Interreg Danube Region

Co-funded by the European Union

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Deliverable D3.6.1 White Paper on Renewable Energy Communities

Activity 3.6

Prepared in the framework of the project:

DRP0200163 – NRGCOM – Creating appropriate operational conditions for renewable energy communities in the Danube Region

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Introduction

The Danube Region is characterised by substantial differences in energy systems, regulatory frameworks, institutional capacities and practical experience with renewable energy communities (RECs). The 12 countries covered by NRGCOM – Austria, Bulgaria, Croatia, Czechia, Germany, Hungary, Moldova, Montenegro, Romania, Serbia, Slovakia and Slovenia – include both EU and non-EU countries, ranging from established community-energy environments to contexts in which collective energy production, consumption and sharing remain at an early stage.

These differences were evident at the beginning of the project. Austria and Germany already had substantial experience with community-based renewable energy models. Austria had established a detailed framework for renewable and citizen energy communities, while Germany had a long tradition of citizen-owned renewable-energy initiatives and energy cooperatives. Czechia, Slovakia and Slovenia were developing or applying newer arrangements for energy sharing and community participation. In Croatia, Hungary and Romania, legal recognition had advanced, but implementation remained limited by incomplete operational arrangements, administrative complexity, financing constraints or uncertain market conditions. Bulgaria, Moldova, Montenegro and Serbia were still developing parts of the legal, institutional and operational framework required for functioning energy communities.

The national situations also reflected different energy profiles. Coal remained relevant in several countries, including Bulgaria, Serbia and Montenegro, while nuclear energy played an important role in Hungary, Slovakia, Slovenia and Czechia. Hydropower was significant in Austria, Croatia, Slovenia and Montenegro, and solar photovoltaic deployment was expanding rapidly across much of the region. These structural conditions influenced the motivation for establishing energy communities, the technologies available to them and the services they could realistically provide.

Energy-price volatility, security-of-supply concerns and the need to accelerate renewable-energy deployment formed part of the wider context in which the project was implemented. Municipalities, households, SMEs, public institutions and civil-society organisations increasingly recognised the potential value of producing and managing energy locally. The project nevertheless confirmed that interest alone does not lead to implementation. Community energy depends on usable legislation, clear administrative procedures, suitable market and grid rules, access to technical data, investment capacity, organisational competence and trust among participants.

The *NRGCOM* project – *Creating appropriate operational conditions for renewable energy communities in the Danube Region*, was implemented within the Interreg Danube Region Programme by 13 Project Partners, with the involvement of 14 Associated Strategic Partners. The partnership brought together regional development organisations, energy agencies, research institutions, public-sector actors and organisations experienced in stakeholder engagement and community development. This composition enabled the project to examine renewable energy communities from legal, economic, technical, institutional and social perspectives.

NRGCOM was structured around three interconnected Project Specific Objectives. *Project Specific Objective 1 – Initiating the establishment of the proper legal, operational and social environment for RECs*, examined the legal, financial, organisational, technical and institutional conditions affecting

REC development. *Project Specific Objective 2 – Raising awareness and encouraging society to create or join energy communities*, focused on public understanding, stakeholder motivation, professional capacity and the role of trusted intermediaries. *Project Specific Objective 3 – Enhancing production and use of renewables through pilot testing in potential and existing RECs*, translated the earlier research into mentoring support for emerging initiatives and technological assessment for existing or developing RECs.

Activity 3.6 – Joint development of a White Paper to enhance the use of renewables and the expansion of energy communities in the Danube Region, was designed as the final transnational synthesis of the project. Its principal result is *Output 3.3 – White Paper on the successful creation and more sustainable functioning of renewable energy communities*. The White Paper provides stakeholder-oriented guidance on the policy and regulatory environment, financing mechanisms, technological solutions, community-engagement approaches, operational practices and barriers affecting REC development across the Danube Region. *Deliverable D3.6.1 – White Paper on Renewable Energy Communities* presents the process through which the comparative analyses, national evidence, stakeholder experience and pilot results were reviewed, consolidated and translated into the White Paper.

The present study is organised around the evidence base used for the White Paper, the main transnational findings on REC development and the process through which these findings were consolidated into stakeholder-oriented guidance. The country-specific partner contributions that provided the principal national evidence base are included as annexes to the study.

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Methodology and evidence base

The preparation of Output 3.3 was based on the cumulative evidence generated throughout the 30-month implementation of NRGCOM. Activity 3.6 drew together comparative studies, strategic outputs, monitoring data, stakeholder feedback, pilot documentation and updated national contributions from the 12 participating countries. The methodology combined comparative research, stakeholder input, practical testing and thematic synthesis.

The first strand of evidence was developed under *Project Specific Objective 1*, which examined the legal, operational, technical, financial and social conditions required for the establishment and functioning of renewable energy communities. Activity 1.1 compared the national legal systems of the participating countries, considering the applicable legislation, establishment requirements, permitted forms of operation and areas requiring further development. The resulting comparative analysis provided the legal baseline for the later policy recommendations, strategic work and White Paper.

Building on this legal assessment, Activity 1.2 examined business models and stakeholder-management practices through desk research and knowledge-exchange workshops involving founders and members of operating or developing energy communities. The analysis covered ownership structures, financing mechanisms, revenue models, production and consumption arrangements, task allocation, energy storage, stakeholder engagement and the barriers encountered by existing initiatives. In parallel, Activity 1.3 complemented this work by examining internal operating systems, organisational structures, decision-making processes and governance principles such as transparency, accountability, participation, fairness and inclusivity.

From a technical perspective, Activity 1.4 assessed possible low-cost infrastructure investments and developments, including renewable-energy systems, storage, smart-grid technologies, energy-efficient equipment and demand-side management. The analysis considered technical feasibility, economic viability and environmental effects, while also providing input for the technological solution subsequently tested under Project Specific Objective 3.

These legal, organisational, financial and technical findings were then brought together under Activity 1.5 through professional roundtables addressing legal, technical-operational and social or internal-governance aspects. The process produced national policy recommendations, a model for an appropriate legal, operational and financial environment and *Output 1.1 - the Strategy to create the proper legal, technical and social conditions for energy communities*. These results provided the strategic basis for the engagement and pilot activities that followed.

The second strand of evidence was generated under *Project Specific Objective 2*, which focused on awareness raising, stakeholder motivation and professional capacity. Activity 2.1 established the REC Ambassador Network, involving representatives from public authorities, energy agencies, civil society, academia, professional organisations, energy communities and businesses. The

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ambassadors contributed practical knowledge, supported national communication and helped translate complex legal and technical issues into messages adapted to local target groups.

To support this engagement work, Activity 2.2 developed a common Motivational Programme based on stakeholder needs, experience from operating energy communities and the governance findings produced under *Project Specific Objective 1*. The programme combined two main elements: general information on renewable energy and energy communities, and targeted encouragement for citizens, municipalities, institutions, businesses and other organisations to establish or join community initiatives.

The programme was subsequently tested through Activities 2.3 and 2.4, which implemented public awareness-raising actions and professional training activities in the partner countries. The methods included public events, workshops, conferences, fairs, school activities, study visits, media appearances, short educational videos, online seminars and training sessions for municipalities, economic actors and potential REC founders. Changes in knowledge, motivation and willingness to engage were assessed through pre- and post-event questionnaires, attendance data, participant feedback and partner reports. Together, these activities formed *Output 2.2 – Dissemination and professional awareness-raising pilot activities*.

The findings from these pilot activities informed *Output 2.1 – Engagement strategy* to increase interest in energy communities and Activity 2.5. Activity 2.5 consolidated the tested motivational method, communication tools, learning materials and evaluation findings into *Output 2.3 – Energy communities' awareness raising toolkit* including a jointly developed motivational method. Together, Outputs 2.1–2.3 provided evidence on changes in stakeholder awareness and on the engagement approaches most suitable for different target groups and levels of REC maturity.

The third strand of evidence was created under *Project Specific Objective 3*, which tested the practical application of the earlier analytical and engagement results. Activity 3.1 developed a common mentoring scheme and implementation plan for the creation of energy communities. The scheme covered stakeholder mapping, definition of the community purpose and value proposition, legal and governance options, technical feasibility, energy demand and generation potential, financing and preparation of implementation steps.

This framework was then applied under Activity 3.2 to nine emerging initiatives in Hungary, Croatia, Serbia, Moldova and Germany. Together, Activities 3.1 and 3.2 formed *Output 3.1 – A pilot action testing the jointly developed energy community creation mentoring scheme*. The initiatives had different starting positions, ranging from early stakeholder groups and preliminary concepts to more advanced organisational arrangements. The mentoring process generated comparable evidence on the legal, organisational, technical, financial and stakeholder-related conditions affecting community formation. Progress was assessed not only through formal establishment but also through intermediate results such as clearer governance options, stronger stakeholder groups, data collection, preliminary technical concepts, identified financing needs and implementation roadmaps.

Complementing the mentoring work, Activities 3.3 and 3.4 developed and tested the ETMEC technological solution in Austria, Czechia, Slovakia and Slovenia. Together, these activities formed *Output 3.2 – A jointly developed technological pilot solution tested in parallel in operating energy communities*. The pilot assessed legal, organisational, economic and technical readiness and examined the availability of production and consumption data, metering arrangements, internal

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energy use, storage potential and opportunities for improved energy management. The tests generated practical evidence on the conditions under which digital assessment and optimisation tools can support existing or developing energy communities.

To broaden the practical evidence base further, Activity 3.5 resulted in Deliverable D3.5.1—Digital RECs database, which compiled examples of community-energy initiatives from across the Danube Region.

Building on these analytical, engagement and pilot results, Activity 3.6 coordinated the preparation of *Output 3.3 – White Paper on the successful creation and more sustainable functioning of renewable energy communities*. Each participating country prepared a national contribution following a common thematic structure. These country documents formed the principal national evidence base for the White Paper and are included as annexes to this study. The national contributions examined the energy profile, legal and institutional framework, maturity of the REC ecosystem, legislative and administrative barriers, electricity-market and infrastructure conditions, financing and capacity gaps, relevant examples, NRGCOM experience and country-specific policy recommendations. They also captured legal, institutional and practical developments that had occurred since the initial comparative assessment.

As part of Activity 3.6, the annexed national contributions were reviewed alongside the earlier comparative analyses, strategies, Outputs 3.1 and 3.2, Deliverable D3.5.1 and other relevant project results. Recurring findings supported by several national contributions or project activities were synthesised as transnational conclusions. Country-specific information was retained where it illustrated a relevant legal development, operational barrier, support need or transferable approach.

Rather than applying a rigid numerical ranking, the synthesis took account of differences in legal definitions, registration systems, statistical reporting and operating conditions. The number of registered entities does not always distinguish between formally established organisations and communities actively sharing energy. The analysis therefore focused on predominant development stages, operational readiness and corresponding support needs rather than on a single composite indicator.

Taken together, the three strands of evidence enabled Activity 3.6 to connect comparative legal and policy analysis with practical experience from awareness raising, mentoring, technological testing and emerging or operational REC models. The annexed national contributions ensured that the synthesis reflected both recurring regional patterns and the legal, institutional and market differences shaping the establishment and operation of energy communities in each participating country.

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Transnational findings on REC development

The evidence collected throughout NRGCOM confirmed that REC development in the Danube Region cannot be described through a single measure of maturity. Countries differ in legal readiness, institutional capacity, market organisation, grid conditions, access to finance, public awareness and practical experience. These dimensions do not necessarily develop at the same pace: a country may recognise energy communities in primary legislation while still lacking the secondary rules, administrative procedures, technical systems or financial support required for practical operation.

In more established contexts, the main questions extend beyond whether an energy community can be legally established. Austria provided experience with registration, energy allocation, network arrangements and local governance, while also demonstrating the increasing importance of administrative simplification, real-time data, storage, flexibility and grid-supportive operation. Germany showed how citizen ownership, cooperative traditions and municipal cooperation can mobilise local capital and strengthen acceptance of renewable-energy investment. Regionalwerke Passauer Land, formally established with the participation of 27 municipalities and the Landkreis Passau, demonstrated the potential of coordinated intermunicipal action. These models provide transferable principles, but their legal and institutional forms cannot be reproduced without adaptation to national conditions.

Czechia, Slovakia and Slovenia illustrated the opportunities and challenges associated with newer systems. Legislative reform, registration arrangements and data-management functions can create favourable conditions relatively quickly, but practical implementation still requires accessible guidance, testing, municipal support and links with local and regional energy planning. The Slovak experience also showed that formal registration alone does not necessarily mean that a community is actively sharing energy or operating under a sustainable business model.

Croatia, Hungary and Romania demonstrated the distance that may remain between legal recognition and wider practical uptake. Depending on the national context, recurring constraints included unclear or incomplete operational rules, administrative complexity, limitations or uncertainty affecting public-sector participation, insufficient advisory capacity and difficulties in preparing financially viable local projects. Emerging organisational forms may create new pathways, but their applicability depends on clear procedures, suitable financing and sustained implementation support.

Bulgaria, Moldova, Montenegro and Serbia showed how different combinations of prosumer development, municipal interest and wider energy-sector reform can create foundations for future collective models even where energy communities are not yet fully operational. In these contexts, progress depends on completing the regulatory framework, clarifying institutional responsibilities and maintaining stakeholder engagement while practical procedures and support instruments are developed.

Across all national contexts, the most consistent finding was the gap between formal legal readiness and practical operation. Primary legislation may establish definitions and rights, but effective implementation also requires detailed provisions governing registration, membership, energy sharing, metering, settlement, grid access, network charges and cooperation with suppliers and market operators. Where responsibilities are fragmented or procedures remain uncertain, potential founders face delays and risks even when the legal right to establish a community exists.

Grid access, metering and electricity-market integration were among the most widely reported barriers. Energy communities introduce distributed generation, multidirectional energy flows and the allocation of electricity between several consumption points, while existing systems were largely designed for centralised generation and conventional supplier–consumer relationships. Their operation therefore requires reliable interval or smart metering, timely data exchange, transparent settlement and clearly allocated responsibilities among communities, suppliers, distribution system operators and other market actors.

The technological pilots implemented in Austria, Czechia, Slovakia and Slovenia confirmed that installed renewable-generation capacity alone is insufficient for efficient community operation. The Austrian and Slovenian pilot contexts had relatively advanced metering and data conditions, enabling more detailed analysis of production, consumption and potential optimisation. The Czech pilot demonstrated how the absence of continuous metering and an energy-management system can restrict analysis, while the Slovak cases showed that initiatives operating under the same national framework may have substantially different levels of technical and organisational readiness.

The pilots also demonstrated that digital tools can support decision-making but cannot replace reliable data, institutional cooperation or professional judgement. Their usefulness depends on whether communities can translate the results into governance, investment and operational decisions. Technical readiness must therefore be considered together with legal conditions, market arrangements, financial capacity and organisational maturity.

Physical grid capacity is a further constraint, particularly in rural and peripheral areas where renewable potential may be high but distribution infrastructure is weaker. Long connection procedures, limited transparency regarding available capacity and insufficient coordination between local energy planning and grid development can delay viable initiatives. Grid reinforcement, automation, storage, demand-side management and more transparent connection procedures are therefore relevant both to emerging communities and to the further development of more advanced ones.

Financing was identified as a persistent weakness throughout the region. Many initiatives are led by municipalities, citizens, SMEs or local organisations with limited equity, collateral and project-development capacity. Public programmes often support renewable-energy equipment but provide less assistance for the preparatory work needed before investment, including feasibility studies, legal structuring, stakeholder engagement, technical design, energy-data analysis, business planning, metering arrangements and professional project management.

These preparatory costs are particularly significant for small and medium-sized municipalities. Evidence from Romania and Serbia pointed to insufficient access to tailored financing for smaller initiatives, while Hungary and Slovakia illustrated difficulties in identifying and combining EU, national and private sources. Bulgaria and Romania demonstrated uneven municipal capacity

outside major urban centres, and Croatia and Czechia showed that legal frameworks are not always sufficiently connected to territorial energy planning and local investment preparation.

Private financing is also constrained by unfamiliar legal structures, small project size and uncertain revenue. Communities may generate value through self-consumption savings, energy sharing, sales of surplus electricity or flexibility services, but these income streams depend on national tariff and market arrangements. Viable projects therefore require realistic business planning, transparent allocation of risks and financing instruments adapted to collective ownership rather than conventional utility-scale investment.

Governance and organisational capacity were found to be equally important. A functioning community requires a shared purpose, clearly defined membership rights and responsibilities, transparent decision-making and understandable rules for allocating costs, revenues and benefits. Members must know how decisions are taken, how new participants may join, how responsibilities are distributed and how conflicts or withdrawals are handled. Weak governance can undermine trust, delay decisions and reduce long-term participation even where the legal and technical conditions are otherwise favourable.

The mentoring pilot demonstrated that REC development is rarely linear. Nine initiatives in Hungary, Croatia, Serbia, Moldova and Germany received structured support, but their starting positions ranged from early stakeholder groups and preliminary concepts to more advanced organisational arrangements. Some initiatives first needed to define their purpose and membership, while others required legal clarification, energy-data collection, feasibility analysis, governance design or financing preparation.

Formal establishment was therefore not the only relevant measure of progress. The supported initiatives achieved intermediate results such as stronger stakeholder groups, clearer governance options, preliminary technical concepts, identified financing needs and implementation roadmaps. The German pilot progressed to formal establishment, while the Hungarian, Croatian, Serbian and Moldovan initiatives advanced through different combinations of concept development, stakeholder mobilisation, data collection and preparatory planning.

The mentoring experience confirmed the value of combining a common framework with tailored assistance. Stakeholder mapping, definition of the value proposition, legal and governance options, technical feasibility, energy demand and generation potential, financing and implementation planning were relevant to all initiatives, but their sequence and relative importance depended on the national framework and the maturity of the local group.

Municipalities emerged as important connecting actors because they can contribute assets, energy-consumption data, legitimacy, local knowledge, convening capacity and continuity. Their involvement is particularly valuable where citizen groups have limited access to professional expertise. At the same time, municipalities face staff constraints, public-finance and procurement requirements and uncertainty regarding the legal forms and market activities in which they may participate.

Energy agencies, regional-development organisations, civil-society actors, professional associations and REC ambassadors can therefore play an important intermediary role. They can translate complex legal and technical requirements into practical guidance, connect communities with regulators and financing bodies and provide continuity between initial awareness raising and project preparation.

The engagement activities confirmed that the spread of energy communities depends on more than the availability of information. Participants often understood renewable energy in general but were less familiar with the legal, organisational and financial characteristics of community models. More than 40 awareness-raising events, 31 professional training sessions and nine fairs were organised across the partner countries, reaching more than 2,600 participants and visitors.

Interactive workshops, professional training, study visits, peer exchange and ambassador-led sessions were more effective than stand-alone communication materials because they allowed participants to discuss uncertainty and connect the concept with local opportunities. Visits to existing initiatives were especially valuable in countries where energy communities remained abstract or untested. Generic digital content supported visibility and initial awareness, but had greater value when linked with expert advice, further training or practical next steps.

The national activities also demonstrated that engagement methods must reflect the maturity of the ecosystem. More established contexts could focus on operational questions, optimisation and participation models, while emerging contexts required basic explanation, confidence building and the formation of stakeholder networks. A gradual pathway – from learning about the concept, through visiting or joining an initiative, to taking leadership or investment responsibility – was often more realistic than expecting inexperienced stakeholders to establish a new community immediately.

The REC Ambassador Network strengthened this process by providing trusted and locally relevant communication. Its members included public-sector representatives, experts, community practitioners, civil-society actors and business representatives. Their credibility helped translate complex regulatory and technical issues into accessible messages and enabled follow-up beyond individual events.

The engagement and mentoring results also confirmed that increased awareness does not automatically lead to implementation. Interest must be connected with advisory services, structured preparation, legal and technical assistance and realistic financing opportunities. Without these elements, participants may understand and support the concept while remaining unable to act.

Social inclusion remained an unresolved issue. Energy communities may reduce or stabilise costs and increase local participation, but households unable to contribute investment capital or provide suitable assets may remain excluded. Inclusion therefore needs to be considered from the beginning in membership rules, financing arrangements and benefit allocation. Municipalities and public-interest organisations can contribute by providing assets, facilitating access to information or supporting participation models that do not depend exclusively on direct private investment.

Taken together, the findings show that legal recognition, operational regulation, technical readiness, market integration, financing, governance, stakeholder capacity and social inclusion form one interconnected enabling environment. Progress in one area cannot fully compensate for the absence of another. Successful creation and sustainable operation are therefore parts of the same development pathway rather than separate challenges.

Development and finalisation of Output 3.3

Activity 3.6 brought together the evidence generated under the three Project Specific Objectives and transformed it into Output 3.3–White Paper on the successful creation and more sustainable functioning of renewable energy communities. The preparation process combined a common transnational framework with country-specific contributions from the participating partners.

The partners prepared national White Paper drafts using a shared structure. Each draft contained a common regional framework and a country-specific section addressing the national energy profile, legal and institutional conditions, maturity of the REC ecosystem, barriers, practices, pilot experience and policy recommendations. These national contributions are retained as annexes because they provide the detailed evidence underlying the consolidated regional findings.

The national drafts were then reviewed comparatively to identify findings that recurred across several countries, differences associated with national legal and market conditions, and examples illustrating particular development stages or support needs. The consolidated White Paper did not reproduce the full national material. Instead, it translated the partner contributions into a regional analysis while preserving the country-specific evidence in the annexes.

The resulting structure distinguished between the successful creation of new communities and the sustainable functioning of existing ones. Emerging initiatives require an enabling legal framework, stakeholder mobilisation, a viable purpose, suitable governance, technical feasibility and access to development finance. Existing communities increasingly require stable business models, member retention, professional management, digitalisation, storage, flexibility, wider participation and opportunities for expansion.

The regional section concentrated on priorities that recurred across the participating countries, including simplification of procedures, clarification of secondary legislation, permanent advisory support, tailored financing, municipal capacity building, transparent governance, smart metering, accessible data and interactive stakeholder engagement.

Country-specific recommendations were retained where national law, market organisation or institutional structures required a differentiated response. Earlier-stage environments need complete operational rules, clearly assigned responsibilities and initial support mechanisms. Countries with legal recognition but limited uptake require practical implementation support, financing and stronger local project preparation. More established systems increasingly need optimisation, scaling, flexibility, digitalisation and wider social participation.

The practical activities were used to assess whether these recommendations reflected implementation realities. The engagement actions showed that awareness must be connected

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with accessible next steps. The mentoring pilot demonstrated the need for tailored and sustained project-development assistance. The technological pilot showed that the value of technical investment depends on data quality, governance and applicable market rules. The Digital RECs database provided additional examples for assessing transferability.

The drafting process involved comparing national inputs with the earlier analyses, strategies and pilot reports, removing overlaps and consolidating recurring findings. Terminology and recommendations were aligned across the regional and national sections, while statements were retained where they were supported by project documentation, national evidence or pilot experience.

Output 3.3 was consequently developed as a framework for informed adaptation rather than a uniform model for the Danube Region. It identifies common principles and practical support needs while recognising that legal forms, institutional responsibilities, market arrangements and financing mechanisms must be adapted to national and local circumstances.

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Conclusions

NRGCOM demonstrated that the development of renewable energy communities depends on the interaction of several legal, institutional, financial, technical and social conditions. The project therefore approached REC development as a connected process: first examining the regulatory, operational and governance environment; then testing methods for awareness raising and stakeholder engagement; and finally applying mentoring and technological tools in emerging and existing community settings.

This sequence helped connect strategic analysis with practical experience. The comparative work identified the main differences between national frameworks and levels of readiness. The engagement activities showed how knowledge, motivation and trust influence participation. The mentoring pilot demonstrated what support emerging initiatives need to move from an initial idea towards structured preparation, while the technological pilot showed how data, metering, governance and market conditions affect the operation of more developed communities. The updated national contributions and Digital RECs database broadened this evidence and enabled the findings to be assessed across different legal and territorial contexts.

The synthesis confirmed that REC development should be treated as a system rather than as a series of isolated interventions. New legislation will not produce functioning communities without clear administrative procedures, grid arrangements, data access, financing and advisory capacity. Awareness raising will not generate projects without trusted support and feasible next steps. Technology will not improve performance where governance, market rules or data quality remain inadequate.

The transnational comparison also showed that the nature of the challenge changes as REC ecosystems develop. In early-stage environments, the priority is to make collective energy legally and administratively possible. In emerging systems, the focus shifts towards implementation support, viable business models, municipal capacity and institutional coordination. In more established systems, attention increasingly turns to optimisation, flexibility, storage, professionalisation, inclusion and scaling.

The country evidence supported this differentiated approach. Austria and Germany contributed experience from more established community-energy environments. Czechia, Slovenia and Slovakia showed the opportunities and implementation challenges associated with newer frameworks. Croatia, Hungary and Romania illustrated how legal recognition may coexist with limited practical uptake. Bulgaria, Moldova, Montenegro and Serbia highlighted the importance of operational rules, institutional capacity and early-stage support. These differences confirm that countries do not require identical solutions, even where they face similar underlying barriers.

Municipalities emerged as important connecting actors across all development stages. They can link energy policy with local assets, public buildings, territorial planning, citizen engagement and social objectives. Their ability to act, however, depends on access to legal, technical and financial support.

Intermediary organisations also have a significant role. Energy agencies, development organisations, civil-society actors, professional associations and REC ambassadors can connect

national rules with local implementation, translate complex requirements into practical guidance and provide continuity where permanent advisory structures are absent.

The preparation of Output 3.3 brought these strands together. Comparative analysis, national evidence, engagement results, mentoring experience, technological testing and examples from across the Danube Region were consolidated into a common framework. The White Paper therefore reflects both the recurring conditions relevant throughout the region and the national differences that determine how those conditions must be applied.

The main conclusion is that successful REC development depends on alignment. Legal frameworks, institutions, markets, grids, finance, governance, technology and stakeholder capacity must support one another. Progress is slower where these elements develop separately and more durable where they are addressed as part of one enabling environment.

A further conclusion is that transferability requires adaptation. Experience from more advanced countries can help emerging systems avoid known obstacles, but legal forms, tariffs, institutional roles and financing mechanisms cannot be copied without adjustment. The most transferable elements are principles, support methods, assessment approaches and governance practices.

The final conclusion is that creation and sustainable operation form one continuous development pathway. The conditions that enable a group to establish a REC also influence its later resilience. Clear governance, realistic financial planning, reliable data, accessible support and sustained member engagement should therefore be considered from the beginning rather than introduced only after formal establishment.

This document was prepared as part of the NRGCOM project, an Interreg Danube Region Programme project co-funded by the European Union.

Annexes

Annex 1 – National Compendium of REC Status and Implementation in Austria

Starting Position and Regulatory Foundation

National Energy Profile

Austria's energy system is characterized by a comparatively high share of renewable energy, with hydropower historically forming the backbone of electricity generation. In recent years, biomass, wind power, and photovoltaics have been steadily expanded as complementary sources. Austria has set the ambitious national target of achieving a net 100% renewable electricity supply by 2030, with a strong focus on the rapid expansion of photovoltaics and wind energy. Despite this progress, the country remains partially dependent on energy imports, particularly natural gas and oil for heating and transport. Community-based generation systems have existed in Austria since 2017, making the country one of the pioneers in the Danube region in the field of decentralized energy models. Together with Germany, Austria is among the most advanced countries in the region regarding the implementation of energy communities, as similar cooperative energy generation concepts have already been successfully realized in the past.

Legal Framework

All laws and legislative amendments in Austria related to Renewable Energy Communities (RECs) and Citizen Energy Communities (CECs) are based on the European requirements of the Renewable Energy Directive (RED II) and the Internal Electricity Market Directive (IMED).

The two types of energy communities introduced through the Clean Energy Package—RECs and CECs—were transposed into national law through the Renewable Energy Expansion Act (EAG), which entered into force at the end of July 2021, as well as through amendments to the Electricity Industry and Organization Act (ElWOG 2010). In Austria, RECs were introduced in two forms: local and regional.

The legal framework for renewable energy communities is defined in Part 6 of the EAG and in §16c of the ElWOG. Provisions applicable to both RECs and CECs are set out in §16d and §16e of the ElWOG.

Renewable Energy Community (REC/EEG):

Scope of activities (EAG §79 para. 1): A REC may generate energy from renewable sources, consume, store, or sell self-generated energy. It may also engage in aggregation and provide other energy services.

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Membership (EAG §79 para. 2): Members or shareholders may include natural persons, municipalities, public authorities (in relation to local offices), other public law entities, or small and medium-sized enterprises.

Legal form (EAG §79 para. 2): A REC must consist of at least two members and may be organized as an association, cooperative, partnership, corporation, or similar legal entity.

Purpose (EAG §79 para. 2): The primary purpose must not be financial profit; instead, it must provide environmental, economic, or social community benefits.

Participation (EAG §79 para. 2): Participation must be voluntary and open; for private companies, participation must not constitute their main commercial activity.

Proximity criterion (ElWOG §16c para. 2): Within a REC, members' consumption units must be connected to generation units via low-voltage distribution networks (local level) or medium-voltage networks (regional level) within the concession area of a grid operator.

Market premium (EAG §80): Electricity generated but not consumed within a REC may receive market premium support for up to 50% of total generated electricity.

Citizen Energy Community (CEC/BEG):

Scope of activities (ElWOG §16b para. 1): A CEC may generate electricity and consume, store, or sell self-generated energy. It may also engage in aggregation and provide services such as energy efficiency services or EV charging services.

Membership (ElWOG §16b para. 1): Members may include natural persons, legal entities, and local authorities.

Control (ElWOG §16b para. 3): Control is limited to natural persons, local authorities, and small enterprises, provided they are not acting as electricity companies.

Profit orientation: Profit maximization is explicitly prohibited. While profits (e.g. from surplus energy sales) are allowed, they must be redistributed to members or the community rather than pursued as a primary objective.

Grid connection and metering: Grid operators are responsible for measuring generation and consumption. Smart meters must be installed within two months if not already in place. Data must be made available to suppliers and the community by the following day at the latest.

Grid user rights: Grid users have a legal right to participate in RECs or CECs and must receive information about their grid connection within 14 days.

Multiple participation: Since January 1, 2024, participation in multiple energy communities is intended to be possible.

New Electricity Act (ElWG): The existing ElWOG will be replaced by a new Electricity Act (ElWG), introducing several relevant changes: clarification of legal gaps, stronger focus on end consumers and new market actors (e.g. aggregators), flexible grid access rules, provisions for energy storage, expanded options for direct lines and community generation with storage integration, and strengthened rules on grid tariffs and regulatory independence.

Institutional Landscape

Key actors in Austria's energy community ecosystem include:

Ministry for Climate Action (BMK): Responsible for setting the political framework and evaluating the support schemes for renewable energy generation (until December 2024 and every five years thereafter). Network operators, the NRA, operators, and communities are required to cooperate and provide data for this evaluation.

E-Control (National Regulatory Authority/NRA): Must publish an annual report on energy communities established in Austria, with a focus on their number and regional distribution. Network operators, RECs, and CECs are obliged to transmit the necessary data to the NRA for this purpose. In particular, distribution system operators (DSOs) must report to the NRA on a quarterly basis. The NRA must also publish a cost-benefit analysis to ensure an appropriate and balanced contribution of energy communities to system costs.

Austrian Coordination Office for Energy Communities: Acts as an online one-stop shop and provides comprehensive information on energy communities and project setup. Its services include a map to identify the different energy communities, information on applying for funding, model contracts and agreements, brochures and guides on specific topics, as well as a helpdesk that connects communities with experts at the regional level. The Coordination Office also coordinates BMK, E-Control, and the federal states in order to make administrative procedures more efficient, faster, and more transparent. DSOs cooperate with the Coordination Office through a working group and information exchange. The template developed under the Horizon 2020 SHAREs project enables the replication of this online one-stop shop in different countries.

Distribution System Operators (DSOs): Responsible for measuring generation and consumption, installing smart meters, allocating generated energy to network users, and reporting quarterly to the NRA.

Maturity Level and Ecosystem (Established, Emerging, Nascent)

Austria is classified as "Established" and, together with Germany, is among the most advanced countries in the Danube region. Joint generation facilities have existed since 2017, and implementation is continuing under the new legal framework. The legal framework for RECs and CECs is fully established, a single point of contact has been defined, grid conditions and tariffs are prescribed, and extensive support programmes are available.

The number of energy communities is growing steadily, supported by a comprehensive institutional ecosystem consisting of the regulatory authority, the coordination office, the ministry, and cooperative network operators. In many respects, Austria serves as a reference model for other countries in the Danube region, particularly regarding the clear distinction between REC and CEC, the establishment of a single point of contact, and the definition of tailored support mechanisms.

Analysis of Specific National Barriers

Legislative and Administrative Obstacles

Despite the advanced legal framework, Austria continues to face challenges at the legislative and administrative level:

- High administrative burden: In practice, the high administrative burden is identified as the greatest obstacle to establishing energy communities. Entry barriers for new members include the declaration of accession, the completion of contracts, and the activation of metering points.
- Restriction due to the proximity criterion: The existing proximity criterion, which requires connection via low-voltage or medium-voltage grids within a network operator's concession area, is perceived in practice as restrictive. A revision of the proximity criterion is mentioned as a desirable improvement to the legal framework.
- Restrictions on eligibility for participation: The participation of large companies is currently not possible, which is regarded as a limitation. Large and medium-sized enterprises, as well as companies classified as "electricity undertakings," are excluded from exercising control over a CEC.
- Profit prohibition: The explicit prohibition of profit-making intent may limit the attractiveness for private investment and make it more difficult to develop viable business models.
- Regulatory dynamics: The existing ElWOG is being replaced by the new ElWG, which creates transition risks. Adapting to a changing legal framework increases uncertainty for existing and planned projects.
- Complex organizational handling: In practice, simpler organizational handling is identified as a key desired improvement.
- Restriction on industrial energy generation: Industrial energy generation based on wood waste cannot be included in RECs due to legal provisions, even though there would be corresponding potential in the regions.

Market and Infrastructure Hurdles

- Technology-related limits on self-supply: The main disadvantages for members of existing RECs lie in the technology-related limits on self-supply. Electricity generation from photovoltaics is highly dependent on solar irradiation and does not always coincide in time with consumption.
- Time-dependent energy surpluses: There are time-dependent energy surpluses, particularly during midday in the case of PV systems and at weekends for commercial users.
- Lack of real-time data: In practice, real-time data on grid feed-in and grid consumption are identified as essential for further optimization, but they are not yet widely available. At

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present, mainly day-after data (e.g. via Powerquartier/Exnaton) are used, while real-time data visualization is only planned.

- Outdated metering devices: In some cases, old meters without time-dependent measurement capability are still being used, even though the law requires the installation of smart meters by the network operator within two months.
- Tariff design and compensation: Losses incurred by distribution system operators due to reduced grid charges for energy communities must be compensated by non-participating consumers. Low-voltage communities receive grid fee reductions of more than 50%, while medium-voltage communities receive reductions of 30%. This may lead to acceptance problems.
- Need for expansion of storage technologies: Although storage technologies are identified as central to optimizing RECs, they are not yet sufficiently widespread in practice. The use of lithium-ion batteries (e.g. 30 kWh at a fire station) is in some cases still in the installation phase.

Financial and Capacity Gaps

High initial investments: Investment costs for photovoltaic systems range from EUR 900 to EUR 1,700 per kWp, with operating and maintenance costs of around 0.5%. For the further optimization of existing RECs, additional costs of about EUR 150 per metering point are estimated.

Support landscape – extensive but complex: Austria has an extensive support system:

- EUR 60 million per year for one-off investment grants for RECs (new wind and PV systems/extensions up to 1 MW, small hydropower plants under 2 MW, storage up to 50 kWh; two calls for proposals per year)
- Some federal states and municipalities offer additional one-off investment grants
- RECs and CECs can receive grants of EUR 25,000 for establishing a legal entity, which may also cover personnel costs
- Special support for energy-sharing projects: up to 50% of the electricity generated within a REC but not consumed can be supported through market premiums (feed-in premiums)
- Competitive tendering procedures apply only to a limited extent to energy communities and to wind projects under 20 MW

Despite this extensive range of support, information deficits persist in practice. Many potential founders are not sufficiently aware of the available funding opportunities.

Lack of professional capacities: Energy communities are often based on voluntary engagement. As a result, there is often a lack of professional know-how in areas such as project management, legal matters, financing, or technology. The coordination office and national research projects do provide support, but in many cases the demand exceeds the available supply.

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Lack of business models for additional energy potentials: There are considerable additional energy potentials in the regions—existing heating networks using waste heat, biomass, and wind—but unlocking them requires business models and investors.

