stakeholders and companies in the local construction ecosystem was decisive for Cordium to deliver the renovation at record-breaking speed.
- Learning from the pitfalls of previous projects was also important when designing the renovation concept of Sociale Energie Sprong.

Innovation city Ruhr: social housing district renovation at an old coal mining area

LOCATION	Bottrop, Germany
Pictures	 *Source: Initiativkreis Ruhr*
Innovation	**Project planning and management:** Deliver SME-friendly, innovation and partnership procurement targeting social housing.
	Technical: Ensure energy efficiency at district-level by combining different sources of energy.
	Technical: Exploration of projects' aggregation.
	This project involved the aggregation of different projects distributed throughout the region which allowed the districts involved to achieve an ambitious goal of reducing CO2 emissions by 50% within 10 years. Different stakeholders took part in this initiative, including politicians, citizens and innovative small and medium-sized enterprises (SMEs) such as Technoboxx GmbH from the metal processing industry and Emschergenossenschaft, which established the world's first hybrid power plant from sewage treatment

LOCAL PARTNERSHIP

ROLE	ORGANISATION
Company	Innovation City Management GmbH (ICM)
Municipality	City of Bottrop
Housing provider	-
Other	Initiativkreis Ruhr, Credit Institution for Reconstruction

The InnovationCity Ruhr competition was introduced in 2009 by the regional entity known as Initiativkreis Ruhr, which is made up of private businesses and other local organisations. The specific goal was to test long-term strategies to reduce the CO2 emissions in the pilot area with 70.000 inhabitants by 50% by 2020. Bottrop was chosen in a multi-stage selection process among a group of 16 applicants, after submitting a participatory governance plan for a low-carbon

transition approach. In this context, the Innovation City Management GmbH (ICM) was established by the local administration to manage the project. ICM collaborated with the municipality of Bottrop, energy providers, politicians, SMEs as well as citizens and schools. They adopted a bottom-up approach by offering these stakeholders a channel where to express their ideas and advance suggestions for the project.
The pilot area of the project included the city centre as well as the districts of Batenbrock, Boy, Lehmkuhle, Ebel, Welheimer Mark and parts of Welheim. Each of these has their own office and manager. One of the reasons for this distribution was to encourage the engagement of local stakeholders.
After the end of the project, ICM offers consultations to other cities in Germany and abroad that want to develop a sustainability strategy and carry out renovations and they assist them in developing a tailored concept and master plan. For cities, the consultancy service and city development of ICM can be co-financed (up to 75%) by the Credit Institution for Reconstruction.

KEY FACTS	
Year of construction	All periods (mid-late 20th century and early 21st)
Renovation period	2010 masterplan, interventions carried out continuously from 2013 to 2020
Area of intervention (m^2)	Not applicable, aggregated projects
Number of dwellings (before/after)	Same before and after. 3657 residential buildings were modernised.
Housing typology	☒Single-family homes ☒Semi-detached homes ☒Row houses ☒Multi-apartment buildings
Housing tenure	Multi-ownership: ☒ Owner-occupancy ☒Private rental housing ☒Public rental housing ☒Cooperative housing ☒Social (non-for-profit) rental housing
Number of residents	3954 residents had an energy consultation
Shared facilities	Solar panel playgrounds in schools where children can produce energy when jumping on the panels and they can battle with other schools that have the same technology, parks, and plants on buildings and the wall of the parking lot. Tree benches with solar plants where people can charge their phones.

FINANCIAL INFORMATION	
Funding sources	The masterplan was funded with an EU grant (2010-2020). After this period, the German federal state, the North Rhine-Westphalia government, the City of Bottrop and Initiativkreis Ruhr have sponsored the project, together with private investments and research grants. After 2010, ICM had to find a new owner ("Green Zero") to be able to continue its operations.
Total cost of renovation (€)	€2.7 million modernization funding triggered a total investment of more than €20 million.

Subsidies received (€)	€2.7 million
Rent before and after renovation (€/month)	Remained unaltered (rent plus energy bills).
Energy bill (€/month)	Decreased

CONTEXT

Bottrop, a typical industrial town located in the northern Ruhr district, has a population of 117,000 residents. Its demographics have been influenced by coal mining for more than 160 years, and a large number of inhabitants have a very low income by German standards (around 18.000€ per year). The city was home to Germany's last hard coal mine, which remained operational until 2018 and was closed definitively in 2020.

GOALS

- Create new jobs to facilitate the transition from coal mining.
- Reduce the CO2 emissions by 50% by the year 2020.
- Help the residents save on energy bills and improve their thermal comfort.

