ProLight



Replication Guidebook

Practical guidance for adapting ProLight approaches to new neighbourhoods, cities and regions.


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Today Agenda : 1

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How to use this Guidebook

This guidebook is a practical resource for organisations that want to replicate or adapt solutions developed and demonstrated in the ProLight project.

Who this guidebook is for

The guidebook is written for practitioners who are considering implementing energy renovation or community energy solutions in their city, region or organisation. This includes but is not limited to:

- Municipalities and local authorities
- Housing associations and social housing providers looking to upgrade their building stock and address energy poverty
- Regional energy agencies supporting local actors in developing and financing energy projects
- Project developers and Energy Service Companies (ESCOs) exploring replicable business models for energy services in residential contexts
- Policy makers and programme managers designing support schemes for building renovation or energy communities

How the guidebook is structured

The guidebook is organised as a three-stage journey from initial reflection to broader lessons and recommendations for wider uptake:

UNDERSTAND (Stage 1)

PREPARE THE GROUND
sets out what needs to be in place before any specific approach can succeed; the five preparation activities that proved decisive across all six ProLight demonstrations.

EXPLORE (Stage 2)

EXPLORE THE APPROACHES
presents the approaches tested in ProLight, plus a cross-cutting chapter on the role of digital tools. Each approach is described as a constellation, with a replication checklist that helps you assess whether your context is ready.

TRANSFER (Stage 3)

ADAPT & SCALE
explores how ProLight approaches can evolve when applied beyond their original demonstration context. Drawing on replication already underway within the project, it illustrates different directions of scaling and summarises broader lessons and recommendations for wider uptake.

Two short sections before the stages - *"How to get started?"* on page 5 and *"ProLight at a glance"* on page 7 - help you locate yourself in the guidebook and give you a quick orientation to the ProLight project itself.

Relationship to the ProLight project deliverables

This guidebook is the entry point to the wider ProLight body of work. The technical details of each demonstration district, the methodologies developed in the project and the evidence behind the lessons summarised here are documented in the ProLight project deliverables. References to the most relevant deliverables are provided throughout the guidebook, and an overview of key ProLight resources is included at the end to help readers explore specific topics in greater depth.

How to get started?

Before you turn to the methodology and approaches that follow, take a moment to reflect on your own situation. The ProLight demonstrations show what is possible, but whether a specific solution is right for you depends on your context, your organisation, and your starting point.

The following questions are not a formal assessment. They are intended to help you identify where you stand, which solutions are most relevant to you, and what you may need to put in place before you start.

01

What is your motivation?

Are you responding to a political mandate, a funding opportunity, a specific problem in your building stock, or a commitment to climate targets? Understanding your motivation matters because it shapes your timeline, your room for measures, and the level of ambition that is realistic. A project driven by an urgent funding deadline looks very different from one that grows out of a long-term municipal strategy.

If your motivation is unclear or not yet shared across your organisation, this is the first thing to resolve, before looking at specific solutions.

02

Who (else) needs to be involved and are they on board?

None of the ProLight solutions were implemented by a single actor. Every demonstration required coordination across organisations: municipalities, housing providers, energy agencies, contractors and residents / end-users. The question is not whether you need partners, but which partners are essential and whether they are already engaged or still need to be won over.

If you are not sure which key actors should be involved, start with a stakeholder analysis to map who is relevant, what their interests are, and where gaps in commitment exist. If key actors are missing or uncommitted, your first step is stakeholder engagement, not technical planning.

03

Do you have a realistic picture of the funding landscape?

Most ProLight solutions required a combination of public funding sources. In some cases, private sponsorship played a decisive role in making the business case work without overstretching public budgets. Before committing to a specific solution, it is worth mapping which national, regional and EU programmes are currently open, what they cover, and whether they can be combined.

If you do not yet have a clear picture of available funding, the UNDERSTAND stage of this guidebook offers a framework for thinking about the funding stacks and points you toward the right places to look for current information.



04 Does your organisation have the capacity to see this through?

ProLight demonstrations ran over multiple years and required sustained coordination, technical expertise, community engagement and administrative capacity. This does not mean you need everything in place from day one, but it does mean you need a realistic view of what your organisation can absorb, and where you will need external support. This also includes the capacity to assess whether a proposed solution is technically suitable for your specific site, either in-house or with the support of external experts. ProLight also showed that sometimes capacity is not just about resources at the start, it is also about the ability to absorb setbacks and the flexibility to adapt.

If capacity is limited, consider starting with a smaller scope or a pilot that builds experience before scaling.

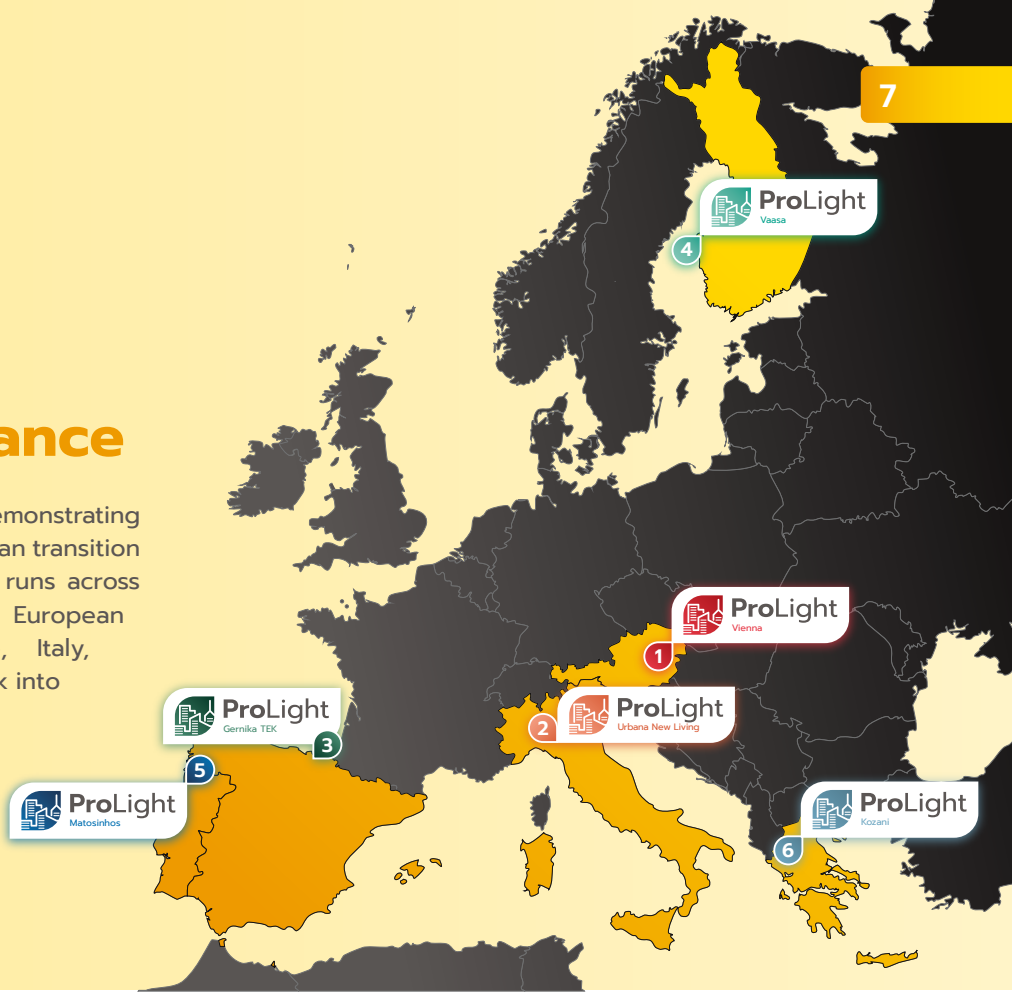
05 Which part of the challenge is hardest for you: the technology, the organisation, or the financing?

The ProLight solutions address all three dimensions. While the underlying technologies are generally mature, the main implementation bottlenecks often lie in organisational, regulatory and financial conditions. Technical suitability still needs to be verified for the specific site and context. Most Early Adopters find that the harder questions are: How do we get all owners to agree? How do we structure the operating model? How do we make the business case work without subsidy dependency? How do we keep residents engaged after the initial enthusiasm fades?

Use your answers to navigate the guidebook: "STAGE 1 - UNDERSTAND | What needs to be in place before you start?" on page 9 helps you address gaps in stakeholder alignment, funding, regulation, ownership and organisational capacity, while "STAGE 2 - EXPLORE | ProLight Approaches" on page 19 allows you to explore the ProLight approaches most relevant to your context. The chapters that follow are organised to support you wherever you are in this process.

ProLight at a glance

ProLight is a Horizon Europe project demonstrating how residential districts across Europe can transition towards climate neutrality. The project runs across six demonstration districts in six European countries (Austria, Finland, Greece, Italy, Portugal and Spain) and clusters its work into two innovation areas and the usage of ICT and apps as cross-cutting enabler.



Innovation Cluster	Demo Districts	Core Themes
1 - Building & Renovation in an energy efficient way	• Vienna (AT), • Kozani (GR)	Energy-efficient renovation and new building
2 - Energy Communities	• Gernika (ES), • Matosinhos (PT)	Renewable energy sharing and community governance
Cross-cutting - ICT & Apps	• Milan (IT), • Vaasa (FIN)	Digital monitoring, feedback and behaviour change, community, awareness building

Innovation cluster 1 – Energy Efficient Building & Renovation

Buildings account for around 40% of energy consumption in the European Union, and the residential sector remains one of the most difficult to decarbonise[1]. The technical solutions exist. Heat pumps, solar thermal systems, geothermal energy, building envelope renovation, smart controls none of these are new. What remains genuinely difficult is implementation: getting the right actors aligned, navigating complex ownership and regulatory structures, securing adequate and combinable funding, and bringing residents along through a process that disrupts their daily lives. This is the challenge that ProLight addressed in Cluster 1. Across the demonstration districts the project tested distinct approaches to energy-efficient building and renovation under real conditions.

Innovation cluster 2 – Energy communities

Renewable Energy Communities offer a way for households, businesses and public bodies to collectively produce, share and manage renewable energy. Beyond reducing emissions and energy costs, they can strengthen local participation and create new forms of shared ownership and decision-making in the energy transition.

