The catalyst for social innovation in the energy market

Medium and long term perspectives of the POWER UP local energy business models

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Executive summary

This deliverable presents the updated, medium and long-term perspectives of the business models for local energy market players, developed from the operational experience gained during the POWER UPOWER UP project's pilot implementations. The core objective is to provide a robust framework that enables the replication and upscaling of successful schemes designed to combat energy poverty, reinforcing both their social and economic impact. The methodology is rooted in a comprehensive analysis of inputs from the four project pilots, collected through iterative interviews throughout the project and dedicated exchanges supported by the SWOT analyses and an obstacle matrix activity. This process distils diverse, on-the-ground experiences into a harmonised and transferable knowledge base for future initiatives.

The comprehensive analysis across four critical dimensions of the business models yielded clear indications for an improved, replicable model. For Social Engagement, successful schemes must be anchored in trusted institutions and ensure a continuous information flow through a single engagement interface and dedicated "neighborhood ambassadors". In terms of Economic Viability, a resilient financial architecture should integrate a public authority, private financiers, and a social fund into a single value chain, forecasting revenues across self-consumption, shared-consumption incentives, export sales, and flexibility payments. To maximize Households' Economic Savings, the model must deliver immediate and visible benefits. Finally, regarding Technical Aspects, the project experience highlighted the maturity and scalability of current renewable technologies, while emphasizing the need to address grid-connection procedures and smart-meter coverage – essential for fair savings monitoring - as critical enablers for reliable implementation and replication.

In conclusion, this report transforms the rich, practical experience of the POWER UP pilots into an actionable framework. It provides developers of future energy community projects with a strategic guide to navigating the intertwined social, financial, and technical challenges inherent in creating initiatives that are not only economically viable but also fundamentally effective in alleviating energy poverty.

Methodology

The goal of this report is to use insights from the POWER UP pilots to replicate successful programs on a broader scale, locally and in other regions, and strengthen their social and economic benefits, especially in addressing energy poverty. The goal is to increase renewable energy production and an increase in the number of households benefiting from the schemes. Benefits are considered both in financial and non-financial terms considering, in particular, the reinvestment of the financial benefits in energy poverty mitigation measures. Other types of energy business models beyond energy production might be defined and started for the upscaling to the local energy market players

From a methodological point of view, the strategy to upscale the long-term business model has been defined in strict cooperation with the POWER UP pilots POWER UP, who brough their experience in the local implementation of the solutions. The pilot leaders' perspective has been collected through different bilateral meetings and a dedicated workshop where they have been required to fill in a SWOT analysis and an Obstacle matrix.

SWOT Analysis

The SWOT analysis focused on four critical dimensions that directly influence model scalability and impact:

- Social Engagement: Community participation, acceptance, and behavioural change.
- Economic Viability: Business sustainability, financial structure, and return on investment.
- Households' Economic Savings: Direct and indirect economic benefits experienced by households.
- Technical Aspects: Infrastructure readiness, technology reliability, and operational challenges.

Obstacles Matrix

The matrix structure explored by each pilot was as follows:

	Replication via Scale-Up	Replication via Transfer
Solved Obstacles	What has been overcome that enables deeper scaling locally?	What solved issues enable smoother transfer to other regions?
Unsolved Obstacles	What unresolved issues limit scale-up in current areas?	What challenges must be addressed to replicate the model elsewhere?

To ensure a seamless integration of the inputs gathered through the SWOT analysis, the inputs provided by the various pilots' partners have been harmonised to make them comparable, while maintaining the specific points of each pilot.

Once the contents were aligned, they were analyzed by categories (Social Engagement, Economic Viability, Households' Economic Savings, and Technical Aspects) POWER UP, incorporating responses from all four pilots to provide an overall improvement framework useful for developing new pilots across different geographic regions.

To this end, the information provided through the SWOT analysis was processed as follows to offer valuable insights for developing enhanced business models that ensure the replicability of the initiative:

- Strengths: Provide insights into the strong points to capitalize on and replicate in replication activities and the development of new pilots.
- Weaknesses: Highlight the weak points of current models; in replication activities, it is vital to consider these aspects and establish improvement measures, leveraging past experiences.
- Opportunities: Offer suggestions for business model improvement in the growth of pilots or the development of new initiatives from scratch, capitalizing on the advice of pilot leaders to increase the impact of new initiatives.
- Threats: Identified threats from the POWER UP pilot experience enable planners to undertake activities with a broad understanding of the situation, allowing new developers to plan proper risk identification and management activities, and evaluate the introduction of contingency measures.

These insights were complemented by the inputs collected through the obstacle matrix, which analyzes the obstacles encountered and resolved during the project's activities, as well as those that remain unresolved. Resolved obstacles that have improved the model offer the opportunity to understand what has been overcome, enabling deeper local scaling and smoother transfer to other regions. Conversely, unresolved obstacles that must be addressed in future replications provide an internal perspective on issues that limit current scalability. Addressing these challenges is essential for replicating the model elsewhere to achieve a large-scale impact.

01

Introduction

Effective solutions to tackle energy poverty need to be sustainable over time and co-created with the involvement of vulnerable households to achieve long-term impacts. One-shot solutions, such as welfare public-funded projects and government support, may help solve the issue for a few beneficiaries but are usually not self-sustainable in the long term and are applied top-down, not solving the structural issues.

Funds from governments or public institutions (grants, tax credits, incentives, etc.) are key in supporting initiatives to fight energy poverty. Still, several other options are available, including the involvement of market players (e.g. ESCOs) or exploiting opportunities from the new EU regulation on energy communities.

The POWER UP approach aims to support the co-creation of solutions with the involvement of vulnerable households. Thus, the business models were developed assuming that the upfront cost needs to be covered by third parties, while the generated value is then shared with vulnerable households.

The POWER UP project pilots chose business models and different ways of financing the implementation of the solutions, as well as exploiting the opportunities available in their countries. In the case of Campania Pilot (Italy), the municipality exploited the incentives for the setting up of renewable energy communities; in Valencia (Spain), the municipality makes some of its roofs available for PV installation by energy communities, requiring that a share of the energy produced is shared with vulnerable households; in Roznov (Czechia) the municipality can use a public incentive to install a PV plant on the roof of a social housing building and the households living inside can gain a benefit; in Eeklo (Belgium) the municipality buys some shares of the local energy cooperative and give them (in a rolling fund way) to selected vulnerable households, that can benefit from the lower tariffs applied to the energy produced by the local wind farm. All these different pilots, require different funding and business models to ensure their long-term sustainability, which are discussed in this report.

02

POWER UP model analysis and guidelines for replication

Capitalizing Partners' experience to foster replicability

2.1 Comprehensive analysis

The harmonized analysis of the SWOT exercises and obstacle matrices delivered by the four POWER UP demonstrations make it possible to define a single, transferable knowledge base to foster replication activities and future business models. Each contribution has been stripped of its local features and re-ordered along the four critical dimensions: Social Engagement, Economic Viability, Households' Economic Savings and Technical Aspects. For each dimension, the analysis first consolidates strengths, weaknesses, opportunities and threats that emerged. It then explains how the obstacles that have been overcome have already widened the scope, and how the remaining obstacles need to be addressed to ensure that future pilots can scale locally and travel across regions with minimal re-engineering.

Social Engagement

Operational evidence confirms that social legitimacy is the key factor for energy poverty initiatives. When the promoter of the social energy market model owns a strong pre-existing reputation – whether a public body, a known local cooperative or a social-enterprise network – households are usually more willing and quicker to enroll. Successful pilots translated that trust into personalized contact strategies. Example includes letters signed by the Mayor of the Municipality, help desks and neighborhood ambassadors who speak directly to the beneficiaries.

These interventions created a sense of proximity and largely neutralized skepticism about the fairness of benefit allocation. A further enabling factor has been the emergence of solidarity mechanisms that operate inside the community itself. For example, the practice of allocating small incentive streams to a rolling social fund has proven capable of widening the catchment to households that would never respond to a traditional investment offer.

On the other hand, inconsistent communication remains a great vulnerability. Engagement campaigns based on single events or intermittent press releases experienced a decline in attendance at information sessions and an increase in consistent delays in document returns.

A second weakness point is the lack of transparency perceived by households when several organizations are involved without a coordinated and consistent approach, as well as complexity and lack of knowledge to understand the projects.