INTERVENTIONS

- Organisation of activities to foster public participation. A total of 137 were organised with more than 11350 attendees. The most common and participated were the free consultations with energy experts open to private citizens and housing providers.
- As an aggregated project, a number of interventions took place in the frame of several sub-projects:
  - Insulation of building shells with diverse materials, including vacuum insulation.
  - Installation of automated building ventilation.
  - Substitution of windows with triple glazed models and thermal decoupling of balconies.
  - Installation of solar panels on roofs and façade. The PVs were connected to an electricity storage that enabled the charging for electric vehicles.
  - Installation of SmartHome technology for complete building control.
  - Installation of underfloor heating and heat pumps (solar and geothermal) with low flow-through storage tank.
  - Construction of translucent wall systems with sound insulation properties.
  - Installation of a wastewater heat recovery system.
- Interventions carried out by SMEs:
  - Technoboxx GmbH installed photovoltaic plants in 2011, which supply energy for the metal production processes such as welding, rolling or turning. Almost 300 modules with a total output of 70,000 watts (equivalent to 70 kWp) and an energy quantity of around 60,000 kWh/year generate more electricity than Technoboxx GmbH consumes on a roof area of 1,500 square meters. The photovoltaic system with an output of 70 kWp was supplemented in 2016 with a vanadium redox flow battery storage system as part of a research project.
  - Emschergenossenschaft developed the first sewage that is a “hybrid power plant”. This means that sewage sludge becomes fuel, sewage gas becomes electricity or usable gas for vehicles. In addition, hydrogen is produced in a large model experiment, which is led

via a pipeline directly to the school center, where it is converted into electricity and heat.

IMPACT

The project has achieved improved energy efficiency. The city implemented around 300 individual projects and achieved a modernization rate of over 3%, compared to the national average of 0.8%. The city's focus on energy modernisation had a tangible impact. Over 3,600 residential buildings were modernized, which is about 36% of the total stock. With an annual energy modernization rate of 3.3%, it is estimated that on average 3.3% of residential buildings are being partially or completely modernized in terms of energy every year. The modernization efforts were also able to trigger investments worth over 20 million €, with 2.7 million € in modernization funding.

InnovationCity Ruhr has been successful in engaging the local community. **Over 11,000 people participated in 437 events and over 3,900 energy consultations were conducted by the end of 2020, reaching more than 30% of all individual homeowners.** The population, including children, were involved and their contributions taken into consideration through due process. Their efforts also paid off as citizens are saving on their energy costs.

The reduction of CO2 emissions was significant. From 2010 to 2020, emissions from residential buildings decreased by 47% in Bottrop, compared to the 19% decrease at the federal level. In the industry sector, CO2 emissions decreased by 56% in Bottrop, while the decrease at federal level amounts to 5.3%. In 2020, CO2 emissions per capita (excluding the transport sector) in Bottrop were 2.44 metric tons per year, compared to 6.11 t/a nationwide.

The city's success in sustainability and energy efficiency has made this project a blueprint for other cities in the Ruhr region and elsewhere. The efforts have also had a positive impact on employment, with an increase of approximately 300 jobs over the entire period.

LESSONS LEARNT - ADVICE FOR THE FUTURE

- The process of reaching out to homeowners was sometimes challenging; less complicated when they were the owners of the whole building but increasingly so in the multi-ownership cases. Difficulties in this regard were overcome by organizing open consultations with energy consultants. In addition, 18 office quarters were established in each district as informative spaces for homeowners.
- Political involvement is needed to overcome obstacles that obstruct progress. For instance, convincing landlords to renovate can be difficult as they are unable to sell the energy produced in their buildings. The current regulatory framework in Germany mandates that residents must sell their energy to the grid, and not share it internally with the other residents in the building. Also, in Germany, the landlord cannot manage both the rent and the energy bills, and this prevents them to get back their investment by compensating the savings in energy bills with a higher rent (while the total rent will remain the same as before the renovation). In sum, it is key to closely collaborate with local and national level decision-makers to work together for improving the regulatory framework of the renovation – one that facilitates and not hinders renewable energy uptake and the distribution of the economic benefits thereof.

Vilawatt Project: setting up a public-private-citizen partnership (PPCP) to support renewable energy supply, fast renovation of private buildings & learning.