1 European Commission (2026): Energy Performance of Buildings Directive, https://energy.ec.europa.eu/topics/energy-efficiency/energy-performance-buildings/energy-performance-buildings-directive_en (accessed: March 2026)

While the policy framework for energy communities has developed considerably across Europe, implementation remains highly context-dependent. National and regional regulations, grid and metering procedures, governance arrangements, access to suitable generation assets and the capacity of participating organisations can all determine whether a community that appears viable on paper can become operational in practice.

ProLight explored two distinct approaches to Renewable Energy Community implementation in Gernika, Spain, and Matosinhos, Portugal. The Gernika demonstration builds on an existing and trusted local community network, with a school acting as an anchor for the energy community. The Matosinhos demonstration explores a publicly led model in social housing, where the municipality and housing management structures play a central role in enabling participation. Together, the two cases illustrate how different starting points and governance models shape the implementation pathway and the conditions for replication.

ICT & Apps as cross-cutting enabler

Digital tools and applications are treated in ProLight as cross-cutting enablers rather than standalone replication approaches. Across the demonstration districts, they support different aspects of implementation, including energy monitoring, communication, resident engagement and more sustainable energy use.

Their value depends not only on the technology itself, but on how well the service responds to local needs and integrates with existing systems and organisational structures. Access to reliable energy data, clear responsibilities for operation and maintenance, and a reason for users to engage with the service over time are therefore important conditions for successful implementation.

Experiences from the ProLight demonstrations in Milan and Vaasa show that digital services can be particularly effective when energy-related functions are combined with services that are useful in residents' everyday lives. This can support regular use of the platform and create additional opportunities for communication, awareness and community engagement.

Each demonstration district faced different constraints, involved different actors, and produced different lessons. The replication value therefore lies not only in the technical solutions themselves, but in understanding the conditions, delivery models and organisational arrangements that made implementation possible.



Stage 1 - UNDERSTAND

What needs to be in place before you start?

Across all six demonstrations, ProLight surfaced a set of preparation activities that proved decisive. They form the common ground that replication projects need to address before the detailed technical and organisational design can succeed.

This stage presents five preparation activities: mapping stakeholders, building a funding stack, testing regulatory and administrative feasibility, clarifying ownership and responsibilities, and assessing organisational capacity. They are not a checklist to work through once and tick off. They are interconnected: a weakness in one dimension can easily create barriers in another.

Preliminary technical and site-specific feasibility should be considered alongside these activities. The capacity to assess technical suitability is addressed in Section 5, while more specific technical requirements are included in the approach-specific replication checklists in Stage 2.

Each activity is presented in two parts: what ProLight learned from the demonstrations, and how to translate that learning into your own context. References to the underlying ProLight deliverables are provided at the end of each activity for those who want to go deeper.

01 Map your stakeholders and their level of engagement

Stakeholder engagement is not a single activity but a set of decisions about who needs to be involved, at what depth, and with what continuity. The starting point is a structured map.



What ProLight learned

In every demonstration, the project teams worked with a stakeholder analysis that captured for each actor: who they are, how the project affects them and how they affect the project, their level of impact and influence, their position toward the project, and the engagement strategy required. Vaasa's experience makes the case for taking this seriously: a citizen group identified during the mapping as a potential opponent successfully appealed the planning permit and the original site had to be abandoned. The mapping had been done, the lesson was that opposition deserves the same engagement attention as support.

A second consistent observation is that engagement is not an event but a sequence. Demonstrations that built durable engagement moved through several formats over time: visible public events to establish presence, smaller workshops to deepen specific topics, and ongoing structures to maintain continuity once the initial attention faded. Vienna established an End-Users Advisory and Interest Group that has met regularly across the project's three years. Gernika holds coordination meetings with energy community members alongside annual public events.

A third observation concerns who carries that engagement forward within the community itself. In each community there is typically an existing anchoring point, a trusted person or entity already respected within the local context, and stakeholder mapping should identify and deliberately leverage this anchor rather than attempting to build trust from scratch. This anchor can take different forms: in Spain's Gernika demo, the local school itself served this role, lending the energy community credibility and also opening a channel to reach households through their children. In the Italian demo, a community manager played an equivalent function, acting as a sustained point of contact and trust-builder among residents.

What's relevant for your own context?

1. **List your stakeholders systematically.** For each, record who they are, what role they will play, what they stand to gain or lose, their current position toward the project, and any formal decision, consent or approval rights they hold. The Stakeholder Analysis Tool Template developed in ProLight (D4.1, Annex A) provides a complete worksheet that can be used directly.

2. **Map adversaries explicitly, not just allies.** Opposition that is visible in the analysis can be engaged. Opposition that is overlooked becomes a planning permit appeal months later.

3. **Identify your intermediary.** Across the ProLight demonstrations, trusted organisations or individuals played an important bridging role between technical, financial and social dimensions. Consider who can perform this function in your project. If no credible actor or coordination structure exists, establishing one should be treated as an early priority.

4. **Plan engagement as a sequence.** For each stakeholder group, decide which formats you will use, at what intervals, and at which project milestones their input or agreement is required. Engagement should be aligned with key decisions rather than organised only as general communication.

5. **Plan for new occupants over time.** Especially in apartment buildings and over the multi-year horizon of a renovation project, residents move in and out. Engagement built only around the residents present at project start will lose ground. Build in onboarding materials, recurring information sessions, or a designated community contact



Find more detailed information on stakeholder mapping and engagement in ProLight Stakeholder Mapping and Activator Plan (Deliverable D4.1) and Stakeholder Engagement for Replication Requirements (Deliverable D4.3).

02 Build your funding stack across multiple sources

One of the clearest cross-cutting findings from ProLight is that none of the six demonstrations was financed from a single source.



What ProLight learned

Every demonstration combined public funding, regional or national programmes, EU instruments, and in several cases private contributions or sponsorships. Two specific patterns deserve attention because they have proven replicable across contexts:

The sponsorship model developed in Kozani started with one apartment planned and ended up renovating three, because local construction companies and material suppliers contributed expertise and resources alongside public funding. This model works where there is a credible local coordinator (in Kozani's case, CluBE and the municipality), where sponsors gain visibility through their contribution, and where the social purpose is clearly communicated.

The alignment with metropolitan climate frameworks can be also important. All lighthouse districts are located within cities following ambitions to become climate neutral. Some of the cities are also part of EU's Climate Neutral and Smart Cities Mission (Milan, Kozani, Porto). These Climate City Contracts open access to dedicated EU funding, capacity-building tools, and matchmaking with public, private, and academic actors. Where a municipality is among the Mission Cities or has comparable climate frameworks in place, this can substantially expand the funding stack available.

Eventually, the choice of financing model should also be matched to the replication phase itself, rather than fixed once and carried forward unchanged. Sponsorship or third-party investment, as in Kozani's model or in the ESCO structure used in Vienna, can be a good fit for a first-of-a-kind demonstration, particularly where the technical solution is risky, complex, or unproven locally, since it shifts execution risk away from the building owner and toward a partner already equipped to carry it. Once a track record and monitored performance data exist, as this report itself aims to provide, that risk premium becomes easier to justify removing, and wider replication may be better served by a different model, such as direct ownership or a cooperative structure, that avoids the ongoing margin a sponsor or third-party investor requires. Vienna's own replication at Sulmgasse illustrates this shift directly: the same technical solution, delivered without an ESCO, at a lower cost.

What's relevant for your own context?

1. **Think in three categories of capital.** Own resources (equity from the project lead), non-repayable funding (grants, subsidies, etc.), and repayable financing (loans, bonds, energy service contracting). A viable funding stack typically draws on a combination of these.
2. **Identify potential sources.** Consider not only capital investment and operation, but also the pre-development work needed to make the project investment-ready, such as technical feasibility studies, design, legal and procurement support, permitting and stakeholder engagement. Different activities may require different funding instruments. Verify

Find more detailed information on funding and business models in ProLight Benchmarking report (Deliverable D2.4) and Advanced Roll-out strategy (Deliverable D3.1). Note: Specific funding programmes might change over time.



that the sources can legally be combined for the same project, as some grants may exclude other forms of public funding.

3. **Check the timing as well as the amount of funding.** Map when each source becomes available and whether reimbursement schedules, co-financing requirements or delays could create temporary financing gaps. Make sure the project lead has sufficient liquidity to bridge these periods where necessary.

4. **Assess sponsorship potential.** For projects serving vulnerable populations or addressing energy poverty, private sponsorship from construction companies, material suppliers, or regional businesses can add a meaningful layer to the stack. Because sponsorship is less predictable than contractual or grant-based funding, it should normally be treated as a complementary source rather than assumed as the sole basis of the financing model.

5. **Check alignment with metropolitan climate frameworks.** If your municipality is part of the EU Mission for 100 Climate-Neutral Cities, holds a Climate City Contract, or participates in comparable national programmes, additional funding and matchmaking channels may be available.

6. **For energy community projects specifically, consider member equity (entry fees and ongoing contributions) and citizen crowdfunding as complementary sources.** Be aware that entry costs and ongoing contributions can become a barrier for vulnerable households and effectively exclude the very groups whose participation is often a stated goal of the community. Where this risk is present, design tiered contribution models, subsidised membership for low-income participants, or financing routes that do not depend on member equity at all.

03 Test your project against regulatory and administrative blockers

Regulatory and administrative frameworks vary substantially across Europe, and the details can determine whether a project is feasible and how long it takes to become operational. The same ambition can be straightforward to implement in one context and require significant adaptation in another. Regulatory feasibility should be assessed alongside preliminary technical and site-specific suitability. This section focuses on the legal and administrative pathway; the capacity to assess technical feasibility is addressed in Section 5.



What ProLight learned

ProLight has encountered enough specific regulatory blockers to identify patterns that recur:

Public procurement constraints. Where the project lead is a public entity, most major decisions need to follow public procurement rules. This affects supplier selection, asset transfers, and even the appointment of operating entities. Carcavelos demonstration stalled in part because the appointment of a Collective Self-Consumption Managing Entity had to follow public procurement, creating delays incompatible with the project timeline. Where a private investor wanted to donate photovoltaic equipment to the municipality, public procurement rules made the direct donation legally complicated. The pattern is generalisable: procurement constraints can sometimes be loosened by introducing an additional, appropriately positioned actor.