Results of the NRGCOM Pilot Project

Within the framework of the NRGCOM project, Austria participated as a partner country in the international comparative analysis of national legal systems. Project Activity 1.1, coordinated by FORS Montenegro, was implemented from the end of January to May 2024 and aimed to analyze national legal systems and draw parallels between the characteristics of the legal frameworks for energy communities, taking into account the scope of laws and regulations, the conditions for establishment, and the permitted forms of operation. All 12 target countries – Hungary, Austria, Bulgaria, Germany, Croatia, the Czech Republic, Moldova, Montenegro, Romania, Slovenia, Slovakia, and Serbia – were involved in the implementation.

An international workshop took place on 14 March 2024 in Budapest, where the key findings for each target country were presented and discussed. The workshop enabled the exchange of experiences, lessons learned, and good-practice models.

Austria served as a central reference model for the other target countries. Several Austrian approaches emerged from the comparative analysis as transferable best practices:

- Clear distinction between REC and CEC in full compliance with the EU acquis
- Establishment of a single point of contact (coordination office) to simplify the entire administrative procedure
- Definition of clear tariff models and methods for calculating generated energy and grid charges
- Tailored support mechanisms for promoting energy communities

As part of Activity 1.4 (Assessment of possible low-cost infrastructure investments and developments), a national workshop was conducted with experts, engineers, and operators and members of energy communities. The questionnaire was developed to collect information on existing RECs – why they were established, which technologies are used, and what the current market situation looks like in terms of costs and incentives. The results fed directly into the development of a data catalogue for optimizing existing RECs through infrastructure investments and developments.

The data catalogue takes into account different consumer profiles (household, commercial, industry) and their specific load profiles: households show energy consumption peaks in the morning and evening, spread across the entire week; commercial consumers have their energy demand mainly between 08:00 and 18:00, with almost none on weekends; industrial consumers can hardly be described by a standard profile, but often have daily peaks that may also occur on weekends. Categorizing consumers into these profiles helps optimize energy management within the REC.

The technologies most relevant for RECs mainly include wind turbines, photovoltaics, hydropower plants, and combined heat and power systems (CHP). CHP plants fueled by wood or biogas can generate renewable electricity as well as heat, which is of interest for the creation of heat-based RECs.

The online one-stop-shop template developed in the Horizon 2020 SHAREs project, based on the Austrian coordination office, was identified as a replicable solution for other countries and can be considered a transnational contribution of the NRGCOM project.

The tariff reductions for RECs – more than 50% for low-voltage communities and 30% for medium-voltage communities – as well as the price spread model from practice (11.5 ct/kWh feed-in, 14.5 ct/kWh supply) were used as concrete reference values for economic feasibility analyses in other target countries.

The general conclusion was that, due to differences in status and experience with RECs, the national reports vary considerably but also contain some common elements wherever possible. For most countries in the Danube region, the practical implementation of energy communities is limited, except for Germany and Austria, which have already successfully implemented similar cooperative concepts. Nevertheless, countries such as Slovenia, Romania, and the Czech Republic have shown a high degree of readiness, and an expansion of energy communities can be expected in the coming years.

Policy Recommendations Austria

Based on the analysis of the legal framework, the identified barriers, and practical experience, the following specific recommendations are formulated for Austria:

1. Adjustment and flexibilization of the proximity criterion

The existing proximity criterion, which requires connection via low-voltage or medium-voltage grids within a network operator's concession area, should be made more flexible in order to enable broader participation and a greater geographical reach for energy communities. The introduction of flexible grid access, as provided for in the new ElWG – including temporary flexible grid access – should be implemented more rapidly.

2. Expansion of participation eligibility

The participation of large companies in energy communities should be permitted under defined conditions, without jeopardizing democratic control and the non-commercial purpose of the communities. At the same time, legal obstacles preventing the inclusion of industrial energy generation (e.g. based on wood waste) in energy communities should be removed in order to make better use of existing regional potentials.

3. Simplification of administrative and organizational handling

The high administrative burden in establishing and operating energy communities should be reduced through standardized and digitalized procedures. Entry barriers for new members – declaration of accession, contract conclusion, activation of metering points – should be simplified and, wherever possible, integrated into a single digital process. The role of the coordination office as a central contact point should be further strengthened and expanded to include proactive advisory services.

4. Expansion of real-time data availability and digital infrastructure

For the further optimization of energy communities, the widespread availability of real-time data on grid feed-in and grid consumption is essential. The current predominant practice of using day-after data should be complemented by real-time data visualization. The introduction of open API platforms (e.g. FI-WARE) should be supported and promoted in order to improve interoperability between different systems and actors. The full rollout of smart meters must be ensured and accelerated.

5. Strengthening sector coupling (electricity-heat)

The regulatory framework should explicitly promote sector coupling in order to better utilize existing potentials – existing heating networks using waste heat, biomass, and wood waste. The possibility of establishing heat-based energy communities that generate and distribute not only electricity but also heat should be legally clarified and supported through appropriate funding instruments. CHP plants fueled by wood or biogas offer particular potential here.

6. Further development of the support landscape

The existing support programmes (EUR 60 million per year for investment grants, EUR 25,000 start-up grants, market premiums for unconsumed generation volumes) should be continued, communicated more transparently, and supplemented with specific instruments for optimizing existing communities – for example for storage systems, flexibility technologies, and digitalization measures. Information on available support schemes should be provided more proactively in order to reduce existing information deficits.

7. Ensuring social inclusion

It should be ensured that participation in energy communities remains accessible to all consumers, including those in low-income or vulnerable households – in line with RED II, Article 22(4)(f). Strengthening jointly acting renewable self-consumers offers opportunities to promote energy efficiency at household level and combat energy poverty through lower consumption and lower supply tariffs. Targeted programmes and inclusive participation models should be developed in order to avoid a "two-tier energy transition" and to make the benefits of the transformation – lower energy costs and higher feed-in remuneration – broadly accessible.

8. Coherent transition to the new ElWG

The transition from ElWOG to the new ElWG should be carefully designed in order to minimize legal uncertainty for existing energy communities. In particular, the innovations provided for in the ElWG – flexible grid access, storage regulations, definitions of new market actors, expanded possibilities for direct lines and joint generation facilities including storage – should be designed in such a way that they facilitate the practical implementation of energy communities and do not create additional burdens through new administrative requirements. However, it is still foreseen that grid companies may not operate energy storage systems.

9. Strengthening knowledge transfer and multiplier effects

Austria should actively use its role as a reference model in the Danube region and intensify transnational knowledge transfer – especially to countries in early development phases such as Montenegro, Serbia, and Moldova – through the documentation and dissemination of its experience. In non-EU countries of the Danube region, the legal framework for energy communities is still under development, and the transfer of knowledge from EU countries could play an important role and facilitate the overall process. The REC Ambassadors network and the replication of the coordination office's one-stop-shop model in other countries should be advanced as a priority.

10. Promoting storage infrastructure

The integration of storage solutions into energy communities should be specifically promoted. The existing support for storage up to 50 kWh within the framework of investment grants should be expanded and supplemented with incentives for larger community storage systems. Battery storage systems (such as the 30 kWh lithium-ion battery used in the practical example), as well as the automated control of flexibilities (heat pumps, hot water preparation, wallboxes/EV charging stations), should be considered integral components of REC operation and supported accordingly. The possibility provided for in the ElWG to operate joint generation facilities including storage should be implemented in practice with low entry barriers.

Annex 2 – National Compendium of REC Status and Implementation in Bulgaria

Starting Position and Regulatory Foundation

National Energy Profile

Bulgaria's energy transition policy is still stumbling into the state-dominated fossil fuel-heavy energy mix (77% in 2022, including 25% coal) and persistent dependence on Russian natural gas imports. On the other hand, there has been a dynamic, market-driven push for intermittent renewables. Bulgaria now boasts 5.4 GW of solar photovoltaics (PV), with battery storage quickly catching up with 1300 MWh of installed capacity by mid-2025.[1] Installed onshore wind capacity has remained below 1 GW.

While the surge in PV will likely help Bulgaria achieve its national objective of a 34.48% share of renewable energy in gross final energy consumption by 2030, this is an unbalanced expansion of renewable energy capacities also highlighting some emerging imbalances in Bulgaria's electricity system.

OVERALL ENERGY BALANCE 2024 Thousand tonnes of oil equivalent

	Total	BKB & PB plants	**88,596**
Primary production	**9633,843**	Gas works	**-**
Recovered & recycled products	**52,474**	Blast furnaces	**-**
Imports	**11890,22**	Petroleum refineries (oil refineries)	**529,386**
Exports	**4620,838**	Nuclear industry	**-**
Change in stock	**378,887**	Coal liquefaction plants	**-**
Gross available energy	**17334,587**	Liquefaction & regasification plants (LNG)	**-**
International maritime bunkers	**57,098**	Gasification plants for biogas	**-**
Gross inland consumption	**17277,489**	Gas-to-liquids (GTL) plants	**-**
International aviation	**233,534**	Charcoal production plants	**-**
Total energy supply	**17043,955**	Not elsewhere specified (energy)	**10,536**

- [1] https://csd.eu/fileadmin/user_upload/publications_library/files/2025_10/BRIEF_160_ENG_WEB.pdf

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Transformation input	**17291,356**	**Distribution losses**	**403,688**
Electricity & heat generation	**8811,73**	**Available for final consumption**	**10436,916**
Coke ovens	**-**	**Final non-energy consumption**	**466,543**
Blast furnaces	**-**	**Final energy consumption**	**9845,891**
Gas works	**-**	Industry	**2594,815**
Refineries & petrochemical industry	**7651,97**	Iron & steel	**95,189**
Patent fuel plants	**-**	Chemical & petrochemical	**766,764**
BKB & PB plants	**445,886**	Non-ferrous metals	**180,23**
Coal liquefaction plants	**-**	Non-metallic minerals	**551,615**
For blended natural gas	**-**	Transport equipment	**19,961**
Liquid biofuels blended	**177,603**	Machinery	**118,493**
Charcoal production plants	**1,307**	Mining & quarrying	**167,035**
Gas-to-liquids plants	**-**	Food, beverages & tobacco	**287,988**
Not elsewhere specified	**202,861**	Paper, pulp & printing	**130,638**
Transformation output	**12054,163**	Wood & wood products	**78,02**
Electricity & heat generation	**4178,765**	Construction	**74,871**
Coke ovens	**-**	Textile & leather	**41,378**
Blast furnaces	**-**	Not elsewhere specified (industry)	**82,633**
Gas works	**-**	Transport	**3748,692**
Refineries & petrochemical industry	**7361,471**	Rail	**43,493**
Patent fuel plants	**-**	Road	**3568,968**
BKB & PB plants	**131,811**	Domestic aviation	**5,507**
Coal liquefaction plants	**-**	Domestic navigation	**0,111**
Blended in natural gas	**-**	Pipeline transport	**130,612**
Liquid biofuels blended	**177,603**	Not elsewhere specified (transport)	**-**
Charcoal production plants	**0,74**	Other	**3502,384**
Gas-to-liquids plants	**202,861**	Commercial & public services	**1320,059**
Not elsewhere specified	**0,912**	Households	**1961,546**
Energy sector	**966,157**	Agriculture & forestry	**189,528**

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Own use in electricity & heat generation	**309,121**	Fishing	**0,489**
Coal mines	**27,571**	Not elsewhere specified (other)	**30,763**
Oil & natural gas extraction plants	**0,948**	**Statistical differences**	**124,482**
Patent fuel plants	**-**	***"-" figures not applicable***	
Coke ovens	**-**	***"0" - figure less than half the unit used***	
		".." - confidential data	

Legal Framework

Bulgaria has formally transposed the concept of energy communities in EU Renewable Energy Directive (2018/2001/EC - RED II) and the Internal Electricity Market Directive (2019/944/EC - IMED) into national legislation but the practical legal framework for establishing and operating energy communities remains fragmented and incomplete.

The Energy Act is the central law governing Bulgaria's electricity market. It defines CECs, giving them the right to participate in energy markets with non-discriminatory access to the grid. However, the Act does not specify the detailed operational procedures for these communities.

The Renewable Energy Sources Act (RES Act,) defines RECs. These are restricted to renewable generation and are subject to geographical proximity requirements, which RED II does not impose. The RES Act allows RECs to produce, store, consume, and sell renewable energy.

The Power Market Rules regulate participation in the electricity market, covering trading, scheduling, and balancing. However, these rules do not currently recognize energy communities as distinct market participants, nor do they provide specific procedures for how ECs can trade electricity or offer flexibility services. The latest version of the Power Market Rules can be found on the Energy and Water Regulatory Commission (EWRC) website at dker.bg.

The Electricity Measurement Rules govern how electricity production and consumption are measured. These rules do not yet address collective self-consumption or the shared metering requirements for energy communities. The rules are available also at dker.bg.

Grid access for renewable energy installations, including those owned by energy communities, is regulated by the Ordinance on Grid Connection. However, this ordinance does not provide simplified procedures or special provisions for community-owned installations.

The Spatial Development Act governs the construction and permission-obtaining process for renewable installations, including those for energy communities.

The Condominium Management Act provides a limited framework for collective decision-making and management in residential buildings. While it could be relevant for collective self-consumption installations, it does not directly support the creation of energy communities.

The Cooperatives Act provides a potential legal form for energy communities, but its current scope is largely tied to agricultural cooperatives. Minor amendments would be required to make it suitable for energy communities.

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The Non-Profit Legal Entities Act also offers a potential legal form for energy communities. However, energy activities do not fit neatly into the existing categories envisaged for non-profit associations. Amendments would be necessary to accommodate energy communities.

Institutional Landscape

The Ministry of Energy (http://www.me.government.bg). The state energy policy is legislated through the National Assembly and the Council of Ministers, in accordance with Art. 3 of the Energy Act (EA). The country's energy policy is implemented by the Ministry of Energy, in accordance with Art. 4 of the EA.

The Energy and Water Regulatory Commission (EWRC) (http://www.dker.bg). EWRC is an independent specialized state body that regulates activities in the energy sector in accordance with the provisions of the EA and the Renewable Energy Act, and in activities in the water supply and sanitation sector, in accordance with the provisions of the Water Supply and Sewerage Services Regulation Act.

The Nuclear Regulatory Agency (NRA) (http://www.bnsa.bas.bg). The state regulation of the safe use of nuclear energy and ionizing radiation and of the safe management of radioactive waste and spent fuel is carried out by the Chairman of the NRA. The Chairman of the Agency is an independent specialized body of the executive branch carrying out state regulation of the safe use of nuclear energy and ionizing radiation and of the safe management of radioactive waste and spent fuel within the framework of the powers granted to him/her by law. The Nuclear Regulatory Agency is an administration that assists the Chairman in the exercise of his/her powers and technically supports his/her actions.

The Sustainable Energy Development Agency (SEDA) (http://www.seea.government.bg) SEDA is an executive agency under the Minister of Energy, which performs activities and services related to the implementation of the state policy for improving energy efficiency, as well as for promoting the production and consumption of electricity, thermal and cooling energy, from renewable sources; the production and consumption of biogas and green hydrogen, as well as the production and consumption of energy from renewable sources in transport; renewable liquid and gaseous transport fuels of non-biological origin and recycled fuels in transport.

Maturity Level and Ecosystem (Established, Emerging, Nascent)

One of the most critical issues facing the development of Citizen Energy Communities and Renewable Energy Communities (CECs/RECs) in Bulgaria is the effective participation of citizens. Currently, there is no designated authority tasked with overseeing the implementation and enforcement of energy community policies, creating a governance gap that hinders progress. Therefore, the maturity level of CECs/RECs can be considered as emerging.

The Gabrovo Civil Energy Community (CEC Gabrovo) has been established by the Municipality of Gabrovo to supply clean, locally generated electricity for public use, whilst empowering citizens to

actively participate in the energy transition and share the financial benefits of renewable energy investments.

The Burgas Civil Energy Community (CEC Burgas – Slaveykov Swimming Hall) is a municipality-driven initiative inspired by the Gabrovo model. Its mission is to develop citizen-owned renewable energy projects that advance the city's energy sustainability goals, reduce electricity costs for public services, and create opportunities for citizens and local organisations to invest in clean energy.

Comprative assessment of the EC Gabrovo and EC Burgas[2]

	EC Gabrovo	**EC Burgas**
Organisational aspects		
Form of establishment of the EC	Citizen energy community	Citizen energy community
Initiator	Municipality of Gabrovo	Municipality of Burgas
Members/shareholders	Municipality, citizens and legal entities	Municipality, citizens and legal entities, incl. municipal enterprises
Rationale for the City Council to implement the EC	Art. 21, par. 2 and par. 1, p. 23 Local Governance Law and art. 57 of the Order for the requirements and procedures to manage municipal property rights in public enterprises and commercial associations with municipal capital on the participation of the Municipality in civil associations and signing contracts for shared activities	Art. 21, par. 1, 8, p. 23, Local Governance Law, Art.51, pa.2, Art. 51a, par.4 and in relation to Art. 31 and the following of Section IX of the Order for the requirements and procedures to manage municipal property rights in commercial associations, civil associations and signing contracts for shared activities by Municipality of Burgas
Shareholder participation requirements	From 500 to 5000 BGN The share of the Municipality is 80 BGN	From 500 to 10 000 BGN The share of the Municipality is 10 000 BGN
Members/shareholders	73	131
Participation structure	Citizens - 67 NPOs - 1 Companies - 4 Municipality of Gabrovo - 1	Citizens - 92 NGOs - 4 Companies - 27 Municipal companies – 7

- [2]https://www.seea.government.bg/documents/EAP_REScoop_Feasibility%20Study%20Municipal%20Energy%20Communities%20Bulgaria_Final%20with%20logos.pdf

		Municipality of Burgas - 1
Total investment	160 180 BGN, incl. VAT	450 302 BGN, incl. VAT
Legal types	Association established under the Obligations and Contracts Law	Association established under the Obligations and Contracts Law
	Constituent Assembly	Constituent Assembly
Management bodies	General Assembly	General Assembly
Manager	Authorized representative from the municipality, approved by the general assembly of the CEC	Association Manager allocated by the Mayor following a decision of the City Council approved by the general assembly of the CEC
Registration number	ID 181071764	ID 181277878
Guaranteed purchase of the produced energy	Energy consumed by the regional non-hazardous landfill and other municipal buildings: 1. Municipal administrative buildings 2. Hristo Botev Sports Stadium 3. Orlovets Sports Hall 4. Vuzrajdane Hall 5. Municipal enterprise "Welfair" – administrative building and other	Energy consumed by the Slaveikov Swimming Hall and other municipal buildings
Technical aspects		
RES type	Rooftop Photovoltaic power plant	Rooftop Photovoltaic power plant
Capacity	100 kWp	420 kWp
Location	Non-hazardous waste landfill nearby the city of Gabrovo	Slaveikov Swimming Hall
Ownership of the EC site/building	Public municipal property	Public municipal property
Ownership of the PV installations	Municipality of Gabrovo	Municipality of Burgas

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Analysis of Specific National Barriers

Legislative and Administrative Obstacles

While the Energy Act and Renewable Energy Sources Act provide recognition for energy communities, they lack detailed operational procedures. Key gaps include the absence of a dedicated registration process, unclear grid access and metering rules, and no established protocols for data exchange.

One of the key gaps in the current Bulgarian legislation is that even if an energy community (EC) is set up, sharing its produced energy between members for their own use is practically impossible. Thus, the only energy communities set up in Bulgaria following the model of Gabrovo, Burgas and Sofia Vitosha Municipality, are forced to sell the energy they produce, and they do not have the opportunity to consume it among themselves.

Current legislation provides for apartment dwellers to produce, store and share energy but is limited when it comes to how they can create and join energy communities. In Bulgaria additional limitation is the legal provision for an obligation of reaching full consensus whenever such decisions concern any modification of common building parts (e.g. roofs) such as for the construction of an energy production system.

In 2025 Bulgaria's Parliament has refused to liberalise the electricity market. Without this key reform households continue paying a regulated tariff set below the average market price. Hence, they are not motivated to monitor closely their energy spending and to undertake activities such as setting up or joining an EC, to reduce their electricity bills. The lack of incentives for setting up ECs actually leads to poor interest among citizens. In the end, only a handful of enthusiasts remain – municipalities, small businesses and people with a cause, who drive the development of the process.

There's a lack of adequate support from the municipal administrations for initiatives for setting-up ECs. Most often, this is due to lack of expert capacity and political will. The establishment of one-stop-shop administrative services and a central registry for energy communities is critical, and the national agency SEDA is supposed to play a future role in registering and providing support to energy communities.

Adopted legislative amendments increase fines for electricity outages up to fivefold, strengthening regulatory oversight over investment plans[IV]. These punitive provisions target DSOs while excluding the TSO (Transmission System Operators), and run into the risk of imposing double penalties for the same incident. The collected fines are diverted into the state budget and do not go into actual grid upgrades.

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Market and Infrastructure Hurdles

Bulgaria has the highest rate of electrification in the EU – 27.4% of final energy consumption, compared to a 24% average in 2023[3]. Grids face mounting interconnected challenges that threaten both reliability and decarbonisation goals. Renewables are located in remote areas and create variability and congestion risks. Bulgaria's grid infrastructure suffers significant losses, amounting to 5.37% or 2516 GWh in 2022[4] (close to the EU average), the cost of which is passed directly to the final consumer. Hence, an Amendment to the Energy Act, [Закон за изменение и допълнение на Закона за енергетиката[5]], last amended on 11 August 2025, mandates Distribution System Operators (DSOs) to allocate 30% of their investments to grid modernisation.

Bulgaria's domestic electricity grid suffers from limited grid capacity to accommodate all new generation facilities - there has been a massive surge in PV installations since 2020 and, more recently, in batteries. By mid-2025, the country's solar capacity amounted to 4.5 GW. This rapid expansion of PV facilities requires the introduction of more complex balancing activities. Yet, there is no clarity about which entities should bear these system costs. Furthermore, there is an urgent need for more accurate and timely information exchange between different market players.

DSOs have limited capacity to absorb new renewable projects. This drives them to exploit regulatory gaps to delay or obstruct new connections. They do not publish data on available grid capacity, and since the process of estimating and allocating grid expansion costs is not well defined, DSOs use this to their advantage and often overburden investors with excessive upgrade costs.
DSOs are responsible for installing, maintaining, and managing smart meters[6] but there is no clear regulatory mandate for nationwide deployment. The official smart meter penetration rate in Bulgaria is as low as 1%[7] .

Financial and Capacity Gaps

In mid-October 2025 the National Assembly adopted amendments to the Energy Efficiency Act, establishing the long-awaited National Decarbonisation Fund which will be transforming the Energy Efficiency and Renewable Energy Sources Fund. The new fund aims to become the main

- [3] https://ec.europa.eu/eurostat/databrowser/view/nrg_ind_re__custom_17718575/default/table
- [4] https://www.ceer.eu/publication/3rd-ceer-report-on-power-losses/
- [5] https://www.parliament.bg/bg/desision/ID/166488
- [6] Electricity Measurement Rules and Grid Connection Ordinance: https://lex.bg/laws/ldoc/2136150122
- [7] European Union Agency for the Cooperation of Energy Regulators (ACER), Energy Retail and Consumer Protection: https://www.acer.europa.eu/sites/default/files/documents/Publications/2023_MMR_Energy_Retail_Consumer_Protection.pdf

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public financial instrument in our country to support building stock owners – residential buildings, offices and others – with a focus on energy efficiency measures and renewable energy sources.

The development of energy communities in Bulgaria faces a number of challenges – from regulatory and institutional uncertainty to limited access to appropriate financial mechanisms. Existing forms of financing often do not reflect the specifics of citizen initiatives and pose high barriers to their applicability. The lack of a coherent national strategy and a specifically defined instrument to support energy communities leads to low interest from both potential members and external funding institutions. Although public structures with the potential to provide financial support for such initiatives exist in the country, they are currently not operational or do not have targeted programs. This creates a real risk that political and administrative uncertainty will delay the critically needed intervention in the early stages of development of the collective renewable energy model. On the other hand, a leading complication in approval is the chosen legal form of the energy community which can significantly limit financing opportunities.

A recent study [8] examines the available financial mechanisms and technical support tools that can facilitate the creation and development of energy communities in Bulgaria. Depending on the stages of development of ECs, which can be divided into four main phases: initiation, planning, implementation and operation, there are different requirements on the type and volume of financing required, which further complicates the provision of long-term financial sustainability of ECs. For the stage of EC initiation the following are considered suitable: voluntary work; personal funds; NGOs funding; European capacity building programmes (e.g. Citizen-led Renovation (CLR)). For the EC planning stage: European funding programmes for project preparation (European Energy Communities Facility (EECF) and LIFE Clean Energy Transition 2021-2027; HORIZON Europe – Cluster 5: Climate, Energy and Mobility) and NGO funds are considered suitable. For the REC implementation stage crowdfunding; loans; grants and subsidies; and public-private partnerships are recommended. For the EC operation stage revenues could be expected from electricity sales and from auxilliary activities, such as consultations, trainings.
However, specific funding mechanisms have their disadvantages, such as:
European Energy Communities Facility (EECF): limited number of funded initiatives under EU grants and programmes (~140 communities by February 2028); funding only for business model development, but not investment implementation.
LIFE Clean Energy Transition (LIFE-2025-CETENERCOM): high competition; high requirements for indicators measuring environmental impact; condition for replicating the model; need to form a consortium of international participants.

- [8] https://netzerolab-feba.bg/wp-content/uploads/2025/10/Analiz_na_nalichnite_finansovi_mehanizmi_Greenpeace_2025-2.pdf

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Cluster 5 Call 02-2026 (WP 2025) (HORIZON CL5-2026-02) : high requirements for technical maturity and digitalisation; competition with technically advanced organisations; need to form a consortium of international participants.
European Local Energy Assistance (ELENA): Does not finance the investments themselves, but the preparation for them; Minimum investment volume after the grant: €30 million for energy efficiency, housing and sustainable transport; It is possible for a civic energy community to participate if it works together with a municipality or local authority; Financing is in the form of a grant, not a loan.
Citizen-led Renovation (CLR): Focus on renovation of the housing stock; Consent of all owners; Lack of a Bulgarian intermediary to provide direct guidance on the application process.
Equity-based crowdfunding: Possible discrepancy between social purpose and commercial interest.
Loans: Require a robust business plan and co-financing; Applicable to individuals with a higher risk profile; Low collateral requirements and preferential interest rates; Limited to only approved banks in Bulgaria; Risk of disapproval of the requested loan
Public-private Partnerships: Complicated coordination between partnering financial institutions; Administrative burdens; Dependence on political decisions
Financial mechanisms for supporting energy communities carry a number of risks that may hinder both access to finance and effective project management. These risks stem from: Low administrative and financial capacity of newly established or small energy communities, which often rely on voluntary work and limited resources; Complex and non-transparent application procedures; Lack of publicly available information on available mechanisms, their funding amounts and application conditions; Regulatory uncertainty – in Bulgaria currently there's only a basic regulatory framework for energy communities exists, which leads to legal uncertainty regarding their treatment, preferences and obligations; Inappropriate financial requirements designed for commercial entities, and not for civil establishments.
Risks can be grouped into two main categories: those *related to project and fund management*, and risks *related to accessibility and the application process*. The former arise from insufficient administrative capacity, lack of experience in fund management, and improper allocation and use of funds. In the absence of a clearly defined statutes of the community there is a risk of concentration of votes and management rights among a limited number of members, especially in the case of disproportionate financial participation. This could undermine the principles of collective governance and threaten the protection of the common interest. An additional risk arises when the responsibility for paying back external funding (e.g. a bank loan) is formally assumed by only one member of the community – usually due to technical limitations in the application process. This can lead to an imbalance in management rights and claims for control over the production/storage technology, violating the solidarity nature of the initiative.
The second group of accessibility risks arises from the complexity of application procedures, requirements for documents and evidence, as well as restrictive eligibility criteria. In addition, restrictions imposed as a condition by financing institutions are possible - for example, a ban on

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raising additional loan funding and the pre-sale of key assets or restrictions on the right to dispose of certain resources. The consequences of these risks can include the withdrawal of members from the community due to loss of trust, delays in the implementation of the citizens' initiative, unscrupulous use of resources and missed funding opportunities.

Case Studies and Pilot Capitalisation

Best Practice Example

EU-funded projects for setting-up RECs have been implemented as pilots in Bulgaria[III]. However, they have primarily focused on exploring the potential for deploying RES capacities for self-consumption and prosuming, rather than developing fully-fledged energy communities. These initiatives have mostly involved pilot projects aimed at self-sufficient use or prosuming. While these pilots were not fully integrated the way ECs are supposed to into the real-life grid environment, they adapted to grid rules and sparked important discussions on grid integration challenges. These projects have mainly addressed the technological aspects of integrating RES generation into the grid but have not tackled the social dimensions of energy communities. Nevertheless, they have contributed valuable hands-on experience, creating a foundation that supports the further development of the energy community concept in Bulgaria.

Gabrovo Energy Community

1. Mission and Objectives

The Gabrovo Civil Energy Community (CEC Gabrovo) was established by the Municipality of Gabrovo in response to rising electricity prices and the opportunities offered by the Clean Energy Packages and the Renewable Energy Directive and the Internal Electricity Market Design Directive

in particular. Its main objective is to supply clean, locally generated electricity for public use, whilst empowering citizens to actively participate in the energy transition and share in the financial benefits of renewable energy investments.

2. Strategy
The EC Gabrovo prioritizes:

- Utilizing municipal rooftops for solar power generation.
- Creating accessible investment opportunities for citizens.
- Ensuring fixed returns and stable energy pricing over a 10-year period.
- Retaining all generated electricity within the municipal and public domains wherever feasible

3. Organisational Structure and Governance

- Legal form: Association established under the Bulgarian Obligations and Contracts Law.
- Governance: Managed by representatives appointed by the Municipality of Gabrovo.
- Ownership: The PV installation is owned by the Civil Energy Community throughout the 10-year operational period, after which ownership transfers permanently to the municipality.

4. Activities

- Construction of a 100 kWp photovoltaic plant on the roof of the municipal non-hazardous waste disposal facility.
- Sale of electricity to municipal entities at a fixed rate via Power Purchase Agreements (PPAs).
- Inclusion of 73 members—citizens and SMEs—as financial contributors.
- Administration of returns and dividends to community participants.
- Management of grid coordination and electricity sales processes.

5. Business Model

- Energy Use: Approximately 55% of the electricity is consumed directly on-site at the waste disposal facility.
- Electricity Sale: Energy is sold to municipal consumers at a fixed price of 0.23 BGN/kWh for the first three years.
- Price Adjustment Mechanism: After each three-year cycle, prices are reassessed based on EWRC solar price forecasts and grid charges to ensure sustainability and limit volatility.
- Excess Electricity: Between 20–30% of production is sold on the open market to cover operational costs. Any surplus revenue may be distributed as bonuses or retained in a reserve fund, as decided by the CEC General Assembly.
- Return on Investment: Community members are guaranteed a 22% return on investment over 10 years.

6. Mix of Goods and Services

- Goods: Renewable electricity supplied for public consumption.
- Services: Investment returns, cooperative governance, energy education, and active participation in the green transition.

7. Financing Mix and Partnerships

- Initial Capital: €80,000 (including VAT), contributed by 73 citizens and entities.

- Contributions: Individual investments ranged from BGN 500 to BGN 5,000.
- Municipal Support: The municipality provides administrative assistance, roof space, and engineering documentation for the project.
- Legal Framework: A joint activity agreement governs cooperation, ownership transfer, and benefit-sharing among stakeholders.

8. Socio-Economic and Environmental Impacts

For the Municipality:

- Access to clean electricity at predictable, below-market prices.
- Ownership of the installation after 10 years.
- Progress toward climate goals and an enhanced reputation for sustainability.

For Citizens:

- Fixed dividends and a new opportunity for green investment.
- Access to locally generated clean energy whenever feasible.
- Inclusion in a pioneering model of citizen participation in energy.

Joint Benefits:

- Increased local energy autonomy and security.
- Enhanced energy literacy among community members.
- Symbolic transformation of a landfill into a renewable energy hub.
- Greater access to renewable energy, especially for apartment dwellers and lower-income households.

Burgas Energy Community

1. Mission and Objectives

The Burgas Civil Energy Community (CEC Burgas – Slaveykov Swimming Hall) is a municipality-driven initiative inspired by the Gabrovo model. Its mission is to develop citizen-owned renewable energy projects that advance the city's energy sustainability goals, reduce electricity costs for public services, and create opportunities for citizens and local organisations to invest in clean energy.

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2. Strategy

CEC Burgas follows a strategic approach focused on:

- Utilizing municipally owned rooftops for solar power generation.
- Encouraging broad participation from citizens, SMEs, NGOs, and municipal enterprises.
- Offering fixed investment returns and stable energy prices.
- Building municipal capacity to scale up renewable energy and community energy projects.

3. Organisational Structure and Governance

- Legal form: Association under the Bulgarian Obligations and Contracts Law.
- Capital: BGN 431,802.78 (including VAT).
- Governance: Managed by the Municipality of Burgas.
- Ownership: The PV installation is municipally owned, becoming a permanent municipal asset after 10 years.

4. Activities

- Construction of a 420 kWp rooftop solar installation on the municipally owned Slaveykov Swimming Hall.
- Sale of electricity under a fixed-rate agreement with the Civil Energy Community.
- Financial participation of 131 individuals and legal entities, including municipal enterprises.
- Administrative management of electricity sales, investor returns, and partner coordination.

5. Business Model

- Energy Use: Approximately 85% of electricity generated is consumed onsite by the swimming hall, ensuring high efficiency.
- Electricity Sale: Energy is sold to the municipality at a fixed price of 0.13 BGN/kWh for the first 3 years.
- Price Adjustment: Every 3 years, the fixed price is reviewed based on national solar energy forecasts and grid charges. If the difference exceeds 20%, the sale price is adjusted accordingly.
- Excess Energy: Around 15% of electricity is sold on the free market, generating additional revenue used for operational costs, bonuses, or reserve funds.
- Return on Investment: Investors receive a guaranteed 30% ROI over 10 years.

6. Mix of Goods and Services

- Goods: Clean electricity for municipal use and, where possible, for sale to other consumers.
- Services: Investment opportunities with guaranteed returns, access to energy knowledge, and inclusive civic participation.

7. Financing Mix and Partnerships

- Capital Contributions: Citizens and legal entities invested between BGN 500 and 10,000.
- Municipal Enterprises: Eleven municipal companies invested BGN 10,000 each following City Council approval.

- Municipal Contribution: Provision of roof space, engineering documentation, and administrative support.
- Legal Framework: A joint activity agreement defines cooperation terms and responsibilities.

8. Socio-Economic and Environmental Impacts
For the Municipality:

- Stable access to affordable green electricity.
- Full ownership of the installation after 10 years.
- Progress toward climate and sustainability goals.

For Citizens and Local Stakeholders:

- Secure and transparent investment with 30% ROI.
- Broader access to renewable energy participation, especially for those unable to install their own systems.
- Enhanced sense of ownership and empowerment in the city's clean energy future.

Shared Impacts:

- Reduced reliance on external electricity providers.
- Increased local capacity for renewable energy development and management.
- Educational benefits through hands-on involvement.
- Promotion of fairness and inclusivity in the energy transition.

Policy Recommendations

Liberalise the electricity market so consumers will have an incentive to save more on electricity and take action to reduce their bills.

A more effective approach to penalties for outage would link financial incentives to lower outage periods or reduced distribution losses, ensuring resources flow directly into system modernisation and reliability.

To improve the maintenance of the distribution system, the government should fill regulatory gaps and create direct incentives for faster connections of new users and maximising existing grid efficiency, either through upgrades or digital tools.

Introduce amendments to the Energy Act to allow dynamic pricing and billing based on smart meter data and new rules under the Electricity Measurement legal framework to mandate DSOs to provide hourly or 15-minute metering. Traders should receive preferential access to manage the settlement process, and a data-sharing framework should be introduced to ensure secure, GDPR-compliant exchange of information with full consumer control over permissions.

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Above measures would incentivize consumers so they would have accurate and transparent information about their power usage, and be motivated to save more electricity.

A report[9] (*Advancing Energy Communities in Bulgaria*, supported by the Norway Grants 2014-2021, in the frame of the Business Development, Innovation and SMEs Programme in Bulgaria) outlines the specifications for a software platform designed to support the establishment and operation of energy communities in Bulgaria. This platform is envisaged to be based on open-source software to ensure transparency, flexibility, and cost-effectiveness. It includes one or more centralized databases to store all collected data, such as meter readings, master data, and transaction records, ensuring consistency and easy access for authorized users. The platform supports real-time and historical data analysis, providing valuable insights into energy consumption patterns. It features advanced security measures, including encryption and authentication, to protect sensitive information. The platform also includes modules for managing energy production, consumption, storage, and sharing, as well as tools for financial management, stakeholder engagement, and compliance monitoring. Additionally, it offers user-friendly interfaces for both administrators and end-users, facilitating efficient data management and decision-making processes.