Municipal one-stop shops are being rolled out, providing professional staff who can bundle welfare advice with community-energy onboarding. They were tested in POWER UP and showed also success in keeping a streamlined communication and engagement process with the target groups. Additionally, digital tools, which were not the focus of the project, are now cheap enough to become part of the standard kit allowing for the implementation of stronger engagement models. Practical examples areenergy-coaching apps, automated SMS communication, real-time dashboards.

A key enabler for adoption of the models and engagement with the target groups is data availability. Currently with a growing number of national regulations requiring Utility companies to share consumption data with social stakeholders, it could facilitate the identification and engagement of the target groups.

However, threats remain. Data protection rules still hinder smooth sharing of vulnerability information between welfare departments and energy cooperatives, creating a gap where cross-sector collaboration is most needed. Additionally, bureaucratic delays can undermine trust when enrollment takes longer than the limited attention span of vulnerable users.

Suggestions for an improved model:

To strengthen community participation and trust, improved business models should:

1. Build on trusted institutions: Anchor initiatives within cooperatives, municipalities, or other locally recognized organizations to enhance reciprocal trust;
2. Simplify enrollment: Provide a single engagement interface with pre-filled forms, personalized savings forecasts, and real-time support to reduce barriers for households;
3. Invest in communication: Dedicate part of the project budget to professional communication and hire neighborhood ambassadors to keep households informed and engaged;
4. Ensure data integration and privacy: Use GDPR-compliant systems to automatically integrate household data, send invitations, and manage participation securely;

5. Include solidarity measures: Create a support mechanism that allows families unable to cover upfront fees to still join and benefit from the scheme (like via rolling funds or other).

These actions may help transform households from passive participants into active promoters of the initiative, strengthening community ownership and accelerating the scalability of Renewable Energy Communities.

Economic Viability

Evidence from the pilots shows that the economic performance of renewable energy projects depends more on financial structure and cash flow management than on the specific technology adopted. Effective models often rely on hybrid arrangements such as public-private partnerships and collaborations between municipalities and cooperatives. These approaches allow for significant investment even when public funds are limited. Third-party financing reduces the upfront burden for municipalities, while cooperatives mobilize local savings at competitive rates.

Nevertheless, several weaknesses remain. All pilots highlighted that governance procedures requiring multiple layers of budget approval in publicly controlled entities lead to procurement delays and reduce negotiating power with contractors. In addition, renewable energy cooperatives often face uncompetitive tariffs in the short term: prices set to recover the real cost of renewable investments can be higher than those offered by commercial suppliers in some locations and at some times. This creates a dilemma for vulnerable households, who must choose between supporting community-based schemes and aiming for long-term price stability or seeking immediate savings on the retail market.

Opportunities for improvement are emerging in three main areas:

1. Regulatory developments: New recognition of simplified associations and foundations provides energy communities with better financial autonomy, without the rigidity of traditional corporate structures;
2. Technological progress: The reduction of cost of energy storage technologies could make it possible to access flexibility markets, creating new and more diverse revenue streams;

3. Financial innovation: Green finance products dedicated to small-scale projects are expanding. Low-interest loans and guarantee mechanisms can replace ad-hoc municipal subsidies, making roll-out more stable and predictable.

At the same time, promoters must manage a dynamic environment risk. Electricity price fluctuations can strongly affect revenues when projects depend on grid exports. Policy changes, such as the gradual reduction of incentives, can erode margins.

Some recent measures have improved conditions. In Italy, for example, social housing organizations are now allowed to join energy communities, creating new opportunities for vulnerable households living in social housing buildings. Standardized tender documents will help shorten procurement time. Revolving funds are being tested, providing new financing options. However, challenges persist. Community tariffs are generally higher than those of certain commercial entities and it requires innovative approaches to bridge this tariff gap to ensure the models pertinence for vulnerable groups.

To strengthen long-term sustainability, business models should build on diversified revenue streams. These should include self-consumption, incentives for shared consumption, flexibility payments, and conservative assumptions about spot market prices. In parallel, risk-mitigation mechanisms such as price-floor agreements with aggregators should be adopted. These measures are crucial to ensure that vulnerable households do not face higher costs than under conventional supply contracts.

Suggestions for an improved model:

A stronger and more resilient business model should be built on three complementary pillars:

1. Public authority: providing access to roofs or land, planning stability, and institutional and reputational support.
2. Private partners (e.g. energy service companies or energy cooperatives): arranging and managing financing, taking on part of the investment risk, and delivering the design, installation and long-term technical operation and maintenance of the systems.
3. Dedicated social fund: reserving a predefined share of the net surplus to support vulnerable households and related social measures.

To accelerate project development, the use standardized legal tools such as pre-approved concession agreements, model statutes for participation foundations, and template shareholder agreements should be adopted. These reduce legal complexity and shorten approval timelines.

Revenue forecasts should cover four streams simultaneously:

1. On-site self-consumption
2. Incentives for shared consumption (according to national regulation)
3. Energy exported to the grid
4. Flexibility market revenues (where available)

Each revenue line should be stress-tested against price volatility and the gradual reduction of subsidies.

Finally, floor-price agreements with aggregators could stabilize revenues, reassure investors, and at the same time guarantee that a community dividend is safeguarded for local households.

Households' Economic Savings

Renewable Energy Communities are designed to support households in managing their energy expenses, with particular attention to families facing energy poverty. POWER UP pilots have shown that the most tangible benefit for households comes from the direct and visible reduction of energy bills. Households quickly trust the model when savings are transparently shown, either via clear billing of self-consumed renewable energy or redistribution of incentive revenues.

However, several challenges remain. If the link between energy production and individual household savings is not clearly established, participants may have difficulty identifying their specific benefits. This could occur if the incentive scheme is too complex or requires technical knowledge to be fully understood. Complexity and technicality could, in fact, discourage households from participating in these projects.

From a more technical point of view, some other challenges could be faced. For instance, in projects where estimated consumption profiles or aggregated building data are used, it could be difficult to calculate a reliable value for savings for the participants. Misalignment between renewable production and actual consumption, particularly when self-consumption limits are reached, has led to lower-than-expected savings. Still, if real-time monitoring is not available, these discrepancies could not be perceived, undermining trust. Moreover, upfront fees or administrative burdens discouraged participation, especially among vulnerable households who often discount future benefits more heavily.

Nevertheless, opportunities for improvement are emerging, even if not integrated in POWER UP schemes. Digital monitoring tools, linked with household budget applications, could make daily savings transparent and easy to understand. Combining community energy benefits with social welfare schemes could provide families with direct "top-ups" to their existing support, improving protection without adding administrative complexity. Small-scale batteries and smart devices are another opportunity, they could increase the share of self-consumed renewable electricity, reducing dependency on the grid. In addition, new regulatory frameworks that remunerate flexibility services at household level open the door to additional micro-payments.

Yet, risks must be carefully managed. Falling wholesale prices during peak solar generation hours may reduce or even eliminate revenues from sales of surplus energy, reducing savings to be shared with households. Regulatory changes that limit the size of energy-sharing clusters could reduce the share of benefits for participants. Rebound effects, where households increase consumption because electricity seems free, can reduce the real economic benefit.

Some obstacles have already been addressed in the market, even if not integrated in POWER UP pilots. For instance, prepaid-style monitoring tools are helping households, including those with limited financial literacy, to better understand their savings. Curtailment measures have been introduced to protect households from negative-price events, and communication strategies now link payments to simple energy-saving advice. However, unresolved challenges persist: the methodology for distributing benefits among frequently changing tenants of apartments is not yet finalized, data on vulnerable groups remain scarce, and the cost of reallocating benefits during tenant turnover is often underestimated. Addressing these aspects will be crucial to ensure long-term reliability and fairness in future replications.

Suggestions for an improved model:

To ensure households experience clear and lasting benefits, improved models should:

1. Make incentive sharing easy and understandable: define simple rules and explain them in a simple way, avoiding too much technicality;
2. Make savings visible and transparent: Provide monthly statements showing kWh produced, kWh consumed, and euros saved compared to the pre-project baseline;

3. Increase self-consumption: Install low-cost technologies such as smart plugs, load-shifting devices, or small batteries to maximize the use of locally produced renewable energy;
4. Protect households from market risks: Program inverters to stop exports when wholesale prices drop to zero, or redirect surplus energy into a community battery to avoid losses;
5. Adapt benefit distribution: Offer quarterly micro-payments instead of annual settlements to maintain engagement and support household cash flow. Introduce relocation clauses so benefits follow tenants who move;
6. Ensure resilience: Build in a reserve (e.g., covering three months of OPEX) and consider micro-insurance mechanisms to mitigate periods of low generation or policy changes.