LOCATION	Viladecans, Spain
Pictures	*Source: Viladecans City Council* 
Innovation	**Project planning & management:** Teaming up with local authorities for the uptake of new technologies.
	Project planning & management: Deliver SME-friendly, innovation and partnership procurement targeting social housing.
	Social: Developing different models of co-ownership or shared ownership of accommodation or certain utilities.
	VILAWATT creation aimed to drive forward the energy transition in the Catalan city of Viladecans. The project set up a public-private-citizen partnership (PPCP), as the main governance structure to manage the 4 key services created to support the process: 100% renewable energy supply; fast renovation of private buildings; consulting services and learning communities (energy audits & contract optimisation, training and empowerment in energy culture, financing options); and efficiency incentives via the Vilawatt local currency. The project shows the potential of urban authorities to test risky and experimental ideas. Viladecans City Council was transformed into a lab where new governance and energy models and services are tested and lessons learnt.

LOCAL PARTNERSHIP

ROLE	ORGANISATION
Company	Ubiquat Tecnologies; Associació LIMA - Low Impact Mediterranean Architecture; Cercle Gespromat; EGM
Municipality	Viladecans City Council; VIGEM - Viladecans Grup d'Empreses Municipals, S.L. and VIMED.
Housing provider	Viladecans City Council

Other	ICAEN - Institut Català de l'Energia; Barcelona Urban Ecology Agency; CICLICA SCCL

Vilawatt's backbone is the public-private-citizen partnership (PPCP). Vilawatt was an UIA project[42] made up of 9 partners (public and private) coordinated by the municipality of Viladecans were involved in Vilawatt, combining different fields of expertise:

Viladecans City Council was the promoter of the UIA project supported by VIGEM and VIMED as municipal companies responsible for the technical management and implementation of the project.

Ubiquat Tecnologies was responsible for the co-design of the local energy currency; Cercle Gespromat, was in charge of the management of social mediation and legal, financial and technical aspects related to building renovation; EGM, a local energy consultant responsible for the analysis of data to create an energy information system; LIMA, promoted sustainable construction and contributing to the design of buildings with low environmental impact; CÍCLICA, a cooperative supporting community participation and engagement; Barcelona Urban Ecology Agency, supporting the implementation of the local energy operator; the Catalan Institute of Energy for the definition of the model of energy savings contract.

A key achievement was the development of a Participatory Strategic Plan that analysed the specific role played by 10 different social actors, mainly: neighbours (benefitting from all the company´s services); schools (eleven schools are implementing energy-saving programs); construction companies (they exchange ideas and good practices), unemployed (they receive trainings in the energy field) and local trades (they accept the currency).

KEY FACTS	
Year of construction	1970s
Renovation period	2016-2019
Area of intervention (m^2)	3 buildings for private dwellings
Number of dwellings (before/after)	60
Housing typology	☒Multi-apartment buildings
Housing tenure	Multi-ownership: ☒Owner-occupancy
Number of residents	51 dwellings
Shared facilities	4 open spaces for learning and knowledge exchange among citizens, business, professionals and schools; ground floor retail space.
FINANCIAL INFORMATION	
Funding sources	EU Regional Development Fund (Urban Innovative Actions)
Total cost of renovation (€)	5,300,000 €
Subsidies received (€)	4,269,862.8 € (80% ERDF)
Rent before and after renovation (€/month)	N/A
Energy bill (€/month)	The estimated real reduction has been: 54 - 58% in each building. Although not all the dwellings took part in the

[42] https://uia-initiative.eu/en/uia-cities/viladecans

	retrofitting, actions were carried out in the building common areas.

CONTEXT

The Vilawatt project was initially located in the district of Montserratina, a densely populated urban area accommodating 30% of the population in Viladecans, Catalonia. Most of dwellings were built before 1976, when Spain began to adopt energy legislation, and thus highly inefficient. Resident profiles were mixed, mostly coming from vulnerable regions within Spain and from the 1990s onwards, from outside Europe. Income was 15 % lower than the city average and six hundred households in Viladecans lived in an energy poverty situation. In an attempt to address this situation, the Viladecans City Council aimed at improving energy management, focusing on fighting energy poverty and climate change. These concerns gave rise to Vilawatt, an integrated energy operator with a joint structure that includes residents, companies and the City Council, as well as a second public institution.

GOALS

- To raise awareness on Energy Transition and Energy Efficiency among citizens and city agents in order to empower and engage them in the Energy Transition process.
- To improve governance and energy sovereignty: Renewable energy supply; Integral energy retrofitting; Creation of a local currency linked to energy savings; Creation of training programs and learning spaces for the improvement of energy culture (empowerment of citizens on energy issues).
- Contribute to the energy transition and social justice locally by addressing energy poverty from within the energy system, and by promoting secure, clean and efficient energy.