- [9] https://seea.government.bg/documents/Advancing%20Energy%20Communities%20in%20Bulgaria.pdf

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Annex 3 – National Compendium of REC Status and Implementation in Croatia

Starting Position and Regulatory Foundation

National Energy Profile[10]

Based on the data publicized in "Energy in Croatia" published by the Energy Institute Hrvoje Požar the following summary provides an overview of the key energy indicators for the Republic of Croatia in 2024, The text analyses the relationship between energy consumption and economic growth, while detailing the structure of domestic production, import dependency, and progress in renewable energy and energy efficiency.

Total Consumption and Economic Context

Total energy consumption in 2024 amounted to 372.9 PJ, representing a slight increase of 0.7% compared to the previous year. Notably, during the same period, the real GDP growth rate was significantly higher at 3.9%, indicating a degree of decoupling between economic growth and energy consumption.

Domestic Primary Energy Production

Total domestic production fell by 3.6%, totaling 154.1 PJ.
The production structure is dominated by:

- Firewood and biomass: 40.1% (with a 0.5% decrease)
- Hydropower: 16.1% (with a significant 15.7% decrease)
- Natural gas: 15.6% (5.8% decrease)
- Crude oil: 14.9% (6.1% decrease)
- Renewable sources: 11.0% (4.8% increase)

Croatia produced 651.1 million m³ of natural gas (27% of consumption needs) and 492.6 thousand tons of crude oil (25% of total refining).

Energy Imports and Exports

Due to the decline in domestic production, total energy imports rose by 7.2% (392.0 PJ). The most imported energy sources were petroleum products (41.5%), natural gas (24.1%), and crude oil (19.6%). Exports also grew by 4.2% (165.4 PJ), dominated by petroleum products (50.3%) and natural gas (20.5%).

Transformations and Final Consumption

[10] Source: https://eihp.hr/wp-content/uploads/2026/01/Energija-u-HR-2024_web.pdf

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Final energy consumption reached 301.0 PJ, an increase of 3.8%.

- Sectoral consumption: Other sectors (households, services) 45.7%, transport 38.2%, and industry 16.1%.
- Energy sources: Liquid fuels account for 46.7% of final consumption, followed by electricity (20.0%), and natural gas and renewables (13.9% each).
  The share of renewable energy sources in gross final energy consumption is estimated at 26.7%, which is 1.4 percentage points lower than in 2023.

Electricity

Total production amounted to 15,360.4 GWh, covering 77.9% of domestic needs. Approximately 73.6% of electricity was produced from renewable sources (large hydropower plants 43.9%, other RES like wind and solar 29.7%). Electricity imports accounted for 66% of total consumption, while exports reached 56.3% of domestic production.

Energy Efficiency and Environment

From 2000 to 2024, the energy efficiency of the Croatian economy improved by approximately 20% (ODEX index), with industry and households contributing the most, while the transport sector showed stagnation. CO2 emissions from energy sources totalled 16.7 million tons, a slight decrease of 0.1% compared to 2023 and 15.5% less than the 1990 base year level.

Legal Framework

Adoption of EU definitions

Questions regarding renewable energy communities (RECs) in Croatia are primarily regulated by the Electricity Market Act and the Act on Renewable Energy Sources and High-Efficiency Cogeneration, which transposed the EU directives (RED II and the Clean Energy Package) into Croatian legislation.

Croatia has adopted the definition of a REC from Directive (EU) 2018/2001. However, it has restricted membership in RECs to specific legal entities. According to Croatian law, a REC is a legal entity that:

- Is based on open and voluntary participation.
- Is autonomous and under the effective control of shareholders or members located in the proximity of the renewable energy projects (local control).
- Whose shareholders or members are natural persons, SMEs (micro, small, or medium-sized enterprises), or local and regional self-government units.
- Whose primary purpose is to provide environmental, economic, or social community benefits to its members or the local areas in which it operates, rather than generating financial profit.

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Description of permitted legal forms

Unlike citizen energy communities, for which Croatian law prescribes only one legal form—the association—the legislator does not mandate a single fixed legal form for RECs. Instead, it allows them to be established as any legal entity capable of fulfilling the aforementioned criteria of autonomy and non-profit purpose, even as limited liability companies (d.o.o. or j.d.o.o.), as long as they are under the strict condition that the company's articles of association limit the primary objective to social benefit rather than the maximisation of shareholder profit.

In practice, no predominant form has yet emerged, given that by the conclusion of this document, not a single renewable energy community has yet been registered in Croatia. Therefore, it is difficult at this moment to claim which form is most suitable, as none of them have been tested in practice yet.

Institutional Landscape

Key Actors for Energy Communities

1. Ministry of Economy (Ministarstvo gospodarstva)

The Ministry of Economy serves as the central state administrative body responsible for shaping the strategic and legislative framework that allows energy communities to exist and operate. Its role is fundamental in transposing European Union directives—specifically the Clean Energy for all Europeans package—into national law. Within this framework, the Ministry drafts the Electricity Market Act and the Act on Renewable Energy Sources and High-Efficiency Cogeneration, which provide the legal definition of CEC and REC.

Beyond high-level legislation, the Ministry is responsible for defining the long-term goals for decentralized energy production in Croatia. In relation to energy communities, it acts as a policy coordinator that ensures these entities are integrated into the National Energy and Climate Plan (NECP). The Ministry is also tasked with establishing the administrative conditions for the "Register of Renewable Energy Sources," where production plants owned by communities must be listed. By setting the "rules of the game" regarding who can form a community and what their rights are, the Ministry ensures that energy communities are protected from discriminatory market practices. Furthermore, it oversees the allocation of high-level funding schemes (such as those from the National Recovery and Resilience Plan) which are often the primary source of initial capital for local energy initiatives. Its role is to bridge the gap between European green ambitions and the practical legal capacity of Croatian citizens to act as active market participants.

2. Croatian Energy Regulatory Agency – HERA (Hrvatska energetska regulatorna agencija)

HERA is an independent regulatory body that acts as the primary supervisor and rule-maker for the practical functioning of energy communities. While the Ministry provides the law, HERA provides the detailed "Grid Codes" and methodologies that dictate how energy is shared and billed. Its most critical role in relation to CEC is the management of the Register of Citizen Energy

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Communities, while for REC on force is the Ordinance on the Register of Renewable Energy Communities. No community can legally operate or trade energy without being vetted and approved by HERA, which ensures the entity meets the non-profit and community-benefit criteria required by law.

3. HEP – Distribution System Operator – HEP-ODS (HEP – Operator distribucijskog sustava)

HEP-ODS is the technical backbone and the most direct point of contact for energy communities regarding physical infrastructure. As the sole operator of the distribution grid in Croatia, its role is strictly operational and technical. For an energy community to function, it must "map" its members within a specific geographical or technical area, and HEP-ODS is the entity that verifies these technical boundaries. They are responsible for the physical connection of the community's production assets, such as solar power plants, to the national grid.

Maturity Level and Ecosystem (Established, Emerging, Nascent)

The maturity level of the energy community ecosystem in Croatia is currently classified as Nascent. Although the legislative framework was introduced through the Electricity Market Act and the Act on Renewable Energy Sources to align with EU Directives (RED II and IEM), the practical implementation remains in its earliest stages, facing significant administrative and technical bottlenecks.

Maturity Level: Nascent

To date, only three CECs have been officially established and entered into the register managed by the Croatian Energy Regulatory Agency (HERA).

Even more indicative of the early stage is the fact that not a single REC has been registered yet. The primary reason for this disparity is the absence of clearly defined registration and operational procedures that would allow initiators to navigate the system. It was only at the beginning of this year that the crucial Ordinance on the Registration of Renewable Energy Communities was finally adopted. Prior to this, potential RECs existed in a regulatory vacuum, unable to formalize their activities.

Current Status and Implementation

The most critical hurdle remains the technical execution of energy sharing. While the law allows for the sharing of electricity among members, the process is currently only in a testing phase. Full-scale, automated energy sharing—where production from a common source is seamlessly deducted from individual members' bills—is not yet fully operational across the distribution grid.

Technical protocols for billing and data exchange are still being refined in test environments. The registration process is perceived as complex. While interest is growing among citizens and local municipalities, the lack of "success stories" keeps the ecosystem in a preparatory phase.

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In summary, while the "Institutional Landscape" is formally set, the "Ecosystem" is still waiting for the first successful commercial operations to move from the nascent stage into an emerging market.

Analysis of Specific National Barriers

Identified Barrier: Legal Restrictions on Energy Sharing Ownership and Asset Protection in RECs

Description of the Issue:

The current regulatory framework, specifically Article 52, Paragraph 2, Item 2 of the ZOIEiVUK, acts as a significant bottleneck by restricting energy sharing exclusively to production units owned by the REC as a legal entity. This prohibits the sharing of energy from production facilities owned by individual community members, effectively stifling the growth of a diverse and sustainable community model.

Key Implications:

Operational Inefficiency: By excluding member-owned assets, the model fails to utilize a diverse profile of producers and consumers. Allowing members to contribute their own facilities is essential for increasing total available energy and enabling sophisticated demand-side management.

Investment Deterrent: The requirement for the REC to hold sole ownership of assets creates a high-risk environment. Under the current Associations Act, should a REC (registered as an association) face financial failure or liquidation, its assets cannot be redistributed to the investors or members. Instead, ownership is transferred to the Local Self-Government Unit.

Lack of Recourse: This legal structure leaves investors with no mechanism for asset recovery in case of the community's insolvency. It is unrealistic to expect capital injection into REC projects when the legal framework provides no security or recourse for the invested funds.

Proposed Solution:

Amend Article 52 to permit energy sharing from production facilities owned by community members. This shift would protect individual investments and create an economically viable environment for the scaling of RECs.

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Identified Barrier: Restrictive Membership Structure and Exclusion of Public Institutions from RECs

Description of the Issue:

The current definition of membership under Article 4, Paragraph 1, Item 64 of the ZOIEiVUK is excessively narrow. By strictly limiting REC membership to natural persons, SMEs, and local/regional self-government units, the legislator has omitted a wide range of other legal entities. This restrictive interpretation creates a "closed" model that contradicts the principle of open and non-discriminatory participation established in Directive (EU) 2018/2001 (RED II).

Key Implications:

Exclusion of Key Stakeholders: The current framework bars public institutions—such as schools, kindergartens, and hospitals—as well as local utility companies from participating. These entities are often the most suitable candidates for REC involvement due to their high energy consumption and significant roof surfaces available for solar installations.

Obstacle to Public Interest: Since RECs are designed to prioritize environmental and social benefits over profit, excluding institutions that are directly controlled by local authorities and serve the public interest is counterproductive to the community's core mission.

Discrimination in Local Engagement: The legislative "silence" regarding other legal entities prevents various local stakeholders from participating under equal conditions, thereby limiting the scale and impact of energy communities at the local level.

Proposed Solution:

Amend the membership provisions to allow a broader range of legal entities, particularly public institutions and local utilities, to join RECs. Aligning the national definition with the flexible principles of the EU Directive will ensure that all relevant local actors can contribute to and benefit from the energy transition.

Identified Barrier: Risk of Restrictive Spatial Scope and Technical Grid Limitations for RECs

Description of the Issue:

While the current legislative framework does not strictly define the spatial scope of Renewable Energy Communities (RECs), there is a significant risk that future regulations may impose narrow technical restrictions. Specifically, tying the community's boundaries to a single 110 kV transformer station would create an unstable and unsustainable functional foundation. Unlike administrative borders, transformer station coverage is a dynamic technical parameter that changes based on grid load and maintenance, making it an unfit criterion for defining a legal entity’s jurisdiction.

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Key Implications:

Operational and Legal Uncertainty: Tying membership to a specific transformer station would make community participation "fluid" and nearly impossible to manage. If grid operations shift a user to a different station, their legal standing within the REC would become uncertain, creating an administrative nightmare.

Fragmentation of Regional Participation: Narrow spatial limits would prevent regional authorities (Counties) from consolidating their public institutions—such as schools and hospitals—into a single REC. Forcing these institutions to join multiple separate communities based on their micro-location would impose untenable financial and organisational burdens on the regional government.

Failure of Energy Balancing: Effective energy balancing requires a broad scope to allow surpluses from one area (e.g., public buildings) to be shared with "energy-poor" zones (e.g., heritage-protected city centers) where production is impossible. Restrictive technical boundaries would prevent this synergy, resulting in small, disconnected communities unable to achieve economies of scale.

Proposed Solution:

RECs should retain the flexibility to define their own spatial scope based on economic and social objectives. If a regulatory boundary is necessary, it should be defined by stable, legally recognized frameworks, such as:

Administrative Boundaries of Counties (Regional Self-Government Units).

The Distribution System Operator (HEP ODS) Area, ensuring alignment with the overall grid architecture rather than volatile local nodes.

Identified Barrier: Incompatibility of Association Asset Liquidation Rules with REC Investment Protection

Description of the Issue:

The current legal framework for Renewable Energy Communities (RECs) often defaults to the "association" (udruga) as the recommended legal form. However, under the general Associations Act, if an association is dissolved, its assets must be transferred to the local self-government unit where its headquarters are registered. This general rule fails to account for the unique operational nature of RECs, where assets are built through the capital contributions of diverse members across potentially broad territorial scopes.

Key Implications:

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Asset Seizure Risk: The automatic transfer of assets to a single local municipality upon liquidation acts as a major deterrent for potential members and investors. It creates a situation where private or shared investments are effectively "nationalized" by a local authority in the event of the community's closure.

Geographic Inequity: For RECs with a broad territorial scope, the current law unfairly prioritizes the specific municipality of the headquarters over other areas where community members might actually live and where the production units are physically located.

Inhibitor of Formation: This legal uncertainty regarding asset recovery discourages the registration of new RECs, especially those with complex membership structures that require clear mechanisms for the protection of their shared capital.

Proposed Solution:

Introduce a lex specialis provision within the renewable energy legislation that supersedes the general Associations Act regarding REC liquidation. The law should ensure that, upon dissolution:

Assets are distributed proportionately to the rights and shares of the community members.

Or assets are transferred to another legal entity that continues to pursue the community's green energy objectives within the same operational area.

Identified Barrier: Administrative Burden and Discriminatory Activity Registration for RECs

Description of the Issue:

The current legislative framework creates a significant regulatory imbalance between Renewable Energy Communities (RECs) and Citizen Energy Communities (CECs). While the Act on the Electricity Market provides a unified activity for "organizing a citizen energy community"—covering production, supply, aggregation, and storage—no such comprehensive definition exists for RECs. Consequently, RECs are often forced to obtain separate permits and registrations for every individual energy activity they perform.

Key Implications:

Discriminatory Treatment: The lack of a consolidated registration process places RECs at a disadvantage compared to CECs, which enjoy a much simpler and more integrated regulatory framework.

Administrative and Financial Strain: Forcing RECs to register each activity separately generates excessive administrative, temporal, and financial costs. This is particularly damaging for RECs with an installed capacity exceeding 500 kW, where the simplified Registry entry is currently deemed insufficient by regulatory interpretations.

Decline in Formations: The complexity of the current process contradicts the original legislative intent of simplification. This acts as a major disincentive for stakeholders, effectively stalling the establishment and growth of new RECs due to the high "entry cost" of bureaucracy.

Proposed Solution:

Amend the ZOIEiVUK to align the REC registration model with that of CECs. A specific provision should be introduced to enable RECs to perform multiple energy activities (production, sharing, storage, etc.) under a single, unified legal basis or a "consolidated energy community activity" registration, regardless of the installed capacity.

Identified Barrier: Legal Uncertainty Regarding Electric Vehicle (EV) Charging Services for RECs

Description of the Issue:

There is a significant legislative gap and lack of alignment between the Act on the Electricity Market and the ZOIEiVUK regarding electric vehicle (EV) charging. While Citizen Energy Communities (CECs) are explicitly permitted to provide EV charging services, the legislative framework for Renewable Energy Communities (RECs) remains ambiguous. The current reference to "other commercial energy services" in Article 52 of the ZOIEiVUK does not provide sufficient legal certainty to confirm whether EV charging is a permitted activity for RECs.

Key Implications:

Regulatory Inconsistency: The discrepancy between the regulations for CECs and RECs creates an uneven playing field, preventing RECs from adopting a holistic approach to the energy transition that includes green mobility.

Investment Hesitation: The lack of explicit legal authorisation acts as a deterrent for RECs planning to invest in charging infrastructure for their members or third parties, as they face potential regulatory pushback or fines.

Stifled Innovation: By leaving the scope of "commercial energy services" open to interpretation, the legislator hinders the ability of RECs to develop integrated business models that combine local production with sustainable transport.

Proposed Solution:

Explicitly standardize EV charging as a permitted activity within the ZOIEiVUK. This should be integrated into a unified and clear definition of REC energy activities, ensuring full alignment with the rights already granted to CECs and providing the necessary legal certainty for future investments.

Case Studies and Pilot Capitalisation

Concept and Best Practices

The ICEC model represents a pioneering approach to local energy governance, established as a non-profit association that integrates public administration with community-led energy initiatives.

Institutional Synergy: By uniting the County with its public institutions, the project creates a stable institutional framework for the decentralized production of green energy.

Inclusivity through Heritage Protection: A key best practice is the "bridge" model, which directs energy surpluses from modern public facilities to citizens and entrepreneurs in historic city centers. This addresses a critical gap where heritage conservation laws otherwise block active participation in the energy transition.

Pilot Capitalisation and Project Results

The capitalisation strategy focuses on the phased optimisation of public assets to ensure long-term sustainability:

1. Phase I (Resource Mapping): Initial results focus on utilizing existing roof surfaces of County-owned buildings. This phase establishes the baseline production capacity.
2. Phase II (Expansion and Scaling): To meet the high demand of protected zones, the project capitalizes on broader local infrastructure by integrating administrative buildings and facilities managed by cities and municipalities.
3. Social Capitalisation (**Energy** Poverty): The long-term goal is to leverage these shared resources to include and protect households at risk of energy poverty, transforming public assets into a social safety net for clean energy.

Best Practice Example

Case Study: North Adriatic Citizen Energy Community (EZSJ)

1. Structure and Governance

The North Adriatic Citizen Energy Community (EZSJ) is established as a non-profit association, headquartered in Rijeka. It represents a "bottom-up" organisational model, primarily driven by civil society (Udruga Bez granica) and local experts.

Legal Form: Association (Udruga), ensuring a democratic "one member, one vote" governance structure.

Membership: A diverse mix of over 20 members, including natural persons (citizens), local NGOs, and small businesses (SMEs).

Operational Reach: Primarily active in the Primorje-Gorski Kotar and Istria counties, focusing on urban and suburban energy micro-grids.

2. Financing and Resource Allocation

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The financial sustainability of the EZSJ is built on a hybrid model that combines private investment with European strategic funding:

Project-Based Funding: A significant portion of its operational and developmental capacity is financed through the EU DISCOVER project (2023–2026), which provides the technical tools and methodology for scaling.

Member Contributions: Initial production capacities (approx. 150 kW) are derived from decentralized solar installations owned or managed by members.

Technical Cooperation: Participation in EU-wide consortiums allows the community to access high-level expertise without the prohibitive costs usually associated with energy consultancy.

3. Key Benefits and Impact

As one of the first communities in Croatia to receive an official license from HERA (Croatian Energy Regulatory Agency), EZSJ provides a blueprint for regional energy transition:

Energy Independence: Members can produce, share, and store their own renewable energy, reducing reliance on centralized market fluctuations.

Education and Advocacy: Beyond electricity, the community acts as a regional hub for energy literacy, helping citizens navigate the complex legal and technical landscape of Renewables (OIE).

Legal Precedent: By successfully navigating the registration process for various energy activities, EZSJ serves as a practical "test case" for other emerging communities in Croatia, highlighting both the possibilities and the bureaucratic hurdles of the current system.

Results of the NRGCOM Pilot Project

Final Results of the NRGCOM Pilot Actions: Istria County Energy Community (ICEC)

Executive Summary of Findings:

The pilot actions carried out in Istria County have successfully mapped the technical and social potential for a regional Renewable Energy Community (REC). However, the most critical result of these actions is the identification of a regulatory deadlock. The pilot confirms that while the infrastructure and interest exist, the formal establishment and operational launch of the ICEC are currently unfeasible under the existing legislative framework. This White Paper, therefore, serves as a prerequisite for the actualisation of the community.

Key Findings and Solutions to Local Problems:

The "Heritage Deadlock" vs. Regulatory Rigidity:

The pilot identified a high demand for energy among citizens in historic city centers (e.g., Pula, Poreč, Rovinj) who are legally barred from installing solar panels. While the ICEC model is designed to solve this by sharing surpluses from public buildings, current ownership restrictions (Article 52,

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ZOIEiVUK) prevent the community from integrating member-owned production units, effectively halting the project before its launch.

Institutional Participation as a Barrier to Entry:

The pilot action planned to include schools and hospitals as anchor members. However, the restrictive membership definitions and the lack of a unified registration process for REC activities (compared to CECs) create administrative burdens and legal risks that public institutions cannot overlook. Without the legislative changes proposed in this document, these key stakeholders cannot safely join the community.

Investment Insecurity and Asset Protection:

A major finding of the pilot is that the current legal form of associations—combined with the lack of lex specialis for REC asset liquidation—creates an unacceptable risk for regional investment. The pilot results show that potential partners are hesitant to commit capital as long as assets risk being "nationalized" by local government units upon any potential dissolution of the REC.

Contribution to Solving Local Problems (Pending Reform):

The ICEC pilot has laid the groundwork for solving:

- Energy Exclusion: Providing green energy to heritage-protected zones.
- Energy Poverty: Protecting vulnerable households through shared public resources.
- Local Balancing: Achieving a "prosumer-consumer" balance at the County level.

Conclusion:

The ICEC remains in a "ready-to-launch" state. The pilot actions have provided the technical blueprints and the social architecture, but the legal "green light" is missing. The adoption of the reforms outlined in this White Paper is the final and necessary step to transform this pilot from a theoretical model into a functional legal entity that can finally serve the citizens of Istria.

Policy Recommendations

Specific policy recommendations aimed at removing identified barriers in Croatia are provided under the chapter Analysis of Specific National Barriers, where for each proposed solution is provided. These recommendations should be integrated into the upcoming new Act on Renewable Energy Sources and High-Efficiency Cogeneration to foster further development and efficiency.

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Annex 4 – National Compendium of REC Status and Implementation in Czechia

Starting Position and Regulatory Foundation

National Energy Profile

The Czech Republic is currently undergoing a profound transformation from a traditional, centralized energy model—dominated by a few large conventional power plants—to a modern, decentralized system characterized by a multitude of small renewable energy sources (RES), accumulation units, and active prosumers.

According to data from the Ministry of Industry and Trade, the share of gross final energy consumption from RES in the Czech Republic reached 18.2 % in 2022, calculated using the international EUROSTAT methodology. This achievement already surpassed the country's previous 2020 target of 13 %. Breaking this down by sector, renewable sources accounted for 25.8 % of final heating consumption, 15.5 % of electricity consumption, and 7.2 % of transport consumption. Looking ahead, the Czech Republic is committed to reaching a 22 % RES share in gross final energy consumption by 2030, compared to the broader EU target of 32 %.

At the local level, the transition is already highly visible. Currently, approximately 160 municipalities and cities across the country are actively involved in operating and supporting various systems for local electricity and heat production. The collective installed capacity of these municipal systems currently amounts to 24 MWe for electricity and 116 MWt for heat. The most prevalent technologies are rooftop photovoltaic (PV) power plants and biomass heating facilities, though municipalities also successfully operate biogas, wind, and small hydropower plants, which ensures a highly diverse local energy mix.

The national strategic targets for future installed capacity aim to reach 6 to 10 GWe of solar power and 0.7 to 1.5 GWe of wind power by 2030. By 2050, these projections scale up to 21–26 GWe for solar and 3.5–5.5 GWe for wind. However, there is a recognized lack of public acceptance for large-scale solar and wind parks, a sentiment stemming from historical subsidy schemes that heavily favored large developers without bringing benefits to local residents. As a result, the government and stakeholders acknowledge that emphasizing local consumption and community-driven energy is the most viable path to overcome these social and grid-related barriers.

Consequently, Renewable Energy Communities (RECs) are expected to play a critical role in the future national energy mix. Sharing energy is rapidly evolving from a marginal topic into a core component of municipal and corporate management. It is estimated that by the end of 2026, operating energy communities will contribute approximately 9 % to the total installed PV capacity in the Czech Republic. This community-driven growth will primarily focus on decentralized installations connected to the low-voltage (LV) grid with individual capacities of up to 100 kW.

Legal Framework

The legal framework for community energy was firmly established by the "Lex OZE II" amendment to the Energy Act (Act No. 458/2000 Coll.), which took effect on January 1, 2024.

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This legislation aligns Czech law with EU Directives (EU 2019/944 and EU 2018/2001) and defines two distinct categories: Citizen Energy Communities (CEC) and Renewable Energy Communities (REC).

National restrictions

During a transitional period until mid-2026, energy sharing within communities is restricted to a maximum of 1,000 consumption or production points and is geographically limited to the contiguous territories of a maximum of 3 municipalities with extended powers (ORP) or the territory of Prague. Active customers outside of communities can share electricity among up to 11 points across the entire country.

Permitted legal forms include associations, cooperatives, or other business corporations, provided they prioritize environmental, economic, or social benefits over financial profit and adhere to strict profit-distribution limits. Full sharing without territorial or numerical limits is expected to launch on July 1, 2026.

Institutional Landscape

The institutional framework is managed by several key actors:

- Energy Regulatory Office (ERÚ): Manages the official registration of energy communities, oversees compliance, and issues licenses.
- Energy Data Center (EDC): Responsible for the technical facilitation of electricity sharing in 15minute intervals and providing the necessary data for billing among market participants.
- Ministry of the Environment (MŽP) and State Environmental Fund (SFŽP): The primary providers of subsidies (e.g., the Modernisation Fund and the "Komunerg" program) to financially support the establishment of RECs.
- Local Action Groups (LAGs / MAS) and the Union of Community Energy (UKEN): Crucial grassroots coordinators that facilitate local cooperation, provide expertise, and operate tools like the interactive national map of energy communities.

Maturity Level and Ecosystem

The maturity level of the Czech Republic can be classified as transitioning into the Established/Advanced Phase. Despite the legal framework being relatively new, stakeholder awareness and motivation are very high. By early 2024, 83 registered energy communities applied for pilot project support from the MŽP, with at least 40 expected to receive funding.

Currently, the ERÚ registers nearly a hundred functioning energy communities. Projects are successfully scaling up, actively connecting municipalities, businesses, and households to share tens of thousands of kilowatt-hours.

Analysis of Specific National Barriers

Legislative and Administrative Obstacles

A major legislative barrier is the current requirement for "static" energy sharing. This model forces larger communities to distribute energy according to fixed allocation keys regardless of actual real-

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time consumption, frequently resulting in losses of 20 % to 50 % of the shared electricity. Furthermore, the strict territorial limits (maximum 3 ORPs) restrict natural scalability. Cross-border participation is excluded, and the ability of energy communities to independently own or lease local distribution networks is heavily hindered by stringent licensing requirements.

Market and Infrastructure Hurdles

Effective energy sharing requires smart, quarter-hourly metering. However, there is a critical lack of smart meters and comprehensive Energy Management Systems (EMS), particularly in rural areas. Additionally, grid capacity constraints pose a massive challenge; the current "first come, first served" connection rule allows single large projects to block grid capacity for entire municipalities. Communities also face disadvantageous distribution tariffs, paying full transmission network fees even when sharing electricity locally at the low-voltage level.

Financial and Capacity Gaps

Emerging communities struggle with predicting the return on investment and operating costs, which are estimated at 0.4 to 0.7 million CZK annually for smaller ECs, excluding the high initial investments required for IT infrastructure and batteries. Many local initiatives on the municipal level lack professional capacities for active energy management and complex administrative/legal agendas, which are necessary to move beyond passive sharing to active system optimisation

Case Studies and Pilot Capitalisation

ENERKOM Růže (Pilot site: Svatý Jan nad Malší)

A prime example of a well-managed and highly functional renewable energy community (REC) in the Czech Republic is the initiative in the municipality of Svatý Jan nad Malší, which is part of the broader ENERKOM Růže association established in 2022 in the South Bohemian Region. This project clearly demonstrates how even small rural communities can achieve exceptional progress in sustainability and decentralized energy deployment.

The success and cohesion of this community rely on the active and equitable involvement of key stakeholders: municipal representatives, local citizens, private companies, and independent farmers. The model successfully connects municipal infrastructure, a local farm, business entities, and residential buildings, with a primary focus on energy efficiency and RES adaptation. To maintain long-term public support, the community's management organizes regular workshops, educational events, and awareness campaigns, effectively building trust and technical awareness directly among the residents.

Unlike many emerging communities that rely solely on solar panels, ENERKOM Růže stands out due to its highly diversified technological mix. The community integrates a 74 kWp photovoltaic system with a biogas plant and innovative water-saving technologies.

The absolute cornerstone of the local grid's resilience, however, is a centralized heating system featuring a modernized municipal biomass heating plant. This stable baseload source has a total installed capacity of 0.49 MW (comprising 0.3 MW and 0.19 MW units) and consumes approximately 900 spatial meters of wood chips annually, primarily operating from May to August. To maximize energy savings, the municipality has concurrently implemented building insulation

upgrades and the replacement of inefficient heating sources. Crucially for dynamic sharing, the community utilizes 15minute smart metering paired with an advanced Energy Management System (EMS) utilizing a "Distant Measuring Kit" and the "ECM Marfy" software, allowing for precise, real-time monitoring of electricity and water consumption across the grid.

Hard data from the NRGCOM pilot verification proves the immense impact of this initiative:

- The total annual RES production within the community reaches an impressive 6,386 MWh.
- This locally generated energy provides a stable supply to 45 consumption sites and 19 public lighting points.
- Thanks to smart sharing and active energy management, the estimated financial savings for community members amount to approximately 400,000 CZK per year.
- During the NRGCOM project's testing using the "Pilot Readiness Package" methodology, ENERKOM Růže achieved an outstanding score of 48 out of 60 possible points, safely classifying it in the "High readiness" category.

The community's economic model is smartly built on the effective utilisation of external resources, primarily leveraging national and European state subsidies (e.g., the Modernisation Fund, New Green Savings, and operational programs). The community's management is continuously exploring new financing models—including cooperative investments—to ensure long-term financial sustainability and independence.

The Svatý Jan nad Malší case study provides a highly replicable model for other rural regions across the Danube Region. The project promoters highlight the following steps as critical for success:

1. Meticulous Planning and Diagnostics: Success was preceded by detailed mapping of available local resources and a clear identification of energy inefficiencies in the territory.
2. Starting with Smaller Pilots: It is crucial not to rush into massive infrastructure immediately. Smaller pilot projects help municipalities and citizens build confidence and fine-tune their approach before undertaking major investments.
3. Data-Driven Decision Making: The deployment of advanced monitoring and data analysis (EMS) is the absolute key to making correct operational decisions and balancing the grid.
4. Early and Consistent Communication: Involving residents in the process as early as possible and communicating transparently builds the necessary trust for community-driven projects.

Results of the NRGCOM Pilot Project

Within the framework of the NRGCOM project (Activity A.3.4), the Czech Republic served as a primary testing ground for the harmonized technological pilot actions. Coordinated by the South Bohemian Agency for Support to Innovation (JAIP), the pilot aimed to verify the practical applicability of the "Pilot Readiness Package" methodology and the jointly developed expert software tool, ETMEC (Expert Tool for the Management of Energy Communities, engineered by the Slovak partner NEK).

The evaluation assessed regional readiness across three interlinked dimensions: Technical (infrastructure, RES capacity, metering), Economic (investment costs, savings, financial motivation), and Institutional/Legal (governance, stakeholder cooperation, and management capacity). The testing focused on the South Bohemian Region, specifically targeting two contrasting rural community models to identify the exact barriers to the deployment of decentralized energy systems.

The first pilot area, Enerkom Šumavsko, represents a typical Czech rural environment characterized by small municipalities and agricultural enterprises.

The community achieved an overall score of 25 out of 60 points, categorizing it at a Low Readiness level. The assessment revealed excellent institutional foundations, showcasing strong local cooperation driven by the Local Action Group (MAS), highly motivated stakeholders, and the legal feasibility of establishing an EC.

Despite the high enthusiasm, the pilot highlighted severe infrastructural deficits. The community scored very poorly (2/5) due to the absence of continuous quarter-hourly smart metering and localized Energy Management Systems (EMS). Furthermore, the lack of economic modeling and transparent cost-sharing mechanisms prevents the deployment of dynamic sharing algorithms. This case perfectly illustrates the national barrier of "enthusiasm without infrastructure," proving that institutional readiness alone cannot compensate for the lack of technical grid integration.

In stark contrast, the evaluation of ENERKOM Růže (specifically the municipality of Svatý Jan nad Malší) provided a blueprint for successful implementation. This community connects 4 municipalities, 1 operator of two biogas plants, and a social care service.

ENERKOM Růže achieved an outstanding score of 48 out of 60 points, demonstrating High Readiness. The pilot confirmed that strategic municipal investments yield immediate results. By combining 74 kWp of photovoltaic installations with a centralized wood biomass heating plant (consuming 900 spatial meters of wood chips annually) and utilizing the "ECM Marfy" tracking software, the community successfully manages a local RES production of 6,386 MWh/year.

During the international study visit to Svatý Jan nad Malší (February 2025), project partners observed first-hand how the community utilizes data-driven strategies and "Distant Measuring Kits" to optimize energy flows. However, the pilot also identified that even advanced communities face external challenges, such as the market dominance of large energy players, unclear grid operation roles, and technical software deficiencies that require further technological investments.

The parallel testing of these two communities provided critical data for the calibration of the ETMEC software tool. JAIP successfully prepared the implementation proposals, confirming that while ETMEC is a powerful diagnostic engine for optimizing real-time generation and consumption, its deployment is strictly dependent on the prior resolution of the hardware deficit (smart meters).

Overall, the NRGCOM pilot results demonstrate that the South Bohemian region has strong potential to become a model territory for community energy in the Czech Republic and a reference case for similar rural regions across the EU. The findings clearly dictate that future national policies must prioritize targeted subsidies for measurement systems and management capacity building to elevate emerging initiatives from the "Šumavsko level" to the fully operational "Růže level"

Policy Recommendations (Country-Specific)

Based on the NRGCOM findings and the pilot validations, the following recommendations are proposed for national policymakers:

I. **Subsidize Smart Infrastructure and EMS:** As demonstrated by the low scores in rural pilots, there must be massive, targeted funding for the installation of quarter-hourly smart meters and local Energy Management Systems (EMS), rather than just focusing on renewable generation units.

II. **Clarify Grid Roles and Contracts:** Address the identified barriers regarding unclear grid operation roles and provide standardized, legally clear templates for energy sharing contracts.

III. **Fully Transpose EU Directives:** Urgently implement the requirements of EU Directive 2019/944/EU to ensure the regulatory authority effectively monitors and removes all unjustified administrative limits on community energy and self-consumption.

IV. **Introduce Dynamic Sharing and Flexible Tariffs:** Abolish the inefficient static allocation key in favor of dynamic sharing methods, and introduce distribution tariffs that financially incentivize local energy consumption on the low-voltage grid.

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Annex 5 – National Compendium of REC Status and Implementation in Germany

Starting Position and Regulatory Foundation

1. National Energy Profile

1.1 Overview of Germany's Energy System

Germany is Europe's largest economy and its most significant energy consumer. As the ninth-largest primary energy consumer globally, the country consumed approximately 10,478 Petajoules of primary energy in 2024. Germany's energy system is in a period of historic transformation – the Energiewende (energy transition) – which aims to move the country from a fossil-fuel and formerly nuclear-dependent energy system toward a climate-neutral, renewables-based economy by 2045.

The nuclear phase-out was completed in April 2023, when the last three German nuclear reactors were taken offline. A legally mandated coal phase-out by 2038 (with political ambitions to achieve it by 2030 in some regions) further underscores the pace of transformation. This leaves Germany in a position of simultaneously dismantling legacy generation capacity while scaling up renewables, storage, and grid infrastructure at unprecedented speed.

1.2 National Energy Balance and Primary Energy Mix

Despite rapid renewables growth in the electricity sector, Germany's overall primary energy consumption remains dominated by fossil fuels. In 2024, the primary energy mix was as follows:

Energy Source	Share (%)	Trend
Oil	36.1%	Stable/declining
Natural Gas	25.9%	Declining
Renewables	~20%	Growing
Lignite	7.6%	Declining sharply
Hard Coal	7.3%	Declining sharply
Nuclear	0%	Phased out (April 2023)

Table 1: Germany's primary energy mix (2024). Sources: BDEW, Enerdata, IEA [1], [2], [3].