Together, these measures can transform potential savings into reliable financial relief, strengthening household trust and encouraging wider participation in Renewable Energy Communities.

Technical aspects

From a technical perspective, renewable energy community projects face fewer technical challenges compared to financial or social dimensions. Photovoltaic panels, inverters, and batteries are mature technology, widely available with competitive prices and a well-developed market for installation and maintenance. The use of standardized design packages can shorten engineering times, while off-the-shelf monitoring systems provide the level of data detail needed both for performance optimization and regulatory compliance. In several pilots, the involvement of experienced technical partners accelerated commissioning, confirming that earlier investments in capacity building can bring tangible benefits at replication stage.

Nevertheless, the overall process, in a policy landscape constantly changing and with challenges in coordinating the different stakeholders involved in the process, can lead to delays in the implementation of innovative models, as faced by several POWER UP pilots.

Most weaknesses are systemic rather than related to the technology itself. Grid-connection procedures are often complex and non-transparent, with distribution operators in some regions retaining broad discretion to deny medium-scale projects on public land. Smart-meter coverage is uneven, making it difficult to verify shared-consumption schemes. In cases where individual meters were consolidated into a single master connection point, additional electrical works and temporary outages created extra costs. Furthermore, delays in the implementation of collective self-consumption rules have forced project teams to operate in regulatory grey zones, increasing legal costs and delaying the recognition of revenues.

Still, several opportunities are emerging. Falling battery prices enable communities to store surplus energy, improving savings certainly and reducing exposure to volatile market prices. Data-driven optimization, including the use of machine learning, offers the ability to shift demand, distribute savings more equitably, and identify faults before they occur. Modular approaches allow systems to be scaled over time: initial rooftop arrays can later be expanded with ground-mounted systems or even micro-wind units without redesigning the entire architecture.

However, technical threats must be managed carefully. Rising demand for grid connections may lead to stricter capacity caps, increasing the risk of curtailment or outright refusal. Cyber-security risks grow as digitalization expands; unauthorized access to metering platforms could expose sensitive household data. Rapid innovation cycles can leave early installations dependent on outdated protocols, complicating maintenance and spare-parts availability.

Several improvements have already been made in the market. Standardized wiring diagrams and commissioning templates are now available , while harmonized interoperability testing has reduced certification delays. But challenges remain: incomplete smart-meter coverage, the absence of a fast-track procedure for public-land concessions, and the lack of uniform technical specifications for low-income housing, where electrical systems are often outdated. To overcome these issues, future projects should include grid-capacity checks in the feasibility phase, allocate budgets for cyber-security audits, and adopt open-protocol hardware to avoid technological lock-in. A dedicated technical assistance line, funded by a small share of capital costs, would allow smaller municipalities and cooperatives to access expert support when needed. By treating technology as an adaptive platform rather than a one-off investment, future pilots can ensure resilience and continuous performance improvements that support both the social and economic goals of the POWER UP model.

Suggestions for an improved model:

To ensure technical robustness and scalability, improved models should:

1. Conduct a grid-capacity pre-check: Secure connection approval before investing in design to avoid costly delays;
2. Use open-protocol hardware: Prevent vendor lock-in and allow smooth integration of storage and demand-response assets;
3. Allocate a cyber-security budget: Include regular penetration testing of monitoring systems that process personal consumption data;
4. Address smart-meter gaps: Where coverage is incomplete, integrate sub-metering solutions within the project scope to ensure accurate and granular data;
5. Standardize commissioning: Apply shared wiring diagrams and checklists to reduce installer errors and accelerate regulatory approval;
6. Plan for mid-life review: Schedule a technical audit at year seven to recalibrate performance guarantees and incorporate emerging upgrades.

This set of technical indications ensures operational resilience, safeguards data integrity, and supports seamless scaling of Renewable Energy Communities across diverse regulatory contexts.

03

POWER UP business model adaptation

Upgrading Renewable Energy Community business model from POWER UP experience

3.1

Business model adaptation

The objective is to leverage the comprehensive experience gained throughout the project's duration, specifically by transforming the insights and analyses of Business Models conducted within Task T6.6. The proposed enhancements will ensure that the model effectively addresses both the technical and social dimensions of energy transition, fostering inclusivity and resilience. For this, we will focus on an Energy Community model, as it has been one of the key models explored by POWER UP pilots. This approach seeks to deliver scalable, impactful solutions for energy communities while capitalizing on lessons learned to secure long-term sustainability.

Customer Segments

A comprehensive Energy Community initiative, aiming to contrast energy poverty, should prioritize three concentric circles of customer:

- Tier 1. energy-poor households;
- Tier 2. prosumer citizens and local SMEs;
- Tier 3. institutional stakeholders: schools, social-housing companies, NGOs.

The strategic engagement should prioritize the three distinct tiers previously mentioned. The first tier includes energy-poor households identified through welfare databases, who demand zero-entry costs and predictable savings. The second tier consists of prosumer citizens and local SMEs seeking ethical investment outlets, valuing stable returns and community branding. The third tier encompasses institutional stakeholders such as schools, social-housing companies, and NGOs that seek impact metrics and reputational gains. Tailored enrolment packages should be designed to maximize uptake while avoiding mission drift, offering grant-backed "solidarity shares" for the first tier, capped-dividend shares for the second tier, and joint-impact reporting for the third tier. A breakdown of needs and enrolment packages specifically suited for each customer segment is indicate in Table 1.

Customer Segments	Needs	Enrolment packages
Energy-poor households	Require zero-entry costs and predictable savings	Grant-backed "solidarity shares"
Prosumer citizens and local SMEs	Seeking stable returns and community branding	Capped-dividend shares
Institutional stakeholders	Looking at impact metrics and reputational gains	Joint-impact reporting

Table 1. Customer segments' peculiarities

Value proposition

. Building on the lessons learned from pilot operations, the model can be strengthened through three complementary commitments, to deliver community energy model that mitigates energy poverty. First, it must provide households with direct and visible savings on their energy bills or, at least, a valuable incentive to join the scheme. Second, it should offer transparent evidence of social and environmental benefits for all contributors. Third, the model should embed adaptive flexibility to remain relevant over time.

Together, these elements reinforce the value proposition, ensuring that the business model delivers measurable impact for households, credibility for contributors, and resilience for future scaling.

Channels

The project experience highlighted the importance of a multi-channel approach to effectively reach the initiative's diverse targets. To ensure sustainable engagement, a tri-layer channel architecture should be developed to incorporate the following components:

I. Neighborhood ambassadors: Social services-driven representatives who conduct door-to-door outreach to onboard vulnerable households, particularly those that are challenging to reach through conventional methods.

II. Municipal One-Stop Energy Desk: A dedicated walk-in center that facilitates the onboarding of citizens and SMEs, offers personalized energy advisory services, and actively promotes the initiative to the local community.

III. GDPR-secure digital campaigns: Automated SMS or email campaigns, on the top of standard printed communications, designed for quick updates, behavioral nudges, and maintaining constant communication with participants in a secure and compliant manner.

In addition to these channels, periodic stakeholder engagement through workshops or meetings spearheaded by neighborhood ambassadors will ensure sustained interest and commitment to the initiative. These sessions will serve as platforms for sharing progress, addressing concerns, and reinforcing the collaborative spirit required for the initiative's success.

Customer Relationships

Customer relationships in the community energy model are built on transparency, trust, and active co-creation. Different customer groups require tailored levels of engagement, while all interactions remain under a single, recognizable municipal brand.

For energy-poor households, support must be highly personalized. Certified energy coaches and neighborhood ambassadors should provide home visits, quarterly bill reviews, and proactive communication through simple channels such as in person, SMS or WhatsApp. This high-touch approach makes enrolment easier, resolves issues quickly, and builds long-term trust.

For prosumer citizens, the focus is on accessible, self-service tools. Online portals should provide real-time data on consumption, production, and savings, together with actionable insights. To encourage deeper participation, periodic webinars and consultation forums allow prosumers to vote on reinvestment priorities, receive guidance on optimizing energy use, and celebrate success stories. This interaction fosters a sense of ownership while avoiding information overload.

For local SMEs and institutional stakeholders, engagement requires a more customized relationship model. Dedicated account managers provide tailored consumption and performance reports, facilitate access to flexibility markets, and support participation in public–private innovation initiatives. Given the strategic importance and limited number of these actors, they should also be directly involved in decision-making processes, ensuring their continued commitment and visibility as promoters of the initiative.