Planning and permitting constraints. Site-specific rules can affect not only the timeline but also the technical configuration of a project. In Vienna, heritage protection restricted the use of photovoltaic panels on façades, while shared infrastructure also depended on securing the necessary consent for installations on common property. Such constraints should be identified early, while there is still scope to adapt the technical design or implementation approach.

Eligibility conditions: Concerns the eligibility of existing assets within energy community frameworks. National regulations differ on whether PV installations existing before the community is formally established can be brought into the community, on which legal forms the lead entity must take, and on the physical or grid perimeter within which sharing is permitted. These details are not always visible from EU-level documents and require verification at national or regional level, sometimes early enough to determine whether a specific approach is feasible at all.

Administrative lead times: A third recurring pattern concerns the gap between physical installation and operational start. In EC projects, photovoltaic systems and associated hardware can be installed well ahead of the point at which energy sharing can actually begin, because the intervening steps, including grid connection approvals, metering configuration, registration of the community with the relevant authority, and activation of the sharing mechanism by the network operator, each follow their own administrative timeline and are rarely coordinated. The result is a period during which assets sit idle, which creates financial pressure on project budgets and can also complicate communication with participating households, and potentially erode trust in the initiative. Project planning should therefore treat the administrative pathway to first sharing as a critical path item, budgeting both time and resources accordingly.

What's relevant for your own context?

1. **Verify the legal pathway for your chosen approach early.** For energy communities, confirm the eligible legal forms, participant types, generation assets and applicable geographical or grid-sharing perimeter under national regulation. For shared energy infrastructure, clarify the rules governing installations across properties, grid connections and shared assets.

2. **Identify procurement constraints before they materialise as delays.** Where the project lead is a public entity, identify which services, equipment, asset transfers or operating roles require formal procurement procedures and factor realistic procurement timelines into project planning.

3. **Map the full administrative pathway from installation to operation.** Identify all approvals and procedural steps required before the system can become operational, including permitting, grid connection, metering, registration and activation where relevant. Clarify who is responsible for each step, how the steps depend on one another and how long they are likely to take. Treat this pathway as part of the project's critical path.

4. **Screen site-specific planning and permitting requirements early.** Check whether building and planning permissions, heritage restrictions, land-use conditions, drilling or excavation permits, grid requirements or other site-specific rules could affect the proposed solution. Where relevant, involve the responsible authorities early enough to adapt the project design before major commitments are made.

5. **Check whether relevant rules are changing.** Identify regulatory reforms, tariff changes or revised compensation mechanisms that could affect the project during development or operation. Where significant changes are expected, test the business case and delivery model against more than one plausible regulatory scenario.



04 Clarify ownership, use and decision rights before you start

Regardless of the approach chosen, ownership, use and decision rights need to be clarified before implementation begins. These questions can appear straightforward when considered separately, but uncertainty about who owns, uses, decides over or maintains an asset can create delays and disputes later in the project.



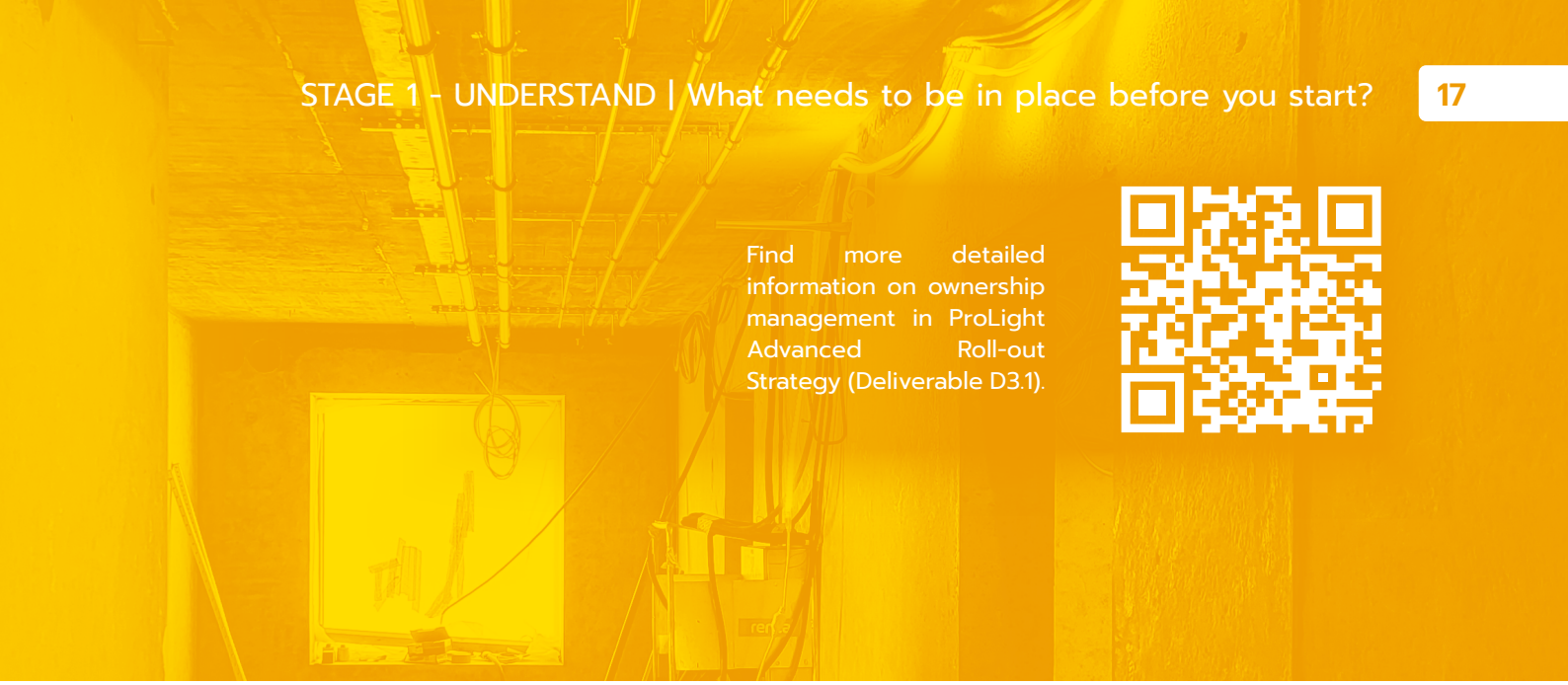
What ProLight learned

Across the demonstrations, ownership ambiguity has been a recurring source of delay and dispute. Building and land ownership is the most visible dimension, but installations and devices, and the data they generate, are equally important and often involve different actors.

Buildings and land ownership matter because shared infrastructure cannot be installed where ownership is fragmented without a coordinating mechanism. In Vienna's demonstration site the residential buildings have multiple owners, and the shared geothermal infrastructure required a coordination structure across all of them. Without that structure, the approach is not feasible. Installation and device ownership defines who is responsible for maintenance, who benefits from the energy produced, and who carries the financial risk if something fails. This is rarely the same actor as the building owner. Energy service contracting models, for instance, deliberately separate building ownership from system ownership, with the system owner taking on both the investment and the performance risk.

Data ownership has become operationally relevant for the digital tools deployed. Who owns the consumption data, who has the right to use it, share it, or analyse it. These are no longer abstract questions once the platforms are live. In projects involving vulnerable populations, data ownership is also a question of dignity and trust.

Decision and consent rights can be as important as ownership itself. An actor does not necessarily need to own an asset to influence whether it can be installed or operated. In projects involving shared property or several owners, formal consent requirements and decision thresholds can determine whether a technically viable solution can proceed. These rights should therefore be mapped alongside ownership from the beginning.



Find more detailed information on ownership management in ProLight Advanced Roll-out Strategy (Deliverable D3.1).

What's relevant for your own context?

1. **Clarify the key ownership, use and decision rights in writing before implementation.**
   a. Buildings and land: Who owns the buildings, roofs and land needed for the project? Where ownership is fragmented, what coordination mechanism is in place and whose consent is required?
   b. Installations and devices: Who will own the technical devices / systems or technical equipment? Who will use the assets, who benefits from them, and who is responsible for operation, maintenance and replacement?
   c. Data governance: What data will be generated by metering systems, monitoring platforms or resident-facing applications? Who can access and use the data, for which purposes, and who is responsible for maintaining access over time?
   d. Decision and consent rights: Who has the authority to approve installation, connection, operation, modification or expansion of the system? Where collective decisions are required, what decision threshold or consent procedure applies?

2. **Document ownership.** Record ownership, use rights, responsibilities and decision-making arrangements in contracts, statutes, operating agreements or, at minimum, a project memorandum. Reopening these questions after assets have been installed and stakeholders have already committed resources is significantly more difficult.

3. **Define responsibilities across the full lifecycle.** Clarify not only who owns and operates an asset at the start, but also who is responsible for maintenance, replacement, insurance and eventual transfer or decommissioning. Where ownership and use are split, make both sides of the arrangement explicit.

05 Self-assess your organisational (incl. technical) capacity

ProLight demonstrations took several months or, in some cases, years to move from planning to an operational state, with significant adaptation sometimes required along the way. What distinguished the demonstrations that were able to respond effectively to setbacks was not the absence of difficulties, but the organisational capacity to absorb them, adapt and maintain momentum.



What ProLight learned

Across the six demonstrations, the projects that adapted best to setbacks shared three characteristics. They had partners (not just contractors) committed to the longer-term goal, which made site changes and pivots possible without losing momentum. Where technical expertise was not available within the lead organisation, access to reliable external partners was important for assessing site-specific constraints, adapting the technical concept and resolving problems during implementation. They had monitoring in place early, which surfaced problems while they were still solvable. And they kept communication with stakeholders steady through the difficult phases.

What's relevant for your own context?

Before committing to a specific approach, work through three capacity dimensions realistically.

Coordination capacity:

- Is the named project lead's time genuinely available for the duration of the project, and who replaces them if they leave?
- Are working arrangements with the partners you depend on documented, or based mainly on informal commitments?
- Does your organisation have experience with multi-year, multi-partner projects, or access to partners who can provide this experience?