While fossil fuels still account for more than 77% of primary energy consumption, the electricity sector tells a markedly different story. Renewables covered approximately 56% of Germany's gross

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electricity consumption in 2025, setting a new annual record. In the second quarter of 2025 alone, the renewable share of electricity generation reached a historic 67.5%. Installed renewable electricity capacity exceeded 210 GW by end of 2025, representing an 11% year-on-year increase.

1.3 Renewable Energy: Sector-by-Sector Breakdown

Electricity Sector: This is where Germany's energy transition has made the most visible progress. In 2025, renewable sources generated approximately 278 TWh of net electricity. Wind power was the single largest electricity source in Germany (approximately 132 TWh), followed by photovoltaics (approximately 87 TWh, a 21% increase over 2024), biomass (approximately 41 TWh), and hydropower (approximately 18 TWh). Installed capacities at end of 2025 stood at approximately 68 GW onshore wind, 9.5 GW offshore wind, and 118 GW solar PV. The federal target is to reach 80% renewable electricity by 2030.

Heating Sector: Progress has been much slower. The renewable share in heating stood at approximately 17% in 2023. The dominant renewables in this sector are biomass (wood pellets, biogas-based heating networks), heat pumps, and solar thermal. The Buildings Energy Act (Gebäudeenergiegesetz, GEG), amended in 2024, mandates that new heating systems must use at least 65% renewable energy, driving future heat pump adoption. District heating networks, which account for approximately 14% of heat supply, are increasingly seen as vehicles for communal renewable heating – a direct intersection with energy community models.

Transport Sector: The transport sector remains the most challenging, with a renewable share of only about 12% in 2023, primarily from biofuels and a small but growing share of renewable electricity for electric vehicles. Germany's greenhouse gas quota policy (THG-Quote) requires fuel suppliers to reduce lifecycle emissions, creating indirect demand for renewables in transport.

1.4 Import Dependency

Germany's energy import dependency remains a defining characteristic and a key motivation for energy community development. In 2021, approximately 64% of Germany's total energy was imported. While this figure has been declining due to renewables growth and reduced consumption, the structural dependency is profound:

Energy Source	Import Rate	Key Suppliers & Notes
Oil	~98%	USA, Norway, Kazakhstan, Libya (Russia virtually zero since 2022)
Natural Gas	~94%	Norway (43%), Netherlands (26%), Belgium/LNG (22%). 4 active LNG terminals.

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Hard Coal	100%	Domestic mining ended 2018. Imports from USA, Australia, Colombia.
Electricity	~5% net	Net importer since 2023 (first time in 20 years). Driven by nuclear phase-out and competitive imports from France, Nordics.

Table 2: Germany's energy import dependency by source. Sources: IEA, Enerdata, BDEW, Agora Energiewende [4], [5], [6], [7].

The geopolitical shock of Russia's invasion of Ukraine in 2022 fundamentally reshaped Germany's energy security outlook. Pre-2022, Russia supplied 34% of Germany's crude oil, 55% of its natural gas, and 45% of its hard coal. The rapid diversification effort – including the emergency construction of LNG import terminals, acceleration of renewables, and reduced consumption – demonstrated both the vulnerability and adaptability of Germany's energy system.

2. Legal Framework

2.1 EU Transposition Status

Germany's legal framework for renewable energy communities has evolved through a complex interplay of EU directives and national legislation. The transposition of the EU Clean Energy Package into German law has been a protracted process, with significant progress made only in 2022–2025.

Renewable Energy Communities (RECs) under RED II: The EU's Renewable Energy Directive (RED II, Directive 2018/2001) introduced the concept of renewable energy communities (Erneuerbare-Energie-Gemeinschaften, EEG). Germany transposed the REC definition through amendments to the Renewable Energy Sources Act (Erneuerbare-Energien-Gesetz, EEG 2023), aligning its pre-existing concept of the "citizen energy company" (Bürgerenergiegesellschaft) with the EU definition. The revised definition was adopted in July 2022 and entered into force on 1 January 2023.

Citizen Energy Communities (CECs) under the Electricity Market Directive: The CEC definition from the Internal Electricity Market Directive (Directive 2019/944) has not yet been separately transposed into German law. It remains unclear whether the existing Bürgerenergiegesellschaft definition will also serve as the transposition vehicle for CECs.

Energy Sharing under EMD III: The most significant recent development is the transposition of the EU Electricity Market Design Reform (EMD III, Directive 2024/1711). In November 2025, the Bundestag passed amendments to the Energy Industry Act (Energiewirtschaftsgesetz, EnWG) introducing the new §42c EnWG, which for the first time creates an explicit legal basis for energy sharing via the public electricity grid. The Bundesrat approved the law on 21 November 2025, and it entered into force on 22 December 2025. Distribution system operators must enable energy sharing within their balancing zone from 1 June 2026, and within adjacent balancing zones from 1 June 2028.

2.2 Key National Legislation

Legislation	Relevance for Energy Communities
Erneuerbare-Energien-Gesetz (EEG 2023)	Core law for renewable energy support. Defines Bürgerenergiegesellschaft (citizen energy company). Provides feed-in tariffs, market premiums, and exemptions from competitive tendering for qualifying citizen energy projects (up to 18 MW onshore wind, 6 MW solar PV). Target: 80% renewable electricity by 2030.
Energiewirtschaftsgesetz (EnWG)	Regulates the energy industry, grid access, and electricity supply. The new §42c EnWG (2025) enables energy sharing via the public grid. §42a covers tenant electricity (Mieterstrom), §42b covers shared building supply (Gemeinschaftliche Gebäudeversorgung).
Genossenschaftsgesetz (GenG)	Governs the formation and operation of registered cooperatives (eG), the most common legal form for energy communities. Requires membership in an auditing association. Open and voluntary membership, democratic governance (one member = one vote).
Klimaschutzgesetz (KSG)	Federal Climate Protection Act. Sets legally binding emissions reduction targets: 65% reduction by 2030 (vs. 1990), climate neutrality by 2045. Provides the overarching policy imperative for renewables expansion.
Gebäudeenergiegesetz (GEG)	Buildings Energy Act. Mandates 65% renewable energy for new heating systems. Drives demand for communal heating solutions and district heating networks – a direct entry point for thermal energy communities.
Brennstoffemissions-handelsgesetz (BEHG)	National Fuel Emissions Trading Act. Introduces carbon pricing for heating and transport fuels (EUR 55/tonne in 2025, market-based from 2026). Increases the economic incentive to switch to renewables.
Wärmeplanungsgesetz (WPG)	Heat Planning Act. Obligates municipalities to develop municipal heat plans, identifying areas for district heating and decentralised renewable heating. Creates a planning framework within which energy communities can position themselves.

Table 3: Key German legislation relevant to renewable energy communities.

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2.3 National Restrictions and Barriers

Despite the improving legal framework, several significant barriers remain for energy communities in Germany:

Regulatory complexity: The German energy regulatory framework is among the most complex in Europe. Energy communities must navigate the EEG, EnWG, GenG, and numerous subordinate ordinances. The administrative burden is disproportionately heavy for volunteer-driven community organisations compared to professional market participants.

Absence of financial incentives for energy sharing: Unlike Austria's model, German energy sharing provides no reduced grid fees or other financial benefits. The economic viability of energy sharing arrangements depends entirely on the differential between community-internal electricity prices and market prices.

Smart meter deployment: The mandatory 15-minute interval metering required for energy sharing depends on smart meter rollout, which has been slower in Germany than in many EU member states.

Grid connection delays: Long waiting times for grid connections for new renewable installations (particularly in rural areas) can delay energy community projects.

Incomplete CEC transposition: The absence of a clear legal framework for Citizen Energy Communities (as distinct from RECs) creates uncertainty for community initiatives that engage in activities beyond renewable energy generation (e.g., energy efficiency services, EV charging infrastructure).

3. Institutional Landscape

3.1 Federal Level

Institution	Role & Relevance for Energy Communities
Bundesministerium für Wirtschaft und Klimaschutz (BMWK)	Federal Ministry for Economic Affairs and Climate Action. Primary ministry responsible for energy policy, including the EEG, EnWG, and the overall Energiewende strategy. Drafts energy legislation and sets policy direction for renewables and energy communities.
Bundesnetzagentur (BNetzA)	Federal Network Agency. Primary regulatory authority for electricity and gas networks. Conducts renewable energy tender procedures, monitors grid access, manages the Marktstammdatenregister (market master data register), and will oversee the implementation of the new energy sharing provisions under §42c EnWG.

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Bundesamt für Wirtschaft und Ausfuhrkontrolle (BAFA)	Federal Office for Economic Affairs and Export Control. Administers various energy efficiency and renewable energy subsidy programmes relevant to energy communities, including building efficiency grants and heating system subsidies.
Kreditanstalt für Wiederaufbau (KfW)	Germany's state-owned development bank. Provides preferential loans and grants for renewable energy projects, energy-efficient building renovations, and storage systems. A key financing partner for energy community projects.
Umweltbundesamt (UBA)	Federal Environment Agency. Maintains the Working Group on Renewable Energy Statistics (AGEE-Stat). Provides data, analysis, and policy recommendations on renewable energy deployment and environmental impacts.
Deutsche Energie-Agentur (dena)	German Energy Agency. Implements energy transition projects, publishes analyses on energy communities, and serves as a knowledge hub for innovative energy solutions.

Table 4: Key federal-level institutions.

3.2 State Level (Bavaria / Freistaat Bayern)

As DIT, the NRGCOM German partner, is located in Bavaria, the Bavarian state-level institutional landscape is particularly relevant:

Institution	Role & Relevance
Bayerisches Staatsministerium für Wirtschaft, Landesentwicklung und Energie (StMWi)	Bavarian Ministry of Economic Affairs, Regional Development and Energy. Sets Bavaria's energy policy within the federal framework. Administers the Bavarian Energy Programme and supports Interreg transnational cooperation projects (including NRGCOM). Contact: Dr. Thomas Bonn (Interreg Leuchtturmprojekte).
Landesregulierungsbehörde Bayern	Bavarian State Regulatory Authority. Exercises regulatory oversight over smaller distribution system operators within Bavaria (those serving fewer than 100,000 customers). Relevant

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	for grid access and connection issues for energy community projects.
Bayern Innovativ / Energie-Atlas Bayern	Provides data, mapping, and information tools for renewable energy potential assessment across Bavaria. The Energie-Atlas is a key resource for identifying suitable sites for community energy projects.
Genossenschaftsverband Bayern e.V.	Bavarian Cooperative Association. Mandatory auditing body for cooperatives in Bavaria. Provides advisory services, business plan review, and compliance oversight for energy cooperatives.
Bayerischer Gemeindetag / Bayerischer Landkreistag	Bavarian associations of municipalities and districts. Provide guidance and advocacy for municipal involvement in energy projects. Relevant for the communal enterprise (gKU) model used by Regionalwerke Passauer Land.

Table 5: Key Bavarian state-level institutions.

3.3 Institutional Landscape: Summary Diagram

The institutional landscape for energy communities in Germany can be understood as a multi-level governance system:

EU Level: Sets the directive framework (RED II, EMD III, Clean Energy Package) → Transposition deadlines drive national legislative action.

Federal Level: BMWK drafts legislation; BNetzA regulates and implements; KfW and BAFA provide financing; UBA and dena provide analysis and guidance.

State Level (Bavaria): StMWi sets state energy policy and co-finances programmes; Landesregulierungsbehörde oversees smaller DSOs; Genossenschaftsverband audits cooperatives.

Local Level: Municipalities grant permits, develop heat plans, and can participate as members/shareholders; DSOs provide grid access and metering; local banks finance projects; civil society organisations provide networking and advocacy.

4. Maturity Level and Ecosystem

4.1 Classification

Overall maturity classification: ESTABLISHED – Germany is classified as having an established energy community ecosystem. It is one of the most mature markets for citizen-owned renewable energy in the European Union, with a tradition of community energy dating back to the early 20th century electrification cooperatives and a modern wave of energy community formation beginning

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in 2006. However, it is important to note that "established" refers to the electricity generation dimension; the energy sharing, communal heating, and storage dimensions remain at an emerging stage.

4.2 Estimated Number of Functioning Energy Communities

Quantifying the exact number of energy communities in Germany is complicated by the diversity of legal forms, definitions, and data sources. The most reliable figures come from the DGRV (Deutscher Genossenschafts- und Raiffeisenverband), which tracks energy cooperatives specifically, and from broader academic estimates that include non-cooperative forms.

Category	Number (approx.)	Source / Date
Energy cooperatives (eG) registered with DGRV	998	DGRV Jahresumfrage 2025 (latest data)
Total members of energy cooperatives	220,000	DGRV 2025
Energy communities (broader definition, all legal forms)	2,500–3,000	Academic estimates (Kahla et al., Leuphana); includes GmbH & Co. KG, GmbH, Vereine, gKU
New energy cooperatives founded in 2024	64	DGRV Genossenschaftsgründungen 2024 (down from 88 in 2023)
New energy cooperatives founded in 2023	88	DGRV 2024 (highest since 2013; ~50% focused on Wärmenetze)
Total investment by energy cooperatives	EUR 3.6 billion	DGRV 2025 (cumulative)
Clean electricity generated by cooperatives in 2025	~8 TWh	DGRV 2025 (~3 million tonnes CO_2 avoided)
Citizen energy share of installed renewable capacity	~42%	trend:research/Leuphana 2018 (latest comprehensive ownership study)

Table 6: Energy community ecosystem in numbers. Sources: DGRV Jahresumfrage 2025, Leuphana/trend:research, CATF 2024 [8], [9], [10], [11], [12], [13].

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4.3 Ecosystem Characterisation

Activity profile of energy cooperatives (DGRV 2025):

Approximately 80% of energy cooperatives operate solar PV installations, making this the dominant activity. Around 25% generate electricity from wind parks (often through GmbH & Co. KG subsidiaries). The heating sector is gaining momentum: 28% now operate communal heating networks (Wärmenetze), up from a much lower share in previous years. Around 50% of cooperatives founded in 2023 were specifically focused on Wärmenetze, marking a significant structural shift. Additionally, 20% operate battery storage systems, and 22% are active in electromobility (charging infrastructure, car-sharing).

Geographic distribution:

Energy cooperatives are not evenly distributed across Germany. The strongest concentrations are found in Baden-Württemberg, Bavaria, and North Rhine-Westphalia, reflecting both favourable solar conditions (south) and political support structures. Northern Germany, particularly Schleswig-Holstein and Lower Saxony, has a high density of citizen wind energy projects, though these are more commonly structured as GmbH & Co. KG rather than cooperatives. Bavaria has a particularly strong tradition of agricultural biogas cooperatives.

Growth dynamics:

The energy cooperative sector experienced explosive growth between 2006 and 2013 (approximately 890 new cooperatives in this period), followed by a sharp decline in new formations from 2014 to 2018 as declining feed-in tariffs and the introduction of tendering requirements reduced the attractiveness of new electricity generation projects. A recovery began in 2021, driven by the energy crisis, rising energy prices, and renewed political commitment to citizen participation. The 88 new cooperatives in 2023 represented the highest founding rate in a decade. The 2024 figure of 64 new cooperatives suggests a stabilisation at a healthy level. Critically, the composition of new formations is shifting: away from pure PV-electricity cooperatives and toward Wärmenetze and multi-purpose energy communities – a development that aligns with the broader heating transition (Wärmewende) and the municipal heat planning obligations under the Wärmeplanungsgesetz.

4.4 Maturity by Dimension

Dimension	Maturity Level	Assessment
Electricity generation (PV, wind)	Established	~998 cooperatives + ~1,500–2,000 other forms active; 42% of installed RE capacity citizen-owned; mature legal framework under EEG.

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Energy sharing via public grid	Nascent	Legal framework adopted Dec 2025 (§42c EnWG); go-live June 2026; no operational projects yet; implementation infrastructure incomplete.
Communal heating (Wärmenetze)	Emerging	28% of cooperatives active; rapid growth in new formations (50% of 2023 new cooperatives); driven by Wärmeplanungsgesetz and GEG.
Community storage	Emerging	20% of cooperatives operate storage; residential storage booming; community-scale (100kW–1MW) models still rare.
Electromobility / sector coupling	Emerging	22% of cooperatives active in e-mobility; bidirectional charging enabled from Jan 2026; early stage.

Table 7: Maturity assessment by energy community dimension [14], [15], [16], [17], [18], [19].

4.5 Ecosystem Strengths and Weaknesses

Strengths: Germany benefits from a deep institutional foundation for community energy, including a 130-year-old cooperative law tradition, strong local banking infrastructure (Sparkassen, Genossenschaftsbanken), high citizen awareness of energy issues, a politically established commitment to the Energiewende, and an increasingly sophisticated legal framework. The sheer scale of the sector – nearly 1,000 cooperatives with 220,000 members and EUR 3.6 billion invested – provides a resilient base for further growth. The recent legislative milestones (EEG 2023 reform, Solarpaket I, §42c EnWG energy sharing, storage public interest designation) signal continued political support.

Weaknesses: The ecosystem's primary weaknesses are regulatory complexity (which creates disproportionate barriers for citizen-led initiatives compared to professional developers), the late and still incomplete transposition of EU energy community provisions, the absence of dedicated financial support instruments, and the persistent smart meter deployment deficit that threatens to delay energy sharing implementation. The demographic profile of cooperative members (male, higher-income, higher-education) indicates an inclusivity challenge that must be addressed to fulfil the democratic promise of community energy. The sharp decline in new cooperative formations between 2014 and 2018 demonstrates how sensitive the sector is to changes in feed-in tariffs and regulatory conditions – a vulnerability that energy sharing and new business models must help overcome.

Analysis of Specific National Barriers

1. Legislative and Administrative Obstacles

1.1 Regulatory Complexity

An energy community in Germany must simultaneously comply with at least eight major federal laws: the EEG (feed-in tariffs), EnWG (grid access, energy sharing), GenG (cooperative law), MsbG (smart metering), BImSchG (environmental permits), BauGB (planning/zoning), WPG (heat planning), and EnFG (levies). Each has been amended multiple times in recent years. The dena has identified this regulatory complexity as the single most frequently cited barrier. For example, a wind energy tender bid alone can cost EUR 50,000–100,000 in upfront legal and administrative expenses – costs lost entirely if the bid fails.

1.2 Late and Incomplete EU Transposition

REC definition (RED II): Transposed over a year late (July 2022 instead of June 2021). The earlier vague definition had been exploited by commercial developers posing as citizen energy companies. **Energy Sharing (EMD III):** New §42c EnWG passed only in November 2025, seven months before the July 2026 EU deadline. The FfE has concluded practical implementation by June 2026 is "not yet feasible." **CEC definition:** Not transposed at all. **Enabling framework:** The official REC barrier assessment required by Art. 22(4) RED II has never been published.

1.3 Permitting Barriers

Wind energy: Average permitting time remains 20–24 months. Bavaria's 10H distance rule, though partially relaxed in 2023, still makes onshore wind development exceptionally difficult. **Heating networks:** Municipal heat plans (Wärmeplanung) are mandatory by 2026/2028, but many small municipalities lack the capacity to develop them – creating a chicken-and-egg problem for communal heating projects. **Ground-mounted solar:** Requires Flächennutzungsplan amendments that can take 12–18 months.

1.4 Energy Sharing Implementation Gap

While §42c EnWG creates the legal basis, critical operational elements are missing: the law does not define which actor merges generation and consumption time series, market communication standards have not been published by the BNetzA, the required joint DSO online platform (§20b EnWG) has no specification or timeline, and – crucially – no financial incentives (such as reduced grid fees) are provided, unlike Austria, Italy, or Spain.

2.Market and Infrastructure Hurdles

2.1 Smart Meter Deficit

Smart meters are a prerequisite for energy sharing (§42c EnWG requires 15-minute interval metering). As of June 2025, only 1.6 million smart meters were installed nationally, with just 760,000 counting toward mandatory targets. A November 2025 technical study by the Horizonte Group

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concluded that the mass rollout required by 2026 "will not be possible" due to technical constraints and recommended postponing deadlines by twelve months.

2.2 Grid Connection Delays and High Grid Fees

Approximately 160 GW of projects are queued for grid connections (only 24 GW immediately viable). Distribution grids in rural areas were not designed for bidirectional flows from distributed renewables. Over EUR 400 billion in grid expansion costs will be socialised through grid fees – already among Europe's highest – which erode the economic case for energy sharing since shared electricity is not exempt from grid charges.

2.3 Electricity Price Structure and Declining Tariffs

Germany's retail electricity price is heavily loaded with taxes, levies, and grid fees. Energy sharing under §42c EnWG provides no exemption from these charges, making the price advantage of community-shared electricity potentially marginal. Meanwhile, EEG feed-in tariffs have declined to 5.62 ct/kWh (partial feed-in, 40–100 kWp) – a fraction of early rates – forcing new projects toward more complex self-consumption and direct marketing models.

2.4 Heating Sector Gap

The heating market has no regulated feed-in tariff or grid fee structure. Communal heating networks must compete purely on market terms. Municipal heat plans are in early stages, creating planning uncertainty. Many buildings require energy-efficient renovation before heat pumps or low-temperature district heating can operate, creating an unresolved precondition for thermal energy communities.

3. Financial and Capacity Gaps

3.1 High Pre-Development Costs, No Dedicated Funding

Pre-development costs of EUR 50,000–100,000 for wind projects represent existential risk for volunteer-run cooperatives. Unlike Ireland (Community Energy Fund) or Austria (Klima- und Energiefonds), Germany has no federal fund specifically targeting energy community formation. The available financing (KfW loans, BAFA grants, EEG premiums) is technology-specific, not community-specific, putting energy communities at a disadvantage against professional developers. The energy sharing framework under §42c EnWG deliberately avoids financial incentives, potentially excluding rural and lower-income communities.

3.2 Capacity and Expertise Constraints

Germany's approximately 998 energy cooperatives are predominantly volunteer-run. Board members typically have full-time employment elsewhere. Specialised energy law expertise is scarce outside major cities, and the smart metering / energy sharing framework presupposes digital literacy that may be lacking in ageing rural communities. Small municipalities are already stretched with mandatory tasks (Wärmeplanung, infrastructure) and struggle to add energy community coordination.

3.3 Social Inclusivity Deficit

Energy cooperative members are disproportionately male (over 70%), with above-average education and income. Even modest cooperative membership fees (EUR 100–500) can be prohibitive for low-income households, and the "welfare dilemma" (where energy community income could affect benefit entitlements) creates perverse incentives. With approximately 50% of German households renting, tenant participation remains structurally limited despite the Mieterstrom and Gemeinschaftliche Gebäudeversorgung models.

4. Summary: Barrier Matrix

Barrier	Severity	Trend	Key Impact on Energy Communities
Regulatory complexity (8+ laws)	**High**	Stable	Disproportionate burden on volunteers; EUR 50–100K bid costs.
Late/incomplete EU transposition	**Medium-High**	Improving	CEC untransposed; enabling framework missing; years of uncertainty.
Permitting delays (esp. wind/Bavaria 10H)	**High**	Improving	20–24 months for wind; ground-mounted solar 12–18 months.
Energy sharing implementation gap	**High**	New issue	Law passed but process roles, platform, standards undefined.
Smart meter deficit	**High**	Slowly improving	Only 1.6M installed; mass rollout 2026 deemed "not feasible."
Grid connection queue + high fees	**Medium-High**	Worsening	160 GW queue; no grid fee reduction for EC energy sharing.
Declining tariffs / price structure	**Medium-High**	Stable	Feed-in at 5.62 ct/kWh; shared electricity not exempt from levies.
Heating sector unregulated	**Medium-High**	Slowly improving	No feed-in for heat; Wärmeplanung incomplete; renovation gap.
No dedicated EC funding	**High**	Stable	No federal fund; state programmes fragmented; technology-specific.

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Pre-development cost risk	**High**	Stable	EUR 50–100K sunk cost risk; no pre-development grant programme.
Volunteer/capacity constraints	**Medium-High**	Stable	Legal/engineering expertise scarce; municipalities overstretched.
Social inclusivity deficit	**Medium**	Slowly improving	70%+ male members; tenant exclusion; welfare dilemma.

Table 8: Summary barrier matrix for renewable energy communities in Germany.

Case Studies and Pilot Capitalisation

Best Practice Example: Energiezukunft Fuchstal (Bavaria)

Overview

The municipality of Fuchstal (population approximately 4,300) in Landkreis Landsberg am Lech, Bavaria, is widely regarded as one of Germany's most successful community energy models. Under the leadership of Bürgermeister Erwin Karg, Fuchstal has systematically built an integrated renewable energy system that produces more than twice the municipality's electricity demand from local sources. The project "Energiezukunft Fuchstal" received approximately EUR 6 million in federal funding for sector coupling and was named Bioenergie-Kommune of the year in 2019.

Structure

Feature	Detail
Location	Fuchstal, Landkreis Landsberg am Lech, Oberbayern
Population	~4,300 inhabitants
Legal form	Bürgerwindkraft Fuchstal GmbH & Co. KG (first wind park, 2016) + Bürgerwind Fuchstal Gemeindewald GmbH & Co. KG (second wind park, 2024). Municipality operates the heating network directly.
Ownership split	49% municipality / 51% citizen investors (Kommanditisten). Over 200 local citizens invested as limited partners in the second wind park (2024), bringing 30% of equity.

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Key leadership	Bürgermeister Erwin Karg (initiator), Gerhard Schmid (VG Fuchstal), Ingenieurbüro Sing (technical planning), UmweltBank (financing partner).
Wind energy	7 turbines total: 4 × Enercon E115 (3 MW each, since 2016) + 3 × Enercon E160 EP5 (5.56 MW each, since Feb 2024). Total installed capacity: 28.68 MW. Annual generation: ~70 million kWh.
Solar PV	~3 MWp from three PV parks (municipal ground-mounted + rooftop). Annual generation: ~10 million kWh.
Biogas	800 kW biogas plant (flexibilised for demand-responsive generation). Annual generation: ~8 million kWh.
Heating network	13 km Wärmenetz, 210 connection points (98% of Leeder households connected). 6,000 MWh annual heat consumption. Supported by biogas plant + 1,000 kW wood chip plant.
Storage / sector coupling	5,000 m³ thermal storage (Power-to-Heat from surplus wind/solar). 5.8 MW / 3,200 kWh battery storage (Samsung Li-ion). Virtual power plant for wholesale market access.
Total annual RE generation	~70+ million kWh (electricity) – more than double the municipality's consumption of ~30 million kWh.
CO_2 avoidance	~16,000 tonnes CO_2/year from wind park alone.

Table 9: Energiezukunft Fuchstal – key facts. Sources: UmweltBank, AEE, Gemeinde Fuchstal, IB Sing [20], [21], [22], [23].

Financing Model

Citizen equity participation: Both wind parks were financed through a GmbH & Co. KG structure in which citizens of Fuchstal could invest as Kommanditisten (limited partners). For the second wind park (2024), over 200 local citizens contributed approximately 30% of the required equity capital. Bürgermeister Karg reported that demand for participation shares was overwhelming: "When you can get 19% return instead of zero on your bank account, people call me every day asking when the new wind park starts." The first wind park reportedly generated returns of approximately 19% annually.

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Bank financing: The remaining 70% of the capital was provided by the UmweltBank (a specialised green bank based in Nürnberg), which provided both project finance and advisory services for environmental impact assessments, yield analyses, and grid connection concepts. The UmweltBank has financed over 400 wind energy projects nationally with a total capacity exceeding 1,000 MW.

Municipal investment: The municipality itself holds 49% of the GmbH & Co. KG shares, ensuring that profits flow back into the municipal budget. Revenue is used for local infrastructure: schools, playgrounds, public facilities. The heating network is built and operated directly by the municipality.

Federal R&D funding: The "Energiezukunft Fuchstal" sector-coupling project received approximately EUR 6 million in federal funding for the thermal storage, Power-to-Heat infrastructure, and virtual power plant development. The bird protection monitoring system (camera-based AI for Rotmilan detection) was co-funded by the Bavarian environment and economics ministries.

Key Benefits and Success Factors

Energy autonomy: Fuchstal generates more than 200% of its electricity consumption from local renewable sources. The municipality aims for complete energy self-sufficiency (Strom und Wärme) by 2026.

Citizen acceptance through ownership: Initial resistance to wind energy was significant. A 2019 Bürgerentscheid (citizen referendum, held on EU election day to maximise turnout) passed with 52.7% support. Since then, the financial returns (19% annually) and visible community benefits have transformed opposition into enthusiastic support. This demonstrates that citizen financial participation is the most effective acceptance-building tool.

Innovation: Fuchstal is one of the first communities in Germany to deploy a camera-based AI bird recognition system (for Rotmilan/red kite protection) at wind turbines in forested areas. This innovation, developed with Hochschule Weihenstephan-Triesdorf, resolved what had been a project-killing environmental permitting barrier, proving that wind energy and bird protection can coexist.

Overcoming Bavaria's 10H rule: Both wind parks were developed under the strict 10H distance regulation by identifying sites within the Denklinger Rotwald forest that maintained >2,000m distance to all residential buildings. Fuchstal is one of the very few Bavarian municipalities to have received wind energy building permits in recent years.

Sector coupling as the next frontier: The 5,000 m³ thermal storage converts surplus wind and solar electricity into heat for the Wärmenetz via Power-to-Heat – turning "waste electricity" (Negativstrom) into a revenue-generating heating asset. The virtual power plant provides

wholesale market access. Battery storage provides grid flexibility services. This integrated model represents the future of community energy beyond simple feed-in.

Results of the NRGCOM Pilot Project

Key Pilot Results and Milestones

Date	Milestone	Description & Significance
9 Dec 2024	Kreistag adopts charter	Passau Kreistag (district council) adopts the Gründungssatzung for Regionalwerke Passauer Land, authorising the Landkreis to co-found the gKU.
Q1 2025	27 municipal council votes	All 27 target municipalities pass individual accession resolutions (Beitrittsbeschlüsse). All votes are unanimous or near-unanimous, demonstrating exceptional community buy-in.
11 Mar 2025	"2nd Fastenwoche" event	NRGCOM co-hosts event with Landkreis Passau and TZE on "Geld macht Macht" (Money Makes Power) – exploring sustainable financing models for Regionalwerke, with presentations by Franz Galler (EGIS eG) and Peter Ranzinger (Landkreis Passau).
26 Mar 2025	Founding of Regionalwerke	Charter signed by all members. Regionalwerke Passauer Land gKU is formally established as a legal entity.
5 Jun 2025	First Verwaltungsratssitzung	Leadership elected: Kneidinger (chair), Kurz (deputy), Schätz (CEO). Wirtschaftsplan 2025 adopted unanimously.
30 Jun 2025	Public launch event	Official launch at Schloss Neuburg, 77 participants. Featured expert presentations, podium discussion, and information on participation and funding.
H1-H2 2026	First PV projects	Operational implementation begins: rooftop PV on commercial buildings and housing cooperative properties. Engineer recruitment underway.

Table 10: DIT pilot milestones.

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Contribution to Solving Local Problems

Problem 1 – Fragmented municipal energy efforts: Prior to Regionalwerke, each municipality in Landkreis Passau approached energy transition individually, lacking the scale, expertise, and coordination to develop projects efficiently. The gKU model pools resources from 27 municipalities, enabling professional project development capacity that no single municipality could afford alone.

Problem 2 – Value leakage: Revenue from existing renewable energy installations in the region (primarily private PV and agricultural biogas) flowed largely to external equipment suppliers, project developers, and grid operators. Regionalwerke creates a local institutional vehicle for retaining value within the community, from project development through operation to energy marketing.

Problem 3 – Lack of technical and legal expertise: Small rural municipalities lacked in-house expertise on energy law, grid connection, project finance, and technology selection. The NRGCOM mentoring scheme provided this expertise through DIT, while the permanent staffing of Regionalwerke (CEO + engineer) institutionalises this capacity for the long term.

Problem 4 – Low public engagement: Despite general support for renewable energy, citizen participation in concrete projects was low. The democratic structure of the gKU (every municipality represented in the Verwaltungsrat), combined with public events and local media coverage, has already activated a level of engagement that isolated PV installations on private rooftops never achieved.

Problem 5 – Bavarian wind energy constraints: Bavaria's 10H distance rule severely limited onshore wind development. By creating a unified institutional actor with political backing from 27 municipalities and the Landkreis, Regionalwerke is better positioned to navigate the complex exception procedures and to secure Flächenausweisungen across the region.

Policy Recommendations

The following recommendations are derived from the systematic barrier analysis and the practical experience of the NRGCOM pilot in Bavaria. They are addressed to federal, state, and local policymakers and are organised by the barrier categories identified in the preceding chapter.

Recommendations to Remove Legislative and Administrative Barriers

R1 – Establish a "One-Stop Shop" for energy community formation: The federal government, in cooperation with the Länder, should establish dedicated advisory and coordination offices (Anlaufstellen) for energy community founders. These offices should provide integrated guidance across all relevant legal domains (EEG, EnWG, GenG, BauGB, MsbG) and handle inter-agency coordination on behalf of community applicants.

R2 – Complete the CEC transposition: Germany should transpose the Citizen Energy Community definition from the Internal Electricity Market Directive without further delay, creating a legal

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framework that enables communities to engage in the full range of energy services (storage, EV charging, energy efficiency) beyond renewable generation alone.

R3 – Publish the official barrier assessment for RECs: As required by Article 22(4) RED II, Germany should publish a comprehensive official assessment of existing barriers and the development potential of RECs, and use this as the basis for a dedicated enabling framework.

R4 – Simplify the Bürgerenergiegesellschaft definition: The current requirement of 50 natural persons as voting shareholders is significantly more demanding than the EU REC definition requires. This threshold should be reduced (e.g., to 15–20 members) to make the formation of citizen energy companies more accessible, particularly in rural areas with small populations. The successful CEEAG exemption (6 MW solar / 18 MW wind without tender) should be maintained and potentially expanded.

R5 – Accelerate and clarify energy sharing implementation: The Bundesnetzagentur should urgently publish binding guidance on process roles, market communication standards, and the technical specification of the joint online platform required by §20b EnWG. Without this clarity before June 2026, energy sharing will remain theoretical. A transitional phase with simplified procedures should be considered to enable early adopters.

3.2 Recommendations to Remove Market and Infrastructure Barriers

R6 – Accelerate smart meter rollout with community priority: The MsbG rollout targets should be adjusted to give priority to areas where energy sharing arrangements are being established. Metering point operators should receive accelerated deployment obligations and, if necessary, financial support to meet the June 2026 deadline. A "grid-based" rollout approach, as recommended by the Horizonte Group study, should be adopted to account for differences between urban and rural grid environments [24].

R7 – Introduce reduced grid fees for local energy communities: Following the Austrian model, Germany should introduce a grid fee reduction for energy sharing arrangements where generation and consumption occur within the same distribution grid area. This would reflect the reduced grid utilisation (shorter transport distances, lower grid losses) and provide the financial incentive currently absent from §42c EnWG. The reduction could be structured progressively: highest for energy sharing within a single transformer station area, moderate for sharing within a DSO balancing zone, and minimal for cross-DSO sharing.

R8 – Create a grid connection fast-track for community projects: The Bundesnetzagentur should establish a dedicated fast-track procedure for grid connection applications from recognised energy communities (Bürgerenergiegesellschaften and equivalent forms). Given the 160 GW queue, community-scale projects (typically <10 MW) should not be forced to compete for grid access with utility-scale commercial developers.

R9 – Support community-scale storage deployment: The new public interest designation for battery storage under §11c EnWG should be complemented by a targeted support programme for

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community-owned storage systems (100 kW–1 MW range). KfW should develop a dedicated loan product for energy community storage, with favourable terms reflecting the public benefit of decentralised flexibility.

Recommendations to Close Financial and Capacity Gaps

R10 – Establish a federal Energy Community Development Fund: The federal government should create a dedicated fund (Bundesförderprogramm Energiegemeinschaften) providing grant financing for pre-development costs: feasibility studies, legal advice, environmental assessments, and business planning. The fund should cover up to 80% of pre-development costs (capped at EUR 80,000 per project) and be accessible to all recognised energy community legal forms. This would eliminate the single largest financial barrier – the risk of losing EUR 50,000–100,000 in sunk costs if a project fails at the permitting stage.

R11 – Lower cooperative formation barriers: The Genossenschaftsgesetz (GenG) auditing requirements, while providing valuable insolvency protection, create a disproportionate cost burden for small energy cooperatives. The federal government should consider a simplified auditing regime for energy cooperatives below a certain revenue threshold (e.g., EUR 500,000/year), or alternatively provide a federal subsidy for initial auditing costs of newly formed energy cooperatives.