INTERVENTIONS

- Creation of a Public-Private-Citizen structure (formed by citizens, businesses, Barcelona Metropolitan Area and the Municipality of Viladecans). Creation of an Integral Energy Operator, through the PPCP.
- Deep retrofitting of three private residential buildings: passive systems renovation: Insulation of facades and roofs; Change carpentry (window frames and doors); Replacement of single glazing by double glazing; solar protection by means of awning installation in main façades. Active system renovation: New air conditioning systems; New heaters; New ventilation systems; Change of LED bulbs; Replacement of refrigerators by those with a triple A rating; installation of solar panels in building roofs (6 kw).
- Installation of photovoltaic panels.
- Creation of “energy communities” capable of sharing power when excess energy is produced (three buildings). Regulations allow to connect consumers in the district within a radius of 500 metres, even if they are not directly connected to the Vilawatt installation. Vilawatt purchases energy collectively in the wholesale market for all association members (100% Certified Renewable Energy) acting as a single customer to the suppliers and thus improving the negation power of their members.
- Introduction of a local currency (“Vilawatt”) incentives for participating families, who are paid in the currency in return for savings. This encourages loyalty to the local shops where “Vilawatt” is accepted as currency.
- Set up of an Energy Advisory Service: to raise awareness on energy efficiency in four learning spaces (schools, citizens, professionals and business); specific training in the field

of energy efficiency and renewable energies energy audit services, information/participative actions, etc., in order to promote a behavioural change.

IMPACT

The Vilawatt approach in terms of governance and energy management are now well-established procedures in the public administration.

The essence of Vilawatt has permeated the city administration. Vilawatt has become a brand for innovating and energy transition in Viladecans and beyond. Viladecans 2030 Strategy was approved in September 2021 and Vilawatt project is a driver to accomplish the mission "to make Viladecans a climate-neutral city by 2030".

Vilawatt led to the development of a City Council Innovation Model (MIA), that would have not been possible to approach that fast without the previous existence of the project. Ultimately, Vilawatt prepared the City Council to address the challenges of the municipality with a new innovative perspective.

Since the end date, 1 energy office was set up with 600 new energy contracts, 146 households were trained and engaged in a deep renovation scheme and 66 unemployed were trained in energy efficiency. Nowadays there are more than 4.000 Vilawatt currency users, and more than 400 local shops and business accepting energy currency. 47 participative actions carried out in the streets of Viladecans to raise awareness & 4 learning spaces were created.

Energy consumption has been reduced by 54-58% through deep energy renovation works (measurements recorded by the software platform connected to the dwelling's sensors). The carbon footprint has been reduced by 2750 TS CO^2/year, measured by the purchase of energy with a certificate of renewable origin by the company.

LESSONS LEARNT ADVICE FOR THE FUTURE

- Political leadership and support were key success factors for Vilawatt. It was a strategic and complex project affecting several municipal services, such as business development, energy, participative processes, education, skills development. Projects that are integrated into a broader and long-term vision and strategy on Energy Transition in the municipality, are more impactful.
- Public procurement was a major obstacle addressed. A local authority's experience in tendering out contracts to external service providers and/or purchase products through public procurement procedures, tends to be challenging in an innovation context. The complexity of the Vilawatt project and the tools led to delays and difficulties in coordinating and deploying some of the energy tools (PPCP creation, energy currency deployment, the Vilawatt Office). This made the consortium change the beneficiaries' budget to speed up the externalizations and avoid the legal complexity and administrative procedures of the planned public procurement contracts.
- The engagement of neighbours, the roll-out of the local currency, and the fiscal barriers that affected the beneficiaries of the subsidy for renovations were other challenges that Vilawatt faced and overcame. Regarding the latter, a thorough assessment of the fiscal barriers and the impact that they will represent on the tax returns of the beneficiaries is recommended before renovation (given the situation that they are low-income beneficiaries and therefore they were not obliged to declare their incomes as they were below the limit).

- Public intervention in private dwellings was complicated. The public administration should make the financial means and technical assistance available to private individuals, who ultimately should take the initiative to renovate their homes.

Progetto Energheia, Turin: Improving the energy efficiency of buildings and creating an energy community for their inhabitants

LOCATION	Pinerolo, Turin, Caselle Torinese, Borgaro Torinese, Cavour, Racconigi, Moretta, Metropolitan Area of Turin, Italy
Pictures	 *Source: Progetto Energheia*
Innovation	**Social**: Develop different models of co-ownership or shared ownership of accommodation or certain utilities.
	Technical: Ensure energy efficiency at district-level by combining different sources of energy.
	Technical: Digitise social housing service provision in an affordable, adaptable and purpose driven manner.
	Progetto Energheia is based on two pillars: improving the energy efficiency of buildings and creating an energy community for their inhabitants. Concerning the first, actions undertaken comprehend the insulation of the façade, the substitution of windows, the positioning of solar panels on the roof and the installation of a heat pump in the thermal room. The involvement of the inhabitants in the energy community is facilitated by the introduction of a gamification system through a smart device that they can use to monitor their energy consumption and to engage in "competitions" within the condominiums where they try to consume less than the neighbours.