Technical capacity:

- Do you have the capacity to assess preliminary technical and site-specific feasibility, either in-house or through qualified external experts?
- Depending on the approach, can you assess relevant site conditions such as building energy performance, roof area, orientation and shading for PV, available space and ground conditions for geothermal infrastructure, existing heating systems and preliminary grid-connection requirements?
- Do you have access to the technical expertise needed to design and implement the chosen approach, in-house or through reliable external partners?
- Have you mapped the supply chain for key components and verified that suitable suppliers and service providers are available with realistic lead times?
- Who will operate, maintain and, where necessary, replace the technical systems after installation?

Engagement capacity:

- Do you have a credible internal owner for resident or member engagement, with resources for ongoing engagement beyond the initial launch?
- Are communication formats and materials suited to the language, digital access and literacy levels of the target group?
- For projects involving vulnerable populations, do you have a partner organisation already trusted in the community, or will that relationship need to be established?

If important capacities are missing, this does not necessarily mean that the approach is unsuitable. Identify which capabilities need to be brought in externally, strengthened before implementation or built through a smaller pilot before scaling.



Stage 2 - EXPLORE

ProLight Approaches

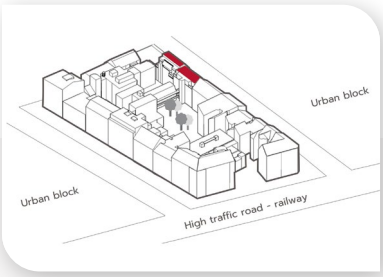
Having worked through the common preparation activities in Stage 1, Stage 2 turns to the approaches demonstrated in ProLight. The approaches are not alternative versions of the same solution: they respond to different starting points, target groups, ownership structures and local needs. Each approach chapter summarises the demonstrated model, highlights what worked and what proved difficult, and concludes with a replication checklist covering the main conditions to consider before implementation. Start with the approach that most closely resembles your ownership structure, target group and implementation challenge

Energy Efficient Building & Renovation

The ProLight demonstrations in this cluster do not represent versions of the same solution. They reflect fundamentally different starting points, target groups and delivery models. Before reading the individual solution chapters, it is worth identifying which approach is most relevant for your situation.

01 Shared District Energy Infrastructure







Demonstrated in Vienna, Austria

The demonstration site is located in Vienna in an existing residential block of 13 buildings with fragmented ownership. Starting from two already refurbished buildings, the project implemented a shared renewable heating and cooling concept based on a low temperature energy network, geothermal probes, photovoltaic-thermal collectors (PVT collectors, a combined solar technology producing both electricity and usable thermal energy), solar thermal elements and ground source heat pumps. The heat supply is delivered through an ESCO model.

ProLight also explored extending the shared infrastructure to further buildings within the block. This provided practical experience not only with the technical operation of the system, but also with the ownership, financing and coordination challenges that arise when shared energy infrastructure is introduced across several privately owned buildings.

Details on all aspects of the demonstration site can be found in the ProLight Factsheet

The replication value of the approach lies less in reproducing the exact technology mix and more in the model of coordinating, financing and operating shared renewable energy infrastructure across several buildings and owners.

What worked and why?

- **A shared coordination structure supported decisions across multiple owners.** In a block with multiple owners, the End-Users Advisory and Interest Group (EAIG) served as the structure that turned a fragmented audience into a coordinated body. The group has met regularly across the project's lifetime, bringing together owners, residents, and technical partners. Its function is primarily knowledge transfer and trust-building. Technical progress is explained, concerns are surfaced early, complex topics (heat pump operation, monitoring, regulation) are discussed in plain language. Beyond its resident-facing role, the EAIG has also served as the operational forum for negotiating extension of the system to additional buildings in the block, and as a knowledge-exchange platform with the other ProLight demonstration districts. This pattern is replicable independently of the technical configuration around it: wherever a project requires sustained alignment across multiple owners over years, a recurring advisory forum of this kind is a low-cost, high-leverage instrument.
- **The ESCO model reduced the investment and risk burden for building owners.** Investment and performance responsibility for the heat supply system were transferred to a specialised operator. This reduced the need for individual owners to finance and manage technically complex shared infrastructure themselves. An ESCO is one possible delivery model rather than a prerequisite; other ownership and financing structures may be appropriate where sufficient investment capacity and technical expertise exist.
- **Long term institutional involvement provided continuity.** The City of Vienna and technical and scientific partners remained involved across several project phases. This was particularly important because coordination and investment decisions across several buildings took place over a longer period than a typical renovation project.
- **Existing subsidy stack covering different parts of the investment.** Viennese pilot combined several national and regional renovation and decarbonisation support schemes (*Sockelsanierung* - partial renovation funding, the "*Out of Oil and Gas till 2040*" subsidy, the *Sanierungsbonus* for thermal upgrades, and *Wohnbauförderung*). The transferable lesson is to build a funding stack around the different components of the project rather than relying on a single programme. Vienna combined Austria's.
- **Early technical integration.** Integrated technical planning was essential. Shared energy infrastructure needs to be designed as a system rather than as a collection of individual technologies. Building demand, available renewable sources, existing systems and future expansion need to be considered together from an early stage.

What was difficult?

Challenges / Barriers	Mitigation
Heritage protection ("Ensembleschutz") prevented photovoltaic panels on the facades, limiting system optimisation.	Constraint accepted; system designed around it with roof-only PV. Replicators in heritage-protected areas should map regulatory constraints early.
Unanimous consent of all owners was legally required for installations on shared courtyard ground.	The EAIG provided the long-running forum in which consent could be built. Where consent cannot be secured, the approach is not feasible in this form.
Monitoring data was initially only accessible to technicians, limiting residents' ability to engage with their own system.	Integration of the Planet App made consumption and performance data accessible to residents. The lesson is generalisable: data ownership and access should be designed in from the start, not retrofitted after deployment.
High upfront investment for the geothermal infrastructure.	ESCO model transferred capital and performance risk to the operator; combined with the public subsidy stack to close the business case.

Replication Checklist

If you have worked through the introductory questions and confirmed that this solution is relevant to your context, use the following checklist to assess your readiness before moving to implementation.

STAKEHOLDER & ORGANISATIONAL READINESS

- ☐ All relevant stakeholders identified through a structured stakeholder analysis
- ☐ All relevant property owners are identified and their decision and consent rights confirmed
- ☐ Municipal or regional authority involved and supportive (where required)
- ☐ Local energy utility or DSO consulted on grid connection and metering requirements
- ☐ Technical partners identified: system integrator, energy auditor, installer, maintenance provider
- ☐ Neighbourhood initiatives or community organisations consulted where relevant
- ☐ Coordination structure established (e.g. project steering group, working group, advisory board)
- ☐ Responsibilities between the participating organisations are clearly assigned

FINANCIAL & FUNDING READINESS

- ☐ National and regional renovation subsidy programmes mapped and eligibility confirmed
- ☐ EU funding instruments assessed (e.g. EIB, LIFE, Horizon)
- ☐ Business case modelled under different subsidy scenarios (with and without public support)
- ☐ Financing options assessed for owners with limited liquidity or borrowing capacity
- ☐ ESCO or other third-party financing and operating models assessed
- ☐ Long-term operating cost structure planned (maintenance, energy management, system upgrades)
- ☐ Cost-recovery model defined (who pays what, and on what basis)

RESIDENT & USER INVOLVEMENT

- ☐ Resident communication strategy prepared before any works begin
- ☐ Information materials developed in accessible, non-technical language
- ☐ Concerns about new technology (e.g. heat pumps) proactively addressed (risk-reduction measures planned)
- ☐ Feedback mechanism established during construction and after go-live
- ☐ Residents involved in monitoring results (consumption data made visible and understandable)

ORGANISATIONAL CAPACITY

- ☐ Internal capacity assessed: coordination, technical expertise, administrative resources
- ☐ Capacity available, either in-house or through external experts, to assess preliminary technical and site-specific feasibility
- ☐ Building energy performance, existing heating systems and potential renovation needs assessed before sizing the shared energy system
- ☐ Available roof, ground and technical space assessed for the proposed infrastructure.
- ☐ External support needs identified and providers selected
- ☐ Resident and user involvement planned and resourced
- ☐ Realistic project timeline established, accounting for permitting, procurement and coordination
- ☐ Risk-reduction measures planned for the transition period (e.g. backup heating during works)

LEGAL & OWNERSHIP STRUCTURE

- ☐ Ownership and use rights for buildings, land and shared infrastructure documented
- ☐ Legal form for shared energy infrastructure defined (ownership of district heating loop, geothermal probes, grid connection)
- ☐ Operating agreement drafted covering responsibilities, cost-sharing and liability
- ☐ Planning and permitting requirements for shared underground infrastructure clarified
- ☐ Backup and fallback arrangements legally documented (e.g. backup heating system)

Further reading

The Vienna demonstration is also featured in publications of the City of Vienna's initiative "100+ Projekte Raus aus Gas", which showcases practical examples of replacing gas heating in multi-apartment buildings.

02 Owner-occupied Social Housing Renovation for Vulnerable Households





Demonstrated in Kozani, Greece

The Kozani demonstration explores a coordinated renovation model for vulnerable owner-occupiers with limited capacity to invest in improving the energy performance of their homes. The approach combines public-sector involvement, technical support, private-sector contributions and targeted household engagement to enable renovation measures that might otherwise be financially or organisationally out of reach.

Within ProLight, three dwellings were renovated in a social housing area comprising around 500 homes originally provided by the Greek State to lower-income households. The buildings, located in Greece's coldest climatic zone in Western Macedonia, were constructed around 2003 and had low energy performance. The renovation measures included thermal insulation, high-performance windows, solar thermal systems for hot water, rooftop photovoltaic systems and air-to-air heat pumps for heating and cooling. The specific combination of measures was adapted to the condition and needs of the individual dwellings.

Implementation was coordinated by CluBE in cooperation with the Municipality of Kozani. Financing combined public-private support with a sponsorship model through which local construction companies and material suppliers contributed expertise, materials and services in kind. The replication value of the approach lies in this coordinated delivery model: bringing together technical expertise, public-sector support, local private contributions and household engagement to enable renovation for vulnerable owner-occupiers. Sponsorship was an important enabling mechanism in Kozani, but should be understood as a context-dependent and potentially complementary financing source rather than a prerequisite for applying the wider approach.