R12 – Invest in municipal energy planning capacity: The Wärmeplanungsgesetz creates planning obligations but does not adequately fund the planning capacity in small municipalities. The federal government and Länder should provide ring-fenced funding for energy planning staff in municipalities below 20,000 inhabitants, recognising that these municipalities are both the most in need of support and the most likely beneficiaries of energy community models.

R13 – Address social inclusivity through targeted participation models: The energy sharing framework should be complemented by specific measures to ensure that low-income households and tenants can participate in and benefit from energy communities. This could include exempting energy community dividends from welfare benefit calculations ("welfare dilemma" resolution), mandating landlord cooperation with energy sharing arrangements in social housing, and establishing a federal "Energy Community Participation Voucher" covering cooperative membership fees for households receiving social transfers.

Recommendation Summary Matrix

#	Recommendation	Addressed To	Barrier Category	Priority
R1	One-Stop Shop for EC formation	Federal + Länder	Legislative	High – immediate

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Annex 6 – National Compendium of REC Status and Implementation in Hungary

Starting Position and Regulatory Foundation

National Energy Profile

In 2024, Hungary's *total energy supply* consisted of 31.9% oil and oil products and 30.7% natural gas, making these the two largest energy sources. Nuclear energy accounted for 18.1% of the total, while biofuels and waste contributed 11.2%. Coal and coal products made up 3.2% of the energy supply, and solar, wind, and other renewables represented 4.9%. Hydropower had the smallest share, at just 0.1%[11].

In 2024, 24.1% of *electricity* was generated from renewable energy sources and waste in Hungary[12].

In 2024, the share of *electricity* consumption generated from renewable energy sources within Hungary's gross final energy consumption was distributed as follows: biomass accounted for 11.9%, biogas 2.7%, wind 5.5%, hydropower 1.9%, solar energy 76.9%, renewable municipal waste 0.8%, and geothermal energy 0.1%[13].

Net energy imports accounted for 49.4% of Hungary's *total energy supply* in 2024. In 2025, imports accounted for 18.6% of Hungary's *electricity* consumption.

Legal Framework

There are three main acts in Hungary connected with the energy communities. And, of course, there are numerous regulations on detailed rules. We have no transposition only into the electricity law:

- Act No. LXXXVI of 2007 on Electricity (Electricity Act) 66/B. § as amended in 2021 established a framework for energy communities and renewable energy communities
- Government Decree 273/2007 on the implementation of certain provisions of the Act No. LXXXVI of 2007 on Electricity 39/B. §
- Act XL of 2008 on the Natural Gas Supply
- Act CXXX of 2025 amending Act X of 2006 on Cooperatives in connection with energy cooperatives

[11] https://www.iea.org/countries/hungary/energy-mix
[12] https://www.ksh.hu/energiagazdalkodas
[13] https://www.ksh.hu/stadat_files/ene/hu/ene0012.html

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The legislation defines the term renewable energy community but does not formulate specific provisions, however the newer framework now includes more specific operational elements, especially for condominium energy communities, including two settlement models, the condominium energy community must inform the grid operator and the electricity supplier, and rules allowing participants to remain in universal service.

The Renewable Energy Directive (REDII) contains a number of basic rights to ensure that citizens are protected when investing in renewable energy.Governments and private operators must also guarantee citizens these rights:

- The right to produce, store, consume and sell renewable energy - individually or collectively.
- The right not to pay unfairly for energy produced by oneself.
- The right to access appropriate markets - both directly and through third parties.
- Discriminatory procedures and protection against charges that discourage or penalise those active in renewable energy production, consumption, supply or storage.
- Protection of consumer rights.
- The right to adequate remuneration or support for renewable energy production.
- The right to trade and share energy between individual consumers (P2P).
- Right of access to information on these rights for citizens

The transposition of the EU Directive 2019/944 into the Electricity Act entered into force on January 1 2021 to regulate energy communities. Additions covering energy communities came into force on 1 January 2021. Additions covering renewable energy communities came into force on 1 July 2021. In the following we provide the full text of these two paragraphs.

‘66/B. § (1) The energy community is a legal entity operating in the form of a cooperative or non-profit business company and association, the primary purpose of which is not to obtain financial profit, but to provide environmental, economic and social benefits for its members or for the operational area specified in the energy community's founding document. By performing at least one of the following activities: electricity production, storage, consumption, provision of distribution flexibility services, electricity sharing, aggregation, provision of electromobility services in accordance with the Road Traffic Act, and operation of electric charging equipment.The current legal definition also allows expressly energy-efficiency services among the eligible activities.

(1a) The rules applicable to energy communities must be applied to renewable energy communities, whereas the renewable energy community is defined as an energy community that produces electricity from renewable energy sources, and consumes, stores or sells such electricity. The actual management of the renewable energy community must be provided by the member or members whose points of use are located in the same high/medium voltage transformer station

area as the connection points of the electricity storage and power plant owned by the renewable energy community.

(2) The energy community may not carry out activities according to § 74, paragraph (1), points c), d), f) and g) 1. In possession of the appropriate permit, the energy community may carry out activities according to points a), b) , e) and h-l) of Section 74 (1).2

(3) The energy community may not participate in cross-border cooperation regarding its activities regulated by this law.

(4) Participation in an energy community may not adversely affect the acquired rights and obligations of the user regulated in this law. However in the case of condominium energy communities, the newer rules expressly state that participation does not count as multi-source supply and that participants may remain in universal service.

(5) A natural or legal person whose occupation or primary economic activity is based on the establishment of the NACE Rev. 2 system for the statistical classification of economic activities and on the amendment of Council Regulation 3037/90/EEC and EC regulations on certain specific statistical areas, in accordance with Annex I of Regulation 1893/2006/EC of the European Parliament and of the Council of 20 December 2006 (hereinafter: Regulation 1893/2006/EC), if it operates in the field of electricity and gas supply, or has sole or majority ownership and decisive influence in a legal entity, or a senior official or affiliated company of a legal entity whose main activity is in the field of electricity and gas supply in accordance with Annex I of Regulation (EC) 1893/2006, cannot manage the energy community, or - if the energy community is managed by a board consisting of several persons – become a majority member.

1 § 74 (1) c) = transmission system control, d) = distribution of electricity, f) = universal service, g)=operation of the organized electricity market2 § 74 (1) a) = installation of power station of 0,5 MW and above, b) = installation of power station of 50 MW and above, e) = electricity trading and h-l) = establishment of a private power line, establishment of a direct power line, operation of public lighting, operation of electricity storage with a nominal discharge capacity of 0.5 MW and above

(6) The natural or legal person defined in paragraph (5) may not participate in the decision-making body of the energy community, to the extent necessary for the exercise of management rights.66/C. § (1) The Authority maintains a register of energy communities, which - with the exception of the identification data of legal entities - is considered a public authority register. The given legal entity is considered an energy community from the date of entry into the register.

(2) The register contains the energy community's following data:
a) the exact name of the activity which is carried out or intended to be carried out and is covered

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by this law. In the case of an activity is subject to a permit, the data relating to the permit, in the case of an activity subject to the obligation to register, the number of the decision on registration,
b) statistical identifier, if it falls under the scope of the Act on Official Statistics,
c) company registration number, if it falls under the scope of the Act on company registration, court company proceedings and liquidation,
d) other registration number in the absence of the data listed in points b) and c,
e) seat (registered office),
f) his senior official's
fa) natural personal identification data,
fb) his nationality and
fc) residence,
g) technical data regarding the site, installed capacity, energy sources used in the power plant (if it is engaged in electricity production activities), andh) technical data relating to the location and installed capacity of the electricity storage facility owned or operated (if it is engaged in electricity storage activities),i) a designation of "renewable energy community", if it complies with § 66/B. (1a) and the applicant requests its registration by indicating this.

(3) In order to identify the energy community registered in the register, the Authority is entitled to manage the data related to the energy community specified in paragraph (2)(4) The Authority provides data from the computerized database of the registry in paper or electronic copies. The Authority is entitled to process the data specified in paragraph (2) until the end of the fifth year following the year of deletion from the register.'

In addition to the above quotes, paragraph § 66/D. was also added about aggregators. It came into force on 1 January, 2021.

In the Hungarian legal system, the term energy community is defined in Section 66/B (1) of Act LXXXVI of 2007 on Electricity. The definition is electricity-focused, i.e. it does not contain any reference to the fact that activities beyond the focus of the Electricity Act may also be included in the framework of community energy cooperation1. The statutory menu of activities has become wider than the original text suggests, including energy-efficiency services and, in the evolving concept, procurement-agent and allocation services for members.

The law provides that an energy cooperative shall provide environmental, economic and social community benefits to its members or in the area of operation specified in the articles of association of the energy cooperative by carrying out at least one of the activities of generation, storage, consumption, provision of distribution flexibility services, electricity distribution, aggregation, provision of electromobility services under the Road Transport Act and operation of electric charging equipment. Since the adoption of Act CXXX of 2025, Hungarian law now contains a dedicated chapter on energy cooperatives in the Cooperative Act. That law expressly defines the

energy cooperative as an energy community in cooperative form, allows both natural and non-natural persons as members, recognises investor members, confirms voluntary entry and open membership, permits justified technical and geographical entry conditions, and regulates exit, transfer and governance in detail.

In addition to the general definition of an energy community, the Act also contains a restrictive definition, in line with EU legislation, which defines a renewable energy community [Electricity Act 66/B (1a)], in which the electricity generated, stored and sold is exclusively from renewable energy sources.

The definition also includes a territorial restriction. However, the territorial limitation is linked by the legislator to the management of the energy community, according to which the effective management of the renewable energy community is exercised by the member or members whose points of connection to the points of use are located in the same high/medium voltage transformer station area as the points of connection to the electricity storage and power plant owned by the renewable energy community.

Paragraph 66/B(2) of the Electricity Act precludes the energy community from being the transmission system operator [Electricity Act 74. (1) (c)], electricity distribution [Electricity Act 74 (1) (d)], universal service [Electricity Act 74 (1) (f)] and the operation of an organised electricity market [Electricity Act 74 (1) (g)]. At the same time, the Act provides that an energy community may, subject to the relevant authorisations, engage in electricity generation below and above 50 MW [Electricity Act 74 (1) a), b)], electricity trading [Electricity Act 74. § (1) e)], private and direct line activities subject to authorisation [Electricity Act § 74 (1) h), i)], operation of electricity storage and street lighting installations with a rated output of 0.5 MW and above [Electricity Act § 74 (1) j), l)]. This means, in practical terms, that an energy community in the form of a cooperative or a non-profit business company or an association may also be a licensee for these activities, which obviously requires the fulfilment of all the licensing conditions imposed on these licensees.The legal-form wording in the last sentence is no longer fully current, because the updated definition also includes association as a possible legal form.

Section 66/B(3) of the Electricity Act precludes the energy community from directly participating in a cross-border cooperation. There are practical reasons for this prohibition, because under EU legislation there is a set of rules for cross-border operational electricity cooperation, which is a key instrument for the development of the internal energy market. Its set of rules clearly defines the tasks and competences, as well as the precise framework for commercial and technical cooperation. Cross-border cooperation can therefore only be implemented as an activity subject to an electricity trading licence.

Given that EU legislation on energy communities is explicitly designed to allow for user-side initiatives alongside existing, more or less traditional energy market players, the legislation limits the participation of energy companies in the creation of energy communities. The domestic legislation does not contain any further restrictions on membership [except Electricity Act § 66/B

(5) and (6)], but the EU Directive is stricter in this respect, as it excludes medium and large companies from the governance of energy communities.

The Electricity Directive aims to strengthen local, community-based initiatives, which is why the legislation limits the participation of energy companies in the creation of energy communities. The domestic legislation does not contain any further restrictions on membership, but the EU Directive is stricter in this respect, as it excludes medium and large companies from the management of energy communities.

An additional rule on energy communities is that the Hungarian Energy and Public Utility Regulatory Office must keep a register of energy communities [Electricity Act § 66/C].

Although the Electricity Act defines the legal form of an energy community, its territorial delimitation and its members, it does not define the responsibilities of network operators. Similarly, on the commercial side, it does not clarify how the holders of universal service rights in an energy community, who do not buy energy from the market, can exercise their universal right by joining the community.

Network and commercial operators have no interest in the creation of energy communities. Network operators have no control over the supply system of producers and consumers. In the same way, traders are deprived of potential purchases, and they are not subject to scheduling obligations, so they cannot predict the price at which they should or can sell energy to the communities. The updated framework expressly assumes DSO and supplier interaction in condominium models, including remote-readable metering in the basic-meter model and allocation-based settlement in the smart-meter model, so the legal-operational framework is more developed than this passage suggests.

Recent regulatory developments have broadened the range of possible models. From 2026, specific rules on energy cooperatives will apply, allowing natural and legal persons to participate in a cooperative structure dedicated to energy-related activities.

Condominium energy communities as an emerging Hungarian model

Condominium energy communities represent a particularly relevant emerging model in Hungary, especially in urban environments with dense residential building stock. Their main advantage is that they allow locally generated electricity from a common connection point, typically rooftop photovoltaic systems, to be used and allocated within the building without requiring the participating households to leave universal service. This makes the model potentially attractive for residential consumers who would otherwise face uncertainty regarding market-based electricity supply.

Two practical models should be distinguished. The first is a discounted network tariff reimbursement model, which is simpler from a metering perspective and generates financial benefits mainly at condominium level. The second is a smart-meter-based allocation model, which allows more precise settlement between individual units based on quarter-hourly production and

consumption data. The latter can provide more direct savings for individual households, but requires more advanced metering infrastructure, data management and coordination.

Overall, the main legal characteristics of Hungary's framework today are these: energy communities are recognised legal entities with a non-profit primary purpose; they may use several legal forms; they are tied to sectoral registration and, where applicable, licensing; and they are still embedded in a strongly electricity-law-based regulatory logic. The main legal obstacles are now more specific than before: the still complex interface between energy law and public-law rules for municipally led projects; the continuing need for clear rules on asset contribution, procurement and governance; and the practical legal-administrative burden of registration, metering, supplier contracts and compliance. The two most important changes since the earlier analysis are therefore clear: energy cooperatives now have a dedicated statutory framework, and condominium energy communities now have an explicit operational model in law and practice. These changes improve the legal landscape substantially, but they do not yet make the Hungarian framework simple.

Institutional Landscape

- Ministry of Economy and Energy
- Hungarian Energy and Public Utility Regulatory Authority (MEKH)
- Electricity distribution system operators (DSOs)

Maturity Level and Ecosystem (Established, Emerging, Nascent)

- Initiation – The energy community is only in the planning or preparation phase, and its legal form and technical solutions are still being developed.
- Development – The community has been officially established, holds the necessary permits, and operates partially, but full energy trading has not yet started. It has been registered with the Hungarian Energy and Public Utility Regulatory Authority (MEKH).
- Operational / Mature – The community actively produces and consumes energy, its system operates stably, and the accounting/billing system has been established.

Currently, 18 registered energy communities exist in Hungary.

Analysis of Specific National Barriers

Legislative and Administrative Obstacles

The largest barrier in Hungary has long been regulatory incompleteness: energy communities were recognised in electricity law, yet the operational rules were underdeveloped, especially for licensing, supplier cooperation, metering, universal service, and the role of network operators.

For municipalities, the problem was even deeper, because the cooperative model fitted the EU concept, but Hungarian public-law and national property rules made it very difficult for local authorities to participate in a genuinely member-controlled structure. That assessment still explains many practical difficulties. However, one major point from the earlier analysis is now partly outdated: since the adoption of Act CXXX of 2025, Hungary has introduced a dedicated legal framework for energy cooperatives within cooperative law. The new regime defines the energy cooperative as a cooperative-form energy community, clarifies its possible activities, confirms open membership, allows technical and geographic entry conditions, and regulates investor members

and governance. This is a clear improvement compared with the earlier legal vacuum around "energy cooperatives". Even so, it does not automatically remove all constraints affecting municipally led projects, because registration, sectoral permits and the interaction with public-ownership rules still remain relevant in practice.

Administrative friction also remains substantial. Energy communities still depend on registration with the regulator and, where relevant, on separate permits for generation, trading, aggregation or energy sharing. This creates a heavy compliance burden for small local actors. The earlier documents are therefore still broadly right in identifying unclear procedures, slow coordination and weak institutional support as a barrier. The more recent legal changes improve the formal framework, but they do not by themselves solve the practical problem that a small community must navigate company law, energy regulation, metering rules, billing logic and operator interfaces at the same time.

Market and Infrastructure Hurdles

The earlier analysis identified electricity sharing, grid access and system usage fees as the main market barriers. Those points remain valid for most energy communities. Communities usually rely on the public grid, yet traditional tariffs were designed for ordinary retail consumption rather than local sharing. This undermines the business case, especially where local generation reduces actual network use but the tariff structure does not fully reflect that. Subsidised household tariffs and the legacy net feed-in logic for residential PV also continue to weaken incentives for households to move from individual solutions towards community-based models.

Here, however, the position of condominium energy communities has changed materially since 1 September 2025. The earlier text described condominiums as a particularly blocked case because suppliers and DSOs were not obliged to support the metering needed for sharing. The newer framework partly addresses this: condominium energy communities can be formed from September 2025 and can use sharing and fee-refund models. Official reasoning to the 2025 MEKH tariff amendment states that, following amendments to the Electricity Act and its implementing decree, condominium energy communities now have two special settlement methods for locally produced and consumed electricity, provided the necessary meters are available: a discounted network-fee refund model and a smart-meter-based allocation model. In the second model, the shared locally produced electricity is excluded from volumetric system usage fees. The obstacle has shifted: the key issue is now less legal impossibility and more metering readiness, smart-meter availability, balancing-circle alignment, and operational implementation.

Financial and Capacity Gaps

Hungary has offered very limited targeted advantages for energy communities, and that this has weakened the investment case from the start. Household subsidised tariffs and residential net feed-in arrangements often make individual participation economically unattractive, especially for smaller actors. As a result, even when the legal pathway exists, the expected savings may not justify the organisational effort.

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Capacity gaps are equally serious. Hungarian projects often lack in-house expertise in energy law, tariff design, metering, contracted-capacity optimisation, business planning and technical-economic simulation. Communities therefore struggle to size systems correctly, assess returns, or build workable governance and accounting models. Recent project experience suggests that viable schemes often need stronger technical infrastructure, robust monitoring and control systems, and sometimes alternative pathways such as private microgrids or e-mobility-based local consumption. In other words, the biggest remaining obstacle is no longer only "missing law"; it is the combination of complex implementation, weak incentives and limited institutional and technical capacity.

Case Studies and Pilot Capitalisation

Best Practice Example

The Bábolna Energy Community is the first functioning energy community in Hungary, created by the municipality of Bábolna together with the city's major electricity consumers. It operates in the legal form of a non-profit limited liability company, which reflects the Hungarian approach of treating energy communities primarily as non-profit entities rather than profit-oriented businesses. Bábolna was established under a national pilot call for energy community projects, one of around twenty pilot initiatives intended to test practical solutions and provide experience for future legislation and operational fine-tuning in Hungary.

A defining characteristic of Bábolna's model is the leading role of the municipality. The municipality is described as the main owner, and its intention is to retain more than 50% of the stake in the company. This means that, although additional members are expected to join, local government will remain the dominant actor in governance. At the time reflected in the document, the community still had only two members: the municipality and a large industrial or commercial electricity consumer whose consumption is exceptionally significant, reportedly comparable to that of the rest of the city combined. This creates a structure in which the community is built around a strong municipal core and a limited number of high-consumption actors, rather than around a broad household base from the start.

The organisational and governance arrangements of the Bábolna Energy Community were still under development. A members' assembly is expected to take strategic decisions, while the detailed voting procedures are still being designed. Unlike more egalitarian community models, the Bábolna case appears likely to adopt a governance system in which voting rights reflect the size of members, because the participating actors differ greatly in scale. This is an important feature of the project: it suggests a pragmatic model tailored to local economic realities, where a municipality, a very large consumer and, later, smaller members such as private individuals may coexist within the same organisational structure. Legally, as in other Hungarian non-profit limited liability companies, the executive director remains the formal decision-maker who signs the company's decisions.

In financial terms, Bábolna was, at the time of reporting, fully financed by the municipality through the pilot project. The city provided the initial capital and was also prepared to contribute further funding if necessary. A major task for the community was to establish its accounting system and pricing scheme, since its future viability depends on finding electricity purchase and sale rates that

are financially attractive for members while also generating enough revenue to cover operating costs. Those costs are expected to include staff expenditure as well as the operation of energy management and reporting software.

The community uses double-entry accounting, like other limited liability companies. It also intends to pursue future project opportunities, especially those linked to infrastructure development. One of its long-term ambitions is particularly noteworthy: Bábolna aims to develop its own electricity network, which would reduce or eventually eliminate dependence on the external E.ON grid.

From an operational perspective, the Bábolna Energy Community was still in a setup phase, with actual operation expected to start in the autumn of 2024. Membership expansion was planned only after the installation of the necessary energy management and reporting software. Once this technical basis is in place, the community intends to open up to additional members. Communication with members is expected to rely mainly on e-mail, while everyday technical coordination will be carried out by a technical team in close contact with the technicians of the larger power consumers. The future staffing model includes one full-time energy expert, further part-time specialists subcontracted from member companies, a part-time executive director, and outsourced financial management. This indicates a hybrid management model that combines public leadership, technical professionalism and external support services.

Overall, the Bábolna Energy Community emerges as a pioneering municipal-led pilot with strategic importance well beyond its local scale. It is designed as a practical experiment in how an energy community can be organised in Hungary under current legal and market conditions. Its main strengths are strong municipal backing, the inclusion of major consumers, and a clear intention to build technically and financially robust operations. At the same time, Bábolna is still at an early stage, with governance, pricing, software systems and broader membership still being developed. In that sense, Bábolna is presented less as a fully mature model and more as a first operational test case that may help shape the future development of Hungarian energy communities.

Results of the NRGCOM Pilot Project

The final results of the NRGCOM pilot actions in Hungary show a clear shift from general interest in renewable energy communities towards more concrete preparation for implementation. This matters in a national context where the main barriers have been legal uncertainty, weak financial incentives, limited stakeholder coordination, complex registration and compliance requirements, and insufficient technical and organisational capacity for designing viable community models. The pilot actions did not remove these structural barriers on their own, but they reduced them in practical and measurable ways by building knowledge, trust, motivation and project readiness.

In the framework of the Activity 2.1 “The REC Ambassador Network” is actively operating with 53 national experts and an on-line platform was created with the aim to create and facilitate energy-community related information flow within the Hungarian expert community. A landing page was created at www.nrgcom.hu (with all public project outputs uploaded and constantly updated), and a Facebook group, with 61 members. Altogether four interactive on-line network meetings were organised for more than 50 participants altogether, which actively engaged our expert community members and contributed to sharing expertise with foreign NRGCOM partner representatives. A

webinar was also held, in which the communication tools developed by the NRGCOM project were introduced to the "REC Ambassador" network members. Finally, a 33-page training material was prepared about energy communities in Hungary (in HU and EN), and based on this reader a training programme was conducted for the Hungarian expert community.

Besides contributing to the development of the project-level motivational strategy, Activity 2.2 included the "testing" of this strategy in Hungary, which included carrying out social media campaigns and a 2x1.5 hour on-line training seminar for potential energy community members. By the end of the project a short educational video will also be published, with the aim to motivate interested individuals to join energy communities.

Activity A2.3 delivered broad-based awareness raising among the general public through three public events in Pécs, Miskolc and Budapest, complemented by two webinars. Its main result was a measurable improvement in public understanding and openness towards energy communities. Before the campaign, awareness of the concept was already relatively high, but detailed knowledge was uneven and many respondents remained uncertain about governance, operation and local examples. After the events, the share of participants showing a strong willingness to join an existing energy community rose from 49% to 61%, while the share of those unlikely to join fell from 22% to 12%. Participants also asked mainly for financial, technical and legal guidance, which confirms that the campaign successfully identified the real bottlenecks rather than only spreading generic messages. In local terms, A2.3 helped address one of the most persistent Hungarian obstacles: low confidence and fragmented public knowledge. It made energy communities more visible, linked them to concrete examples such as Bábolna, and reduced scepticism among potential future members.

Activity A2.4 went one step further by targeting stakeholders with a professional training on 28 November 2024. The training brought together representatives of energy companies, local authorities, NGOs, experts and community actors. Its final result was not only better awareness, but a stronger capacity to act. Participants entered the training with doubts mainly related to weak state support, regulatory uncertainty and lack of clear rules. After the training, motivation increased markedly: 66.7% rated their likelihood of founding an energy community at level 4, and 33.3% at level 3. Legal-regulatory and practical workshop content were especially appreciated, and the Bábolna case proved highly motivating. Participants also clearly identified what remains necessary: step-by-step guidance, examples from functioning communities, stronger support frameworks, and continued engagement with suppliers and other market actors. This directly addressed the Hungarian barriers of legal uncertainty, weak coordination and limited implementation know-how. In other words, A2.4 translated abstract interest into operational readiness among the actors most capable of launching or supporting new communities.

Activity A3.2 produced the most concrete implementation-oriented results. Through pilot mentoring, STRIA supported three prospective communities: Kunsziget, Nemesvámos and Budapest Freeport. In all three cases, the pilot sites reached important milestones: mentoring workshops were completed, professional concepts were prepared and finalised, data collection was carried out, and the legal form was identified as a non-profit Ltd. The pilots also produced concrete technical and organisational scenarios. Kunsziget identified 7 potential members, 6 of whom confirmed interest, and developed a concept based on solar PV. Nemesvámos reached 13 identified stakeholders and 9 confirmed interested participants, with production and consumption

data already assembled. Budapest Freeport selected a scenario involving 4 entities, 1,000 kWp solar PV and 3,900 kWh battery storage, and advanced DSO engagement. Importantly, the mentoring process helped sites understand and optimize energy balances, assess realistic capacities, and clarify the administrative steps still required before registration, including company formation, contracting and registration with MEKH.

The contribution of A3.2 to solving local problems was therefore highly practical. It reduced the capacity gap by giving pilot sites the confidence to interpret production and consumption data and to translate local needs into technically grounded REC concepts. It also exposed the still unresolved national constraints: delayed DSO interaction, incomplete registration pathways, dependence on PPA solutions, and the weak attractiveness of citizen participation under current price conditions. Even so, the activity proved that the mentoring methodology is transferable and that, with adequate expertise, local actors can move from vague ambition to structured project development.

Overall, the Hungarian NRGCOM pilots achieved three final results. They increased public motivation, strengthened stakeholder competence, and converted local interest into bankable and registrable pilot concepts. Their main contribution was not the immediate creation of many fully operational energy communities, but the reduction of the most binding local obstacles: lack of information, weak coordination, poor technical preparation and uncertainty about the first concrete steps. In a country where regulatory and market barriers remain significant, this is a meaningful and necessary foundation for future scale-up.

Policy Recommendations

Hungary should now move from framework creation to practical implementation and model-specific usability. The legal basis for energy communities has improved, especially with the introduction of specific rules on energy cooperatives and the operational model for condominium energy communities. However, the main barriers identified in the national analysis remain substantial: complex registration and permitting, unclear interaction with DSOs and suppliers, tariff structures that do not sufficiently reward local sharing, weak financial incentives, limited access to reliable consumption and production data, and insufficient technical and organisational capacity among local actors. The most effective policy response should therefore combine legal simplification, market and tariff reform, model-specific implementation rules, consumer protection safeguards, and targeted capacity and financing support.

A first priority is to make the regulatory pathway predictable, proportionate and differentiated by model. Hungary should clearly distinguish between classic energy communities, energy cooperatives, condominium energy communities and municipally led models, as these forms follow different legal and operational logics. Classic energy communities require legal personality and registration by MEKH, while condominium energy communities are based on written cooperation between owners and do not constitute separate legal entities. This distinction should be reflected in practical guidance, standard templates, model contracts, fixed administrative deadlines, and clear allocation of responsibilities among MEKH, DSOs, suppliers and community members. Particular attention should be paid to the legal status of households participating in energy sharing, the governance of condominium-based schemes, and the specific membership, capital and investor rules applicable to energy cooperatives.

A second priority is to create a dedicated implementation framework for condominium energy communities. These models have significant potential in urban and densely populated areas, but their viability depends on clear metering, data access and settlement rules. Hungary should support both the simpler discounted network-charge reimbursement model and the more advanced smart-meter-based allocation model, including static and dynamic sharing arrangements where appropriate. Regulatory guidance should clarify the treatment of common connection points, internal allocation rules, quarter-hourly metering data, production and consumption data.

A third priority is to align tariffs and market rules with the logic of local energy sharing. The current framework still weakens the business case for most communities because system usage fees and subsidised household tariffs do not adequately reflect the value of local balancing, collective self-consumption and reduced grid use. Hungary should introduce a cost-reflective tariff model for shared locally produced electricity, including broader eligibility for reduced network charges where communities demonstrably reduce actual grid use. A stable settlement regime should also be created beyond the condominium segment. This would improve investment viability, reduce the current bias in favour of purely individual solutions, and help make community-based models competitive even in a regulated household price environment.

A fourth priority is to address the specific barriers faced by municipalities. Municipalities can play an important role as initiators, coordinators and infrastructure owners, but their participation is constrained by public-law decision-making, public asset management rules, transparency obligations and the need to preserve public control over contributed assets. The classic cooperative principle of equal voting rights may therefore be difficult to reconcile with municipal governance and public property requirements. Hungary should develop specific guidance for municipally led or municipality-supported energy communities, including model governance clauses, asset contribution rules, procurement guidance, transparency requirements and decision-making procedures compatible with local government law.

A fifth priority is to close the financial and capacity gap through a broader support package. Many Hungarian communities still lack the expertise needed for tariff design, legal structuring, metering architecture, data management, business planning, governance design and technical-economic simulation. Dedicated early-stage support should include feasibility grants, metering and software support, technical assistance, legal templates and business modelling tools. However, support should not be limited to seed funding. Hungary should also facilitate access to multiple financing channels, including member contributions, community financing, grants, concessional loans, combined loan-and-grant instruments, ESCO-type models, corporate energy-efficiency financing and pro bono expert support. This should be particularly accessible for municipalities, SMEs, condominiums, rural communities and locally rooted civil organisations.

A sixth priority is to strengthen consumer protection, billing transparency and data governance. Energy communities can only scale if participants understand how benefits, costs, risks and responsibilities are allocated. Hungary should require clear written internal allocation rules,

transparent pricing structures, understandable billing arrangements, access to relevant consumption and production data, and effective complaint-handling mechanisms. These safeguards are especially important for households and condominium residents, where the relationship between the jointly produced electricity, household-level savings, common costs, network charges may otherwise remain unclear for participants. It is necessary to clarify the legal status of households with regard to universal service.

Finally, Hungary should support diversified, locally adapted technical models. While rooftop solar remains the most immediate and scalable option, policy should also encourage technically and economically sound combinations of solar energy, storage, heat pumps, geothermal energy, waste heat, biomass, biogas, small-scale wind, electric mobility and local energy management systems. The choice of technology should be based on local resources, building characteristics, consumption profiles and grid conditions. Such diversification can improve self-consumption, reduce grid stress, increase resilience and make energy communities more viable across urban, rural and mixed-use contexts.

Policy recommendation for Energy community development based on NRGCOM project experience

Recommendations in steps:

- **Clarify model-specific legal and implementation rules**

Hungary should develop separate implementation pathways for classical energy communities, energy cooperatives, condominium energy communities and municipality-led models. This should include practical guidance on establishment, registration, governance, grid connection, data management, settlement, billing and consumer protection. Further clarification of secondary legislation and implementing rules, including the conditions under which household consumers may remain under universal service.

- **Develop model documents and practical guidance**

Standardised templates should be prepared for statutes, articles of association, condominium agreements, energy sharing agreements, member accession documents, data protection notices and internal settlement rules.

- **Create dedicated municipal guidance**

A specific guide should be prepared for municipalities, covering public-law decision-making, public asset contributions, transparency requirements, ownership control, accountability and possible roles such as founder, member, property owner, consumer, supporter or project owner.

- **Strengthen metering, data access and billing infrastructure**

Quarter-hourly production and consumption data, allocation ratios, data exchange and correction mechanisms should be clarified and made accessible in a transparent manner. Digital systems should support the joint handling of production, consumption, sharing, storage, grid feed-in and billing corrections.

- **Introduce targeted financial instruments**

Dedicated support should be provided for feasibility studies, legal and technical advisory services, metering systems, IT infrastructure, smart meters, storage, energy management systems and community organisation.

- **Recognise local system benefits in tariffs**

The tariff system and network charges should be reviewed to better reflect the network, environmental and local economic benefits of locally generated and locally consumed renewable electricity. It requires preparation and capacity-building of DSOs, structured consultation with distribution system operators, and development of an appropriate pricing and tariff system.

- **Support social inclusion and awareness raising**

Energy communities should not be treated only as investment vehicles, but also as tools for education, local cooperation and energy efficiency. Targeted support should be provided for vulnerable households, smaller municipalities and less technically prepared communities.

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Annex 7 – National Compendium of REC Status and Implementation in Moldova

Starting Position and Regulatory Foundation

The Republic of Moldova is currently in an emerging phase of renewable energy community (REC) development, characterized by a recently established legal framework and a limited number of pilot initiatives. While the regulatory foundation is in place, practical implementation is still evolving, with key challenges related to market readiness, infrastructure, and institutional capacity.

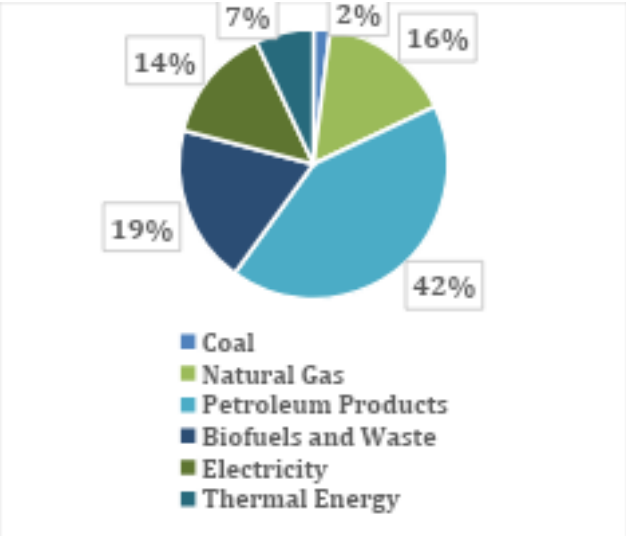
This section provides an overview of the national context, assesses the current level of REC deployment, identifies existing barriers, and formulates targeted policy recommendations to support the scale-up of community energy initiatives.

National Energy Profile

Recent data from the National Bureau of Statistics (BNS) provides a clear snapshot of final energy consumption patterns in the Republic of Moldova, both in terms of energy sources and sectoral distribution.

The current structure reflects a strong reliance on fossil fuels and highlights the dominant role of the residential sector in overall energy demand. At the same time, it points to structural vulnerabilities related to import dependency and limited domestic generation capacity.

These trends reinforce the need for accelerating the transition towards more sustainable, decentralized, and locally driven energy solutions.



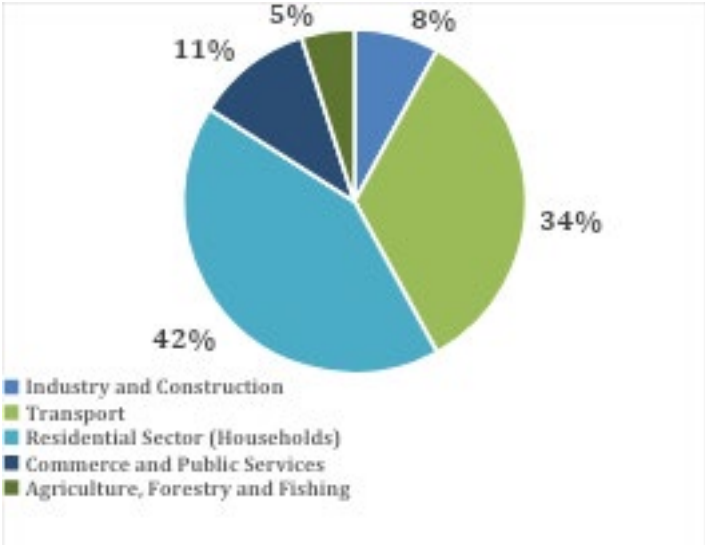


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Fig. 1 Final energy consumption by product type in 2024

Fig. 2 Final energy consumption by sectors in 2024

The Republic of Moldova's final energy consumption structure reflects a diversified energy mix dominated by petroleum products and natural gas, alongside a significant contribution from electricity and biofuels. The sectoral distribution highlights the prominent role of the residential sector, followed by transport and commercial services.

