HORIZON RESULTS BOOSTER

SERENE LocalRES SUSTENANCE

A multi-disciplinary approach to increase the local adoption of energy-efficient solutions

Policy Brief

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Executive Summary

The growing demand for accessible, locally available energy solutions, combined with the urgency to implement new regulations for the clean energy transition, highlights the need for widespread adoption of renewable energy on a much larger scale than is currently in place. Households account for 36% of total energy consumption in the EU (source: European Parliament), making them one of the largest contributors to overall energy usage. Their adoption of energy-efficient solutions is critical for achieving Europe's climate goals.

The SERENE project group, consisting of three EU-funded projects (SERENE, LocalRES, SUSTENANCE), is developing cutting-edge solutions to transform energy management and empower citizens and municipalities. Together, these projects aim to foster innovation, promote energy efficiency and renewable energy, and drive the transition towards a decarbonised energy system. Supported by the Horizon Results Booster (HRB) programme of the European Commission, the SERENE group collaborates to disseminate their findings and address the key challenges associated with scaling renewable energy adoption across Europe.

1 Topic Overview

By 2030, it is estimated that renewable energy sources will account for 32% of the EU's energy consumption, up from 20% in 2018 (source: Eurostat). Smart grid technologies, energy storage systems, and demand-side management strategies are among the innovative solutions being deployed to enhance energy resilience and sustainability.

Moreover, in order to achieve these goals, it is crucial to engage consumers in the energy transition process. With energy consumption in buildings responsible for 36% of total EU energy consumption, empowering residents to adopt energy-efficient behaviours is crucial (source: European Parliament).

Among other types of actions and initiatives, energy communities are one of the key elements in achieving the EU's energy transition: By 2050, half of Europe's citizens could be producing up to 50% of the EU's renewable energy, according to the Energy Communities Repository and the Rural Energy Community Advisory Hub.

Facilitating the market introduction of sustainable energy solutions is another key objective. Despite the potential for renewable energy to create up to 900,000 jobs by 2030, regulatory barriers and market uncertainties remain significant hurdles to overcome (source: European Commission).

Through innovation, collaboration, and community engagement, they are overcoming challenges, seizing opportunities, and spearheading the transition towards a cleaner, more resilient energy future.

1.1 Topic Context

There is a recognised need for more research to tackle challenges such as increasing the adoption of renewable sources of energy at local levels, while reducing their costs of implementation. SERENE, LocalRES and SUSTENANCE are three EU-funded projects that aim to drive this change forward.

However, to implement these solutions a series of challenges need to be overcome.

1.2 Societal Challenges

The transition towards secure, clean, and efficient energy faces significant societal challenges, particularly in isolated communities that may lack access to advanced regulations, such as the timely acquisition of permits with Distribution System Operators (DSOs). These communities often encounter barriers when introduced to innovative energy technologies due to unfamiliarity and societal reluctance. While energy communities are emerging in different locations, their success largely depends on societal acceptance, which remains uneven.

Many people prioritise cost-saving over environmental benefits, and knowledge disparities contribute to a sense of uncertainty. Some communities fear they do not have the right information to make informed decisions, emphasising the need for clear, transparent communication about the long-term benefits of new technologies, particularly in terms of cost.

Additionally, community participation is often sidelined by a heavy focus on technical aspects, leading to different levels of acceptance based on the varied backgrounds of the communities. Fake news and misinformation further complicate the adoption of innovative solutions, creating resistance that hinders the progress of clean energy initiatives.

These challenges underline the importance of engaging communities with accessible information, addressing their concerns, and highlighting the tangible advantages of energy innovations.

1.3 Scientific and Technological Challenges

The shift towards sustainable energy systems presents significant scientific and technological challenges, particularly in enhancing interoperability and standardisation among diverse energy systems and networks to ensure seamless integration.