Revenue Streams

To secure long-term financial resilience, four complementary revenue channels should be aggregated, each informed by POWER UP pilots' performance data and risk analyses.

I. Self-consumption savings: Priority is given to maximizing on-site use of generated electricity, as this routinely delivers the largest net benefit under most tariff structures. Dynamic load-shifting - via demand-response contracts or smart-appliance scheduling – could raise the self-consumption ratio and cushions the project against retail-price spikes. Savings accrue monthly to participants, creating an immediate, visible dividend that reinforces engagement.

II. Additional revenues from sales of energy: Surplus production could be sold to the wholesale market or to a balancing aggregator. Where volatility is high, the promoter can arrange floor-price power-purchase agreements or indexed collars that lock in a minimum cash flow while allowing upside participation. Export contracts are aligned with battery-dispatch logic to avoid negative-price exposure and preserve asset health.

III. Shared-consumption incentives: Where national schemes remunerate virtual sharing, the incentive stream is treated as a communal asset. A predefined algorithm should splits receipts between direct rebates to participants and a ring-fenced social fund that finances further poverty-mitigation measures - energy coaching, micro-efficiency grants, or additional rooftop arrays - thereby compounding social impact.

IV. Social shares and revolving fund: To expand capacity without over-leveraging municipal balance sheets, the project issues low-denomination social shares to citizens, SMEs and local institutions. Dividends are modest but stable, structured as a subordinated revenue slice that activates only after operating costs and social-fund obligations are met. Repaid tranches recycle into a revolving fund that underwrites no-cost membership for new vulnerable households, sustaining inclusive growth without continual public subsidy.

Key Activities

The business model of an Energy Community pivots on a two-stage activity chain that translates ambition into sustained impact. Firstly, a set-up phase is necessary to activate the initiative; consequentially the operational phase will last for the duration of the project. This distinction allows us to define distinct key activities for the mentioned stages.

Set-Up Phase

- Stakeholder mobilization and governance: establish a multi-party steering committee and, where required, create a legally distinct entity like a foundation or association.
- Feasibility and resource assessment: complete grid-capacity checks, site audits and vulnerability mapping through secure data-sharing with welfare agencies.
- Capital structuring: assemble a blended finance package - grants, green loans and citizen social shares - channeled into the legal entity, aiming at reducing or eliminating upfront costs for vulnerable households.
- System engineering and procurement: finalize PV + storage design, run a competitive EPC tender and secure all permits.
- REC platform activation: synchronize digital enrolment, metering and billing systems to launch the energy-sharing model on day one.

Operational Phase

- Community engagement: deploy neighborhood ambassadors for continuous onboarding and support of vulnerable households.
- Asset operation and maintenance: monitor generation, self-consumption and export in real time; schedule predictive maintenance and optimize battery dispatch.
- Data management and compliance: running a unified CRM, producing regulatory and lender reports, and track service-level performance.
- Benefit distribution: calculate monthly bill credits, allocate shared-consumption incentives and replenish a ring-fenced social fund.
- Reinvestment and scaling: channel part of the benefit into additional PV capacity or micro-efficiency grants, creating a compounding growth loop.
- Policy and performance review: scan for tariff or regulatory changes and conduct mid-life technical audits to refresh hardware and software.

Key Partnerships

A municipal-driven Renewable Energy Community relies on a deliberately layered partnership ecosystem, each tier addressing a distinct operational or governance need.

- Local Public Authority: The municipality anchors the scheme, contributing with land or rooftop assets, planning certainty and policy alignment. It also plays a key role in retaining the political legitimacy required for long-horizon social mandates.
- Distribution System Operator: The DSO secures grid interconnection, validates energy flows and manages metering data, guaranteeing technical compliance and enabling virtual self-consumption.
- Energy Service Company / Citizen Cooperative: Acting as the main technical and financial partner, this entity organizes the project's financing, oversees system design and installation, and ensures long-term technical operation and maintenance; in case of cooperative structure, It also enables citizen participation through shared investment and democratic decision-making
- Financial Institutions: Green-loan facilities, impact-oriented funds and crowd-investment platforms supply blended capital, reducing the project's weighted-average cost and diversifying risk.
- Social Services & NGOs: Welfare departments and community organizations identify energy-poor households, manage targeted outreach and co-design benefit-distribution protocols, ensuring that poverty-alleviation objectives remain central.
- Local Energy Agency or Technical Foundation: Provides feasibility assessment, legal structuring templates and continuous performance auditing, shortening lead times and safeguarding regulatory compliance.
- Aggregator / Flexibility Market Operator: Monetizes surplus generation and battery dispatch through capacity or ancillary-service contracts, adding a stabilizing revenue stream.
- Educational and Civic Institutions: Schools, health centers and cultural venues host additional PV capacity, diversify load profiles and serve as visible showcases that sustain public engagement.

Each partner operates under performance-based memoranda that define roles, data-sharing standards and social-dividend allocations, creating a cohesive value chain that transforms municipal ambition into financially robust and socially inclusive energy outcomes.

Cost Structure

The cost structure of the community energy model combines careful capital investment with lean but resilient operating budgets.

Capital expenditures should cover not only the equipment but also feasibility studies, structural audits, legal advice, and stakeholder-engagement campaigns at roughly two percent of total investment. Core hardware includes photovoltaic modules (or any other renewable technology), inverters, mounting systems, battery storage, smart meters and an open-protocol monitoring platform. Civil works range from minor rooftop reinforcements to full ground-mount foundations, while grid-connection fees and cybersecurity hardening complete the upfront scope. Establishing a legal vehicle, whether an association, participation foundation or special-purpose company, adds initial costs related to registration outlay that covers incorporation, authorizations and initial statutory filings. Cost optimization is achieved through use of municipal roofs or land, modular system sizing that defers non-critical capacity, joint procurement with neighboring authorities and pre-engineered design templates that compress engineering hours. Upfront costs should not be charged to vulnerable households who cannot afford it. It's necessary to define a scheme where a third party bears initial investment cost while vulnerable households benefit from the sharing of incentives.

Operational expenditures encompass predictive and corrective maintenance under multi-year service contracts, insurance, CRM and data-analytics licenses, regulatory reporting, energy-coaching staff and neighborhood-ambassador stipends. Smart monitoring and remote diagnostics reduce site visits, while shared-service agreements allow the municipality to allocate administrative overhead across several community projects. Administrative OPEX covers statutory accounting, regulatory reporting, CRM licenses, insurance and meeting logistics for the governing board and general assembly. Personnel costs - energy coaches, outreach coordinators and part-time legal or financial officers - scale with membership growth but are partially offset by shared-service arrangements with municipal departments or partner cooperatives. Debt service and cooperative dividend distribution are treated as pass-through lines, activated only after the ring-fenced social fund is replenished each billing cycle. A mid-life asset-renewal reserve, accrued from year one, finances battery or inverter replacement in year seven without recourse to new debt.

04

Pilot specific replication analysis

Critical review of the replication opportunity for Pilots' business models

4.1

Campania area, Italy

Medium- and long-term goals

Following strategic pivot from refurbishing existing small-scale installations to developing a significant new photovoltaic asset (described in D4.3), the Campania area pilot is positioned to pursue a robust roadmap for increasing its social and economic impact. The following medium- and long-term objectives outline a structured pathway for the "Vesuvio Est" Energy Community Foundation, transforming it from an initial concept into a scalable and resilient model for regional energy transition and social inclusion. This strategy is designed to build upon the foundational 441 kWp plant, creating a self-sustaining model that delivers tangible benefits to its members, particularly the most vulnerable.

Medium-term goals

In the medium term, defined as the period through the end of 2025 and into 2026, the primary focus is on establishing the core operational and social infrastructure. The cornerstone achievement will be the commissioning of the 441 kWp photovoltaic plant in the municipality of Palma Campania, owned by a founding member. This asset is critical, providing the necessary energy production capacity to launch the Community's activities. Concurrently, a concerted effort will be made to expand the membership base with a clear social mandate. A first public call for "consumer" members will be launched, giving priority access to vulnerable households and those identified by the social services to be at risk of energy poverty. This will be supported by extensive information campaigns and public meetings designed to also attract "prosumer" members, with a particular focus on engaging local small and medium-sized enterprises (SMEs). This dual approach ensures both social equity and economic vitality from the outset.