Details on all aspects of the demonstration site can be found in the ProLight Factsheet

What worked and why?

- **A strong local coordinator connected the different parts of the delivery model.** CluBE linked the municipality, participating households, local businesses and technical partners and coordinated their contributions throughout implementation. The transferable function is the presence of an actor able to bridge technical, administrative, financial and social aspects and maintain relationships over time.
- **Cooperation between the coordinator and the municipality brought complementary capacities together.** CluBE contributed technical expertise, project management and outreach to potential sponsors, while the Municipality supported household identification, communication and the connection to Kozani's wider climate-neutrality ambitions. This combination of project-development capacity and public-sector legitimacy helped move the renovations forward.
- **Transparent household selection created a clear and credible basis for participation.** The Municipality used an energy-poverty survey and a public call for expressions of interest, applying social, economic and technical criteria to select households from a larger group of eligible residents. Clear criteria helped target limited resources while making the selection process transparent and defensible.
- **A visible first renovation created a demonstration effect and helped mobilise further contributions.** The activity expanded from one initially planned dwelling to three during the project. Showing tangible results helped build confidence among local businesses and lowered the threshold for additional organisations to contribute.

What was difficult?

Challenges / Barriers	Mitigation
Sponsorship financing is by nature uncertain as sponsors can withdraw or change scope, with no formal contractual obligation comparable to grant funding.	CluBE developed sponsorship in stages, using early commitments and visible progress to attract further contributors. For replication, sponsorship should be diversified across several partners and, where possible, combined with more predictable funding sources rather than relied on as the sole basis of the financing model.
Distribution System Operator (DSO) reluctance to authorise PV installations created delays beyond what the renovation works themselves required.	Permits were eventually approved, but the lesson holds for replication: DSO engagement should start in parallel with building permits. In jurisdictions with conservative DSOs, anticipate longer timelines and start the conversation early.
Reaching households with limited digital access and different levels of literacy required more than standard online communication.	The Municipality combined online channels with offline methods (local newspaper banners, in-person assistance). Clear, non-technical language was essential. Projects involving vulnerable households should plan multi-channel communication and use clear, non-technical language from the outset.
Long-term maintenance of installed systems (heat pumps, PV, solar thermal) requires technical capacity that vulnerable households typically do not have themselves.	Where households cannot reasonably take responsibility for maintaining systems such as heat pumps, PV or solar thermal installations, this role should be assigned to the municipality, project lead or a contracted service provider. Responsibilities and associated costs should be defined and budgeted before handover.
Greek net-metering regulations are transitioning to a net-billing model, changing the business case for self-consumption over time.	Project economics were modelled under the existing framework. Replicators in jurisdictions with shifting regulatory frameworks should stress-test their business case against multiple regulatory scenarios before committing.

Replication Checklist

If you have worked through the introductory questions and confirmed that this solution is relevant to your context, use the following checklist to assess your readiness before moving to implementation.

STAKEHOLDER & ORGANISATIONAL READINESS

- ☐ Trusted local coordinator identified to connect households, municipality, sponsors and technical partners
- ☐ Relevant public authorities and organisations working with vulnerable households identified
- ☐ Potential local sponsors and contributors identified and engaged
- ☐ Technical partners identified: energy auditor, renovation contractor, installer, maintenance provider
- ☐ Responsibilities between municipality, coordinator, sponsors, technical partners and households clearly assigned
- ☐ Organisations already trusted by vulnerable households involved where relevant

FINANCIAL & FUNDING READINESS

- ☐ National and regional renovation subsidy programmes mapped and eligibility confirmed
- ☐ Funding options available to participating households assessed
- ☐ Potential in kind contributions such as materials, labour and technical services mapped
- ☐ Sponsorship contributions diversified across several partners and complemented by other funding sources where possible.
- ☐ Pre-development and technical assessment costs included in the financing plan.
- ☐ Process for coordinating contributions from different sponsors established
- ☐ Financing available for measures not covered through sponsorship
- ☐ Long-term operating and maintenance costs planned
- ☐

RESIDENT & USER INVOLVEMENT

- ☐ Transparent social, economic and technical criteria for household selection established
- ☐ Household needs and existing building conditions assessed individually
- ☐ Communication strategy adapted to households with limited digital access or technical knowledge
- ☐ Information materials developed in accessible, non-technical language
- ☐ Residents informed about planned renovation measures and their implications
- ☐ Residents supported in using and maintaining new technical systems after completion
- ☐ Transparent social, economic and technical criteria for household selection established

ORGANISATIONAL CAPACITY

- ☐ Capacity available to coordinate individual renovations across several households
- ☐ Capacity available to assess preliminary technical and building-specific feasibility
- ☐ Building condition, energy performance and suitability for the proposed renovation and renewable-energy measures assessed
- ☐ Roof suitability for solar installations assessed where relevant
- ☐ Sponsor contributions coordinated with procurement and renovation schedules
- ☐ Administrative capacity available for funding, permitting and grid connection procedures
- ☐ Long term technical support and maintenance arrangements established

LEGAL & OWNERSHIP STRUCTURE

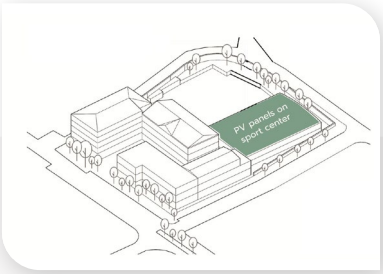
- ☐ Ownership and eligibility of participating dwellings confirmed
- ☐ Ownership of equipment financed or provided by third parties defined
- ☐ Planning, permitting and grid connection requirements clarified
- ☐ Applicable self-consumption and compensation rules assessed
- ☐ Responsibilities for operation, maintenance and replacement of installed equipment documented

Energy Communities

Across two demonstration districts Gernika in Spain and Matosinhos in Portugal the ProLight project tested two distinct approaches to renewable energy community (REC) implementation under real conditions. Both produced lessons that are directly relevant to anyone considering a similar initiative in Europe today. The two cases illustrate how the appropriate delivery pathway depends on who initiates the community, who owns or provides the generation assets, how participants are engaged and which legal, administrative and organisational capacities are available.

01 REC Build on an existing community network







Demonstrated in Gernika, Spain

The Gernika demonstration shows how a Renewable Energy Community can be built around an existing and trusted local institution. An existing school building hosts a rooftop solar installation that supplies renewable electricity not only to the school itself but to surrounding homes and businesses through a Renewable Energy Community. The school acts as the anchor, providing roof space, institutional legitimacy and a connection point for the wider community. Around 200 solar panels were installed on the roof of the school sports centre for collective self-consumption. The electricity is shared with the school, households, small businesses and public buildings in the surrounding area. The initial installation was designed to serve around 150 homes and businesses. The community follows the TEK model developed by Edinor. San Fidel promoted the initiative and provided the roof, while Edinor supported the establishment of the community, member recruitment, financing, selection of contractors and the administrative procedures required for implementation. Governance is based on an assembly of members and an elected board, with external operational and energy management support during the initial phase. The experience also showed strong local demand. During ProLight, interest eventually exceeded the capacity of the initial community, indicating potential for further expansion and replication. The experience suggests that the organisational model is not tied to one particular type or size of municipality.

The replication value of the approach lies in combining a trusted local anchor, access to a suitable renewable-energy asset, active member participation and specialised facilitation. The model is therefore not dependent on a school as such: other locally trusted organisations with suitable assets and strong community links could perform a similar anchoring role.

Details on all aspects of the demonstration site can be found in the ProLight Factsheet



What worked and why?

- **A trusted local institution provided a strong starting point.** San Fidel contributed both a suitable roof for renewable-energy generation and an established relationship with the local community. This combination of physical assets and local trust helped connect the technical project with households, businesses and other local actors from the beginning.
- **An experienced facilitator reduced the organisational burden.** Edinor supported the community through establishment, member recruitment, financing, contractor selection and administrative procedures. This allowed the local initiative to build on specialised expertise without having to develop all legal, technical and operational capacities internally from the start.
- **A clear governance model gave members an active role.** The members form the highest decision-making body, based on the principle of one member, one vote. Day to day management is assigned to a board supported by the facilitator during the initial operating period.
- **The school as a community anchor broadened participation beyond the groups typically involved in energy community initiatives.** Through its established links with pupils, families and the wider local community, San Fidel helped reach residents without prior technical expertise or previous involvement in energy initiatives. Moreover, the school's involvement in the REC also enabled a range of pedagogical activities to be built on top of the initiative itself. Beyond its role as the site hosting the PV installation, the school has served as a natural entry point for engaging a younger audience directly, for example through the Lego League platform.

What was difficult?

Challenges / Barriers	Mitigation
The geographical limit for collective self-consumption restricted which households and businesses could participate.	Potential members were identified within the eligible area around the installation. The applicable sharing perimeter needs to be checked against current national regulation when planning replication.
Demand eventually exceeded the capacity available within the initial community.	Expansion needs to consider additional generation capacity or further installations rather than only increasing membership within a fixed system.
Establishing and operating the community requires legal, administrative and energy management expertise.	Edinor provided dedicated support during establishment and the initial operating period. Similar initiatives need either an experienced facilitator or sufficient internal capacity to perform these functions.
The community needs to remain operational after the initial facilitation phase ends.	Responsibilities for administration, energy management and member support need to be established beyond the initial facilitation phase.

02 Publicly led REC in Social Housing





Demonstrated in Matosinhos/Carcavelos, Portugal

Energy Community in social housing, using publicly managed buildings and rooftop areas to enable collective self-consumption for residents. The approach is particularly relevant for households with limited capacity to invest individually in renewable-energy generation and where the municipality or housing provider can play a coordinating role. The municipality and housing-management structures provide access to the buildings, coordinate the development process and offer established communication channels with residents.

Experience at the original demonstration site also showed that public leadership does not remove implementation barriers. Procurement requirements, asset-ownership questions and the administrative procedures required for collective self-consumption caused delays and required adaptations to the original implementation pathway. The experience gained through ProLight is now informing the development of Renewable Energy Communities in additional municipal housing complexes in the Porto region.

The replication value of the approach lies in using municipal and housing-management structures to enable access to renewable-energy sharing for social-housing residents while integrating the initiative into a wider public-housing and energy strategy. Its feasibility depends strongly on public-sector administrative capacity, clear ownership and management arrangements, and a financing model that does not rely on substantial individual household investment.