LOCAL PARTNERSHIP

ROLE	ORGANISATION
Company	ACEA Pinerolese Energia S.r.l, Technozenith S.r.l.
Municipality	-
Housing provider	Different tenures
Other	Atenes Auc, Energy Center of Politecnico di Torino

ACEA Pinerolese Energia S.r.l and Technozenith S.r.l. formed together a joint venture called Progetto Energheia. This gave life to an initiative of collective self-consuming condominiums. The evolution of this project was facilitated by a favourable fiscal incentive at the country-level.
Atenes Auc is the cultural organisation that takes care of the social part of these energy communities. The Politecnico of Torino Energy Centre validates and analyses the data coming from the energy sharing of the condominiums.

Each renovation starts with an informative evening where the benefits of the interventions are presented to residents. If after that they are still interested, a preliminary plan is made. If there is consensus, the project is moved on to the execution phase. Progetto Energheia became increasingly popular in the Turin area thanks to word of mouth. In the waiting list, that is currently closed, there are around 50 buildings.

KEY FACTS	
Year of construction	1950-1970
Renovation period	The project started in 2018 and is still going on now in some areas. The renovation of a buildings takes three to four months on average.
Area of intervention (m^2)	Different condominiums
Number of dwellings (before/after)	No changes, but these condominiums have normally from 10 to 30 dwellings each
Housing typology	☒Multi-apartment buildings
Housing tenure	Multi-ownership : ☒ Owner-occupancy ☒Private rental housing ☒Social (non-for-profit) rental housing
Number of residents	From 70 to 100
Shared facilities	e-charging columns for bikes or cars in some cases

FINANCIAL INFORMATION	
Funding sources	Partially funded by Italian fiscal incentives, like the Superbonus 110% and 90%, two measures that were effective respectively from 2020 to 2022 and from 2023 onwards. The rest is financed by residents, who start a mortgage that is paid back with the savings in the condominium expenses due to the lower energy bill after the renovation works. The condominium and ACEA stipulate an Energy Performance contract, according to which if the energy performance after the intervention is better than expected ACEA receives the revenues but is also obliged to provide a reimbursement in the opposite case.
Total cost of renovation (€)	1/1.5 million € per building, around 40 000/45 000 € for apartment.
Subsidies received (€)	European Funding (300.000€) for ventilated wall technology and Enerboxx in the context of the project BuildHeat.
Rent before and after renovation (€/month)	Normally it stays the same, but it is not to be excluded the possibility of rising prices after the expiry of the contract (in the case of private rental).
Energy bill (€/month)	In the first condominium that was renovated 133€ for heating (1200€ per year) before and 30€ per month afterwards (370€ per year).

CONTEXT

These interventions cannot be done on historical buildings, therefore city centres are normally excluded, while renovations take place in peripheries, semi-peripheries, and villages. While the model is effective in flat regions, it is not suitable for mountainous areas due to the impracticality of heat pumps in cold climates. Another factor that is considered when deciding on a location is the distance of the construction sites from each other (ideally not more than 60 or 70 km).

GOALS

- Reducing primary energy need for heating and cooling in summer and cutting 90% of energy from the outside.
- Increasing the thermal comfort in the dwellings.
- Helping tenants and home-owners to save money on their energy bill.
- Creating social inclusion through the establishment of energy communities open to all tenants despite their income.
- Providing different flats with building automation system to regulate and control energy use, so people can monitor and adjust their consumption during the day.

INTERVENTIONS

- Insulation of the façade, ceilings and cellars through the insufflation of the interspace with glass wool and other materials, and, in some cases, using the ventilated wall technology.
- Substitution of windows with state-of-the-art double glass models.
- Installation of solar panels on each roof.
- Installation of a heat pump.
- Creation of the self-consuming community at the condominium level.
- Installation of an energy storage system in each condominium
- Ventilated walls and Enerboxx (boilers for sanitary hot water storage), funded by the EU project BuildHeat, are installed in some condominiums.
- Installation of smart meter devices in each flat.
- Offering of consultancy services to stakeholders that want to carry out similar work in other districts across Italy.

People were able to stay in their houses during the interventions. Construction workers enter the apartments only one day to change the windows, and the rest is done externally.