Governance and territorial influence will also be expanded, with plans to welcome adjacent municipalities such as San Gennaro Vesuviano, Ottaviano, Terzigno, and Striano into the Foundation. This expansion is strategically timed to leverage opportunities, such as the extension of Italian NRRP incentives, to promote further PV installations among new members, especially commercial entities. While partnerships with ESCOs for energy services are envisioned for a later stage, the immediate priority remains the consolidation of the Foundation's core structure and membership.

Long-term goals

Looking towards a three-to-five-year horizon, the long-term strategy focuses on scaling operations, deepening social impact, and fostering a comprehensive local energy ecosystem. The technical infrastructure will be progressively expanded through the development and acquisition of new photovoltaic facilities, driven by the goal of maximizing collective self-consumption. The integration of energy storage systems is a key consideration for this phase, aimed at utilizing surplus energy for critical public services, such as municipal lighting systems. In lockstep with this technical growth, the number of consumer members will proportionally increase, maintaining a steadfast commitment—consistent with the Foundation's public governance and social mission—to prioritize citizens in vulnerable conditions.

Framework for Future Expansion

The long-term vision extends beyond energy provision to cultivate a network of strategic alliances. This involves the systematic involvement of private partners, including local cooperatives, manufacturing companies, labor unions, and critically, local financial institutions like "Banca Popolare Vesuviana". Such partnerships will be instrumental in securing favorable credit conditions for members and the Foundation itself, thereby catalyzing investments in new production assets and energy efficiency measures.

The evolution and replication of the model represent the ultimate strategic objective. The experience gained through the POWER UP project is considered fundamental to refining a replicable framework for energy communities. One of the most tangible follow-up initiatives will be the establishment of One Stop Shops in all affiliated municipalities. These hubs, supported by collaborations with consumer protection associations and local tax assistance centers (CAF), will provide invaluable information and guidance on energy savings and efficiency, while simultaneously promoting new memberships.

The Foundation's strong public governance and accumulated administrative expertise create fertile ground for success. This success is expected to position the Vesuvio Est Energy Community as a leading model for surrounding territories, with genuine potential for regional replication. While the model is anchored in fixed elements like its top-down governance, it retains the flexibility to adapt to diverse social and cultural contexts, ensuring its long-term relevance and capacity to generate lasting positive change.

SWOT analysis on business model

Due to limited funds for PV system installation, the municipality launched a public tender to select an ESCo. The investment will be covered by energy sales and incentives, requiring no municipal funds. Additionally, in May 2025 the population limit for PNRR capital funding for CER photovoltaic systems was raised from 5,000 to 50,000 residents, making UCSA consortium municipalities eligible. However, tight installation deadlines may still prevent access to this funding.

Chapter 4.1 of deliverable D4.3 provides a detailed description of the Pilot's structure.

Strengths

- Social engagement aspects:
    - Implementation of a direct and personalized communication strategy to engage REC's participants
- Economic viability of the model:
    - The initial economic endowment of the REC is contributed by the founding members who are Public Administrations and have easier access to economic resources
- Households' economic savings
    - Thanks to existing government-owned facilities, it will be possible to distribute small amounts of the REC's generated incentives to participants to help them meet energy expenses
- Technical aspects:
    - The fundamental role of having a technical partner, such as AESS, to support the REC start up and development

Weaknesses

- Social engagement aspects
    - Inconstant communication, only linked to specifically vents, has proven to reduce household engagement level
- Economic viability of the model:
    - The public governance in the chosen model presents a rigidity in the financial model that can be a brake on economic growth
- Households' economic savings:
    - The scheme is not operational yet, there is no economic savings to be evaluated
- Technical aspects:

  - Public administration slowness of the bureaucratic and political process required to set up the REC

Opportunities

- Social engagement aspects:
  - Through public administrations leading the energy community and their social departments, it is possible to directly reach a large number of households in energy poverty
- Economic viability of the model:
  - More attention to RECs and more funding at national level by the government
- Households' economic savings:
  - The possibility, as a municipality, to make people in energy poverty join the REC (through an income-based call) so that they can benefit from the incentives of the REC
- Technical aspects:
  - The founding municipalities of the Energy Community are already planning new solar installations which can be part of the Community's technical and technological heritage

Threats

- Social engagement aspects:
  - lack of an already existing community, need to use top-down approach to create drive households' participation in the scheme
- Economic viability of the model:
  - High bureaucratic complexity and cost for administrative set-up for establishing energy communities with the participation of a local authority
- Households' economic savings:
  - Financial aid that comes from the community can be a disincentive for families participating in the REC to adopt virtuous behaviours. In other words, if the economic incentives in not well communicated and linked to the promotion of a better energy behaviour, households could interpretate it as an opportunity to cover energy consumption increases or bad planned consumptions
- Technical aspects
  - National grid manager could deny construction of new medium- to large-scale plants on public land owned by municipalities

Obstacles to the pilot replication

Replication in terms of increasing the magnitude of pilot activities by reinvesting profits

- Solved obstacles that can improve the model
    - Previously, social housing companies were excluded from participating in RECs, as they were considered 'large companies' under Italian regulations. However, this has now changed on May 2025 by the law n. 60/2025 that adopted the DL n. 19 del 28 febbraio 2025 named "Energy Bills Decree". Now their participation is allowed, and this means that vulnerable households living in social housing dwellings could now be part of community schemes.
- Unsolved obstacles that must be addressed in future replications
    - No specific obstacles were reported by the pilot partners for this category at the time of data collection.

Replication of the model in new pilots

- Solved obstacles that can improve the model
    - Set up of information offices for citizens within the municipalities for energy related issues, similar to the model of the Oficinas de Transformación Comunitaria (OTCs) adopted in Spain and the Contact Point implemented in Palma Campania could be important for the development of new ECs initiatives and consolidating the already existing ones.
    - One of the barriers to overcome while establishing an energy community is the legal form to be adopted when public entities are involved. In addition, perfect patrimonial autonomy is necessary to ensure that municipalities are insured against the risk of having to contribute sums in the future that could not be programmed at the time of establishment. The Court of Auditors (the superior auditing body to municipalities in the case of legal forms under Title I of the C.C.), has the right to express its prior opinion and indicate prescriptions. This can be avoided by using the form of Simple Association or Participation Foundation.
- Unsolved obstacles that must be addressed in future replications
    - Need for greater uniformity of national legislation in terms of legal recognition with the reduction of the economic burden needed to legally establish an energy community entity. In Italy, different legal forms have different values as minimum

capital for legal recognition, and these values also vary from region to region. We observe a variation between 15,000 to 60,000 euros between a recognized association operating in Lombardy and one in Campania, for example. Having a single amount for all entities that are energy communities would facilitate its implementation.

- To create specific and simplified procedures to allow public areas to be used for the installation of generation systems owned by energy communities. For example, the art. 47, paragraphs 4 and 5, from the Legislative Decree n. 13/2023 introduced a simplification mechanism for the concession of public areas to be used for the installation of generation system owned by REC until 31 December 2025. This was a measure only for systems in small municipalities (under 50,000 inhabitants), financed through the NRRP. However, the National Anti-Corruption Authority (ANAC) was supposed to implement measures by releasing standard provision and specific models for the tenders/public calls to be used by local authorities. This, however, has never been done and this remained inapplicable in practice. A national guideline in this direction for all areas would be important for the scaling of the EC initiatives.
- Campania Region should allocate resources to municipalities with more than 50,000 inhabitants for promoting energy communities in order to complement the funds that have already been allocated at national level. Implementing promotional measures similar to those adopted in the Emilia-Romagna Region, where a public call was launched to finance the creation and implementation of feasibility studies for the generation systems (open to all - more information here) and a second one destinated to finance generation systems owned by energy communities in cities with over 50,000 inhabitants (more information here), thus complementing the national tender that is direct for cities under 50.000 inhabitants.

4.2

Valencia, Spain

Medium- and long-term goals

The renewable energy strategy in Valencia is distinguished by a dual-model approach designed to accelerate the energy transition while ensuring social inclusion. In the "Cemetries model", the municipality directly invest in PV plants and involves citizens. These systems provide energy for municipal services and, critically, allocate free energy shares to vulnerable households, making clean energy accessible without requiring upfront capital from residents.

The second, complementary model involves the municipality acting as a facilitator for citizen-led Renewable Energy Communities (RECs). In this bottom-up approach, the city provides public rooftops free of charge, enabling citizen groups to invest collectively in their own PV systems and share the energy produced. Chapter 4.2 of deliverable D4.3 provides a detailed description of the Valencia Pilot's structure. The medium- and long-term objectives for the Valencia pilot are structured to advance both parallel strategies, scaling up infrastructure while refining the business models for sustained local impact.