Details on all aspects of the demonstration site can be found in the ProLight Factsheet

What worked and why?

- **Public ownership provided a clear entry point for the project.** Municipal involvement made it possible to consider rooftop generation and energy sharing across a social housing complex within a coordinated framework. Compared with fragmented private ownership, this can simplify access to buildings and create clearer structures for project development and decision-making.
- **The housing management structure provided access to residents.** Existing relationships between the housing provider and tenants created a channel for information, engagement and coordination. This is particularly relevant in social housing, where participation cannot rely only on residents actively seeking out an energy community.

- **The project generated experience that could be applied to further housing complexes.** The difficulties encountered at the initial site did not end the replication process. Experience from the demonstration contributed to the implementation of Renewable Energy Communities in additional municipal housing complexes. Because the REC model here is publicly led, there is also a clear replication pathway available that would not necessarily exist under a privately-led model: the municipality can fold this experience directly into a broader municipal strategy and roadmap for REC roll-out across its wider building stock, rather than replication depending on separate, uncoordinated decisions by individual private owners or developers.
- **The model connects renewable-energy sharing with affordability objectives.** Social-housing residents can benefit from locally generated renewable electricity without having to finance individual generation assets themselves. This makes the approach particularly relevant where reducing energy costs and improving access to renewable energy are part of wider social-policy objectives.

What was difficult?

Challenges / Barriers	Mitigation
Public procurement requirements affected supplier selection, asset transfer and the appointment of entities required for collective self-consumption.	Procurement requirements need to be mapped early and included in the implementation timeline. Roles that appear straightforward in privately led communities may require formal procedures when the lead organisation is public.
A proposed donation of photovoltaic equipment to the municipality created legal and procurement difficulties.	Ownership and transfer of externally financed or donated assets need to be clarified before investment commitments are made.
Administrative procedures created a gap between physical installation and operational energy sharing.	Grid connection, metering, registration and activation of energy sharing need to be treated as part of the critical implementation path.
Establishing the management structure collective self-consumption required coordination between several public and market actors.	Responsibilities for community management, energy allocation and interaction with the grid operator need to be defined before operation starts.
Residents have limited capacity to invest directly in the energy infrastructure.	The financing and ownership model needs to allow participation without requiring substantial or in some cases any individual investment from households.
Administrative lead times for REC approval can create a period during which assets sit idle, which creates financial pressure on project budgets and can also complicate communication with participating households, and potentially erode trust in the initiative	Potential administrative lead times need to be factored in project planning, building on previous experiences and typically observed timelines.

Energy Community Replication Checklist

The ProLight demonstrations show that energy communities share a common set of requirements, but the implementation pathway differs depending on who initiates and manages the community. The checklist therefore distinguishes between requirements that apply broadly to energy communities and additional considerations for two models demonstrated in ProLight.

The **member-based model,** represented by Gernika, builds on a local anchor organisation, active membership and shared governance. The **municipality led model,** represented by Matosinhos, relies more strongly on public sector coordination, existing housing structures and administrative procedures. Use the common requirements as a starting point and add the considerations that best reflect the governance and delivery model in your context.

STAKEHOLDER & ORGANISATIONAL READINESS

COMMON REQUIREMENTS

- ☐ Potential members of the energy community identified
- ☐ Grid operator consulted on connection, metering and energy sharing requirements
- ☐ Energy supplier or other relevant market actor involved where required
- ☐ Technical partners identified for installation, monitoring and maintenance
- ☐ Responsibilities between participating organisations clearly assigned
- ☐ Energy performance of participating buildings assessed, and renovation needs considered before sizing renewable generation and energy sharing

MEMBER BASED MODEL

- ☐ Trusted local anchor organisation identified to initiate the community and engage potential members
- ☐ Suitable roof owner or renewable energy asset provider involved and supportive
- ☐ Experienced facilitator identified for community establishment and initial operation
- ☐ Governance structure established with clear roles for members, board and facilitator

MUNICIPALITY LED MODEL

- ☐ Municipality and relevant housing management organisation involved and supportive
- ☐ Responsibilities between municipality, housing provider, energy community and managing entity clearly assigned
- ☐ Public procurement requirements for relevant services and operating entities identified
- ☐ Existing communication channels between housing management and residents available

RESIDENT & USER INVOLVEMENT

COMMON REQUIREMENTS

- ☐ Potential members informed before establishment of the energy community
- ☐ Benefits, costs and participation conditions communicated in accessible language
- ☐ Awareness activities planned to support recruitment and participation
- ☐ Consumption and generation information made accessible to participating members
- ☐ Ongoing communication planned beyond the initial recruitment phase

MEMBER BASED MODEL

- ☐ Existing local networks used to support awareness and member recruitment
- ☐ Membership process clearly defined and easy to access
- ☐ Members involved in community decision making
- ☐ Activities planned to maintain participation over time

MUNICIPALITY LED MODEL

- ☐ Housing management organisation involved in resident communication
- ☐ Participation conditions adapted to households with limited financial resources
- ☐ Communication channels suited to residents with different levels of energy knowledge and digital access
- ☐ Resident support available during establishment and initial operation

FINANCIAL & FUNDING READINESS

COMMON REQUIREMENTS

- ☐ National and regional funding opportunities for energy communities and collective self-consumption mapped
- ☐ Investment requirements for renewable generation assessed
- ☐ Financing model for installation, operation and maintenance defined
- ☐ Current incentives and compensation mechanisms for collective self-consumption assessed
- ☐ Longterm operating and administration costs included in the financing model

MEMBER BASED MODEL

- ☐ Member contributions and recurring costs assessed for accessibility
- ☐ Costs for facilitation and energy management included
- ☐ Financing options for future expansion considered if membership demand exceeds available generation capacity

MUNICIPALITY LED MODEL

- ☐ Financing model allows participation without substantial individual household investment
- ☐ Public funding options for social housing and renewable energy infrastructure assessed
- ☐ Conditions for equipment financed or provided by third parties clarified
- ☐ Costs arising from procurement and administrative procedures included in the financing plan

ORGANISATIONAL CAPACITY

COMMON REQUIREMENTS

- ☐ Capacity available for member administration, coordination and communication
- ☐ Legal and technical expertise available during establishment
- ☐ Capacity available to assess preliminary technical and site-specific feasibility
- ☐ Responsibilities for operation, energy management and member support defined
- ☐ Long-term management arrangements established beyond the implementation phase
- ☐ Administrative pathway from installation to operational energy sharing mapped and resourced

MEMBER BASED MODEL

- ☐ Facilitator capacity available during establishment and initial operation
- ☐ Community board supported in taking over governance responsibilities
- ☐ Capacity available to integrate additional members or generation assets as the community grows

MUNICIPALITY LED MODEL

- ☐ Administrative capacity available to manage public procurement procedures
- ☐ Capacity available to coordinate municipality, housing provider, grid operator and managing entity
- ☐ Administrative pathway from installation to operational energy sharing mapped and resourced
- ☐ Capacity available to support residents who cannot manage technical or administrative processes independently

LEGAL & OWNERSHIP STRUCTURE

COMMON REQUIREMENTS

- ☐ Eligible legal form for the energy community confirmed, national transposition status checked
- ☐ Energy community legal entity established and registered per national requirements
- ☐ Collective self-consumption rules and geographical/grid sharing perimeter clarified
- ☐ Expected administrative timeline (incl. grid connection timeline) confirmed
- ☐ Eligible participant types and any inclusion requirements confirmed
- ☐ Eligible generation technologies and asset restrictions (size caps, commissioning-date cut-offs) confirmed
- ☐ Ownership of renewable generation assets defined
- ☐ Electricity sharing and allocation arrangements established
- ☐ Responsibilities for operation, maintenance and insurance documented
- ☐ Governance and decision-making rights defined in the community statutes

MEMBER BASED MODEL

- ☐ Ownership and transfer conditions for equipment financed or provided by third parties defined
- ☐ Relationship between anchor organisation, energy community and facilitator defined
- ☐ Governance structure provides members with appropriate decision-making rights

MUNICIPALITY LED MODEL

- ☐ Public procurement requirements for services, equipment, managing entities clarified
- ☐ Ownership and transfer conditions for equipment financed or provided by third parties defined
- ☐ Responsibilities between municipality, housing provider and energy community legally documented
- ☐ Requirements for participation of social housing tenants assessed
- ☐ Grid connection, metering, registration and activation procedures clarified before installation.

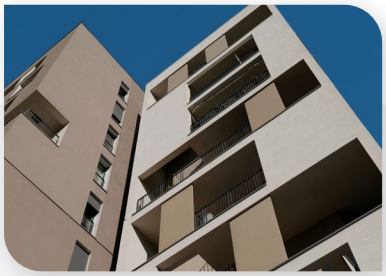
ICT & Apps as cross-cutting enablers

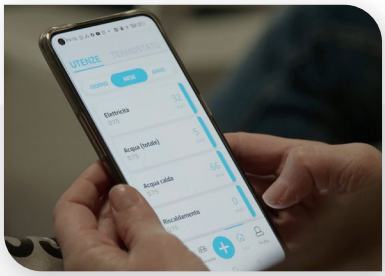
Digital tools and applications do not form a standalone intervention in the way that building renovation or energy communities do. Across the ProLight demonstrations, ICT solutions appeared in almost every demonstration district, often alongside actions whose primary focus was something else. Yet in practice, they consistently emerged as a key lever for success, making energy flows visible, supporting behaviour change, and sustaining community engagement after the initial works are completed.

Digital solutions were used across ProLight demonstration sites to make energy consumption visible, support communication and encourage more sustainable behaviour. Their functions ranged from resident facing apps combining energy information with housing and community services to monitoring platforms providing consumption data at household and neighbourhood level.

The value of a digital solution depends not only on its technical functionality, but on how well it responds to local user needs, integrates with existing systems and provides reliable access to relevant data. A solution that works in one neighbourhood cannot therefore simply be transferred unchanged to another context.

Replication should start with the purpose of the service and the needs of its users. Data availability and access rights, system integration, digital literacy, long-term operation and continued user engagement should be considered before a specific technology or provider is selected.