IMPACT

27 buildings were renovated by the end of 2022 (50 still on the waiting list). In terms of energy efficiency, these interventions resulted in an upgrade from classes D,F or G to A2 or B, and this led to an increase in the property value. On average, energy use has decreased by the 68% (from 77,91 to 24,96 kWh/m^2/year). CO2 emissions had declined as well, passing from 17,39 to 8,88 kgCO2/m^2/year.
The quality of life of residents improved not only in terms of thermal comfort but also of noise reduction, which was achieved by replacing the windows. Tenants experienced a significant reduction in their energy bill, due to gas expenses dropping from 1600€ to 370€ per year (2022). The inhabitants can now exchange the energy they produce within a condominium and rely on renewables. Thanks to the smart devices installed in their apartments, they can compete with their neighbours for who saves more energy. This has led to a virtuous cycle and has enhanced the sense of community and teamwork. This dynamic has fostered social inclusion as also more marginalised people with limited financial resources can join the community and can feel part of a team that shares a common goal (saving energy).

ADVICE TO FUTURE 'LIGHTHOUSE DISTRICTS'

- Bureaucracy was the main obstacle, especially concerning the credit transfer of the Superbonus 110% and 90%.

- Deciding which technology to use can be a trial-and-error process: it is not always easy to understand at first which are the best materials or the most cost effective option. But it is a necessary process to go through.

Renovation of 150 multi-apartment buildings in Silesia (POLAND)

CONTEXT

The Investment Programme is carried out in the Municipality of Sosnowiec, located in the Silesian Voivodeship, as well as in the whole area of the Silesian Voivodeship and in the neighbouring Voivodeships in **Poland** (Opole voivodeship, Lower Silesian Voivodeship and Lesser Poland Voivodeship). Timeline: 2023-2026

LOCAL PARTNERSHIP

ROLE	ORGANISATION
Company	-
Municipality	Municipality of Sosnowiec
Housing provider	MZBM-TBS Sosnowiec
Other	European Investment Bank

INTERVENTIONS

- Envelope insulation and improvements (walls, roofs, and floor)
- Exchange of windows, doors, etc
- Improvement/exchange of heating sources/systems
- Modernization/exchange of hot water sources/systems
- LED lighting & elevators upgrade
- Implementation of (built-in) small scale renewable energy sources.

The investments will address the renovations of the existing multi-apartment residential building. More than 150 buildings (representing around 5 000 apartments) will be renovated (equivalent to around 255 000 m^2).
The total estimated contributions are:

- Energy Efficiency – Annual total energy saved 25.54 GWh representing a reduction of 45% compared to the baseline.
- Renewable Energy – Annual total 0.75 GWh RE electricity generation.
- CO2 reductions – Annual total reductions of 9 141 CO2eq t representing a reduction of 47% compared to the baseline.

PROGRAMME SPECIFICITIES

The project is developed with the help of the ELENA programme which is providing 90 % grant assistance. ELENA provide an OSS implementation support to around 150 multi-apartment residential building owners located in the Silesian Voivodeship with possible extension to the: Opole Voivodeship, the Lower Silesian Voivodeship, and the Lesser Poland Voivodeship.
MZBM-TBS Sosnowiec creates the Project Implementation Unit (PIU) that consist of MZBM-TBS Sosnowiec existing internal staff (Project Coordinator and seven other staff members, experts working part-time for the ELENA project).
The PIU will be supported by external technical consultants, contributing to achieving the ambitious objective of renovating more than 150 multi-apartment residential buildings, targeting a reduction of the final energy consumption of around 45% and achieving annual CO2 emissions reduction of about 9 141 tons.[43]

[43] More information: WHITE Louise, ELENA programme: l.white@eib.org or at https://www.sosnowiec.pl/

Fehring: Former military barracks turned into a circular community project

LOCATION

FEHRING, AUSTRIA
The community of residents Cambium was founded in 2014 with the aim to build up an economic, social and ecological sustainable village. In 2017 the Cambium Community Project rented the former military barrack Hadik in Fehring (close to Graz, Austria) and began **to transform it into a suitable living and working area with residential units, co-working spaces, studios and a seminar facility**. In May 2019, Cambium bought the property with an "asset pool", a direct credit campaign, with over 250 investors. The goal is to build an eco-village with minimal environmental impact and therefore to implement sustainable agriculture techniques and circular building technologies.

CONTEXT

The main goal of the HOUSEFUL project[44] is to develop and demonstrate innovative integrated circular services focused on the optimal management and use of water, waste, energy and material resources during all stages of the life cycle of residential buildings (new and existing).