Medium-term goals

In the medium term, through 2026, the pilot is expecting a significant expansion of its technical infrastructure. Following the direct municipal investment model, 2.5 MWp of new photovoltaic capacity will be developed through two large installations on the Cemeteries. At the same time, the REC facilitation model will see the addition of approximately 167 kWp from three distinct new community-owned plants. This combined expansion is planned to have a considerable social impact, with the potential to integrate more than 400 vulnerable households and 120 additional citizens as members of new and existing RECs. Geographically, these new installations are planned for various districts within the Valencia metropolitan area, extending the benefits of local renewable energy. During this phase, the focus will be on implementing these projects and consolidating existing partnerships, with no immediate plans to involve new external stakeholders.

Long-term goals

Looking ahead to the three-to-five-year horizon, the long-term vision focuses on scaling these models and introducing new services. The plan includes activating at least ten new RECs and integrating battery storage into municipal PV installations to enhance self-consumption. A key development will be the assessment of potential flexibility services, exploring how the aggregation of energy assets—from both the RECs and the municipal installations—can create new value streams and improve the overall business models. Social inclusion will be further deepened by engaging new neighborhoods and leveraging the recently expanded 5km energy sharing radius to ensure all users of social services can be reached by planned installations.

Framework for Future Expansion

The evolution of the pilot will also involve testing new mechanisms. While the core social approach will remain consistent, there are plans to explore more inclusive financing options for citizens, such as a revolving fund model. The business models will adapt, possibly with the inclusion of storage impacting the municipal installations and the potential formation of a formal umbrella organization creating new economic opportunities for the RECs. Technically, a deeper integration of digitalization and monitoring tools is expected to optimize the social and economic impact of the solar energy produced. To ensure sustainability, the long-term strategy is to build internal public capacity, developing new public services related to these models rather than relying on external experts. Replication will be pursued by engaging with provincial and regional authorities to foster a metropolitan-scale vision, building on existing cross-boundary collaborations while maintaining a primary focus on local priorities within Valencia.

SWOT analysis on "Cemeteries model"

Strengths

- Social engagement aspects:
    - Tool for the identification of VH
- Economic viability of the model:
    - solid business model, both municipalities and participants earn economic advantages
- Households' economic savings:
    - direct and easy way to reduce energy bills

- Technical aspects:
    - mature Technologies

Weaknesses

- Social engagement aspects:
    - Entering in REC could not be the priority for families + you need resources to find the people
- Economic viability of the model:
    - Upfront investment is relatively big, hard for small municipalities
- Households' economic savings:
    - limit on direct self-consumption, up to 40% of energy needs couldn't match the renewable production contributing to the share of energy
- Technical aspects:
    - REC participant must be located within 2km perimeter from the plant + collective self-consumption management is still not fully developed

Opportunities

- Social engagement aspects:
    - involving citizens in local energy transition
- Economic viability of the model:
    - grant opportunities
    - optimization of energy production and sharing
- Households' economic savings:
    - Awareness-raising about the problem and solutions beyond the solar energy
- Technical aspects:
    - opportunity to include storage in a second phase

Threats

- Social engagement aspects:
    - low interest from households
- Economic viability of the model:
    - not having the investment capacity; could be not so profitable because of change in solar energy value over time
- Households' economic savings:

   - bad match between consumption and production and long time needed to see the impacts
- Technical aspects:
   - slow development of collective self-consumption regulation and implementation. DSO collaboration

SWOT analysis on "RECs model"

Strengths

- Social engagement aspects:
   - improvement of community link through the REC
- Economic viability of the model:
   - driving private investments, both investors and consumers gain economic positive impact
- Households' economic savings:
   - direct and easy way to reduce energy bills
- Technical aspects:
   - Use of mature Technologies

Weaknesses

- Social engagement aspects:
   - entering RECs could not be the priority for families, as well as resources needed to find the people and convince them to join
- Economic viability of the model:
   - intervention depends on financial capacity of neighbors to invest in PV
- Households' economic savings:
   - limit on the direct self-consumption, up to 40% of energy needs couldn't match the renewable production that contribute to the sharing of energy
- Technical aspects:
   - REC participant must be located within 2km perimeter from the plant + collective self-consumption management is still not fully developed

Opportunities

- Social engagement aspects:
   - involvement of social entities in the models
- Economic viability of the model:

- grant opportunities + optimization of energy production and sharing
- Households' economic savings:
  - Awareness-raising about the problem and solutions beyond the solar energy
- Technical aspects:
  - opportunity to include storage in a second phase

Threats

- Social engagement aspects:
  - having enough interest from neighbors and financial capacity; technical capacity
- Economic viability of the model:
  - not having the investment capacity; could be not so profitable because of change in solar energy value over time
- Households' economic savings:
  - bad match between consumption and production, as well as the long time needed to see the impacts
- Technical aspects:
  - slow development of collective self-consumption regulation and implementation. DSO collaboration

Obstacles to the pilot replication

Replication in terms of increasing the magnitude of pilot activities by reinvesting profits

- Solved obstacles that can improve the model:
  - At the beginning of the pilot implementation, legal basis wasn't clear for REC tenders. Now that this obstacle has been solved, the following activity is testing and integrating new municipal services, beyond PowerUp
- Unsolved obstacles that must be addressed in future replications:
  - Collaboration with social services is thill problematic for data protection barriers and staff availability for vulnerable households' identification; complex RECs' internal governance, multiple actors for decision making

Replication of the model in new pilots

- Solved obstacles that can improve the model:

    - Could use same legal basis and even simpler procedures; Templates for communication and consent forms, agreements… available for any follower city
- Unsolved obstacles that must be addressed in future replications:
    - new REC initiatives may not have their own social services with enough capacity to drive the project; management of new Collective self-consumption initiatives needs technical support

4.3

Rožnov pod Radhoštěm, Czechia

Medium- and long-term goals

The Rožnov pilot initiative, led by the municipality, is designed as a practical and scalable solution to address energy poverty within social housing. By installing a 39.1 kWp photovoltaic system complemented by battery storage on a municipal residential building, the project establishes a model for collective self-consumption. The financial structure, which combines a significant municipal investment with a national "New Green for Savings" grant, allows the minimization of the upfront cost for the households to a small monthly rent supplement, ensuring accessibility. The following analysis outlines the medium- and long-term objectives that will guide the pilot from its initial operational phase toward wider replication, with a clear focus on technical evaluation, community inclusion, and the development of frameworks necessary for scaling.

Medium-Term Goals

In the immediate future, the primary focus is not on expansion but on the thorough consolidation of the results from the initial POWER UP activities. The overarching goal is to ensure the operational success and institutional recognition of the intervention, which is considered a prerequisite for any subsequent scaling. A critical milestone within this timeframe will be a comprehensive impact evaluation of the pilot. This assessment is designed to quantify ex-post – complementary to the ex-ante assessment provided by POWER UP activities – the project's success in mitigating energy poverty and to measure its environmental benefits. Key performance indicators will be meticulously tracked, including total electricity production from the PV system, the building's overall consumption, the level of collective self-consumption achieved, and the amount of surplus energy sold to the grid.

Concurrently, efforts will be dedicated to maintaining and strengthening the involvement of key stakeholders who were integral to the implementation phase. This includes ongoing cooperation with technical partners such as "ČEZ Distribuce", the distribution system operator responsible for smart metering, and "ENVO s.r.o.", the company managing the installation and maintenance of the energy system. By ensuring the stability of these operational partnerships and rigorously documenting the pilot's outcomes, the municipality aims to build a robust case study that validates the model's effectiveness and viability, paving the way for future consideration.

Long-Term Goals

Looking at a three-to-five-year horizon, the long-term vision is centered on leveraging the success of the consolidated pilot to scale up the initiative. The first step involves an internal expansion within the pilot building itself, with the objective of including a wider number of resident households in the collective self-consumption scheme. This will provide an opportunity to engage residents who may not have initially participated and to maximize the social benefit of the installed infrastructure.

Following the anticipated institutional recognition of the pilot's results, the main long-term goal is the geographical expansion of the model beyond the initial building. The strategy is to replicate the pilot in other municipally owned residential buildings throughout Rožnov. This scaling effort aims to extend the economic and environmental benefits to a larger segment of the community, transforming the initial pilot from a standalone project into a city-wide program for addressing energy poverty in social housing.