Demonstration site Urbana NEW LIVING Milan, Italy

The Milan demonstration is located in the Urbana NEW LIVING social housing neighbourhood. In Milan, the Planet App combines energy related information with services supporting communication and community interaction. The digital platform is part of a wider approach to resident engagement, rather than a standalone energy monitoring tool.

Experience during ProLight showed that providing consumption information does not automatically lead to sustained behavioural change. Continued engagement depends on understandable and trusted information, regular interaction and a clear reason for residents to return to the platform. Community activities, challenges and other forms of activation can help maintain interest after the initial novelty has declined.

Details on all aspects of the demonstration site can be found in the ProLight Factsheet





Student housing Vaasa, Finland

Vaasa used student housing as a Living Lab for digital resident services and sustainable behaviour. The aim was to provide residents with energy and water consumption information while connecting digital services more broadly with everyday housing management.

The setting created specific challenges. Resident turnover is high, many residents come from different countries and onboarding needs to be simple and repeated frequently. Adoption was stronger where the app supported everyday activities such as booking shared facilities. Energy information alone provided less reason for regular use.

Implementation also revealed challenges around vendor selection and system integration. A first planned solution was not delivered after the provider changed its business focus. A second existing product could be introduced more easily but did not fully meet requirements for maintenance integration and energy data presentation. The experience highlighted the importance of defining functions, interfaces and responsibilities before selecting a digital solution.

Details on all aspects of the demonstration site can be found in the ProLight Factsheet

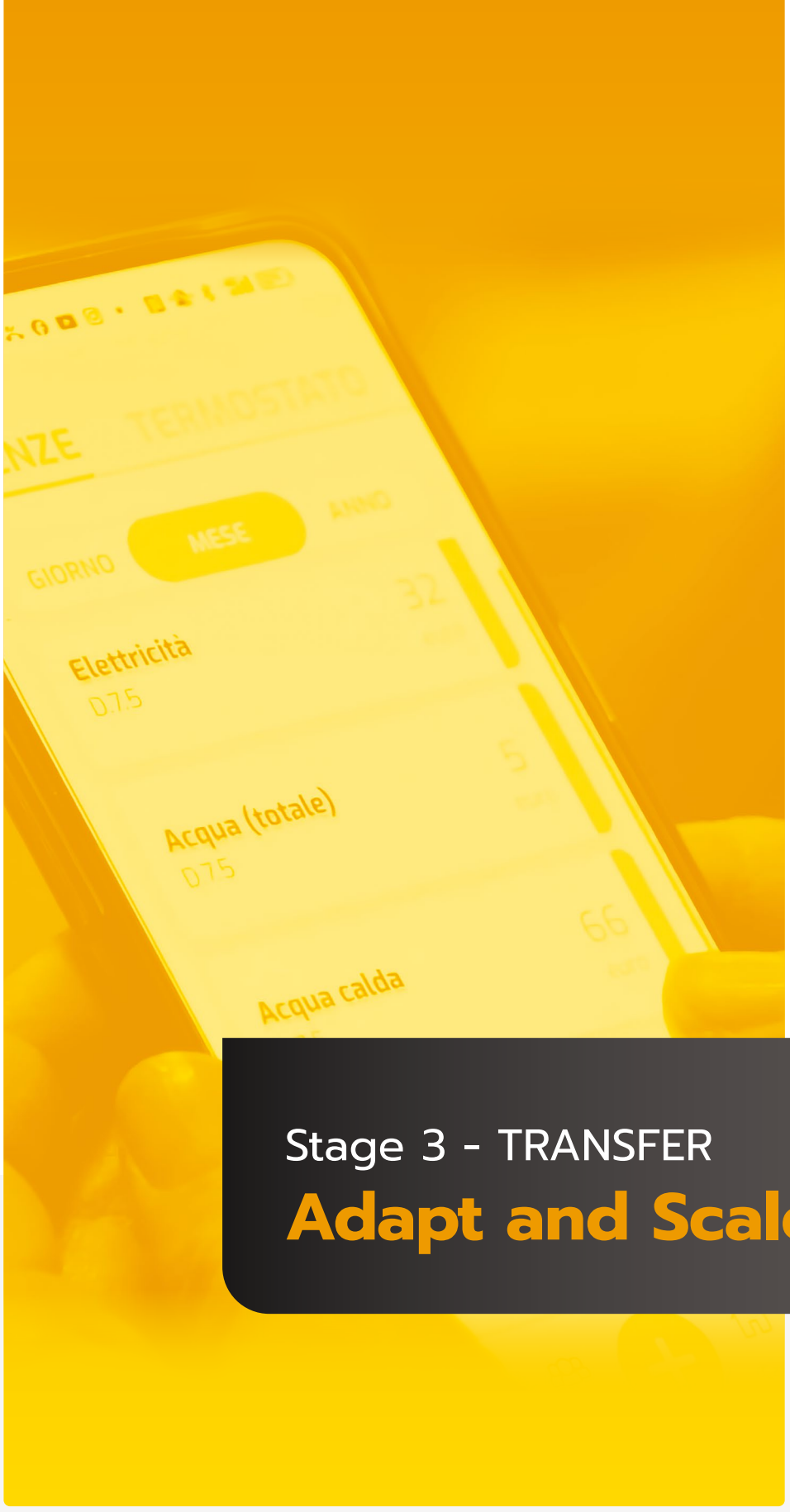
What does this mean for replication?

- **Start with the purpose, not the technology.** Digital services can support different objectives, including resident communication, behaviour change, energy monitoring and energy management. The intended users and purpose should be defined before deciding which technical solution is needed. The monitoring platform used in the ProLight buildings in Portugal illustrates how a focused solution can provide household and neighbourhood consumption information without requiring a broader resident app.
- **Everyday usefulness supports continued use.** Residents need a reason to return to a digital service. Functions connected to everyday housing activities can create regular interaction and increase exposure to energy information that might otherwise receive little attention.
- **Engagement needs to be designed and maintained.** Initial interest can decline over time. Communication, feedback, challenges and community activities can help turn information into continued participation. Digital engagement works best when it is connected to wider resident and community activities.
- **Integration and interface requirements should therefore be defined before selecting a provider, not after procurement.** Digital services need to connect with existing building, maintenance and data systems. Missing interfaces can create additional work for housing providers and limit the usefulness of the service for residents. Requirements for system integration should therefore be defined Access to energy data needs to be clarified early. Energy data may come from meters, building management systems, utilities or other technical platforms. Replication requires clarity on which data is available, at what level of detail, how it can be accessed and who has the right to use it. Data access should be treated as part of service design rather than resolved after implementation.

- **Trust depends on reliable and understandable information**. Users need to understand what information is displayed, where it comes from and why data is collected. Inconsistent or unclear information can quickly reduce confidence in the service.
- **Long term responsibility needs to be defined from the beginning**. Digital services require maintenance, updates, user support, continued access to data and ongoing financing after implementation. Responsibility for operation and future development should be clear before the service is introduced.
- **Plan for provider change and system continuity**. Digital-service providers, products and business models can change over time. Before selecting a solution, clarify whether data can be exported, interfaces are documented and essential functions can be transferred or replaced if the provider or product is no longer available.

Before selecting a digital solution, ask yourself the following questions

- What should the service achieve, and for whom?
- What is the digital literacy in the targeted community? What actions need to be put in place to support on-boarding?
- Which data is available, and do we have access and usage rights?
- Which existing systems need to be connected?
- What will make residents use the service regularly?
- Who will operate, support and finance the service in the long term?
- How will success be measured, and which indicators will show whether the service is being used as intended?
- Can data and essential functions be transferred if the provider or solution changes?



Stage 3 - TRANSFER

Adapt and Scale

Replication was already underway in ProLight

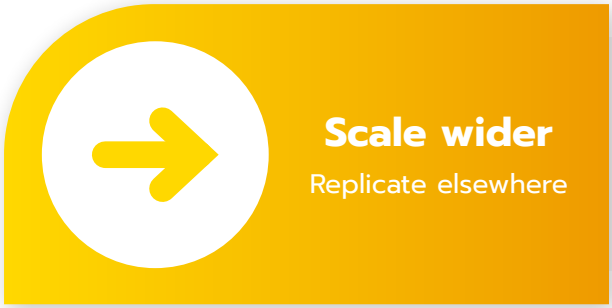
Replication does not only begin after a demonstration has been completed. During ProLight, several approaches were already extended, adapted or applied beyond their initially planned scope. These experiences illustrate three complementary directions of scaling.



Go beyond what is already there by adding further functions, services or benefits to an existing implementation.



Take an existing implementation and enlarge it while retaining the same site and basic model, for example by involving more dwellings, participants or assets.



Apply the approach in another neighbourhood, city or country.

All the three forms became visible during ProLight project. The Planet App moved beyond its originally planned implementation scope and is now being introduced at more sites than initially foreseen. In Kozani, the sponsorship-supported renovation activity expanded from one planned dwelling to three, showing that locally mobilised contributions can create momentum for growth within the same setting. In Gernika, demand eventually exceeded the capacity of the initial Energy Community, indicating potential for further expansion or replication. In Portugal, four additional municipal housing complexes are now implementing Renewable Energy Communities, transferring the experience to further locations.

Replication does not mean reproducing a demonstration unchanged. The implementation pathway is shaped by the local regulatory, ownership, institutional and financing context. The following section highlights some of the European conditions that can influence how housing-renovation and energy-community approaches are implemented, before drawing together broader recommendations for wider uptake.

European conditions shaping implementation

The ProLight demonstrations and wider country mapping show that the same approach can require a different delivery model when applied in another context. The factors that matter most also differ by approach: housing renovation is strongly influenced by ownership, provider structures and access to finance, while energy communities depend particularly on how national regulation and administrative procedures enable energy sharing.

The patterns below should be understood as broad implementation archetypes rather than fixed country classifications. They can help identify likely opportunities and constraints, but the specific regulatory, ownership, financing and institutional conditions still need to be verified for each project context.

Housing renovation and shared energy infrastructure

The ProLight housing research identifies provider and ownership structure as a key differentiator between European renovation environments. The degree to which housing is concentrated in professional portfolios or fragmented across individual owners strongly influences how renovation can be organised, financed and scaled. Four broad patterns lead to different routes for implementation.