LOCAL PARTNERSHIP

ROLE	ORGANISATION
Company	Cambium
Municipality	Municipality of Fehring
Housing provider	-
Other	

INTERVENTIONS

The buildings for the demo sites were selected based on the following criteria:

- Spatial/geographical distribution;
- Differences in social, cultural and current practices on housing;
- Differences in national regulations regarding construction and refurbishment;
- Common European building archetypes, scale and number of dwellers per building;
- Climate differences;
- Common challenges shared by construction companies, related professionals and regional/national housing agencies.

Moreover, three of the considered buildings are social housing buildings, since one of HOUSEFUL's objectives is to demonstrate solutions capable of improving the circularity level of low-income buildings.

ISSUES TACKLED

Wastewater from bathrooms, toilets and the communal kitchen will be separated and transformed into usable resources together with other organic waste. Organic solid waste will be converted into biogas, to be used within the building. The liquid organic-waste component will be processed by a vertical plant-treatment unit, producing valuable fertilizer for agricultural use. Find out more about the HOUSEFUL innovative circular solutions scheme here: https://houseful.eu/solutions/.

[44] https://houseful.eu/demos/cambium-community-center/

La farme du rail, Paris : "An agri-urban space open to All - to welcome, train and integrate the most fragile people"

PARIS, France

CONTEXT

La Ferme du Rail[45] is the winner of the Call for Innovative Urban Projects "Réinventer Paris"; launched in November 2014 by the Paris City Hall in the 19th arrondissement. Born from the desire of residents and associations on the neighborhood for an emerging place that combines urban agriculture and solidarity, La Ferme du Rail aims to integrate disadvantaged people to whom it provides, under the impetus of the association Travail & Vie, training in suitable jobs that meet the needs of the city.

LOCAL PARTNERSHIP

ROLE	ORGANISATION
Company	REHABAIL, Atoll 75
Municipality	Paris City Hall
Housing provider	Action Logement
Other	Bail Pour Tous, FONDATION SOLIDARITE, Fondation Brageac c/o Fondation Caritas, Fondation VINCI, Travail & Vie

La Ferme is a meeting place around urban agriculture, accommodation, training and production. A hybrid project in its uses, the Farm revolves around a community of socially disrupted people and students in horticulture who live at site and further it offers the district a range of attractive services.

INTERVENTIONS

- accommodation: a Housing and Social Reintegration Center with 15 units and a student social residence with 5 units
- a farm: workshops and a production greenhouse, a mushroom farm and cultivated outdoor spaces, in permaculture, aquaponics and agroforestry
- a restaurant: open to the neighborhood, affordable cuisine, local suppliers

ADVICE FOR FUTURE PROJECTS

- **Integration of participants** and future tenants. mostly societal groups in need, during all construction phases is crucial as the site to a significant part is devoted to the employment of these people.
- Likewise, this new workforce **is trained in techniques** that promote their future employability
- **Working with near-by partners in the neighborhood**, like restaurants etc., to collect, compose and produce bio-waste, creates local visibility and acceptance for the project and it's social and environmental cause, attracts new audiences and possibly creates awareness
- The **project exceeds mere accommodation purposes** and integrates employment, environmentally conscious living and housing

[45] https://www.fermedurail.org/

Matrycs

DESCRIPTION

Project duration: October 2020 - September 2023
MATRYCS or Modular Big Data Applications for Holistic Energy Services in Buildings is a project that brings together 18 partners from 10 European and is dedicated to overcoming emerging challenges in big data management for buildings, offering an open, holistic solution tailored for Business-to-Business (B2B) platforms. It provides a competitive edge to stakeholders in the building sector and opens new market opportunities. The **MATRYCS Modular Toolbox** is designed to create a cutting-edge, AI-powered framework for decision-support models, data analytics, and visualizations, applicable to Digital Building Twins and real-world scenarios. This innovation is poised to significantly impact the building sector throughout its lifecycle by addressing diverse use cases:

- **MATRYCS-PERFORMANCE**: Monitoring and improving the energy performance of buildings.
- **MATRYCS-DESIGN**: Facilitating the design and development of building infrastructure.
- **MATRYCS-POLICY**: Supporting policy-making and assessing policy impact.
- **MATRYCS-FUND**: De-risking investments in energy efficiency.

FINANCIAL INFORMATION

Funding: Societal Challenge (Horizon 2020 /EU funding /Project)
Total project budget: €4,577,835.00
Funded by the European Union's Horizon 2020 research and innovation program, **MATRYCS** leverages modern advancements in machine learning (ML), deep learning (DL), and big data to develop a decision-making and data analytics solution for energy-efficient buildings. The project has delivered a state-of-the-art, AI-empowered framework for decision-support, analytics, and visualizations, forming a Reference Architecture for Buildings Data Exchange, Management, and Real-time Processing. This has been translated into an Open, Cloud-based Data Analytics Toolbox—the **MATRYCS Modular Toolbox**—enabling AI-driven cross-sector analytics for smart, energy-efficient buildings across three key layers: **MATRYCS-GOVERNANCE**, **MATRYCS-PROCESSING**, and **MATRYCS-ANALYTICS**.