Framework for Future Expansion

It is recognized that moving from a single, municipally-driven pilot to a wider, replicable program will require significant evolution across several domains. Future pilots and expansions are expected to differ from the current model as they navigate more complex territory. From a legal and regulatory standpoint, scaling will ideally necessitate the development of more sophisticated legal frameworks for collective self-consumption, along with new standardized agreements between tenants and building owners to streamline the process.

Governance structures will also need to adapt. While the initial pilot is managed directly by the municipality, replication will require new governance models within buildings, such as the formal establishment or empowerment of homeowners' associations. This will demand greater cooperation among residents and the implementation of clear internal rules for managing the shared energy infrastructure.

The financial model will likewise need to evolve from one based on public investment to one incorporating joint investments, potentially through new financing schemes like cooperative ownership or Energy-as-a-Service (EaaS) contracts. Finally, ensuring social acceptance and positive behavioral change will depend on fostering collective decision-making processes and building trust among residents, requiring stronger consensus and a sense of shared responsibility. The scalability of the model in multi-apartment buildings offers substantial urban potential but unlocking it is contingent on developing these adaptable legal, governance, and financial frameworks. To support this, strengthened strategic partnerships with regional utilities, technical advisors, and legal experts will be crucial. The replication approach will focus on actively sharing the pilot's experiences, legal templates, and operational guidance with other municipalities through regional and national platforms.

SWOT analysis on business model

Strengths

- Social engagement aspects:
  - households' trust as project carried out by municipality; the project Empowers residents to participate in energy transition;
  - Encourages community solidarity and awareness of sustainability.
- Economic viability of the model:
  - recover of the municipality investment trough households' repayment along the time, fostered and simplified by the availability of national funding
- Households' economic savings:
  - direct energy savings for households - to be verified and quantified - protects vulnerable households from rising energy prices, anticipated by public investment on their building
- Technical aspects:
  - Centralized PV system allows streamlined maintenance and monitoring;
  - PV and future shared battery systems can be optimized for collective use;
  - common and well-known technology

Weaknesses

- Social engagement aspects:
  - Limited understanding or skepticism among households;
  - Potential disappointment if benefits are not communicated clearly
- Economic viability of the model:
  - depends on willingness of the municipality to invest in RES;
  - admin burden - the municipality manages energy sharing groups, contracts with households;

  - High upfront investment - energy & structural assessment, tender documentation.
- Households' economic savings:
  - Savings may be unclear if energy use patterns varies;
  - if more households participate, individual savings could be lower.
- Technical aspects:
  - Additional changes (e.g. retrofitting) must be carried out before installation starts.

Opportunities

- Social engagement aspects:
  - Potential to raise awareness about energy efficiency and change behavior of consuming energy;
  - Community can be strengthened by being involved in the project;
  - Model can be inspirational for other municipalities.
- Economic viability of the model:
  - reduces dependency on external energy providers;
  - Local job creation (maintenance, installation, education)
- Households' economic savings:
  - Relieves household economic situation and saved money could be used elsewhere
- Technical aspects:
  - Potential to use data to optimize; Integration with battery to balance generation and consumption

Threats

- Social engagement aspects:
  - lack of trust of citizens to such project can hinder;
  - some households may feel excluded if not consulted properly
- Economic viability of the model:
  - poor performance in pilot may stall future projects;
  - changes in local government may change priorities for such projects
- Households' economic savings:
  - as household consumption is not known, just estimated, the savings may not be big;

    - energy savings could be minimal if fee for PV use is set too high
- Technical aspects:
    - unavailability of smart metering may delay installation and sharing

Obstacles to the pilot replication

Replication in terms of increasing the magnitude of pilot activities by reinvesting profits

- Solved obstacles that can improve the model:
    - Bad state of the roof - upgrade needed;
    - Clear and timely communication of the project among other municipal staff;
    - Commitment and support from the city political leadership; choice of building was changed a few times
- Unsolved obstacles that must be addressed in future replications:
    - Involvement of social services is not happening - the staff is already overburdened, and does not want other tasks;
    - budget - the initial project approval was later delayed due to change of priorities within the City Council (a coalition so compromises had to be made) - this resulted in project implementation being postponed;
    - Still not much willingness to communicate the project and its benefits - not until the installation is up and running;
    - Still some uncertainties about the benefits as we do no know the household actual energy consumption;
    - Fears that frequent change of tenants in the building will increase transaction costs for the municipality;
    - Local authorities often prioritize investing in PV systems for schools over social housing because such investments are more publicly and politically acceptable.

Replication of the model in new pilots

- Solved obstacles that can improve the model:
    - Easy model to replicate once energy community agrees what needs to be done;
    - Ability to define system requirements and find a reliable contractor;
    - External expert consultation and calculation needed to evaluate the PV potential of buildings and individual consumption patterns to assess the viability of the model.

- Unsolved obstacles that must be addressed in future replications:
    - Still not much willingness to communicate the project and its benefits - not until the installation is up and running;
    - Local authorities often prioritize investing in PV systems for schools over social housing because such investments are more publicly and politically acceptable;
    - More data on establishment and operation of energy communities in Czechia needed;
    - Currently only 2 energy communities are sharing electricity so not enough data to evaluate benefits;
    - Many entities still make decisions exclusively on financial benefits and high upfront costs of energy community may discourage them from even starting the project.

4.4

Eeklo, Belgium

Medium- and long-term goals

The Eeklo pilot, a collaboration between the municipality and Ecopower energy cooperative, has adapted its approach based on direct experience and changing market conditions. The initial model, centered on a social share scheme for wind energy, faced challenges in uptake as market tariffs shifted. This led to the development of a more direct support mechanism involving plug-and-play solar installations (The model upgrade is described in D4.3). The following objectives for the medium and long term are grounded in the lessons from this evolution, focusing on consolidating workable elements, disseminating knowledge, and developing more resilient models to address energy poverty.

Medium-term goals

In the immediate timeframe of 2026, the pilot's activities are concentrated on consolidating the current model and executing targeted, small-scale implementations rather than broad expansion. The objectives reflect a deliberate response to the findings and constraints identified. The primary milestones include the continued operation of the original social share model, with a target of engaging 50 participants who will benefit from locally produced renewable energy at its cost price from Ecopower's collective wind and solar assets. Alongside this, the newer component of the pilot will be advanced, aiming for the installation of 25 plug-and-play solar systems for participating households. These systems, with capacities of 400W or 800W, offer a direct and tangible financial benefit through self-consumption. The target of 25 units is a realistic acknowledgment of practical constraints, including the fact that not all housing situations are suitable for this technology and the relatively recent introduction of these systems in Belgium in the spring of 2025.

Notably, a broader expansion of final users or a geographical replication of the current model is not foreseen in this medium-term phase. This decision is a direct result of the shortcomings detected during the pilot, particularly the challenges related to market competitiveness and the legislative framework. The focus, therefore, remains on refining the existing interventions and gathering further data on their effectiveness. A key activity during this period will be knowledge dissemination. In October 2025, a national capacity-building webinar is planned, targeting local authorities and other energy communities. The goal of this event is to transparently share the results, both successes and challenges, of the Eeklo pilot, contributing to the broader sector's understanding of implementing social energy projects. Ecopower remains committed to exploring impactful solutions for energy poverty in collaboration with its partners, even as direct replication of the pilot's current form is paused.

Long-term goals

Over the next three to five years, Ecopower's objectives for the initiative are focused on evolution, scalability of refined concepts, and deeper integration of flexibility solutions. Ecopower, in its capacity as a cooperative project developer, maintains a robust pipeline of new wind, solar, and collective heating systems, which are fundamental to providing energy at cost. A significant area of investment and development will be energy flexibility. This involves work on both the production side—through measures like the curtailment of solar and wind parks and experimenting with collective storage solutions, such as the battery project on the Eeklo city council site—and the consumption side. Ecopower will enhance its efforts to facilitate optimized energy use among its members by sharing information and cues on production and market conditions.

The long-term vision for social inclusion will be sharpened to focus on the group identified as most in need: households dropped by commercial suppliers who do not have a right to the regulated social tariff. This group, which only became accessible to the pilot partners in the project's later stages, remains the most vulnerable and will be the priority for future energy poverty initiatives, assuming current policy regulations persist. The potential for impact is considerable; while approximately 2% of Flemish households use cooperative energy, a larger portion, around 3%, are supplied by the DSO at elevated rates after being dropped by commercial entities.