Housing-system pattern	Typical structure	Likely implications for delivery
Large integrated systems	Professional municipal, non-profit or limited-profit providers managing substantial portfolios	Portfolio renovation, standardised packages and long-term provider finance
Targeted systems with established providers	Public or non-profit providers, but stronger dependence on programme eligibility and public funding cycles	Provider-led projects combined with targeted grants, loans and guarantees
Small municipal or post-socialist rental sectors	Limited public stock and constrained municipal capacity	Aggregation, technical assistance and EU- or state-supported programmes
Residual and homeownership-oriented systems	Small or fragmented social rental stock; high owner-occupation	Municipal schemes, owner coordination and targeted support for vulnerable owner-occupiers

Three broad implications follow. Concentrated professional ownership can enable renovation at portfolio scale, while fragmented ownership increases the need for coordination, aggregation and third-party support. Smaller or capacity-constrained housing providers may require stronger technical assistance and external programme support. Across all housing-system patterns, the achievable depth and scale of renovation depend on access to long-term finance and on protecting affordability for residents.

Energy Communities

ProLight demonstrations suggest that for energy-sharing actions it is the regulatory framework that concentrates the largest cross-country differences. This is confirmed by the European Court of Auditors' 2026 audit of energy communities[2] across the Netherlands, Poland, Italy and Romania. Four broad regulatory patterns lead to different routes for implementation.

Regulatory pattern	Typical structure	Likely implications for delivery
Mature, broad framework	Energy sharing explicitly permitted, multiple models recognised, wide participant and technology eligibility, well-functioning support infrastructure	Direct implementation of the community's preferred model, with the main constraint being commercial and technical design rather than legal feasibility
Permissive but narrow framework	Energy sharing permitted, but eligibility restricted by participant type, asset ownership, or technology	Reconfiguration of participants or assets to fit eligibility, or a fallback to a different model or perimeter than originally intended
Permitted in principle, procedurally bottlenecked	Legal basis exists, but with constraining conditions or associated with important administrative complexity and/or delays	Extended pre-operational phase; feasibility studies and proxy sites used to estimate performance ahead of formal launch
Underdeveloped or restrictive framework	Energy sharing not yet transposed, narrowly defined, or lacking support schemes for the intended participant/asset combination	Limited to individual self-consumption, or dependent on regulatory change before any shared model becomes viable

Three conclusions follow. A broad and permissive regulatory framework is what allows an energy community to be implemented largely as designed; a narrow or restrictive one forces the community to be redesigned around whatever the law does allow, rather than around the participants' or the asset's actual characteristics. Procedural bottlenecks, particularly constraining conditions or a legal basis associated with important administrative complexity and/or delays, can delay operation for years even once the underlying legal basis is sound, making timeline as much a regulatory question as a technical one. In every system, the achievable model, its geographic perimeter, its eligible participants and technologies, and its economic viability depend on how the same underlying EU directives have been transposed and operationalised nationally, which varies considerably.

2 European Court of Auditors, special report 10/2026 "Energy communities – Potential yet to be fulfilled", Publications Office of the European Union, 2026. (https://www.eca.europa.eu/en/publications/SR-2026-10) found that, despite EU directives with transposition deadlines of 2020-2021, member states' implementation of energy communities remains highly uneven four to five years later, with the EU's own target (at least one energy community per municipality above 10,000 inhabitants by 2025) reaching only 27% on average, and ranging from 86.2% in the Netherlands to 0% in several member states.



Recommendations for wider uptake

The following recommendations draw on recurring implementation barriers and enabling conditions observed across the ProLight demonstrations. They address the public authorities, intermediaries, housing and energy actors that can improve the conditions for replication beyond individual projects.

01 Connect the route from approval to operation

Authorities, regulators and grid operators should provide clear end-to-end procedures from project approval to operational start, with defined responsibilities, standard documentation and realistic service timelines. For publicly led projects, workable procedures are also needed for procurement, operator appointment, third-party investment and asset transfer.

Primary actors: national and regional authorities, regulators, grid operators, municipal associations

02 Give intermediary organisations a stable role

Energy agencies, community-energy facilitators and renovation one-stop shops should have durable mandates and operating finance. Their role should extend beyond information provision to hands-on project development support, including preliminary technical assessment, legal and financial advice, procurement, funding applications and stakeholder engagement.

Primary actors: national and regional governments, local authorities, sector networks

03 Protect affordability and inclusive access

Renovation and energy-sharing programmes should assess the impact on total housing and energy costs and provide long-term support where households cannot take on financial, technical or administrative responsibilities themselves. Participation models should avoid upfront or recurring costs that exclude vulnerable households. Energy communities should combine affordable access with transparent governance and meaningful opportunities for members to participate in decision-making.

Primary actors: energy and housing ministries, municipalities, housing providers, funding bodies

04 Treat data and implementation evidence as shared infrastructure

Clear data-access and usage rights, together with interoperable interfaces, are needed for monitoring, digital services and energy sharing. At the same time, programmes should systematically document implementation experience, including administrative lead times, adaptations, barriers and distributional effects. Making this evidence accessible can help future projects learn not only

from final energy results, but also from the process of getting there.

05

Primary actors: regulators, meter and grid operators, programme managers, digital-service providers

Create stable and accessible financing pathways

Financing for social and affordable housing renovation should be predictable, accessible and designed for long-term investment rather than individual projects. Public authorities and funding bodies should simplify and better align eligibility rules, application procedures, co-financing requirements and reimbursement timelines across programmes, making it easier to combine grants, subsidies, loans and other sources into viable funding stacks. Public subsidies remain particularly important where households or housing providers cannot carry the investment themselves, while sponsorship and other private contributions can complement, but should not replace, more predictable funding sources. Intermediaries such as renovation one-stop shops (OSS) and ESCOs can further support uptake by aggregating projects, connecting technical and financial services and reducing implementation and performance risks for building owners.

Primary actors: national and regional governments, funding bodies, municipalities, housing providers, financial institutions, one-stop shops and ESCOs

Where to continue: communities, networks and resources beyond ProLight

Overview of key ProLight resources

The guidebook provides a practical entry point to the ProLight body of work. The following resources offer more detailed guidance and evidence on the topics covered throughout the guidebook.

Regulatory pattern	Typical structure	Likely implications for delivery
Stakeholder mapping	D4.1 – Stakeholder Mapping and Activator Plan	Stakeholder analysis methodology and template for identifying relevant actors, their influence, interests and engagement needs
Stakeholder engagement	D4.3 – Stakeholder Engagement for Replication Requirements	Guidance and lessons on stakeholder and end-user engagement
Funding and business models	D2.4 – Benchmarking Report	Funding schemes, financial instruments and business-model considerations across the ProLight demonstration districts
Replication, ownership and organisational capacity	D3.1 – Advanced Roll-out Strategy	Guidance on ownership, organisational capacity and operational requirements
Implementation experience	Annual Implementation Reports	Detailed experience from implementation, including adaptations, barriers and progress across the demonstration sites
Demonstration-specific information	ProLight Demo Factsheets	Concise technical and contextual information on the individual ProLight demonstration districts

What does this mean for replication?

ProLight as a project ends at the close of its grant period, but its demonstrations continue to operate. The European Union has put in place several frameworks whose function it is precisely to support replication beyond individual projects The following European resources cover different parts of the follow-on pathway:

- For technical assistance and capacity building on energy community development, the European Commission's Energy Communities Repository is the central platform for urban initiatives. Coordinated by REScoop.eu together with Energy Cities, FEDARENE, the Florence School of Regulation and Akaryon, the Repository combines an EU-wide platform, an interactive map of energy communities in Member States, technical assistance to communities at various stages of development, and capacity-building webinars. It targets at least 150 communities for direct support. For rural initiatives, the parallel Rural Energy Community Advisory Hub provides equivalent technical assistance.
- For affordable housing district replication, the Affordable Housing Initiative European Partnership provides the central platform. It hosts the funding handbook, district-level renovation case studies, and a network of practitioners working on lighthouse districts across Europe. ProLight, drOp and Supershine are sister projects within this framework and the partnership platform is where the next generation of social housing renovation projects can connect with what these three projects have produced.
- For peer learning and city-to-city exchange, Housing Europe (the federation of public, cooperative and social housing providers) offers a network of 43,000 housing providers in 25 countries. Eurocities networks municipalities, with 71 of the EU Mission Cities being members. NetZeroCities is the Mission Platform serving the 112 Mission Cities and the 250+ cities that applied but were not selected.

Useful examples may be closer than expected. Visiting a ProLight demonstration or a similar initiative, getting in touch with the people involved and seeing how solutions work in practice can provide insights that no guidebook can fully capture. Direct exchange is often one of the best starting points for turning experience from one context into an approach that works in another.part of service design rather than resolved after implementation.



Glossary

Challenges / Barriers	Mitigation
DSO – Distribution System Operator	Electricity network operator responsible for processes such as grid connection and metering.
EAIG – End-Users Advisory and Interest Group	Coordination and engagement structure used in the Vienna demonstration to bring together owners, residents and technical partners.
ESCO – Energy Service Company	Specialised operator that can finance, own or operate energy infrastructure and assume investment and performance risk.
ICT – Information and Communication Technology	Digital technologies and applications supporting monitoring, communication and resident engagement.
PV – Photovoltaic	Technology that converts solar energy into electricity.
PVT – Photovoltaic-Thermal	Combined solar technology producing both electricity and thermal energy.
REC – Renewable Energy Community	Community-based arrangement for producing, sharing and managing renewable energy.
RES – Renewable Energy Sources	Renewable energy sources such as solar and geothermal energy.
Collective self-consumption	Sharing electricity from a renewable-energy installation among several participating consumers.
Funding stack	Combination of different financing sources, such as own resources, grants, subsidies and repayable finance.
Public procurement	Formal procedures public organisations must follow when purchasing services or equipment or appointing operating entities.
Replication (ProLight understanding)	Adapting and applying a demonstrated approach in another context rather than reproducing it unchanged.
Shared district energy infrastructure	Energy infrastructure serving several buildings or owners rather than a single building.
Stakeholder mapping	Structured identification of relevant actors, their roles, interests, influence and engagement needs.
Vulnerable households	Households that may require additional financial, technical or administrative support to participate in renovation or energy projects.

Imprint

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