Renewable energy sources are expected to play an increasingly important role in the national energy mix. According to the National Energy and Climate Plan (PNIEC), the Republic of Moldova aims to reach a renewable energy share of approximately 27% in gross final energy consumption by 2030.

This transition is driven primarily by the expansion of solar and wind energy in the electricity sector, while biomass continues to play a key role in the heating sector. At the same time, emerging solutions such as heat pumps and electrification are expected to contribute to further diversification of renewable energy use.

At the same time, the country continues to exhibit a high level of energy import dependency, particularly in relation to natural gas and, to a lesser extent, electricity. This structural reliance exposes the energy system to external risks and price volatility, reinforcing the need for increased local energy generation and diversification.

The evolution of renewable energy in the Republic of Moldova over the period 2017–2024 reflects a relatively stable, yet modest contribution to final energy consumption, with the share of renewables fluctuating between approximately 21% and 28%. Higher levels observed in earlier years are largely driven by the dominant role of biomass, which continues to represent the main component of renewable energy in final consumption.

As of early 2026, the Republic of Moldova has surpassed 1 GW of installed renewable energy capacity, marking a significant milestone in the development of the sector. In 2025, more than 24.5% of gross final electricity consumption was covered by renewable sources, driven primarily by the rapid expansion of solar and wind energy. The differences compared to the share of renewables in total final energy consumption are explained by the distinct structure of the indicators, which cover different sectors and types of energy use.

This evolution reflects a gradual structural shift in the national energy system, moving from a biomass-dominated profile towards a more diversified renewable energy mix. According to the National Energy and Climate Plan (PNIEC), the Republic of Moldova has set a target of reaching approximately 30% renewable energy share in gross final energy consumption by 2030.

This trend is further supported by the significant increase in installed renewable energy capacities, particularly in the solar and wind sectors, as illustrated in the figure below.

The structure of installed capacities confirms the rapid expansion of solar photovoltaic energy, which represents the largest share of newly added capacity, followed by wind energy. Other sources, such as biogas and hydropower, continue to play a more limited role. At the same time, the diversification of support mechanisms, including net metering and participation in the liberalized market, has contributed to this growth, indicating a gradual transition towards a more competitive and decentralized energy system.

Despite these positive developments, the overall contribution of renewable energy remains influenced by structural factors, including high import dependency and sectoral imbalances. In this context, the development of decentralized energy solutions, including renewable energy communities, can play a key role in increasing the share of green energy and strengthening energy security.

	Producători eligibili			Piața liberă	Contorizare Netă	Facturare Netă	Total
	Legea 160-XVI/2007	Legea 10/2016/ Tarif fix	Legea 10/2016/ Preț fix				
PV	0,59	155,35	60,00	328,71	115,31	87,04	747,00
Eolian	27,23	0	0	225,29	0	0	252,52
Biogaz	5,17	1,99	0	0	0	0	7,16
Hidro	0,25	0	0	16,50	0	0	16,75
Total	33,24	157,34	60,00	570,50	115,31	87,04	1023,42

MINISTERUL ENERGIEI AL REPUBLICII MOLDOVA

CNED Instituția Publică Centrul Național pentru Energie Durabilă

*Conform datelor din oficiu disponibile în cadrul CNED

Fig. 3. Installed renewable electricity generation capacities by source and support scheme, Republic of Moldova, February 2026 (MW)

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Legal Framework

The Republic of Moldova has established a legal framework for energy communities through the transposition of key European concepts into national legislation.

Renewable Energy Communities (RECs) are defined under Law No. 10/2016 on the promotion of the use of energy from renewable sources (Art. 39^5) as legal entities based on open and voluntary participation, effectively controlled by members located in proximity to the projects, and aimed primarily at delivering environmental, economic, or social benefits rather than financial profit.

Citizen Energy Communities (CECs), introduced through Law No. 164/2025 (Art. 125), represent a broader concept, allowing participation across the electricity market without strict geographical constraints, while maintaining similar principles of governance, autonomy, and member-oriented benefits.

The regulatory framework for RECs is further supported by secondary legislation, including the ANRE-approved Regulation that defines registration procedures, technical requirements, and the conditions for participation of renewable energy communities in the electricity market.

In the case of CECs, the regulatory framework is still under development, with the National Agency for Energy Regulation (ANRE) responsible for drafting and adopting the necessary regulations governing their registration, operation, and participation in the energy market.

Regarding legal forms, both RECs and CECs are currently allowed to adopt any existing legal form, provided that they comply with the principles set out in the legislation, such as open and voluntary participation, autonomy, and the primacy of social and environmental benefits over profit. At the same time, the legislation explicitly stipulates that, where a Citizen Energy Community is established as a for-profit legal entity, any profit generated cannot be distributed as dividends but must be used exclusively for the needs of the community and/or its members.

The current legal framework in the Republic of Moldova does not allow Local Public Authorities to be members of non-commercial associations, which has created constraints in developing inclusive energy community models. As a result, in existing pilot projects, communities that include Local Public Authorities have been established as limited liability companies (LLCs), while the other communities operate as non-commercial associations.

In this context, national authorities have initiated the development of a dedicated legal framework introducing a specific legal form for Renewable Energy Communities. This initiative aims to facilitate the participation of all relevant stakeholders, including Local Public Authorities, and to support the large-scale development of energy communities.

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Overall, while the basic legal framework is already in place, it remains in a transitional phase, requiring further clarification and the development of secondary legislation to enable the effective and widespread implementation of energy communities.

Institutional Landscape

The institutional framework involves the Ministry of Energy, the National Centre for Sustainable Energy, ANRE, and distribution system operators.

At present, in the Republic of Moldova there are three renewable energy communities officially registered in the ANRE registry, marking an important step in the operationalisation of the legal framework and the practical testing of this model. Of these, two communities are established as non-governmental organisations (NGOs), implemented at the level of multi-apartment residential buildings (condominiums), while one is established as a limited liability company (LLC). In addition, another community structured as an LLC is currently under development and is expected to be registered in the near future.

The development of these communities has followed a phased and structured approach, tested through pilot projects implemented with the support of development partners. The process began with awareness-raising and community mobilisation activities, particularly targeting Condominium Owners' Associations (COAs), which play a key role in enabling collective energy initiatives in the residential sector.

This was followed by dedicated training sessions for administrators and residents, aimed at ensuring a clear understanding of the concept, the legal framework, and the technical and organisational implications. In parallel, a competitive call was launched to select pilot communities, based on criteria such as the level of community engagement, technical feasibility, and the willingness of local stakeholders to participate.

For the selected communities, feasibility studies and business models were developed, including the assessment of optimal technical solutions (such as photovoltaic systems and energy sharing mechanisms). Subsequently, continuous technical and legal support was provided for the establishment of legal entities, preparation of documentation, and submission of applications for registration with ANRE.

A critical step in the process was the validation of the proximity criterion, as well as coordination with distribution system operators for obtaining connection permits. Currently, the selected communities have progressed to the implementation phase, including the launch of procurement procedures for equipment (photovoltaic systems, smart meters, and battery storage systems), followed by installation and operationalisation.

The experience gained so far confirms that the development of energy communities in multi-apartment buildings is feasible, but involves a complex process requiring coordination among multiple stakeholders, rigorous validation of member data, and continuous adaptation to regulatory requirements. These pilot projects provide a solid foundation for scaling up the model at national level in the Republic of Moldova.

Analysis of Specific National Barriers

Legislative and Administrative Obstacles

Although the Republic of Moldova has established a basic legal framework for energy communities, its practical implementation remains constrained by several significant legislative and administrative barriers.

Firstly, the regulatory framework is still in a transitional phase, particularly for citizen energy communities (CECs), where secondary legislation is not yet fully developed or operational. This creates uncertainty for potential initiators and slows down project development.

Secondly, administrative procedures remain complex, fragmented, and time-consuming, requiring multiple interactions with the National Agency for Energy Regulation (ANRE), distribution system operators (DSOs), and other relevant institutions. A major bottleneck is the need for rigorous validation of member data, including alignment with individual supply contracts and metering points, which involves iterative processes and considerable administrative effort.

Another critical constraint relates to limitations in legal forms and governance structures. The current legal framework does not allow local public authorities (LPAs) to be members of non-governmental organisations (NGOs), which restricts the development of inclusive community energy models. As a result, alternative legal structures (e.g. LLCs) are used, which do not fully reflect the core principles of energy communities, such as open participation and non-profit orientation.

Market and Infrastructure Hurdles

From a market and infrastructure perspective, the development of energy communities is affected by several structural limitations.

Firstly, there is limited operational experience among distribution system operators (DSOs) in integrating energy communities, particularly in areas such as energy sharing, data management, and allocation mechanisms. While regulatory provisions exist, their practical implementation is still evolving.

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Secondly, grid connection procedures and existing infrastructure constraints can lead to significant delays. The process of obtaining connection permits is often lengthy and requires advanced technical expertise, which can discourage local initiatives.

In addition, the lack of standardized technical solutions and digital infrastructure (including smart metering, data exchange systems, and energy allocation platforms) limits the scalability and replication of energy community models.

Financial and Capacity Gaps

Financial and capacity-related constraints represent some of the most critical barriers to the development of energy communities in the Republic of Moldova.

Currently, access to financing is limited and not yet structured, relying mainly on pilot projects and ad hoc grant funding. There are no dedicated, large-scale financial instruments specifically designed to support energy communities, particularly in the multi-apartment residential sector.

Upfront investment costs (for photovoltaic systems, storage solutions, and smart metering infrastructure) remain high for households and condominium associations, especially in the absence of accessible financing schemes, green credit lines, or risk-sharing mechanisms.

At the same time, there is a relatively low level of technical and administrative capacity among end beneficiaries, particularly within Condominium Owners' Associations. The complexity of the concept, combined with legal and technical requirements, necessitates continuous support through training, mentoring, and technical assistance.

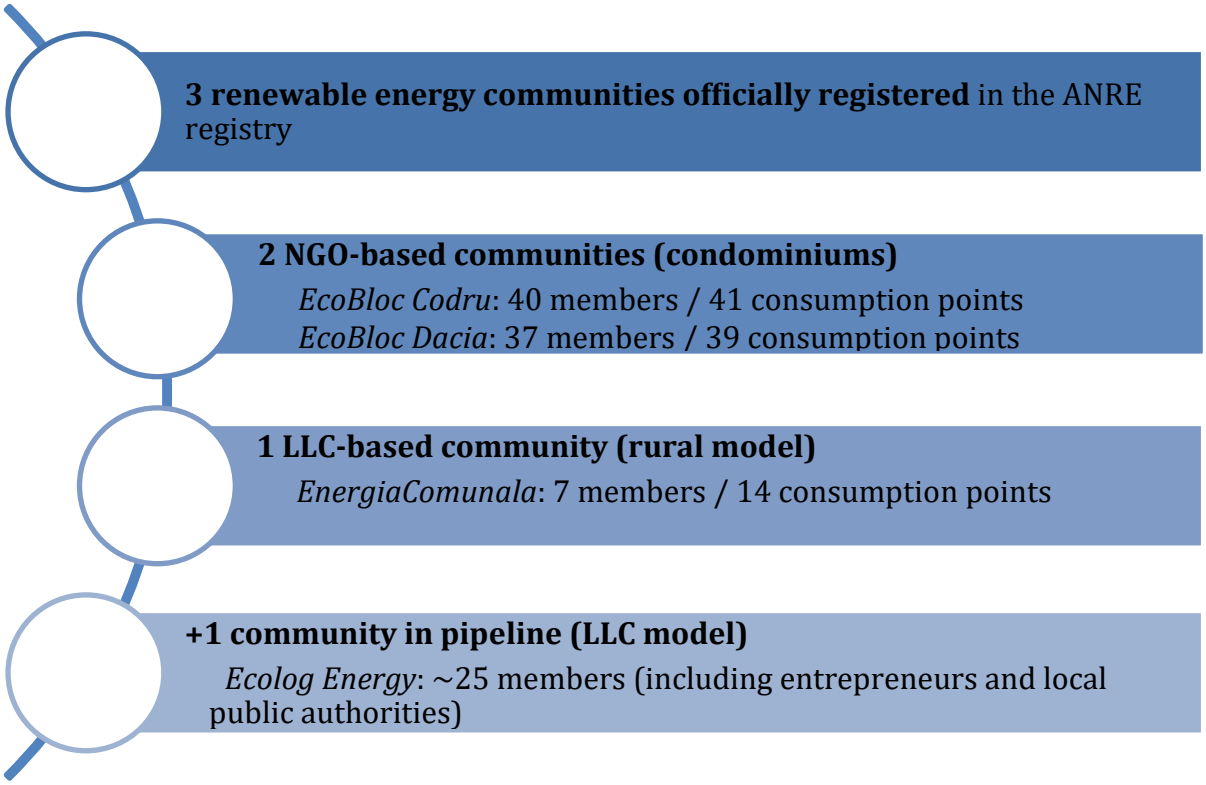
In parallel, institutional capacity is still developing, both at the level of public authorities and market actors, which affects the speed, consistency, and predictability of implementation.

These barriers collectively result in slow uptake, limited scalability, and high transaction costs for initiating and operating energy communities.

Case Studies and Pilot Capitalisation

The development of renewable energy communities in the Republic of Moldova is currently being demonstrated through a set of pilot initiatives that provide concrete evidence of the model's feasibility and adaptability across different local contexts.

Current status of renewable energy communities (April 2026)



At present, three renewable energy communities are officially registered in the ANRE registry, reflecting two distinct implementation models. On the one hand, two communities have been established as non-governmental organisations (NGOs) in multi-apartment residential buildings, namely *EcoBloc Codru* and *EcoBloc Dacia*, located in Chișinău. These communities involve over 70 households in total (40 and 37 members respectively) and represent the first practical applications of the energy community concept in the condominium sector.

On the other hand, a renewable energy community established as a limited liability company (LLC), "EnergieComunala", has been registered in a rural context, involving 7 members and 14 consumption points, demonstrating the applicability of the model beyond urban residential settings.

In addition, another community – SRL "Ecolog Energy" – is currently under development and is expected to be registered in the near future. This initiative is particularly relevant as it includes approximately 25 members, including entrepreneurs and local public authorities, highlighting the potential for more diverse and economically integrated community energy models.

As a result, the Moldovan ecosystem is evolving towards a mixed model, combining:

- NGO-based communities, primarily in multi-apartment buildings (condominiums), and

- LLC-based communities, enabling the participation of local public authorities and private actors.

All pilot communities have followed a structured implementation pathway, including awareness-raising campaigns, training sessions, competitive selection processes, development of feasibility studies and business models, as well as continuous technical and legal support. This approach has enabled the transition from initial concept to formal registration and, currently, towards implementation.

From a technical perspective, the projects include the planned deployment of photovoltaic systems, smart metering infrastructure, and battery storage, combined with internal energy sharing mechanisms among members. These pilots are therefore essential for testing both regulatory provisions and technical solutions under real-life conditions.

The implementation process has also generated valuable lessons learned. Key challenges include administrative complexity, the need for precise validation of member data, and coordination with distribution system operators. At the same time, the pilots highlight the importance of community engagement, capacity building, and trust as critical success factors.

Overall, these pilot initiatives demonstrate that renewable energy communities are not only feasible in the Republic of Moldova, but also adaptable to different legal, social, and geographic contexts. The capitalisation of these experiences provides a solid foundation for scaling up the model at national level.

Best Practice Example - Pilot Project Performance/ Key Results

At this stage, renewable energy communities in the Republic of Moldova are still in the implementation phase, and therefore fully operational performance data is not yet available. However, robust evidence from feasibility studies developed for pilot projects provides a clear indication of their expected technical, economic, and environmental performance.

Pilot project: Eco Bloc Dacia (bd. Dacia 65/19)

Technical setup	Installed PV capacity: 40 kW Battery storage: 30 kWh Inverter capacity: 30 kW Estimated coverage: ~50% of total building electricity demand
Economic performance	Total investment: ~839,000 MDL Grant support: ~90% Annual savings: ~89,000 MDL Savings per member: ~2,400 MDL/year Payback period: ~9.4 years
Environmental impact	CO_2 emissions reduction: ~18.9 tCO_2/year
Community impact	35 households + 1 activity center involved Collective energy sharing enabled Increased energy independence and resilience

A representative example is the pilot renewable energy community developed within a multi-apartment residential building located at *bd. Dacia 65/19, Chișinău*. The project is structured as a community-based photovoltaic system implemented under the energy community framework, enabling both collective and individual energy consumption coverage.

According to the feasibility study, the project includes the installation of a 40 kW photovoltaic system combined with a 30 kW inverter and 30 kWh battery storage capacity, designed to optimize energy generation and consumption patterns in a residential context. The system is expected to cover approximately 50% of the building's total electricity demand, taking into account technical constraints such as available roof space and consumption profiles.

From an economic perspective, the total investment is estimated at approximately 839,000 MDL, with around 90% covered through grant financing and the remaining contribution ensured by the community. The project is expected to generate annual savings of approximately 89,000 MDL, corresponding to about 2,400 MDL per member, with an estimated payback period of 9.4 years.

In terms of environmental impact, the installation is projected to reduce CO_2 emissions by approximately 18.9 tons annually, contributing to local and national climate objectives.

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Beyond quantitative indicators, the project demonstrates important structural advantages of the energy community model. Unlike traditional prosumer schemes, where energy production can only be used for common spaces, the community framework allows energy sharing among individual households, significantly increasing the overall efficiency and benefits of the system.

The pilot also highlights strong social and governance dimensions, with active participation of residents, high levels of community engagement, and inclusive decision-making processes. The involvement of over 35 households illustrates the potential for collective action in the residential sector.

Overall, although still at the pre-operational stage, this case provides strong evidence that renewable energy communities in multi-apartment buildings are technically feasible, economically viable, and socially acceptable in the Moldovan context. It also serves as a replicable model for scaling up similar initiatives at national level.

Results of the NRGCOM Pilot Project

Within the NRGCOM project, Moldova implemented pilot actions focused on testing practical approaches for the establishment of Renewable Energy Communities (RECs) in both rural and urban contexts. The pilot process contributed to increasing local awareness, strengthening institutional dialogue, and preparing the groundwork for future REC implementation under Moldova's emerging regulatory framework.

The main pilot initiatives were developed in:

- Sireți municipality (Strășeni district) – multi-stakeholder community model;
- Chișinău (Vasile Lupu 83 condominium) – residential multi-apartment building model;
- additional stakeholder engagement activities and support in Ungheni, Vorniceni, Cantemir, Ștefan Vodă, Suhuluceni and other municipalities interested in future REC development.

In Sireți, the pilot focused on creating a community-based REC involving the municipality, a local high school hosting a planned rooftop photovoltaic installation, a private economic agent, and household consumers. A governance structure based on an NGO coordination model was explored to ensure flexibility and democratic participation. The pilot contributed to solving local problems related to:

- increasing local energy resilience;
- reducing dependence on external energy sources;
- improving cooperation between public institutions, citizens, and local businesses;
- creating practical local experience in renewable energy governance.

In Chișinău (Vasile Lupu 83), the pilot addressed challenges specific to urban residential buildings, particularly collective energy use and energy sharing among apartment owners. The pilot contributed to identifying feasible models for:

- rooftop solar deployment in condominiums;
- collective self-consumption;
- static energy sharing mechanisms;
- citizen engagement in urban energy transition.

An important result of the pilot process was the establishment of structured cooperation with key institutions, including:

- Ministry of Energy;
- ANRE;
- CNED;
- Premier Energy;
- local public authorities and civil society organisations.

The pilot activities also highlighted several systemic barriers, including:

- incomplete operationalisation of the REC legal framework;
- lack of dedicated financing mechanisms;
- limited technical capacity at local level;
- insufficient public awareness regarding REC opportunities.

At the same time, the project generated concrete solutions and recommendations, including:

- proposed governance models for Moldovan RECs;
- technical and legal roadmaps;
- stakeholder engagement methodologies;
- policy recommendations for improving the enabling framework.

The pilots demonstrated strong interest from municipalities and citizens in community energy initiatives and confirmed the relevance of RECs as a tool for addressing local energy, economic, and social challenges in Moldova. The experiences gathered through NRGCOM provide a practical foundation for scaling up REC development at national level and supporting Moldova's energy transition in line with EU objectives.

Policy recommendation for Energy community development

To accelerate the development and scaling of energy communities in the Republic of Moldova, an integrated approach is required to address the identified legislative, market, and financial barriers. In this regard, the following policy measures are recommended:

1. Strengthening the legislative and regulatory framework

- Finalize and operationalize the secondary legislation for Citizen Energy Communities (CECs), including clear procedures for registration, operation, and market participation.
- Develop and introduce a dedicated legal form for energy communities, enabling the participation of individuals, local public authorities, and private entities within a single legal structure.
- Revise the legal framework to allow local public authorities to participate in associations, or establish alternative mechanisms ensuring their effective involvement in energy communities.
- Clarify and standardize the rules for energy sharing, including allocation methodologies and roles and responsibilities of involved stakeholders.

2. Streamlining administrative procedures

- Simplify and digitalize the process of registering energy communities with the National Agency for Energy Regulation (ANRE), including reducing documentation requirements and processing time.
- Introduce standardized procedures for validating member data, in cooperation with distribution system operators.
- Establish a national one-stop-shop for energy community initiators, providing clear guidance on procedures, documentation, and institutional responsibilities.
- Reduce the complexity of obtaining grid connection permits, including setting clear timelines and ensuring transparency in procedures.

3. Developing market infrastructure and technical solutions

- Develop and implement digital platforms for data management and energy sharing within energy communities.
- Standardize technical solutions (e.g., smart metering, measurement and allocation systems) to facilitate replication and scaling of projects.
- Strengthen the capacity of distribution system operators to effectively integrate energy communities into the grid.

- Promote pilot projects incorporating energy storage and flexibility solutions, particularly in the residential sector.

4. Establishing dedicated financial mechanisms

- Develop targeted financial instruments for energy communities, including grants, concessional loans, and guarantee schemes.
- Integrate energy communities into existing programs (e.g., FEERM) by creating dedicated funding lines for both multi-apartment buildings (HOAs) and individual households in the residential sector, including peri-urban and informal residential areas, to ensure an inclusive approach and equitable access to financing.
- Encourage private sector participation through ESCO models and public-private partnerships.
- Reduce investment risks through co-financing mechanisms and risk-sharing instruments.

5. Strengthening capacities and raising awareness

- Expand training and awareness programs for homeowner associations, local public authorities, and other relevant stakeholders.
- Establish a national support network (helpdesk) providing technical and legal assistance for energy communities.
- Promote pilot projects and success stories to increase trust and replicability.
- Integrate energy communities into professional training and education programs.

Strategic conclusion

The implementation of these measures will enable the transition from pilot initiatives to large-scale deployment of energy communities in the Republic of Moldova, contributing to enhanced energy security, reduced dependency on imports, and active citizen participation in the energy transition.

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Annex 8 – National Compendium of REC Status and Implementation in Montenegro

Starting Position and Regulatory Foundation

1. National Energy Profile

According to the 2023 census, Montenegro has the population of 623,633 citizens and a surface of 13,812 km^2.

Montenegro's energy supply is characterized by a high level of import dependence and limited diversification of fuel sources. Final energy consumption relies on four primary fuel types: coal (predominantly lignite), petroleum products, biomass (wood fuels), and electricity. Coal is used almost exclusively for power generation, accounting for approximately 99% of its total consumption and providing between 40% and 60% of annual electricity production. Petroleum products are primarily consumed in the transport sector, where they represent more than 70% of total usage. Biomass, mainly in the form of wood fuels, is predominantly utilized in the residential and service sectors, with shares of 86% and 9%, respectively.[14]

Montenegro's fuel demand is largely met from domestic sources, with the exception of mineral oil products, which are fully imported and account for 47% of final energy consumption. As a result, oil products largely determine the national energy self-sufficiency level, which ranges between 54% and 66%. Electricity represents another key component of the final energy balance and is almost entirely produced domestically. However, due to the dominance of hydropower, electricity imports are required during the dry season, when lower hydrological inflows coincide with increased demand driven by tourism. This reliance on hydropower also causes significant annual fluctuations in energy self-sufficiency. Total final energy consumption has ranged between 33 PJ and 38 PJ in recent years and is expected to grow moderately in the near future, primarily driven by industrial development. The transport and residential sectors together account for more than two-thirds of total final energy consumption, although their fuel structures differ substantially. Transport energy use is dominated by diesel (80%), followed by gasoline (15%), while LPG and electricity play a minor role. In contrast, the residential sector relies almost entirely on electricity and fuel wood, resulting in a significantly lower carbon footprint due to the high share of renewable electricity. With the expansion of the prosumer concept and additional renewable capacity, the residential sector is expected to be nearly fully decarbonized by 2030, making transport the key sector for achieving national GHG reduction targets.[15]

Primary energy production in Montenegro is based on coal, wood fuels, and renewable sources, including hydropower, wind, and solar energy. Nearly all coal production is used for electricity generation at the Pljevlja Thermal Power Plant, while renewable electricity is generated by two large hydropower plants (Piva and Perućica), numerous small hydropower facilities, two wind

[14] Government of Montenegro, *National Energy and Climate Plan*, 2025, p.32
[15] Government of Montenegro, *National Energy and Climate Plan*, 2025, p.32-33

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farms, and several small solar plants. In recent years, the rapid expansion of residential prosumers—mainly rooftop photovoltaic systems—has increasingly influenced the national electricity mix, currently contributing around 70 GWh annually, or approximately 5% of residential electricity consumption. Total primary energy production amounts to about 30 PJ.

The total installed capacity of all power plants in Montenegro at the end of 2025 was 1,120 MW, namely: thermal power plant (TPP) Pljevlja 225 MW, hydro power plant (HPP) Piva 342 MW, HPP Perućica 307 MW, wind power plants (WPP) 118 MW, small hydro power plants (sHPP) cc 56 MW and solar power plants (SPP) cc 72 MW[16].

For more than four decades, the TPP Pljevlja has been the most stable source of electricity, together with the Peručica and Piva hydropower plants accounting for over 85% of domestic electricity generation. All major power plants are operated by the state-owned utility Elektroprivreda Crne Gore (EPCG), which is also the sole public electricity supplier. Due to variability in hydropower output, electricity generation from TPP Pljevlja remains essential for system stability, despite higher production costs resulting in part from emission allowance prices under the national GHG emissions trading system. The combined operation of thermal and hydropower plants enables EPCG to maintain competitive electricity prices, which remain significantly subsidized to reflect social standards. TPP Pljevlja will continue to operate until sufficient renewable capacity is developed to ensure secure system operation.[17]

Although coal remains a significant source of electricity generation, renewable energy is expected to play a central role in the future energy mix, driven by planned expansions of wind and solar capacity. As a member of the Energy Community (EnC) and a candidate for EU membership, Montenegro pledged to meet the goals of the EnC and the EU in the fields of renewable energy, energy efficiency and GHG emission reduction. In line with the decisions of the Energy Community Ministerial Council[18], Montenegro has committed to achieving 2030 targets related to reducing primary and final energy consumption, accelerating the deployment of renewable energy sources and lowering GHG emissions, with the aim of reaching climate neutrality by no later than 2050. According to the latest available data, the share of renewable sources in final consumption is 40.9%[19].

[16] Government of Montenegro, *Energy Balance for Montenegro in 2026*, available at: https://www.sluzbenilist.me/propisi/46AB7FAB-3338-45EB-A13D-35B0D4BBC2BF?page=1

[17] Government of Montenegro, *National Energy and Climate Plan*, 2025, p.33

[18] Energy Community, No 2022/02/MC-EnC on amending Ministerial Council Decision No 2021/14/MC- EnC amending Annex I to the Treaty Establishing the Energy Community and incorporating Directive (EU) 2018/2001, Directive (EU) 2018/2002, Regulation (EU) 2018/1999, Delegated Regulation (EU) 2020/1044, and Implementing Regulation (EU) 2020/1208 in the Energy Community acquis communautaire

[19] https://www.eea.europa.eu/en/europe-environment-2025/countries/montenegro/renewable-energy-sources

2. Legal Framework

Montenegro as a contracting party of the Energy Community has obligation to harmonize its legal framework in energy field with the EU acquis. Timeline for transposition and implementation of the EU legal acts is prescribed in the *Decarbonisation Roadmap for the Contracting Parties of the Energy Community* which is adopted by the Ministerial Council of Energy Community in November 2021.

One of the key directives which has to be transposed in the national legal framework is Renewable Energy Directive (2018/2001/EU) which is important for facilitation of the RES development and achievement of the renewable/decarbonisation 2030 targets.

Decarbonisation Roadmap has defined concrete deadlines for transposition (end of 2022) and full implementation (2024) of the Renewable Energy Directive (2018/2001/EU) which are not met in case of the Montenegro. Nevertheless, Montenegro has started process of the drafting of the Law on the Use of Energy from Renewable Sources (RES Law) back in 2023 and adopted it in August 2024, enabling favourable environment for implementation of the RES projects.

When it comes to the renewable energy communities (REC), RES Law has transposed main provisions from the Renewable Energy Directive (2018/2001/EU) creating general conditions for introduction of such concept. This law enables all legal and natural persons to join REC on the principle of open and voluntary participation. This possibility is also given to the residential building in accordance to the law regulating the maintenance of residential buildings. Their primary objective is not profit generation, but the provision of environmental, economic and social benefits for their members and the local community. In total 4 articles of the RES Law contain provisions which regulates energy communities as follows:

- Article 72 - Sets out the rights of REC to produce, use, store, sell and distribute renewable energy within their community;
- Article 73 - closer defines who can be member of the energy community and under which conditions and also for members of energy community guarantees maintenance of the rights or obligations of final consumers without being subject to unjustified or discriminatory conditions;
- Article 74 - States that RECs are eligible for incentive schemes and open to cross-border exchange;
- Article 75 – provides for obligation to the Ministry responsible for energy policy to performs an assessment to identify any regulatory and administrative barriers and the potential of development of the energy communities in Montenegro.

In the existing law promotion of use of renewable energy is manly related to electricity production. Incentives for the heat production e.g. form the cogeneration, can be established at the municipal level (responsibility of the local self-governments). The reason for such approach lays in a fact that Montenegro does not have developed district heating network at all, except in one of the municipalities at the northern part of the country (Pljevlja). Also, natural gas is not available which makes development of district heating even more challenging.

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Another legal act regulating decentralized energy production is the Law on Energy, which transposes EU Directive 2019/944. This law enables final customers to install electricity generation systems on their rooftops for self-consumption and establishes a billing mechanism that compensates solar system owners for surplus electricity fed into the grid. By defining and legally recognizing prosumers, or active consumers, the law provides a solid foundation for the establishment of citizen energy communities (CEC). For the first time, Montenegro has adopted a legal framework that enables collective participation in energy generation, consumption, and management. CECs are particularly important for individuals who cannot become prosumers on their own and their integration into national legal frameworks, contributes to energy democracy, social benefits, and the long-term sustainability of the energy system.

In the context of energy communities, the Law on Efficient Use of Energy establishes the legal framework for applying the ESCO (Energy Service Company) model as a central tool for enhancing energy efficiency and implementing energy-saving measures. ESCOs play a key role in supporting both prosumers and citizen energy communities by providing technical expertise, financing and performance guarantees for energy efficiency and small-scale renewable projects. They enable households, local communities and collective energy initiatives to implement energy-saving measures and rooftop solar installations without upfront investment, ensuring that energy production and consumption are optimized. By bridging financial and technical gaps, ESCOs strengthen the participation of citizens in the energy market, promote sustainable energy use and contribute to the country's broader goals of renewable integration and energy transition.

To further strengthen the legal framework for energy efficiency in final energy consumption and align national legislation with EU directives, the Ministry of Capital Investments prepared a set of implementing bylaws. These include regulations on energy labelling and eco-design, the development of the Energy Efficiency Obligation (EEO) scheme, the Reconstruction Plan for central government buildings (2020–2022), building-related regulations, and the National Energy Efficiency Action Plan (NEEAP) 2019–2021, all aimed at implementing the Law on Efficient Use of Energy.[20]

3. Institutional Landscape

Energy represents one of the most important pillars of the economic development of Montenegro, which is reflected in the substantial institutional reforms achieved over the last decade. Below is a list of the most important state institutions that, in accordance with the RES law are responsible for the implementation of the REC:

- Ministry of Energy and Mining – national authority responsible for the adoption, implementation and monitoring of energy policies. It prepares energy laws and regulations, as well as strategies and programmes and is responsible for developing policies and measures to achieve established energy savings and renewable energy targets.
- Ministry of Ecology, Sustainable Development and Northern Region Development - national authority responsible for environmental protection and climate change policy;

[20] Government of Montenegro, *National Energy and Climate Plan*, 2025, p.40

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- Elektroprivreda Crne Gore (EPCG) – state-owned utility company in charge of public electricity supply;
- Montenegrin transmission system operator (CGES) – joint-stock company responsible for the supervision and maintenance of the high-voltage power network.
- Montenegrin electricity distribution system operator (CEDIS) – a state-owned company responsible for distributing electricity to final customers.
- Energy and Water Regulatory Agency of Montenegro (REGAGEN) - independent regulatory authority competent in the area of electricity, oil and natural gas, as well as in the area of water supply and wastewater utility regulation.
- Montenegrin electricity market operator (COTEE) - a state-owned company responsible for organizing and managing the electricity market in Montenegro

4. Maturity Level and Ecosystem (Established, Emerging, Nascent)

RECs in Montenegro represent a relatively new yet significant concept within the process of energy transition and the democratisation of the energy system. The ecosystem for energy communities in Montenegro is currently at a nascent stage of development. Although RECs are formally recognized in the RES Law, the absence of secondary legislation and practical implementation mechanisms has so far prevented their establishment in practice. At present, there are no fully operational energy communities—including RES or CEC—functioning in Montenegro. Participation in decentralized energy remains limited to individual prosumers, primarily through rooftop solar programs implemented by EPCG (Solar +).

Despite the lack of operational energy communities, several elements of an enabling ecosystem are already in place:

- a legal basis recognizing energy communities,
- widespread deployment of smart metering infrastructure,
- a growing number of prosumers,
- utility-led and donor-supported financing models,
- increasing public awareness and institutional capacity.

These factors indicate strong potential for progression toward an emerging ecosystem, provided that clear secondary legislation, collective market mechanisms, and targeted support measures are introduced in the near term.

Analysis of Specific National Barriers

1. Legislative and Administrative Obstacles

In recent years, Montenegro has demonstrated a strong commitment to aligning its energy legislation with EU regulations. In the past two years alone, Montenegro has adopted a set of laws that fully transpose the provisions of the Clean Energy Package (CEP). The aim of this legislative framework is to transform citizens from passive consumers into active participants in the energy transition by establishing a legal basis for the development of RECs. Legal acts that introduce the concept of active consumer (prosumer) in Montenegro are Law on Energy and RES Law. According to the Law on Energy, final consumers are permitted to install electricity-generation systems on their rooftops for their own use. These provisions represent an initial step toward energy

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democracy, however, further measures were needed to strengthen and expand decentralized energy production. By adopting the RES Law, prosumers are allowed to interconnect into a broader collective, which may constitute a REC. Beside legal foundation, in practice RECs represent a new model linking energy production and consumption, which brings significant uncertainties for final customers. A primary obstacle for the development of REC is the absence of comprehensive secondary legislation. While the primary law establishes the concept of RECs, it does not provide detailed guidance on governance structures, collective self-consumption, internal energy sharing or market participation. This regulatory gap creates uncertainty for potential community projects and hinders their formal establishment.

Another significant barrier is regulatory ambiguity regarding electricity sales. Distinctions CECs and RECs are not fully clarified, particularly in relation to participation in wholesale or retail electricity markets. Current rules largely address individual prosumers, leaving collective commercialisation and aggregation mechanisms undefined.

Administrative procedures for establishing energy communities further exacerbate the problem. Licensing, permitting, network access and reporting requirements are often complex and involve multiple institutions without clear coordination. In particular, access to the distribution network remains challenging for community-scale projects, as operators may impose long waiting times, high technical requirements, or additional fees. These obstacles limit the ability of energy communities to collectively manage production and consumption effectively.

2. Market and Infrastructure Hurdles

Before addressing market-related issues, it is essential to clarify from the outset the distinction between CEC and REC, particularly with regard to electricity sales. As already noted, Montenegro lacks secondary legislation that clearly defines these differences. By contrast, in some EU countries REC are not permitted to sell electricity on the market, while this activity is allowed exclusively for citizen energy communities. In general, wholesale, balancing and ancillary service markets are structured for large-scale producers, featuring complex rules, high minimum capacity thresholds and stringent technical requirements that small community-based projects find difficult to satisfy. As a result, REC often find it difficult to compete and participate in electricity markets on equal footing with large, established energy companies.