Integrating various renewable energy sources into the grid adds complexity, requiring innovative solutions to manage risks, such as cascaded failures, and optimising performance. Predictive models, data analysis tools, and intelligent control systems are essential for renewable energy generation, demand management, and energy storage optimization; however, there

is often a lack of reliable historical data, especially in small communities, which complicates model predictions and hinders precise energy management. Further complicating matters is the outdated infrastructure in many communities, where older buildings are not equipped to achieve high energy efficiency, and retrofitting them can be costly and time-consuming.

Moreover, the communication with DSOs and market actors needs to be improved to unlock the flexibility potential and enable energy communities to play on a level playing field. There is a need to enhance IT systems, to fully automate market communication for a large array of actors in distributed system (e.g. aggregators, customers, suppliers etc.).

1.4 Industrial Challenges

The transition to renewable energy faces significant industry and market penetrance challenges, particularly in developing scalable and cost-effective technologies that can be deployed locally. This requires addressing regulatory barriers and ensuring that community-driven approaches are integrated seamlessly with existing infrastructure and industrial practices.

A key hurdle is achieving interoperability and compatibility across renewable energy systems while fostering collaboration and knowledge exchange to drive innovation and best practices in decarbonising energy systems.

Market design also poses challenges, particularly in allowing aggregators to exist in some EU member states, where they are either absent or constrained by regulations (even though the options and the pathways are available legally, the existence of independent aggregation of residential consumers was confirmed by a JRC report (2021) only in seven Member States: France and Finland have the longest experience with this business model, whereas Romania and Bulgaria have only just started).

Moreover, the renewable energy industry faces a skills gap, with a limited number of trained professionals available to install and manage technologies, particularly in rapidly growing markets like Spain and Poland, where many workers are untrained, and best practices are not consistently shared. This skills shortage affects the capacity of companies to meet demand, leading to delays in installing renewable solutions.

Trust issues also arise, as communities often perceive large companies as delivering expensive solutions that don't always meet expectations, particularly when these communities are small and less profitable for those companies.

Enhancing capacity building within industrial sectors and increasing access to markets, both in terms of energy capacity and aggregator participation, will be crucial to overcoming these challenges and ensuring that local communities can successfully engage in the energy transition.

1.5 Policy challenges

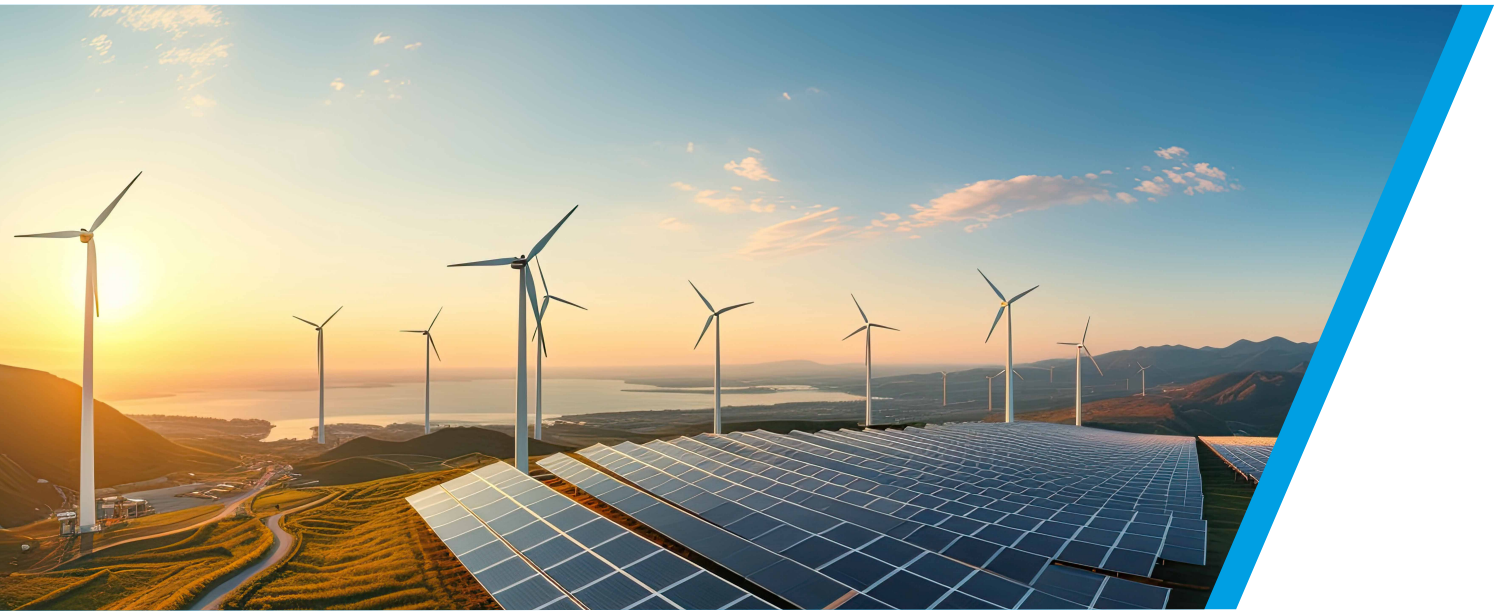
The policy landscape presents significant challenges for the successful implementation of renewable energy solutions and the transition to more sustainable systems.