METHODOLOGY & OBJECTIVES

MATRYCS aims to enable reliable and effective policymaking, fostering the creation of innovative services through diverse data utilization for the safe and efficient operation of buildings. The project's analytics framework will be applied, demonstrated, and validated in 11 large-scale pilots strategically selected across different regions and levels, including regional, national, and pan-European scales.

MATRYCS has outlined seven clear, measurable, and achievable objectives, categorized as follows:

1. **Scientific Objectives**:
    - Develop a data-driven Reference Architecture for scalable AI-based big data management and analytics in smart, energy-efficient buildings, ensuring secure, scalable, and fault-tolerant interoperability among platforms and technologies.
    - Create a semantic and business interoperability framework for cross-domain analytics and learning across the entire building value chain.
2. **Technological Objectives**:
    - Deliver a data governance enabler to facilitate seamless data sharing, exchange, and handling while maintaining data sovereignty, security, and protection.
    - Evolve and deploy a technology enabler for high-quality ML/DL models, leveraging existing datasets across Europe for advanced analysis and forecasting in buildings.
    - Scale and deploy the **MATRYCS** cloud-based data analytics toolbox across different deployment modes (IaaS/SaaS/PaaS), facilitating new analytics services for building stakeholders.
3. **Business Objectives**:
    - Demonstrate the applicability, effectiveness, and value of the **MATRYCS Modular Toolbox** through Digital Building Twins and real-life applications, validating their business, social, and environmental impact.

- Establish a foundation for a pan-European smart buildings ecosystem, boosting the EU data economy, standardization, and industrial clustering.

RESULTS

The MATRYCS project focuses on advancing big data applications for energy-efficient building management. Key results include:

- MATRYCS-GOVERNANCE Framework: A comprehensive approach to data governance, ensuring privacy, security, and compliance.
- End-to-End Security Framework: Secures data from collection to analysis.
- Data Processing and Analytics Tools: AI-driven tools for enhanced building energy management.
- Pilot Operation Plans: Real-world deployment strategies tested in various use cases across Europe.

It has also led to the release of almost 20 publications addressing the topics of big data solutions for energy efficiency, AI-based analytics for building management, data governance and security frameworks, and the deployment of innovative tools in real-world scenarios. The publications explore how these technologies can improve decision-making, optimize energy use, and enhance the sustainability of buildings. They also discuss the technical challenges and solutions related to data processing and security.

Kalasatama Smart City District of Helsinki[46]

CONTEXT & DESCRIPTION

The Smart Kalasatama project, led by Forum Virium, the City of Helsinki's innovation company, was launched in fall 2013 and concluded in June 2021. The project focused on transforming a centrally located former harbor area into a pioneering smart district. Development was carried out through flexible piloting and close collaboration with residents, companies, city officials, and other stakeholders. The vision for Kalasatama was to use smart services to save residents one hour of time each day, enabling a smoother daily life and better city services. The district became a model of smart urban living, with innovations in communal development, housing services, and infrastructure. Residents were involved from the beginning, shaping the neighborhood and testing smart solutions such as space-sharing, energy management, and automated transport.

OBJECTIVES

The primary objective of Smart Kalasatama was to create an Urban Living Lab—a vibrant testbed for co-creating and testing smart and sustainable solutions. The project aimed to improve the quality of life for residents by making daily activities more efficient and eco-friendly through smart technologies. Additionally, the project sought to develop scalable solutions that could be used in other areas of Helsinki. By the early 2030s, the goal is for the Kalasatama district to accommodate approximately 25,000 residents and provide jobs for 10,000 people.

RESULTS

Smart Kalasatama successfully implemented 25 agile pilots, focusing on themes such as shared spaces, green infrastructure, and sustainable living. The district became Finland’s first model area for smart energy systems, featuring large-scale solar power, smart energy storage, and eco-efficient district cooling. Smart infrastructure and housing services were developed to optimize energy consumption, waste management, and daily life. The district's innovations contributed to Helsinki being ranked the second-best smart city in the world in the 2020 Smart City Index.

[46] Smart Kalatama, (2021). *Sharing experiences from Smart Kalasatama.* https://fiksukalasatama.fi/en/sharing-experiences-from-smart-kalasatama/

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