As renewable energy sources become more integrated at the distribution level, the availability of network infrastructure is increasingly becoming a limiting factor for the deployment of REC. This represents another blocking issue for the deployment of such an innovative solution, where distribution system operator will need to ensure technical readiness enabling their connection to the distribution network. Typically, local grids lack sufficient flexibility and without adequate automation, storage, or demand-side management infrastructure, energy communities may have to curtail their generation or operate below their technical potential. Assets like energy storage systems are essential for maximizing self-consumption and enabling flexibility services. However, storage solutions—whether behind-the-meter or at the community level—remain costly and are often constrained by unclear regulations regarding ownership, grid fees, or double taxation.

This task is neither simple nor inexpensive for distribution system operator, making it unrealistic to expect it to be resolved in a short timeframe. Therefore, if this issue persists, it becomes urgent to optimize the grid and carry out the necessary reinforcements. Moreover, the problem extends beyond technical constraints, the current „first-come, first-served" approach to capacity allocation, places energy communities at a disadvantage compared to larger projects, and very often the capacity occupied for reselling to the end contractors of a project. This significantly slows down or even completely prevents the development of energy community projects.

3. Financial and Capacity Gaps

RECs encounter numerous financial barriers that can substantially impede their creation, expansion and long-term viability. These challenges are largely structural, stemming from a mismatch between community-driven initiatives and traditional energy financing models. RECs are typically established by citizens, municipalities or small local entities with limited financial resources (private financing). In contrast to large energy companies, they often lack adequate equity, collateral or credit history, which makes access to bank financing on favorable terms difficult. Moreover, renewable energy projects require significant upfront investments for equipment, grid connection, permitting, metering and project development. Even where projects are economically sound over the long term, these initial costs can be prohibitive for community-based initiatives. Across the EU, most of the financing for energy communities is channeled through the private investments of their members. To raise the capital needed to finance their projects energy communities rely mostly on two options. The first one is to approach individuals or financial institutions for direct investment in return for a number of shares in the business. The second is to acquire debt by borrowing capital. RECs projects are largely ignored by mainstream private financiers because they can hardly generate revenue that can be counted as collateral-raising assets. This underscores the need for increasing institutional financiers' understanding of the nature, performance, and credit risk of REC projects to become comfortable with providing debt.

Public financing – in the form of grants, loans or a combination of the two – can provide an interesting solution to risk-averse energy communities throughout the EU.[21] To accelerate the development of RECs, several EU countries have introduced incentive schemes aimed at encouraging final consumers to become members of RECs. Montenegro has taken a similar approach in its RES Law, under which RECs are eligible to participate in auction processes for market premium tariffs. Incentive schemes are implemented through tenders conducted in an open and non-discriminatory manner. Referring to secondary legislation, they should also clearly define financing mechanisms for RECs and the available options for accessing grants. Good practice in the EU includes the establishment of dedicated funds that support the early development phase of such projects aiming to enable sustainable business models. Some of these funds are also accessible to Montenegrin citizens.

[21] Energy communities in the EU: Opportunities and barriers to financing, Jasmine Arnould and Diana Quiroz, 2022

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For example, The Secretary of State for Energy Security and Net Zero in the UK conducted a Call for Evidence: Barriers to Community Energy Projects, in 2025 where the most frequently cited barrier to community energy projects was funding. Respondents suggested that this barrier could be overcome through a number of changes which included greater provision of loans and other financial aid, capacity funding and blended finance.[22]

Case Studies and Pilot Capitalisation

Although no fully operational renewable energy communities currently exist in Montenegro, several key projects have already been implemented that provide important technical prerequisites for the future establishment of RECs. These projects include:

Installation of smart metering devices,

Installation of rooftop photovoltaic systems

Improvement of energy efficiency in residential buildings.

Around 300,000 smart metering devices have been installed in Montenegro covering about 70% of electricity users. These features are particularly important for prosumers and represent a technical precondition for energy communities, as smart meters are essential for collective self-consumption, energy sharing, and internal settlement among community members. Although further expansion and advanced functionalities will be required, the existing rollout demonstrates a positive trajectory toward a more decentralized and participatory energy system. With continued investment in smart metering, improved data accessibility and supportive secondary legislation, Montenegro is well positioned to leverage this infrastructure to enable energy communities. This would allow citizens and local actors to play a more active role in energy production and consumption, reinforcing energy democracy and supporting the country's broader energy transition goals.

The Solar + project (EPCG) represents an important step toward decentralized renewable energy deployment and increased citizen participation in electricity production in Montenegro. By enabling households and other consumers (business buildings and public institutions) to install rooftop photovoltaic systems under simplified and financially accessible conditions, the project has contributed to the rapid growth of prosumers and increased public awareness of renewable energy technologies. However, despite these positive effects, the Solar + project (EPCG) does not constitute a renewable energy community model. Participation remains largely individual, with prosumers acting independently rather than collectively. Nevertheless, the project can be seen as a precursor to renewable energy communities, as it builds technical capacity, normalizes citizen involvement in energy production, and creates a base of prosumers who could later be organized into collective structures—provided that adequate secondary legislation and supportive policies are introduced.

[22] chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://assets.publishing.service.gov.uk/media/67dc3855cb8c6838d74b4ff8/barriers-to-community-energy-projects-government-response.pdf

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Over 4,500 households accessed energy efficiency upgrades, including solar, via United Nations Development Programme (UNDP)-supported models with no upfront costs repaid through bills. UNDP has supported Montenegro through innovative financing and implementation models aimed at improving energy efficiency in residential buildings, public institutions, and vulnerable households. While primarily focused on energy efficiency rather than energy production, this approach offers valuable lessons for the future development of renewable energy communities in Montenegro—particularly in terms of risk-sharing, upfront cost reduction, and social inclusion.

Montenegro's experience shows that early investment in infrastructure, awareness, and prosumer support is a necessary foundation for energy communities.

Best Practice Example

Montenegro has established an initial legal framework for renewable energy communities through the RES Law, which recognizes prosumers and REC as key actors in the energy transition. The law allows self-consumption, collective participation and access to support schemes, while recent investments in smart metering and digital infrastructure provide the technical basis for community energy models. Although secondary legislation is still pending, the existing framework represents an important structural foundation.

Support mechanisms in Montenegro combine auction-based incentives, utility-led rooftop solar programs such as Solar + (EPCG), innovative financing models supported by international partners, notably UNDP and smart metering installation (CEDIS). These instruments have reduced upfront investment costs, expanded access to renewable technologies and encouraged citizen participation. While financing remains largely individual, these models demonstrate how risk-sharing and bill-based repayment schemes could be adapted to collective energy community projects.

The current approach has led to a rapid increase in prosumers, improved energy efficiency for thousands of households and greater public awareness of renewable energy. These outcomes contribute to decentralisation, social inclusion and increased acceptance of renewable energy projects. With the introduction of clear secondary legislation and targeted community-focused incentives, Montenegro's existing structures could evolve into a fully functional national model for renewable energy communities, supporting energy democracy and long-term energy transition goals.

Results of the NRGCOM Pilot Project

Within the NRGCOM project, FORS Montenegro implemented pilot actions in Montenegro from December 2024 to June 2025 under Activities 2.3 and 2.4. The interventions combined public awareness raising (with a strong focus on youth) and capacity building for key stakeholders (local authorities, public institutions, civil society, companies and educational actors) to strengthen readiness for the establishment and functioning of Renewable Energy Communities / Energy Communities of Citizens (RECs).

These actions addressed key local challenges relevant for citizen energy communities, including low public awareness, limited understanding of the REC concept and its benefits, lack of practical know-how, and persistent concerns related to financial feasibility and implementation procedures.

Activity 2.3 – Launching of an awareness raising pilot action to increase motivation and test the willingness of the general public to create or join energy communities

Activity 2.3 included:

- 13 educational workshops for secondary school students in Nikšić on energy efficiency and renewable energy sources (294 participants), delivered by Olivera Lučić.
- A social media outreach effort on organisational channels to inform the public about the project and promote energy efficiency, renewables and energy communities (with a plan for expanded outreach in the following period).
- Development and distribution of a brochure on energy efficiency, renewable energy sources and energy communities
- TV and radio appearances on TV Nikšić and Radio Nikšić on 30 December 2024, presenting the project and highlighting the role of education and citizen engagement in the energy transition

Final results and contribution to solving local problems:

Activity 2.3 achieved a measurable outreach effect by combining education, media visibility and communication tools, and it helped reduce one of the main local barriers to citizen energy communities: insufficient awareness and understanding among citizens.

Key results include:

- Increased awareness and knowledge among youth on rational energy use, energy efficiency measures and renewable energy options, with energy communities introduced as a practical model for joint citizen action.
- Strengthened public visibility of the topic through local media and social media channels, contributing to broader understanding of why energy efficiency and renewables matter at household and community level.
- Creation of reusable awareness materials (brochure content) to support continued outreach and easier access to basic information for citizens.

In terms of contribution to local problems, the pilot action supported behavioural and social preconditions for RECs by:

- building energy literacy among young people (with potential spillover to households and communities),
- increasing readiness of the general public to engage with the concept of collective renewable energy solutions, and

- establishing stronger communication foundations for subsequent steps where citizens will need clear, accessible information to consider participation in energy communities.

Activity 2.4 – Launching of an awareness raising pilot action to assess and increase the engagement of stakeholders through professional trainings

Activity 2.3 included:

- An online webinar on Energy Communities of Citizens on 24 April 2025 (31 participants), delivered by Nihad Harbaš (energy expert from Bosnia and Herzegovina), covering: the concept and benefits of energy communities, steps to establish a community, legislative frameworks in Montenegro and the EU, technical solutions and regional/EU good practices, and financing models (including public/private options and joint investment approaches).
- An in-person workshop in Nikšić on 30 April 2025 (31 participants), including presentations from a FORS representative, a representative of the Ministry responsible for energy efficiency and energy policy, and a civil society speaker presenting good practice examples.
- A study visit to Croatia from 9–13 June 2025 (8 participants) with meetings and presentations by relevant institutions and organisations working on energy transition and community-based energy initiatives, including examples of operational community models and renewable energy projects.

Final results and contribution to solving local problems:

Activity 2.4 strengthened local capacities and created a stronger enabling environment for the practical development of citizen energy communities by addressing local gaps in knowledge, implementation readiness and access to practical examples.

Key results include:

- Improved understanding among stakeholders of the organisational, legal, technical and financing dimensions of energy communities, supporting clearer orientation on what is required to launch a REC in Montenegro.
- Strengthened stakeholder networking across sectors (public institutions, local government, civil society, business and education), which is critical because energy communities depend on cooperation, trust and coordinated local action.

- Transfer of practical know-how through good practice examples and direct exposure during the study visit, helping participants move from abstract interest to more concrete understanding of feasible models and implementation pathways.

In terms of contribution to solving local problems, the capacity-building actions:

- helped reduce uncertainty related to procedures, governance and regulatory interpretation, which is frequently cited as a barrier for initiating RECs,
- increased readiness to explore local pilot initiatives by demonstrating real-world community models and financing approaches, and

- clarified the types of support still needed locally (especially guidance on step-by-step implementation, feasibility planning, and financing/incentives), thereby informing future interventions and policy dialogue.

Policy Recommendations

Despite legal recognition, energy communities are still not operational in practice in Montenegro. Although the law defines their existence, the necessary secondary legislation—covering issues such as financing models, market participation, grid access and governance—has not yet been fully adopted or implemented. On the positive side, Montenegro's legal framework allows REC to participate in auction-based incentive schemes and certain EU funding programs are accessible to Montenegrin citizens and local initiatives. To transition toward a fully functional community energy model, targeted secondary regulation, collective financing schemes and incentives for joint participation are required.

The secondary legislation should clearly define:

- rules on ownership, governance, and decision-making within RECs,
- detailed procedures for licensing, permitting, and registration,
- explanation regarding tariff structures, network charges and the allocation of costs and benefits among REC members,
- local rules and operational procedures, and
- coordination of responsibilities between energy institutions.

Legislative and administrative barriers in Montenegro—including incomplete secondary regulation, unclear market rules, complex administrative procedures and limited tailored support—significantly constrain the development of energy communities. Addressing these challenges through targeted secondary legislation, streamlined permitting, clear market participation rules and dedicated financial and technical support is critical for enabling collective renewable energy initiatives, enhancing citizen participation and advancing the country's energy transition.

Apart from legal gaps it is recommended to enhance institutional support, awareness-raising and capacity-building at the local level will be essential to transition from individual prosumer schemes toward fully functional energy communities. It could help citizens understand the benefits and potential of REC, thereby building grassroots support for renewable energy initiatives. In addition, establishing partnerships with experienced REC organisations in neighbouring countries could provide valuable knowledge and technical assistance, speeding up REC development and contributing to the creation of a local culture of sustainable energy production.

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Annex 9 – National Compendium of REC Status and Implementation in Romania

Starting Position and Regulatory Foundation

National Energy Profile

Romania ranks 16th in the Climate Change Performance Index (CCPI)[23]. The country receives high ratings in GHG Emissions and Energy Use and low in Climate Policy and Renewable Energy.
The CCPI country experts recognise several positive developments since the Long-Term Strategy (LTS) was adopted in late 2023. For instance, the potential for offshore wind generation in the Black Sea has finally been acknowledged, with major policy changes now planned to account for this potentially transformative renewable expansion. The National Recovery and Resilience Plan (NRRP) includes a coal phase-out date and obligates the government to accelerate the rollout of solar and wind nationwide. Nevertheless, the experts highlight the deficits still shaping the character of the LTS, with current targets still allowing GHG emissions of 3 MtCO2eq in 2050.

Romania has set the objective of achieving a 30.7% share of energy from renewable sources in gross final energy consumption by 2030, considering national circumstances, compared with the shares of 24.4% achieved in 2020 and 23.6% achieved in 2021. The latest available data show an increase to 25.8% in 2023[24].

Romania's energy mix still relies heavily on fossil fuels, mainly oil and gas. A 2032 phase-out goal has been set for coal. No phase-out dates have been set for gas and oil. The country plans to use gas as a transition fuel; therefore, many investments in fossil gas are still planned through various strategic or programmatic documents.

[23] https://ccpi.org/country/rou/

[24] https://www.eea.europa.eu/en/europe-environment-2025/countries/romania/renewable-energy-sources

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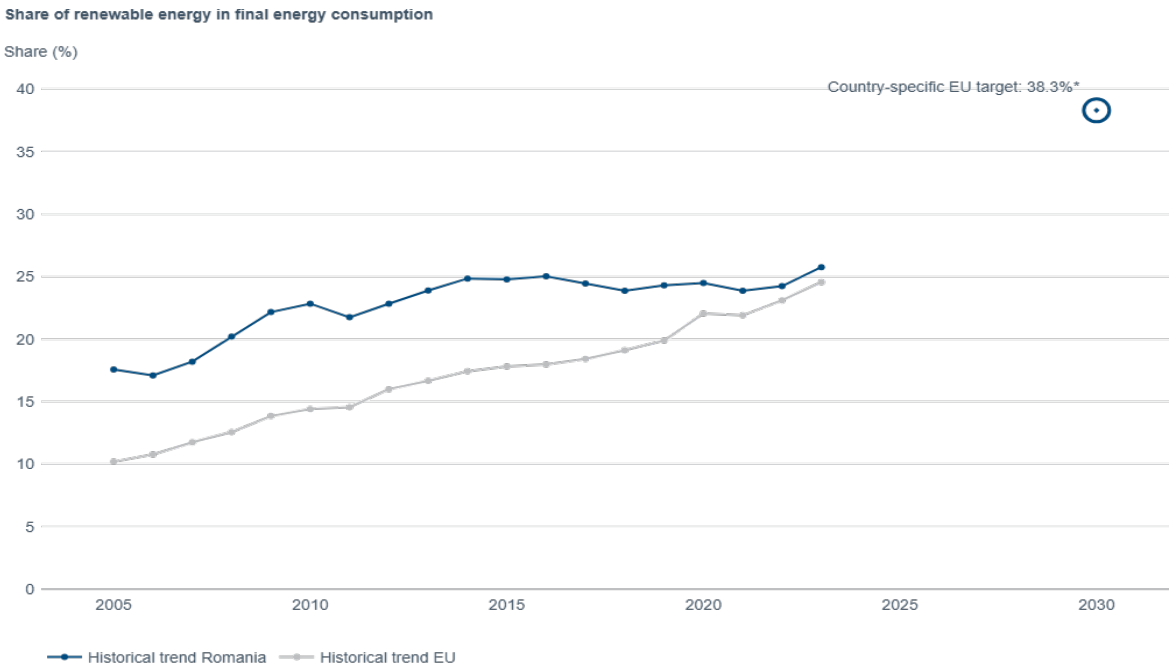
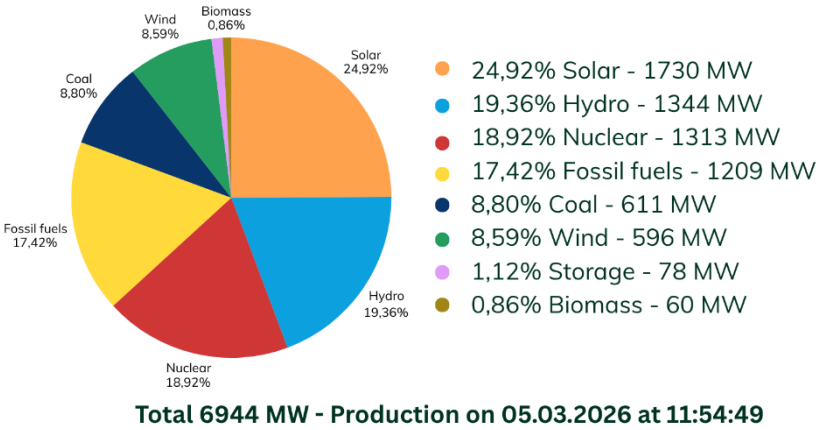


Hydropower is currently Romania's main source of renewable energy, representing approximately 34% of final electricity consumption. In 2023, the installed capacity of wind power plants was 3026,91 MW, or 16% of the net installed capacity, but contributed only 13% to total electricity production, due to variability. At the beginning of 2024, the net installed capacity of solar sources was 1624 MW, up from 1185 MW in 2023. In 2023, only 0.69% of the electricity produced in Romania came from biomass, bioliquids, biogas, waste and/ or waste and sludge fermentation gases, totalling 118 MW of installed capacity. The use of geothermal energy is still limited in Romania[25].

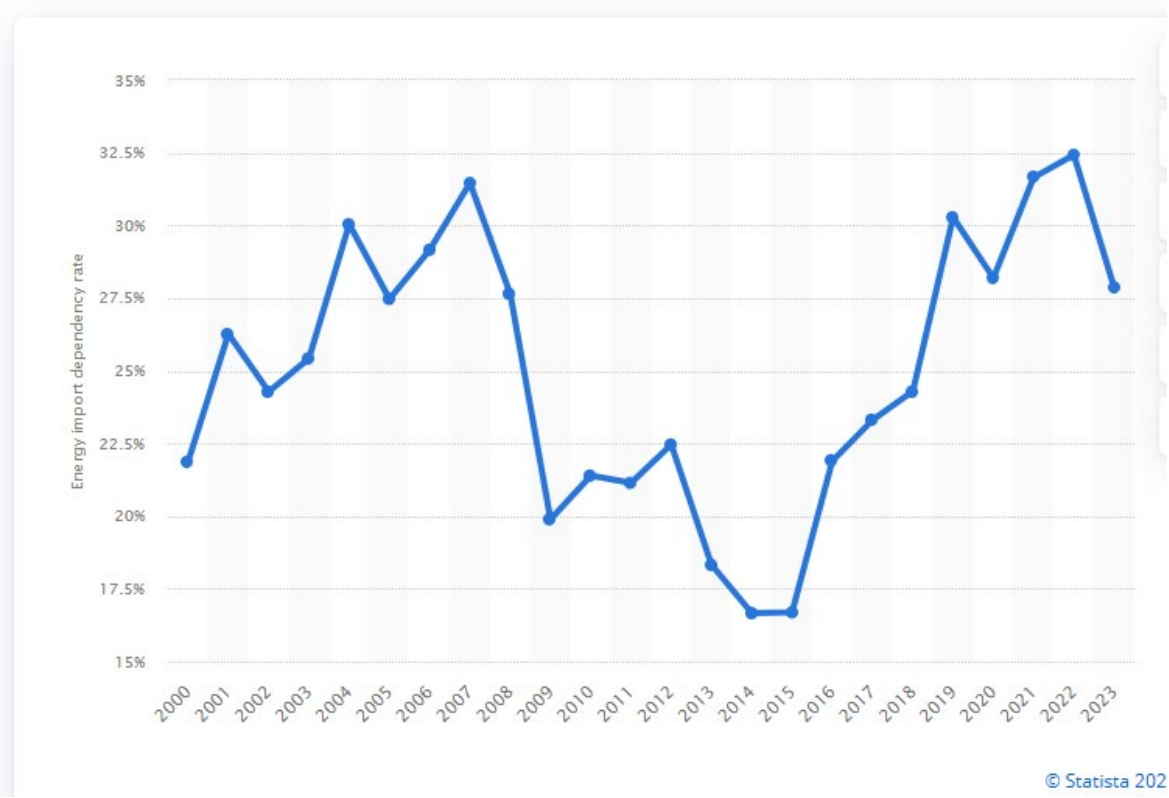


[25] https://www.eea.europa.eu/en/europe-environment-2025/countries/romania/renewable-energy-sources?activeTab=658e2886-cfbf-4c2f-a603-061e1627a515

The Renewable Energy Directive provides citizens who produce their own renewable energy with a clear right to consume, store or sell their generated energy. Small-scale installations for the production of electricity from renewable sources consisted of approximately 40000 prosumers in 2022 (higher numbers for 2026[26], almost 300.000 prosumers), with an installed capacity of 417 MW in 2022 (estimated at 3.400 MW for 2026), which is rather low compared with that in other Member States with similar economies.

Dependency rate on energy imports in Romania from 2000 to 2023[27]

In 2023, energy imports accounted for nearly 28%[28] of Romania's total energy needs. The import dependency rate, which is calculated as net imports of energy divided by gross available energy, was at nearly 22% back in 2000.



Romania became a net electricity importer in recent years[29]. An analysis of Transelectrica's data[30] for the whole of 2025 show that Romania was a net importer for approximately 72% of the time. In the data set analyzed, approximately three-quarters of the time shows consumption

[26] https://asociatiaprosumatorilor.ro/situatia-reala-a-prosumatorilor-si-a-comunitatilor-de-energie-din-romania/
[27] https://www.statista.com/statistics/691184/dependency-on-energy-imports-in-romania/
[28] https://www.destatis.de/Europa/EN/Country/EU-Member-States/Romania
[29] https://www.energynomics.ro/en/when-the-wind-blows-romania-imports-less-the-lesson-of-2025
[30] SENGrafic

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higher than domestic production, a difference covered by cross-border exchanges. On average, Romania needed about 444 MW to supplement from outside. Beyond the fact that Romania imports frequently, it is worth noting that we import in a way that follows very clear patterns. Significant import episodes are not spread evenly throughout the calendar, but occur almost exclusively in the evening hours, when consumption rises rapidly and solar production disappears almost completely.

Trade balance[31] **-** In 2024, Romania exported a total of $693M in electricity, primarily to Hungary, Ukraine and Moldova. During the same year, Romania imported $1.56B in electricity, mainly from Hungary, Bulgaria and Serbia.

Romania is partially self-sufficient in **gas**, but still structurally dependent on imports for peak demand. In 2021, Romania was the EU country least dependent on natural gas imports[32]. The rate of dependence of the European Union on natural gas imports decreased slightly in 2021, to 83%, from 84% in 2020, but Romania is the member country with the lowest dependence on natural gas imports (24%), according to data released by Eurostat. Romania's gas imports increased by 75% in 2025[33] compared to 2024. A reduction trend is expected, with a more pronounced pace around 2027 (minus 6%), in line with the advance in production, through the entry into operation of new capacities, but also taking into account the maintenance of transit to foreign markets.

Legal Framework

Romania's legal framework for Energy Communities is currently in a phase of active development and alignment with EU legislation. Romania has formally adopted the key EU definitions of CECs and RECs through Government Emergency Ordinance (GEO) no. 143/ 2021 and 163/2022, which transpose the provisions of the Electricity Market Directive (EU) 2019/ 944 and the Renewable Energy Directive (EU) 2018/2001 (RED II). More recently, GEO no. 59/ 2025 was adopted to address gaps in the initial transposition and to incorporate elements of the revised Renewable Energy Directive (RED III). While these legislative steps establish a clear legal recognition of ECs, their practical implementation remains incomplete, as several aspects depend on secondary legislation that is still under development. Complementary measures, such as GEO no. 92/ 2024 establishing a network of One-Stop-Shops, aim to support stakeholders by providing information and technical assistance, including for the creation and operation of ECs. However, certain structural elements, most notably a national register of Energy Communities, are still pending, with implementation expected as soon as possible.

Romanian law requires ECs to operate as legal entities, while allowing flexibility in the choice of legal form, provided that core EU principles are respected. In particular, the selected structure must enable democratic governance, ensure effective control by members or shareholders and align with the social and environmental objectives specific to ECs. Both newly established entities

[31] https://oec.world/en/profile/bilateral-product/electricity/reporter/rou

[32] https://www.energynomics.ro/en/romania-is-the-eu-country-least-dependent-on-natural-gas-imports

[33] https://www.energynomics.ro/en/romanias-gas-imports-increased-by-75-in-2025

and pre-existing organisations may qualify, as long as they adapt their statutes and governance arrangements to meet these requirements.

The legislation distinguishes between for-profit and non-profit legal forms that may be used to establish ECs. Eligible for-profit entities include Limited Liability Companies, Joint Stock Companies, Cooperatives, European Cooperative Societies with limited liability and Small and Medium-Sized Enterprises. Non-profit options include Associations, Foundations, Federations, Local Action Groups and Social Enterprises. Each legal form presents distinct implications for governance and operation. Cooperatives and Associations are generally best aligned with the principle of "one member, one vote," thereby facilitating participatory and democratic decision-making. By contrast, corporate forms such as Limited Liability Companies or Joint Stock Companies offer greater operational flexibility but may pose challenges in ensuring inclusive governance structures. Non-profit entities tend to prioritize community-oriented objectives, although they may face more complex administrative and bureaucratic requirements.

Overall, Romania's legal framework provides a broad and flexible foundation for the development of Energy Communities, but it remains a work in progress. Ongoing regulatory refinements and the adoption of secondary legislation will be essential to ensure full operationalisation and to create a stable and supportive environment for community-led energy initiatives.

Institutional Landscape

The institutional framework supporting Energy Communities in Romania involves a range of national authorities, regulatory bodies, local actors and civil society organisations.

Institution	Type	Role
Ministry of Energy	National authority	Main authority for Energy Communities legislation and policy; aligns national law with EU directives; manages financial support programs; coordinates a dedicated working group including public authorities, regulators and civil society.
National Energy Regulatory Authority	Independent regulator	Creates and enforces rules; sets technical standards; issues licenses; manages grid access, tariffs and market participation; responsible for secondary legislation and developing the national Energy Communities Register.

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Ministry of Environment, Water and Forestry	National authority	Supports renewable energy projects through funding and green subsidies; promotes sustainability and pollution reduction.
Ministry of Investments and European Projects	National authority	Manages Romania's access to EU and national recovery funds; funding available to prosumers and Energy Communities.
Ministry of Development, Public Works and Administration	National authority	Coordinates One-Stop Shops for energy efficiency and renewable energy; provides guidance for individuals, companies, and communities to access funding and technical advice.
Transmission System Operators (TSOs) Transelectrica S.A	Technical operator	Ensure Energy Communities can connect to the electricity grid and manage electricity flows.
Distribution System Operators (DSOs) Electrica Distribuție Enel E-Distribuţie România CEZ Distributie E-ON Distributie	Technical operator	Manage distribution network access and local electricity flows.
Local authorities	Local government	Support permitting, land-use planning and can initiate or support Energy Community projects, especially in rural or smaller municipalities.
Civil society Energy Coalition, Energy Cooperative, Greenpeace Romania, WWF Romania,	**NGOs**	Raise awareness, encourage participation, and support local renewable energy initiatives.

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Energy Cities Romania, Between Neighbours		

Maturity Level and Ecosystem (Established, Emerging, Nascent)

Romania's Renewable Energy Communities (RECs) are currently at a nascent stage of development. Although the EU has encouraged Member States to accelerate community-based renewable energy initiatives, Romania has been slow to translate this ambition into functioning, scalable models, primarily due to the absence of a regulatory framework that enables energy sharing between consumers.

This early stage reflects both regulatory and practical barriers. While Romania has transposed parts of the EU Renewable Energy Directive (RED II), the national framework remains incomplete and restrictive, covering mainly electricity from photovoltaic systems and not yet enabling the broader range of activities envisioned at the EU level. As a result, most initiatives remain exploratory, with local actors still navigating unclear procedures, limited support mechanisms and insufficient technical guidance.

The ecosystem shows early signs of mobilisation, driven by EU funding programs, local pilot initiatives and increasing public interest, but lacks the structural elements of an emerging or established market. There is not yet a critical mass of functioning communities, nor a stable pipeline of projects moving from concept to implementation.

However, Romania's policy environment is expected to evolve and several municipalities and civil society groups are preparing studies, partnership models and early-stage project concepts. With clearer regulation, targeted financial instruments and stronger institutional support, Romania could transition from a nascent to an emerging ecosystem within the next few years.

Analysis of Specific National Barriers

Legislative and Administrative Obstacles

Romania's regulatory framework remains incomplete and restrictive, creating significant barriers for citizens, municipalities and SMEs wishing to establish or operate RECs. The absence of clear rules for energy sharing, governance structures, grid access and financial compensation mechanisms leaves potential community members without the legal certainty needed to invest.

Administrative procedures further complicate the landscape. Stakeholders face fragmented institutional responsibilities, slow permitting processes and inconsistent interpretations of the law. The lack of standardized guidelines, one-stop-shop support or dedicated administrative capacity means that even motivated local actors struggle to navigate approvals, grid connection requests and compliance requirements. Additionally, ongoing debates and delays in Parliament, such as unclear provisions for prosumers and shifting capacity thresholds, create regulatory instability that discourages long-term planning.

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Market and Infrastructure Hurdles

Romania's RECs face significant market-related challenges that slow down their development and limit their ability to scale. The national energy market is still dominated by large, centralized producers and suppliers, leaving little room for community-driven initiatives to participate competitively. Access to financing remains limited, with few tailored financial instruments, guarantees or incentives designed specifically for RECs. At the same time, fluctuating energy prices and the absence of long-term, predictable remuneration schemes make it difficult for communities to build viable business models or attract investment. Potential members lack awareness of the economic benefits of collective energy action, which further reduces demand and slows market uptake.

Infrastructure constraints add another layer of complexity. Romania's distribution grids, especially in rural and peri-urban areas, often lack the capacity to integrate new renewable generation or support bidirectional flows of electricity. Grid operators face their own resource limitations, resulting in slow or inconsistent processing of connection requests. Digital infrastructure for metering, monitoring and managing shared energy flows is still underdeveloped, while smart metering coverage remains uneven. Without modernized grid systems and clear operational protocols, Energy Communities cannot fully participate in energy sharing, flexibility services or local balancing.

Financial and Capacity Gaps

RECs in Romania face significant financial barriers that limit their ability to launch and sustain projects. Access to capital is constrained by the lack of dedicated funding instruments, guarantees or low-interest loans tailored to community-led initiatives. Most potential members struggle to secure upfront investment for renewable installations, feasibility studies or digital infrastructure. Existing national programs tend to prioritize individual prosumers rather than collective models, leaving Energy Communities without predictable financial support or long-term revenue mechanisms. This uncertainty makes it difficult to build bankable projects and discourages private investors from engaging with community-driven energy models.

Capacity gaps further stress these financial challenges. Many local authorities, cooperatives and citizen groups lack the technical, legal and organisational expertise needed to design, manage or operate an Energy Community. There are few advisory services, standardized templates or training programs to guide communities through project development, permitting, governance or grid integration. Distribution system operators also face their own capacity constraints, which slow down technical assessments and connection procedures. Without targeted capacity-building efforts and accessible technical assistance, Romania's Energy Communities remain dependent on external consultants and fragmented knowledge, limiting their ability to mature.

Case Studies and Pilot Capitalisation

Best Practice Example

The Flamingo 50 community, managed by Flamingo Energy, includes 27 active members and more to join. Originating from new residents, the initiative emphasizes collaboration, with 25% funded by the Green House program and 75% privately financing photovoltaic panels. Most residents work from home, leading to high daytime energy use, and 97% rely on electricity for heating, indicating strong potential for achieving energy goals.

To meet these demands, a peri-urban Energy Community like Flamingo 50 would need to install photovoltaic panels with a total capacity of 0,4 MW, requiring an area of approximately 5.000 square meters (0.5 hectares) and an estimated investment of 252.000 EUR.

The Flamingo 50 Energy Community offers valuable lessons for other initiatives by emphasizing the importance of social motivations over solely ecological goals. In Romania, the focus on community resilience and shared benefits has fostered strong engagement among residents, uniting them around collective action. The initiative's non-profit framework ensures that energy goals prioritize long-term well-being over short-term profits, highlighting the effectiveness of a community-focused model. Additionally, Flamingo 50 demonstrates that renewable energy solutions, such as photovoltaic panels, can deliver both financial and environmental benefits. The community aims for energy independence, showcasing the long-term cost savings achievable through local energy solutions. This approach also addresses broader challenges such as energy security and sustainability, particularly in remote areas.

Între Vecini/ Between Neighbours: A model for energy and community building

In 2021, Între Vecini launched a project transforming an urban block into an energy-positive community through local collaboration. The homeowners' association received a grant to install solar panels on the roof for €5,500, generating an average of 729 kWh per month and reducing energy bills. The initiative has also fostered social connections among residents, with a newly landscaped garden serving as a communal space. Initially met with scepticism, the project gained acceptance, bridging divides within the community. This initiative showcases the synergy between energy generation and social cohesion, serving as a replicable model for other communities to enhance both their energy resources and social bonds.

Since 2016, Buteni Commune has thrived under a visionary team led by the mayor. They have secured significant funding for energy projects, including a public lighting modernisation funded by Norwegian grants and the successful "Green House Photovoltaic" initiative, which completed 100 of 200 planned installations. These efforts have attracted €720,000 from national programs and €280,000 in local contributions, showcasing the community's commitment to sustainability and effective resource mobilisation. The efforts have made a significant impact, with 36% of the commune's energy consumption in 2022 covered by local renewable sources, reducing reliance on external energy. Notably, 77% of the energy produced by households and municipal buildings was

surplus, contributing to the national grid and enhancing overall sustainability. Economically, 100 households that adopted solar energy are saving over €100,000 annually on electricity bills, showcasing the financial advantages of local renewable energy.

Results of the NRGCOM Pilot Project

The pilot actions at the national level have helped lay a strong foundation for creating and sustaining Energy Communities in Romania. A thorough analysis of the legal framework clarified existing structures, operational models, and main barriers, while also pointing out ways to improve. This analysis included comparisons and real-life examples, along with input from new initiatives focused on consumer behavior, infrastructure needs and cost efficiency.

Engaging actively with public authorities and national ministries, such as the Ministry of Energy and the Ministry of Environment, Waters and Forests, greatly contributed to overcoming structural barriers. The Ministry of Energy set up a working group on Energy Communities (OER being part of it), which was a key step in developing supportive legislation. Participating in this process, along with creating and sharing policy recommendations, helped address regulatory gaps and improve implementation conditions. These efforts increased dialogue between stakeholders and decision-makers, highlighting the importance of Energy Communities for local energy production and consumption.

At the community level, the pilot actions showed how important awareness, capacity building and accessible tools are for promoting engagement. The results reflect this progress: public events attracted about 65 participants and training sessions included 17 participants from various groups. Outreach efforts expanded the impact, with an educational video gaining hundreds of views and guidance materials reaching at least 25 individuals. A network of 16 national ambassadors also helped promote Energy Communities. Additionally, creating awareness toolkits and communication materials gave project partners practical guidance and resources for citizens, municipalities, and new initiatives. This approach ensures that the knowledge and experience gained from the pilot actions can continue to support the growth of Energy Communities after the project ends.

Policy recommendation for Energy community development based on NRGCOM project experience

Based on the NRGCOM project, a key policy priority for developing Energy Communities is adopting the necessary secondary legislation and implementation measures to support their practical operation. Although the national legal framework has been significantly improved through the transposition of relevant EU provisions and the formal recognition of Energy Communities, important regulatory gaps still exist. Additionally, the absence of a regulatory framework for energy sharing among community members hinders the realisation of one of the main benefits outlined in EU legislation. Therefore, policymakers should prioritise the adoption of secondary legislation, establish clear procedures and responsibilities for relevant market participants, and enable energy-sharing mechanisms to fully unlock the potential of citizen-led energy initiatives:

1. Adopt ANRE's pending secondary legislation to operationalize procedures for grid connection, energy sharing, metering and registration.