One of the primary hurdles is the lack of clear and comprehensive regulations for emerging technologies, such as battery installations, which are essential for energy storage and maintaining grid stability.

Additionally, the administrative processes involved in the deployment of energy solutions are often too complex, creating unnecessary burdens for communities and slowing down innovation. While there are regulations at the EU level aimed at facilitating energy communities and renewable energy adoption, these are often seen as not implementable at national scale due to the lack of specific, actionable rules supporting national regulatory frameworks for actual implementation of the EU Directives.

Therefore, there is often a misalignment between EU and national regulations, exacerbating delays in the transposition and implementation of EU regulation at national and local scale. This lack of regulatory coherence and the long timeframes required for local regulatory changes hinder the timely adoption of new energy systems. Moreover, the absence of forward-looking regulations for emerging needs, such as energy sharing, further complicates efforts to decentralise and modernise energy systems. A more agile and harmonised approach is needed to bridge the gap between EU and national policies so as to better support innovative, community-driven energy solutions.

To overcome these challenges, promoting a legal and regulatory framework that encourages a genuine dialogue between communities and DSOs is crucial, ensuring communities are taken seriously in the energy transition process.



2 Recommendations

Based on the landscape and gap analysis overview, the project group has defined eight actionable recommendations for policy makers at national and European level, with the aim of:

1. increase the adoption of energy renewable solutions at local level through training activities,
2. alignment between EU and local regulations,
3. development of scalable solutions for citizens,
4. national and European funds to support companies and start-ups,
5. simplification of administrative procedures for energy projects,
6. support for interoperable and standardised data,
7. promotion of energy sharing and flexibility,
8. combatting misinformation and raising awareness.

2.1 Recommendation 1

Capacity building through training tools and workshops for Local Communities

Why it is important:

Local communities often lack the knowledge and resources to fully understand the benefits of renewable energy projects and emerging technologies. Training workshops can help demystify these technologies and foster a greater level of societal acceptance.

Recommendation:

Develop structured training programmes and workshops aimed at local municipalities, citizens, and other community stakeholders. These should be supported by National governments and EU funding mechanisms to ensure that all communities, regardless of their size or socio-economic background, can access this knowledge.

2.2

Recommendation 2

Better Alignment Between EU and National/Local Regulations

Why it is important:

The disparity between EU-level directives and national or local regulations creates significant barriers to implementing renewable energy systems. Local governments may struggle to apply EU rules that are not adapted to the unique needs of their regions, leading to delays or ineffective implementations.

Recommendation:

Foster a more coherent alignment between EU and national regulations while allowing flexibility to account for country-specific needs. Establish regular dialogue platforms between national authorities, EU bodies, and local stakeholders to ensure regulations are responsive to both regional needs and overarching EU goals. This will streamline the regulatory process and make it easier for energy communities to thrive.