To enable the scaling of the social plug-and-play solar panel model, a central long-term goal is to secure new financial partners. This is necessary to develop a sustainable financing path that allows the model to grow beyond the pilot phase and be offered in other Flemish municipalities. Disseminating this refined model will require improved support from governmental bodies, as outlined in European directives on energy communities. A critical enabler for this is securing access to local renewable energy sources for building new collective production installations. Such installations are essential for producing energy at cost and generating the value required to finance the socially oriented components of the model. Derived from the POWER UP experience, new pilot activities will explore ways to involve vulnerable households in individual flexibility programs. This would allow them to benefit from market mechanisms by shifting consumption to more favorable moments, an area where Ecopower is among the leaders in Belgium.

Framework for Future Expansion

The experiences in Eeklo have provided clear directives for how future projects must differ from the original pilot design to ensure success and scalability. The learnings point towards a model that is more socially intensive, financially robust, and technologically adaptive.

From a social perspective, the target group of households dropped by commercial suppliers without access to a social tariff remains the clear focus. The most profound lesson learned is the necessity of intensive, face-to-face, and personal engagement to build a relationship based on trust with this demographic. Future projects will need to resource this element adequately from the outset. Furthermore, the pilot demonstrated that tangible and immediate financial benefits are the primary motivator for this group; other benefits such as participation in a cooperative or access to green energy are secondary. Consequently, any future business model must deliver a clear financial advantage. In the current context, facilitating access to energy flexibility is seen as a highly promising pathway, pending any federal policy changes to broaden eligibility for the social tariff, which would be a more direct and impactful intervention.

Economically and financially, the pre-financing scheme for cooperative shares, sponsored by a local authority, has proven to work well for the original target group. However, expanding beyond this requires a new approach. The cooperative tariff is not invariably the cheapest option on the market, which necessitates additional value creation. The developed model, which adds a plug-and-play solar panel financed from a social fund, addresses this. This fund is fed by revenues from the energy community's collective installations. It is important to note the financial distinction: while the pre-financing of a €250 social share is budget-neutral for the city over time, the financing of a €500 plug-and-play solar panel represents a direct cost to the energy community, underscoring the need for sustainable revenue streams to support it.

Technically, wind energy remains a vital component of the energy mix, and Ecopower will continue to pursue onshore and offshore wind projects. The market for solar energy, however, is becoming more complex. Large collective installations face challenges if significant energy is injected into the grid, while small individual installations may become disadvantageous for prosumers without dynamic load management due to the increasing frequency of negative prices during peak solar production. These trends make energy sharing more difficult and highlight the importance of consumption optimization platforms. Ecopower will continue to develop and improve these solutions in partnership with the cooperative EnergyID.

The long-term sustainability and replication of a refined model will depend on nurturing key partnerships. The collaboration between local government and an energy community remains a powerful and promising foundation for engaging large numbers of citizens. The Eeklo pilot also proved that partnering with an expert organization in the field of poverty, such as TAO Armoede, is a major asset for effective outreach and trust-building. Therefore, local poverty organizations and experts by experience will be considered essential partners in all future projects involving vulnerable households. The speed and scope of adaptation and replication will ultimately depend on securing alternative project financing and realising local cooperative renewable energy projects that generate both green energy at cost and the added value needed to invest in the time-intensive social approach required for meaningful impact.

SWOT analysis on business model

Strengths

- Social engagement aspects:
  - involve vulnerable households in the local energy transition
- Technical aspects:
  - social share flow has been set up and is working (can be replicated whenever needed, however not yet automated at Ecopower-side)

Weaknesses

- Economic viability of the model:
  - renewable based cooperative energy tariff is not the cheapest on the market; reason: cooperative has to invest and function in a commercial context, in direct competition with commercial suppliers

Opportunities

- Economic viability of the model:
  - cooperative tariff + plug & play PV to fix the gap with the cheapest supplier (e.g. social fund of cooperative, or municipal budget);
  - find a sponsor (per municipality?) to finance the gap (plug&play PV);

  - social fund: not structural, is it the responsibility of the cooperative (members) to organize this;
  - find a partner to fix the gap between social tariff and cooperative tariff
- Households' economic savings:
  - budget meter EnergyID Premium (simulates the budget/pre-paid meter of DSO) -> support VH to work with it; automatic visit by energycoaches at participant's homes (Wooneco);
  - educative interventions on energy poverty mitigation (how to do the V-test, how to read my energy bill, how to work with EnergyID Premium…)
- Technical aspects:
  - pay share in rates (no social share with intervention of sponsor, but individual savingsplan) - we learned how to do it and can scale it whenever needed

Threats

- Social engagement aspects
- Economic viability of the model
- Households' economic savings:
  - plug&play PV must not pose a risk to VH (negative prices -> pay for injection). Solution: small installation that only covers the baseload
- Technical aspects

Obstacles to the pilot replication

Replication in terms of increasing the magnitude of pilot activities by reinvesting profits

- Solved obstacles that can improve the model:
  - Organization of social shares in cooperation with a municipality + energy community; budget monitoring tool operational (clients with budgetmeter can use this to continue the control of his/her budget);
  - Model of 3rd party financing of individual PV on the roof of the target group (coop group purchase) (not implemented, but model is ready)
- Unsolved obstacles that must be addressed in future replications:
  - Gap between coop tariff and cheapest supplier has to be fixed (long term vs short term advantages);
  - (Wo)manpower needed to reach out to potential candidates: high workload necessary for succes of project / reaching target group;

  - Constant flexibility needed to deal with the changing context (regulation, market situation,..);
  - Coop supplier has to compete with old nuclear/other power plants who have no costs anymore. Ecopower has to invest and refinance wind + solar plants

Replication of the model in new pilots

- Solved obstacles that can improve the model:
  - European directive on REC/CEC provides opportunities for energy communities / energy sharing, but implementation must be functional; e.g. countries with a support framework for REC/CEC (e.g. reduced tariffs), the social share model can be used to provide access to VH to energy communities
- Unsolved obstacles that must be addressed in future replications:
  - Cost of energy sharing (especially of small volumes) is not a guarantee for a lower energy bill

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Conclusion

The POWER UP project, through the operational experience of its four pilot initiatives, has generated a valuable knowledge base on the practical implementation of local energy market models to address energy poverty. This deliverable has distilled those lessons, moving from site-specific challenges to a structured and replicable framework, focusing on energy communities. The analysis confirms that while technology is mature and readily available, the long-term success of energy communities to tackle energy poverty depends above all on the careful integration of social, economic, and governance dimensions. The findings provide a clear roadmap for stakeholders aiming to develop sustainable and socially inclusive models.

The cross-pilot SWOT analysis highlights several key insights. Socially, legitimacy rooted in trusted institutions—such as municipalities or long-standing cooperatives—combined with continuous, personalized communication, is the strongest driver of participation. Economically, sustainability relies not on a single financial tool but on hybrid approaches (e.g., public–private partnerships, ESCo concessions) and diversified revenue streams that combine self-consumption, grid exports, incentives, and access to flexibility markets. For households, savings must be immediate, visible, and transparent to build and sustain trust, particularly among vulnerable participants. Technically, the main challenges are systemic: opaque grid-connection procedures, uneven smart-meter coverage, and regulatory uncertainty, rather than deficiencies in hardware.

On this basis, POWER UP proposes an upgraded business model designed to be both resilient and scalable. The model builds on a multi-actor partnership ecosystem that brings together public authorities, technical partners, financial institutions, and social organizations. It promotes a four-pillar economic structure combining self-consumption savings, export revenues, shared-consumption incentives, and the creation of a revolving fund dedicated to inclusive growth. Engagement is driven through a multi-channel strategy, including municipal one-stop-shops and ambassadors, ensuring outreach across all customer segments: from energy-poor households to prosumers and institutional stakeholders.

Each pilot is already integrating these lessons into future strategies, with ambitious but context-specific targets:

- Italy (Campania area pilot): scaling its public-governance model by commissioning a 441 kWp plant and expanding to neighboring municipalities;
- Spain (Valencia pilot): pursuing a dual approach with 2.5 MWp from direct municipal investment and 167 kWp via new citizen-led RECs, targeting over 400 vulnerable households;

- Czechia (Rožnov pilot): taking a cautious path, focusing first on assessing its initial installation before replicating the model in other social housing complexes;
- Belgium (Eeklo pilot): refining support mechanisms such as plug-and-play solar and disseminating national-level lessons learned, especially around competitive market challenges.

Overall, the POWER UP experience shows that while no single solution applies to all contexts, a shared framework built on institutional trust, financial innovation, and strong community engagement provides a robust and adaptable pathway towards a fair and inclusive energy transition.

The catalyst for social innovation in the energy market

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