2.3

Recommendation 3

Development of Plug-and-Play, Scalable Solutions for Citizens

Why it is important:

Complexity in technology adoption can deter citizens from participating in energy transformation projects, especially when solutions require extensive installation or adaptation of existing infrastructure. Plug-and-play solutions reduce the technical burden on individuals and communities, making renewable energy systems more accessible and easier to implement.

Recommendation:

Prioritise the development of plug-and-play energy solutions that are scalable to different community sizes and needs. These solutions should come with user-friendly interfaces and minimal installation requirements, making them easy to adopt and integrate with existing systems. Regulatory support and incentives for companies developing these solutions could accelerate deployment.

2.4 Recommendation 4

National and EU Funds to Support Companies and Start-Ups

Why it is important:

Renewable energy projects often face financial challenges, especially when working with local communities which need to make a high upfront investment while having uncertainties about future financial benefits. Additionally, start-ups and small companies may lack the initial capital needed to make renewable energy solutions profitable and scalable.

Recommendation:

Allocate dedicated national and EU funds to support the development, industrialization, and commercialization of renewable energy solutions. This could include grants for research and development, loans for project implementation, and subsidies for community-focused projects. National and EU funding mechanisms should particularly target innovative start-ups and community-driven initiatives, offering financial support that bridges the gap between pilot phases and full market deployment.

2.5 Recommendation 5

Simplification of Administrative Procedures for Energy Projects

Why it is important:

Complex administrative procedures and slow permit approvals significantly delay the deployment of energy projects and the realisation of their benefits. Small communities, in particular, may lack the capacity to navigate these burdensome procedures.

Recommendation:

Simplify the administrative process for energy projects by introducing fast-track approval systems for renewable energy technologies, especially for small- and medium-sized projects. Create “one-stop-shops” where community groups or small companies can receive comprehensive support for navigating the regulatory landscape. Additionally, create clear, easy-to-follow guidelines for community energy projects to minimise administrative delays.

2.6

Recommendation 6

Support for Interoperability and Standardisation

Why it is important:

A lack of interoperability between new and existing energy systems can create inefficiencies and compatibility issues, preventing seamless integration of renewable energy solutions into the grid and across markets. Without common standards, scaling projects becomes difficult.

Recommendation:

Develop EU-wide technical standards to ensure interoperability between different renewable energy technologies and existing infrastructure. Encourage collaboration between national and EU regulatory bodies, energy providers, and technology developers to create a framework for standardising renewable energy solutions. This will reduce integration costs and make it easier for energy communities to adopt scalable technologies.

2.7

Recommendation 7

Facilitate Energy Sharing and Regulatory Flexibility

Why it is important:

Energy sharing, where surplus energy is distributed among community members, is supported by existing regulatory frameworks; however, the transposition and implementation of such regulations are not always easy to achieve. Legal flexibility and easy handling processes are crucial to allow communities to engage in energy sharing, which is key to creating decentralised, resilient energy systems.

Recommendation:

Introduce legal frameworks that facilitate energy sharing within and between communities, in line with the latest EU regulation (Directive (EU) 2024/1711). These regulations should define, at national level, the rights and responsibilities of participants in energy-sharing systems and provide clear guidance on how distributed energy resources can connect to and interact with the broader energy grid. Regulatory flexibility will empower communities to take control of their energy supply and create localised, sustainable energy systems.

2.8

Recommendation 8

Combatting Misinformation and Raising Awareness

Why it is important:

The spread of fake news and misinformation about renewable energy technologies can hinder public acceptance and adoption. Fear and misconceptions about costs, efficacy, and technological reliability are significant barriers to public support.

Recommendation:

Launch public awareness campaigns at the national and EU levels to educate citizens about the benefits of renewable energy, dispelling myths and addressing concerns. Governments and NGOs should collaborate to create transparent communication strategies, including accessible information portals that provide accurate data on renewable energy projects and their socio-economic impacts.

Project Group

SERENE Cluster, consisting of 3 EU-funded projects, aims at increasing the adoption of energy-efficient solutions at a local level.

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