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2. Standardize administrative procedures and ensure equal treatment for all legal forms: Cooperatives, Associations, Foundations and SMEs.
3. Promote democratic governance principles such as “one member, one vote” across both profit and non-profit entities. Strengthen participatory governance requirements and ensure access for vulnerable households.
4. Introduce flexible grid and network tariffs that recognize the system and community value of distributed generation.
5. Enable Virtual Net Metering for energy sharing among dispersed members and streamline permitting via single electronic platforms.
6. Support local authorities and NGOs with training, technical guidance and funding to initiate and manage projects.
7. Individual prosumers benefit from compensation schemes and legal gaps, making Energy Community participation unattractive. To address this, link access to non-reimbursable renewable energy funding to Energy Community involvement and adjust regulations to prevent individual profit-seeking from undermining community goals.
8. Coordinate with TSOs and regional DSOs to ensure safe grid connections, stable electricity flows and participation in balancing markets.
9. Support long-term infrastructure upgrades to accommodate distributed generation from community projects.

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Annex 10 – National Compendium of REC Status and Implementation in Serbia

Starting Position and Regulatory Foundation

National Energy Profile

Serbia's energy system is historically characterized by a high reliance on coal (lignite) and hydropower, with a growing but still moderate share of renewable energy sources beyond large hydro.

Key characteristics:

- Electricity generation is dominated by lignite-based thermal power plants.
- Large hydropower represents the main renewable electricity source.
- Solar and wind capacity have increased in recent years, but remain significantly below EU averages per capita.
- Serbia remains partially dependent on electricity imports during peak demand periods.
- Natural gas import dependency is high.

Renewable energy share:

- Renewable energy sources account for approximately one quarter to one third of gross final energy consumption (depending on methodology and inclusion of large hydro).
- Solar PV share is still comparatively low but growing rapidly following the introduction of the prosumer framework.

Implication for community energy:

- High fossil dependency and import exposure create structural justification for decentralized renewable production.
- Distributed PV and future energy communities could reduce import dependency, increase resilience and support local economic value creation.

Legal Framework

Serbia has adopted the Law on the Use of Renewable Energy Sources (2021), which regulates renewable electricity production, support mechanisms, and the prosumer model. The law

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establishes market-based support instruments such as market premiums and feed-in tariffs and formally introduces renewable energy concepts aligned with EU energy policy.

The Energy Law regulates overall energy market functioning, licensing, grid operation, and the role of the Energy Agency of the Republic of Serbia (AERS).

While renewable energy production and prosumer participation are legally operational, Renewable Energy Communities (RECs) are not yet fully operationalised, as secondary legislation defining:

- REC registration procedures
- Internal energy-sharing mechanisms
- Grid settlement and billing rules
- Governance compliance criteria

has not yet been adopted.

Therefore, Serbia currently operates in a pre-operational REC regulatory environment.

In the absence of REC-specific bylaws, preparatory community energy structures can be established under the Law on Associations as non-profit entities, structured to enable future transition into formally registered RECs once secondary legislation enters into force.

Institutional Landscape

The institutional framework relevant for REC development includes:

- Ministry of Mining and Energy
- Ministry of Environmental Protection
- Energy Agency of the Republic of Serbia (AERS)
- Distribution System Operator (Elektrodistribucija Srbije – EDS)
- Local self-government units
- Regional development agencies

Currently, Serbia does not have a dedicated national REC coordination body or operational support platform for community energy initiatives.

Maturity Level and Ecosystem (Established, Emerging, Nascent)

Serbia's REC ecosystem is classified as Emerging.

Key characteristics:

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- Primary legislation acknowledges renewable energy concepts.
- Prosumer model is operational.
- No formally registered Renewable Energy Communities exist.
- Growing stakeholder interest among municipalities, citizens, and industrial actors.
- EU-funded initiatives (including NRGCOM) have significantly increased awareness and institutional readiness.

Estimated number of operational RECs: 0 formally registered as of the reporting period.

Analysis of Specific National Barriers

Legislative and Administrative Obstacles

- Absence of REC-specific secondary legislation.
- Undefined energy-sharing and internal allocation rules.
- Lack of formal REC registration procedure.
- Administrative uncertainty regarding DSO coordination.
- No standardised REC documentation templates.

Market and Infrastructure Hurdles

- Grid capacity constraints in certain regions.
- Limited smart metering penetration.
- Lack of digital infrastructure for multi-member energy allocation.
- Historically centralised electricity system structure.

Financial and Capacity Gaps

- No dedicated national financial instruments for RECs.
- Limited access to concessional financing for small community PV systems.
- Limited municipal-level expertise in cooperative energy governance.
- Limited experience with collective energy ownership models.

Case Studies and Pilot Capitalisation

Although Serbia does not yet have formally registered Renewable Energy Communities due to the absence of enabling secondary legislation, important preparatory and market-based developments demonstrate structural readiness for community energy implementation.

The prosumer framework introduced under the Law on the Use of Renewable Energy Sources has enabled individual households and companies to install solar photovoltaic systems for self-consumption. This has demonstrated:

- Technical feasibility of distributed generation
- Administrative operability of small-scale grid integration
- Growing public interest in renewable self-consumption
- Institutional learning within DSOs and regulatory bodies

These developments provide a functional foundation upon which Renewable Energy Communities can be operationalised once the regulatory framework is completed.

Best Practice Example

While no formally registered Renewable Energy Communities currently operate in Serbia, the prosumer model represents the closest existing structural precedent for decentralized renewable participation.

Under this model:

- Households and legal entities may install rooftop PV systems
- Grid connection procedures are operational
- Metering and settlement mechanisms function at individual level
- Self-consumption significantly reduces electricity costs
- Regulatory procedures for distributed generation are established

The prosumer framework demonstrates that:

- Distributed renewable integration is technically viable
- Administrative capacity exists within national institutions
- Financial returns for small-scale renewable investments are achievable

This experience significantly lowers the institutional and operational barrier for the future activation of multi-member Renewable Energy Communities.

Results of the NRGCOM Pilot Project

Within NRGCOM, REDASP developed two preparatory pilot models:

- Residential model – Šumadijski Kutak (Aranđelovac)
- Industrial model – MIND Park (Kragujevac)

Achievements include:

- Structured REC development roadmaps (Preparation–Activation–Implementation phases)
- Draft Statutes and Internal Rules compliant with Serbian legislation
- Democratic governance structures designed for REC transition
- Stakeholder mobilisation and sustained engagement
- Institutional communication with relevant ministries
- Indicative PV sizing and consumption coverage estimates based on national benchmarks

Although formal REC registration was not possible, the pilots demonstrated:

- High stakeholder readiness
- Legal adaptability through association model
- Transferable roadmap methodology
- Capacity-building impact at local level

These results significantly reduce activation time once secondary legislation is adopted.

Policy Recommendations

Legislative

1. Urgent adoption of REC-specific secondary legislation.
2. Clear definition of internal energy-sharing mechanisms.
3. Establishment of simplified REC registration procedure.
4. Standardised documentation templates and guidance.

Administrative

5. Clear operational guidelines for DSOs.
6. Digitalised settlement and billing framework for shared generation.
7. Establishment of a national REC coordination focal point.

Financial

8. Dedicated funding instruments for community energy.
9. Blended financing models (grants + soft loans).
10. Municipal co-financing schemes for pilot REC initiatives.

Capacity-Building

11. National awareness campaigns.
12. Training programmes for municipalities and RDAs.
13. Expansion of REC ambassador networks.

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Annex 11 – National Compendium of REC Status and Implementation in Slovakia

Starting Position and Regulatory Foundation

National Energy Profile

Trends on the market and industry: modern solutions of energetic industrial productions based on RES are connected to the application of one, or a combination of various RES, mainly biomass, geothermal energy and thermal, water and sea energy, solar and photovoltaic power, concentrated solar and thermal power, solar heating and cooling, wind power.

As a matter of fact, there are no existing (except some experimental solutions for small customer sites) functional energetic economies based only on RES, but those are in all cases an advisable combination of those sources with the conventional sources of energies (CES) such as electric power plant/heating plant running on gas, coal, atom and oil products – fossil fuels, which are still essential for the stability and security of electric power supply and heat mostly in the industrially developed countries and whose exceptionally high consumption cannot be today covered by RES and even in long-term perspective with a significant (more than 50%) volume).

This is a key outcome and knowledge for conception of any meaningful RES solution and application. Until 2030 will the orientation trajectory achieve at least the planned contribution of a membership country.

Specification of RES in the conditions of the Slovak Republic's industry

In November 2014, the Government of the Slovak Republic approved the Energy Policy (EP SR), which set the goals and priorities of the energy sector until 2035 with a view to 2050. The strategic goal of the EP SR is to achieve a competitive low-carbon energy sector ensuring a safe, reliable and efficient supply of all forms of energy at affordable prices, taking into account consumer protection and sustainable development. In 2019, the Slovak Republic committed to achieving carbon neutrality by 2050. The Slovak Republic has a balanced share of nuclear fuel and fossil fuels in gross domestic consumption. The development of the Slovak Republic's energy sector is focused on optimizing the energy mix so that greenhouse gas and pollutant emissions are reduced as much as possible while maintaining or increasing energy security and the affordability of individual types of energy. The Slovak Republic proposes a target of 19.2% in 2030, which is an increase of 5.2% compared to the target for 2020.

Based on the requirement of Article 4(2) of the Regulation, the reference points of the indicative trajectory for the years 2022, 2025 and 2027 for the 19.2% target are set at 14.94%, 16.24% and 17.38%. Specifically, the indicative RES trajectory for Slovakia starts with a value of 14% already in 2020. Table 1 describes the estimated RES trajectories in our country until 2030.

The concrete orientation RES trajectory for Slovakia starts with a 14% value already in 2020. Tab 1 describes the estimated RES trajectories in our country until 2030.

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Tab 1: Estimated RES trajectories

Years 20....	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
% RES – production of heat and coolness	13,0	14,3	14,6	15,2	16,1	16,7	17,5	18,1	18,5	19,0
% RES – production of electricity	22,4	23,4	23,9	24,4	24,8	25,9	26,4	26,7	27,0	27,3
% RES – transportation and distribution including multiplication	8,3	8,5	8,6	8,7	9,0	9,5	10,1	10,9	12,6	14,2
% Aggregated RES ratio	**14,0**	**15,0**	**15,4**	**15,8**	**16,4**	**17,1**	**17,8**	**18,2**	**18,7**	**19,2**

The first control year 2022 appeared to be problematic from the start, when a significant increase was planned compared to the assumptions for 2020 and 2021. There was also a risk for 2020 that the binding target of 15% would not be met. In the area of RES, preliminary long-term analyses show that the total investment intensity in achieving the RES targets will be 4.3 billion Euros for 19.2%. The RES Directive also sets an indicative target in the form of an indicative value of 1.3 percentage points as an annual average for the period 2021 to 2025 and 2026 to 2030. This indicative value is reduced to 1.1 percentage points if waste heat and cold are not used.

The indicative values reach an annual average level of 1.3% and 1.4% in the long term.

We consider achieving higher growth or calculating the total heat consumption in technological processes in industry to be very problematic from the perspective of the annual installation and replacement of equipment using RES.

Legal Framework

Energy Community (SE) and Energy Association (SME)

The definition of both terms is contained in the new § 11a, which transposed two directives into national legislation at once, namely Directive (EU) 2019/944 of the European Parliament and of the Council of 5 June 2019 on common rules for the internal market for electricity (the term 'Energy Community') and Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources (the term 'renewable energy community').The very concept of Energy Community and a renewable Energy Association is understood by Slovak legislation as (source SIEA):

The Energy Community shall be a legal entity

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(a) which is established for the purpose of generating electricity, supplying electricity, sharing electricity, storing electricity, aggregating activities, distributing electricity, operating a recharging station or performing other activities or providing other services related to meeting the energy needs of its members or associates (hereinafter referred to as "Member") with a view to realising environmental, economic or social community benefits;

(b) which does not carry out the activities referred to in subparagraph (a) for profit,

(c) which may be joined, acquired or other way become a member, and from which participation may be withdrawn, terminated or the membership can be cancelled by decision of a member; and

(d) members, who alone or jointly with other members may exercise control in an energy community, are only individuals, small enterprises and higher territorial units or municipalities in the territorial self-administration district in which the Energy Community has its settlement.

It follows that the Energy Community ('the Community') will be arisen as soon as the abovementioned mandatory conditions have been fulfilled. The formation of a community entitles it to exercise the rights and obligations laid down in § 35a, i.e. to procure, produce, store and supply or share electricity to its members, to carry out aggregation activities for its members or to operate a charging station.

However, the Community may not carry on with the business for making profit; it must be express the services it provides to its members. Members of the community can be individual persons, small enterprises, municipalities or self-governing region in the territorial district of the self-governing region in which the community has its seat. A community producing energy from renewable energy sources is also considered a community within the meaning of § 11a par. 3 of the Energy Act of the Slovak Republic.

A renewable energy association is a legal entity:

(a) which is based for the purpose of producing electricity from renewable energy sources or biomethane, and which may at the same time be established for the purpose of supplying electricity or gas, sharing electricity from renewable energy sources or biomethane, storing electricity from renewable energy sources, aggregation, electricity distribution, operating a recharging point or performing other activities or providing other services related to meeting the energy needs of its members, in order to with a view to realising environmental, economic or social community benefits;

(b) which does not carry out the activities referred to in subparagraph for profit,

(c) which may be joined, acquired or otherwise become a member, and from which participation may be withdrawn, terminated or membership by decision of a member;

(d) whose members are only natural persons, small and medium-sized enterprises;28(b) higher territorial units or municipalities in the territorial self-administration district in which the renewable energy community is located; and

(e) whose members allowed, individually or jointly with other members, to exercise control in a renewable energy community, reside or have their permanent residence or seat in the territorial area in which the renewable energy installation or biomethane installation owned by the renewable energy community, or most of such installations, is located; if a renewable energy

community If a superior territorial unit cannot be determined according to the previous sentence, it shall be determined by the location of the renewable energy community.

Thus, a renewable energy Association is based on the production of electricity from renewable energy sources and the production of biomethane, and at the same time can be established for the purpose of supplying, sharing or storing electricity or gas, aggregation, distribution or operation of a charging station. Like the Energy Community, the Energy Community cannot conduct business for profit.

Unlike the Community, members of an Association can be not only small but also medium-sized enterprises (as defined in Article 2(1) of Annex I to Regulation No 651/2014). At the same time, the same applies as for a community, i.e. that the formation of a community entitles it to exercise the rights and obligations laid down in Section 70a of the Energy Act.

The essential thing is that members of the Energy Community can only be members who have permanent residence or registered office in the territory of the regional area in which the electricity or biomethane production facility is located.

An energy community producing energy from renewable sources is a legal entity,

a) which is established for the purpose of producing electricity from renewable energy sources or biomethane and which may also be established for the purpose of supplying electricity or gas, sharing electricity from renewable energy sources or biomethane, storing electricity from renewable energy sources, carrying out aggregation activities, distributing electricity, operating a charging station or performing other activities or providing other services related to ensuring the energy needs of its members with the aim of realizing environmental, economic or social community benefits,

b) which does not carry out activities pursuant to letter for the purpose of making a profit,

c) which can be joined, acquired a share or otherwise become a member, and from which it is possible to withdraw, terminate participation or membership based on a member's decision,

d) whose members are only natural persons, small and medium-sized enterprises, higher territorial units or municipalities in the territorial district of the higher territorial unit in which the community producing energy from renewable energy is located resources, and

e) whose members entitled individually or jointly with other members to exercise control in the renewable energy community have their permanent residence or registered office in the territory of the higher territorial unit in which the renewable energy electricity generation facility or the biomethane production facility owned by the renewable energy community is located, or the majority of such facilities, if the renewable energy community produces electricity or gas in several such facilities; if the higher territorial unit cannot be determined according to the previous sentence, it shall be determined according to the seat of the renewable energy community.

A renewable energy community is therefore established for the production of electricity from renewable energy sources and the production of biomethane and may at the same time be established for the purpose of supplying, sharing or storing electricity or gas, carrying out aggregation, distribution or operating a charging station.

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Like an Energy Community, an Energy Community cannot carry out business activities for the purpose of making a profit.

Unlike a community, members of a community can be not only small but also medium-sized enterprises (as defined in Article 2(1) of Annex I to Regulation No. 651/2014). At the same time, the same applies as for a community, i.e. the establishment of a community entitles it to exercise the rights and obligations set out in Section 70a of the Energy Act.

The essential point here is that members of an Energy Community can only be those members who have a permanent residence or registered office in the territory of the regional area in which the electricity or biomethane production facility is located.

Among the crucial supporting regulations in the field of energy with regard to energy communities are the following:

1. Act No. 251/2012 Coll. of 31 July 2012 on Energy and on Amendments to Certain Acts.

This law regulates:

(a) conditions for doing business in the energy sector,

(b)market access, rights and obligations of energy market participants; (c) measures aimed at ensuring security of electricity and gas supply and the functioning of the internal electricity and gas markets.

(d) the rights and obligations of persons whose rights and obligations may be affected by energy market participants.

e) performance of state administration in the energy sector,

f) performance of state supervision and control over energy business. The definition of the two concepts of Energy Community and Energy Community examined is contained here in the new § 11a, which transposed into national legislation simultaneously two directives, namely Directive (EU) 2019/944 of the European Parliament and of the Council of 5 June 2019 on common rules for the internal market for electricity (the term 'energy community') and Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources (the term 'Renewable Energy Community').

1. Act No. 251/2012 Coll. of 31 July 2012 Act on Energy and on Amendments to Additions to Certain Acts.

This law regulates:

(a) the conditions for doing business in the energy sector,

(b) market access, rights and obligations of market participants in the energy sector,-(c) measures to ensure security of electricity and gas supply and the functioning of the internal electricity and the internal market for gas,

(d) the rights and obligations of persons whose rights and obligations may be affected by energy market participants;

e) performance of state administration in the energy sector,

f) exercising state supervision and control over business in the energy sector.

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The definition of the two terms under review here, Energy Community and Energy Community is contained in the new § 11a, which transposes two directives into national legislation at the same time, namely Directive (EU) 2019/944 of the European Parliament and the Council of 5 June 2019 concerning common rules for the internal market in electricity (the term "Energy Community") and Directive (EU) 2018/2001 of the European Parliament and the Council of 11 December 2018 on the promotion of the use of energy from renewable sources (the term "Renewable Energy Producing Community").

2. Act No. 276/2001 Coll. on Regulation in Network Industries and on Amendments to Certain Acts, as amended (including Act No. 107/2007 Coll.)

This amended Regulation Act regulates:

- the subject, scope, conditions and manner of regulation in network industries, - establishment, status and competence of the Regulatory Office for Network Industries,

- defines the functions of the President and Vice-President of the Office - establishes a Regulatory Board

- lays down the terms of the price procedure,

- conditions for the exercise of regulated activities and rights and obligations of regulated entities,

- rules on the functioning of the electricity and gas markets,

- proceedings in cases under this Act,

- administrative offences for breach of the obligations laid down by this Law.

Act No. 657/2004 Coll. of 26 October 2004 on thermal energy

This law regulates:

(a) conditions for doing business in the thermal energy sector,

(b) rights and obligations of heat market participants;

(c) the economics of operation of the thermal installation system;

(d) restrictive measures related to the thermal energy emergency; e) competence of state administration bodies and municipalities and performance of state supervision in thermal energy,

e) competence of state administration bodies and municipalities and performance of state supervision in thermal energy,

(f) the rights and obligations of natural and legal persons whose rights, legally protected interests or obligations may be affected by the exercise of the rights and obligations of heat market participants;

(g) rights and obligations of natural and legal persons in the production of heat in a decentralised heat source.

Act No. 657/2004 Coll. of 26 October 2004 on thermal energy

This law regulates:

(a) conditions for doing business in the thermal energy sector/business conditions in the thermal energy sector

(b) rights and obligations of heat market participants;

(c) the economics of operation of the thermal installation system;

(d) restrictive measures related to the state of emergency in the thermal energy sector;

e) the competence of state administration bodies and municipalities and the exercise of state supervision in the thermal energy sector,

(f) the rights and obligations of natural and legal persons whose rights, legally protected interests or obligations may be affected by the exercise of the rights and bligations of heat market participants;

(g) the rights and obligations of natural and legal persons when producing heat in a decentralised heat source.

Act No. 321/2014 Coll. of 21 October 2014 on Energy Efficiency and on Amendments to Certain Acts (including Act No. 419/2020 Coll. of 1 December 2020)

This law provides:

(a) measures to promote and improve energy efficiency;

(b) obligations when developing concept papers in the field of energy efficiency; (c) the rights and obligations of persons in the field of energy efficiency;

(d) rules for carrying out energy audits;

(e) business in the provision of energy services,

(f) provision of information under this Act.

Act No. 363/2020 Coll. on the Promotion of Renewable Energy Sources

Act No. 363/2022 amending Act No. 309/2009 Coll. on the promotion of renewable energy sources and high-efficiency cogeneration and amending and supplementing certain acts, as amended, also defines the following renewable energy sources as non-fossil energy sources as follows: hydropower, wind power, solar energy, geothermal energy, ambient energy, biomass, biogas, landfill gas, sewage treatment plant gas, and tide, wave and other ocean energy.

Act No. 363/2022 amending Act No. 309/2009 Coll. on the promotion of renewable energy sources and high-efficiency Combined production and Amendments and Additions to certain acts, as amended, also defines the following renewable energy sources as non-fossil energy sources as follows: hydropower, wind energy power, solar energy, geothermal energy, ambient energy, biomass, biogas, landfill gas, gas from wastewater treatment plants and tidal, wave and other ocean energy.

Act No. 17/1992 Coll. Environmental Act (as amended by No. 127/1994 Coll., 287/1994 Coll., 171/1998 Coll., 211/2000 Coll., 332/2007 Coll., 388/2021 Coll.)

The Act defines the basic concepts and establishes the basic principles of environmental protection and the obligations of legal and natural persons in protecting and improving the state

of the environment and in the use of natural resources; In doing so, it is based on the principle of sustainable development and defines the following principles:-The territory must not be burdened by human activity beyond the carrying capacity.

-The permissible level of environmental pollution is determined by limit values laid down by special regulations; These values shall be determined in accordance with the state of knowledge and in such a way that human health is not endangered and other living organisms and other elements of the environment are not endangered.

-Limit values shall be determined taking into account the possible cumulative action or interaction of pollutants and activities. Where, in the light of all the circumstances, it can be assumed that there is a danger of irreversible or serious damage to the environment, there must be no doubt that such damage will actually occur as grounds for postponing measures to prevent it.

It is forbidden to import for the purpose of incineration radioactive waste that was not produced in the territory of the Slovak Republic. Everyone may assert in a

specified manner before the competent authority his rights under this Act and other regulations governing environmental matters.

-Education, education and training are carried out in such a way as to lead to thinking and action in accordance with the principle of sustainable development, to a sense of responsibility for maintaining the quality of the environment and its individual components, and to respect for life in all its forms.

Institutional Landscape

The bodies of the state administration of the Slovak Republic for the performance of the energy regulations of the energy sector and specifically energy communities and associates. The decisive central professional and administrative legislative authorities in the Slovak Republic, competent in decision-making and management of processes relevant to energy management and environmental care, and especially for Energy Communities and Energy Communities, are, in particular:

a) Ministry of Economy of the Slovak Republic

b) Ministry of Environment of the Slovak Republic

c) Slovak Innovation and Energy Agency

d) Slovak Environment Agency

e) Regulatory Office for Network Industries

With precisely defined competencies and activities in accordance with the Programme Declaration of the Government of the Slovak Republic for the given legislative period.

Maturity Level and Ecosystem (Established, Emerging, Nascent)

Currently, the results and numbers of ECs in Slovakia are very variable, there are 7 to 8 established and functioning ECs, and currently, depending on the impacts of the NRGCOM project and PP12-NEK activities and extensive presentation and awareness raising activities, more than 10 new ECs

are being created, mainly in the regions and selected municipalities of Bratislava, Nitra, Trenčín, Prešov, Prievidza and Lučenec.

Current developments and perspectives on energy communities and associations:

The Act on Energy did not oblige either the Ministry of Economy of the Slovak Republic or the Office for the Regulation of Network Industries to draft a special decree in connection with energy companies or communities producing energy from RES. § 14 par. 10 of Act no. 309/2009 Coll. on the support of renewable energy sources, in the version effective from 1/12/2022, includes, within the scope definition, the obligation (or role) of the Ministry of the Economy of the Slovak Republic to create a "support framework for the promotion and facilitation of the development of communities producing energy from renewable sources", through which it will ensure, to:

a) Unjustified legal or administrative barriers to renewable energy communities are removed,

b) The relevant distribution system operator has cooperated with renewable energy communities to facilitate the transmission transfer of energy within renewable energy communities,

(c) Renewable energy communities are subject to non-discriminatory, proportionate and transparent procedures, including registration and licensing procedures, cost reflective network charges and fees, levies and taxes, which ensure that they contribute to the overall cost-sharing in a proportionate, fair and balanced manner.

The above, therefore, currently implies certain ambivalence in action and ambiguity in the further legislative procedure for the introduction and development of energy communities and communities in Slovakia.

Analysis of Specific National Barriers

Legislative and Administrative Obstacles

The legal regulation of energy communities and communities producing energy from RES is still relatively framework. A number of fundamental matters are left to the ÚRSO decree, which should enter into force in the coming months.

Electricity sharing itself is currently not feasible in Slovakia. A prerequisite for the proper sharing of electricity within the energy community, the community producing energy from RES or by active consumers is primarily a functional electronic system displaying individual data, i.e. the Energy Data Centre (EDC).

The launch of the Energy Data Centre is currently planned in two phases. According to the operator of the EDC, which is supposed to be corporation OKTE, a.s., the launch of the first phase is expected to be launched at the end of June this year, and at the beginning of July the basic functionality should be operational in order to allow new market participants to participate in electricity sharing and providing flexibility.

The Ministry of Economy of the Slovak Republic should also help the development of community energy, which is expanding its powers to create a support framework for promoting and facilitating development.

In the course of time, a point of contact for guiding the administrative procedure regarding the establishment, operation and development of energy communities and communities producing

energy from RES should also be established, whose tasks will be fulfilled by the Slovak Innovation and Energy Agency.

Energy communities and communities producing energy from RES are currently a hot topic in which great potential is hidden. In the coming years, we can therefore expect a boom in community energy, which should contribute to increasing energy efficiency and self-sufficiency.

Given that the regulation of energy communities and communities producing energy from RES only defines the basic conditions for their creation and functioning, it can

be expected that other mechanisms and processes will only be created through practice.

Market and Infrastructure Hurdles

Current developments and perspectives on energy communities and associations

The Act on Energy did not oblige either the Ministry of Economy of the Slovak Republic or the Office for the Regulation of Network Industries to draft a special decree in connection with energy companies or communities producing energy from RES. § 14 par. 10 of Act no. 309/2009 Coll. on the support of renewable energy sources, in the version effective from 1/12/2022, includes, within the scope definition, the obligation (or role) of the Ministry of the Economy of the Slovak Republic to create a "support framework for the promotion and facilitation of the development of communities producing energy from renewable sources", through which it will ensure, to:

a) unjustified legal or administrative barriers to renewable energy communities are removed,

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The above, therefore, currently implies certain ambivalence in action and ambiguity in the further legislative procedure for the introduction and development of energy communities and communities in Slovakia.

Financial and Capacity Gaps

Renewable Energy Communities (RECs) in Slovakia and across the Danube Region continue to face significant financial, legal, and capacity-related barriers that limit their development and scalability. Key challenges include restricted access to low-cost financing for municipalities, difficulties in combining grants with private capital, limited availability of community-oriented financial instruments, and the perception of REC projects as high-risk investments. In addition, many local authorities lack the technical expertise, organisational capacity, and practical guidance necessary to initiate and manage community energy projects. The NRGCOM findings demonstrate that legislative frameworks alone are insufficient without accessible financing mechanisms, standardized planning tools, and targeted capacity-building measures. Addressing these gaps is

essential to enable municipalities, SMEs, and citizens to successfully participate in decentralized energy systems and accelerate the energy transition.

Case Studies and Pilot Capitalisation

The NRGCOM project supported the pilot assessment and mentoring of newly established energy communities in Slovakia, including EC-IVANKA and EC–Energetický Holding–Prešovský Region. The evaluations assessed governance structures, legal readiness, stakeholder engagement, operational management, financing preparedness, and implementation progress. Results indicate that both initiatives have successfully established democratic governance models and stakeholder participation mechanisms, while differing in their level of operational maturity. The pilot activities highlighted the importance of continuous mentoring, structured planning, and early stakeholder engagement for successful community development. Lessons learned from these pilot projects provide valuable evidence for the capitalisation of project results and contribute directly to the development of the NRGCOM White Paper, offering practical guidance for future energy community initiatives in the Danube Region.

Best Practice Example

The assessment of successful Slovak energy communities demonstrates that effective community energy development relies on strong local partnerships, democratic governance, continuous stakeholder communication, and a clear energy management strategy. Good practice examples show that communities can successfully organize local renewable energy production, facilitate energy sharing among members, and create environmental, economic, and social benefits for their regions. These initiatives illustrate how municipalities, SMEs, and citizens can cooperate within legally established community structures to enhance energy independence, reduce costs, and increase local resilience. The experience gained through these projects confirms that community-led energy models represent a viable pathway for implementing decentralized renewable energy solutions in Slovakia.

As part of the NRGCOM project, PP12-NEK has so far presented two examples of good practice for already functioning energy communities with an energy mix of renewable energy production and distribution, namely: EK-TEEK and EK SOM_EKO. Details of the pilot testing of the methodology and evaluation of the results of the activities to date are presented in detail in A.T.3.4 and A.T.3.2.

Results of the NRGCOM Pilot Project

The NRGCOM pilot activities in Slovakia demonstrated the practical feasibility of establishing Renewable Energy Communities (RECs) under evolving national regulatory conditions. Through the assessment and mentoring of pilot communities, including EC-IVANKA and EC–Energetický Holding–Prešovský Region, the project validated key elements required for successful community energy development, such as stakeholder engagement, governance structures, legal compliance, strategic planning, and energy management systems. The pilots confirmed that strong local cooperation, continuous mentoring, and clear organisational frameworks are critical factors for implementation success. At the same time, the assessments identified remaining challenges related to certification procedures, financing arrangements, and infrastructure deployment. The results provide valuable evidence for the NRGCOM White Paper and offer a replicable framework

for municipalities, SMEs, and citizens seeking to develop resilient, locally managed renewable energy communities across Slovakia and the wider Danube Region.

Policy Recommendations based on NRGCOM experience

To accelerate the development of energy communities in Slovakia, policy measures should focus on simplifying permitting procedures, improving access to financial support, and strengthening institutional assistance for project developers. National authorities should establish guarantee schemes and blended financing mechanisms that combine grants, preferential loans, and community capital. Greater support should also be provided through advisory services, standardized tools, and technical guidance for municipalities and community organisations. In parallel, local governments should promote joint energy clusters and participatory financing models, while academic institutions and industry partners should contribute expertise, innovation, and training. These measures would help overcome existing barriers and create a supportive environment for the large-scale deployment of renewable energy communities in line with national and European energy objectives.

Annex 12 – National Compendium of REC Status and Implementation in Slovenia

Starting position and regulatory foundation

National energy profile

Slovenia has a relatively diversified energy system, but it is still strongly influenced by existing infrastructure and long-term development patterns. The country remains moderately dependent on energy imports, with domestic sources covering approximately 55% of total energy demand in recent years.

The current energy mix shows both structural limitations and ongoing changes linked to the energy transition. Oil products remain the dominant energy source (around one third of total supply), primarily due to transport demand. Nuclear energy, generated at the Krško Nuclear Power Plant, represents a stable and significant share of electricity production, contributing to system reliability and low-carbon generation. Hydropower also plays a central role, supported by the country's geographical conditions, while other renewable sources—particularly solar photovoltaics—have seen strong growth in the last few years. Coal still maintains a measurable presence in the energy balance, although its role is expected to decline in line with decarbonisation objectives. Natural gas is used primarily in industry and heating, but its long-term role remains uncertain due to price volatility and climate targets. Electricity consumption patterns show increasing electrification, particularly in the residential and service sectors, while industry remains a major consumer. At the same time, the distribution grid is experiencing growing pressure due to decentralised generation and the connection of new renewable installations. The most dynamic segment of the Slovenian energy transition is the rapid expansion of solar photovoltaic systems. In 2025, more than 146 MW of new solar capacity was installed, with a substantial share linked to self-consumption schemes. Community-based self-consumption models have expanded significantly, with several hundred installations across the country, indicating strong interest from households, municipalities and small enterprises. Despite these positive trends, Slovenia continues to face challenges in meeting its renewable energy targets. The share of renewable energy in gross final consumption remains below planned trajectories, which reflects structural barriers in permitting procedures, grid capacity and investment conditions.

The updated National Energy and Climate Plan (NEPN) sets more ambitious targets for renewable deployment, electrification and energy efficiency. However, achieving these targets will require not only increased investment, but also more effective integration of local actors, including municipalities, cooperatives and citizen-led initiatives.

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Legal Framework

The Slovenian legal framework relevant to energy communities and local renewable energy initiatives has undergone significant development in recent years. The framework is relatively well developed at the formal level, but in practice it remains fragmented and not always easy to apply.

The framework is primarily defined by four key laws:

- Energy Act (EZ-2), which provides the overarching structure of the energy sector, defines institutional roles and establishes general principles for system operation and energy policy
- Electricity Supply Act (ZOEE), including its amendment ZOEE-A (2025), which regulates electricity market functioning, defines active customers and introduces elements relevant for citizen participation in the energy system
- Act on the Promotion of the Use of Renewable Energy Sources (ZSROVE-1), adopted at the end of 2025, which updates the national framework for renewable energy, including support mechanisms, guarantees of origin and provisions related to self-consumption
- Energy Efficiency Act (ZURE), which complements the framework through measures aimed at reducing energy demand and improving efficiency

Within this legislative structure, Slovenia recognises two main types of collective energy participation:

- Citizen Energy Communities (CECs), primarily linked to the electricity market framework under ZOEE
- Renewable Energy Communities (RECs), defined under ZSROVE-1

However, these concepts are not implemented through a single coherent legal instrument. Instead, they are distributed across different laws, each addressing specific aspects of participation, ownership, market access or production. In practice, this means that even though energy communities are legally recognised, their implementation often requires navigating several overlapping rules.

Secondary legislation plays a decisive role in translating these concepts into practice. The most relevant acts include:

- the Decree on self-supply of electricity from renewable energy sources, which regulates both individual and community self-consumption and defines key parameters such as metering, allocation of produced electricity and contractual arrangements
- the Rules on the operation of the electricity market, which define balancing responsibilities, settlement procedures and participation conditions

- the system operation rules for the electricity distribution system, which determine technical conditions for connection, capacity allocation and network use

In practice, the Slovenian framework currently enables:

- individual self-consumption,
- group or community self-consumption within a defined network area,
- limited forms of collective participation through contractual arrangements.

However, fully developed energy communities with independent governance, market participation and long-term business models are still relatively rare.

The main limitation of the legal framework is not the absence of regulation, but its fragmentation, complexity and partial operationalisation, particularly in relation to:

- multi-apartment buildings,
- multi-site participation,
- cross-municipal projects,
- and integration with market mechanisms.

Institutional Landscape

The Slovenian institutional framework for the energy sector is relatively well developed and includes a number of clearly defined actors with complementary roles. At the same time, coordination between these actors remains one of the key challenges for the implementation of more complex energy models such as energy communities. At the central level, the Ministry of the Environment, Climate and Energy (MOPE) is responsible for energy policy, legislative development and strategic planning. It also plays a key role in the preparation and implementation of national programmes, including the National Energy and Climate Plan. The Energy Agency acts as the national regulatory authority. Its responsibilities include the approval of tariffs, oversight of market functioning, monitoring of network operators and ensuring compliance with regulatory rules. The Agency also has an important role in defining the conditions under which new market participants, including energy communities, can operate. Borzen performs several operational functions within the energy system. It manages support schemes for renewable energy, including subsidies and market premiums, and is involved in market organisation and settlement processes. Its role is particularly relevant for projects that rely on public support mechanisms. The transmission system operator, ELES, is responsible for maintaining system balance and operating the high-voltage network. Its role is increasingly important in the context of variable renewable energy and cross-border electricity flows. At the distribution level, the system is managed by several distribution companies, coordinated under SODO. Distribution system operators are responsible for network development, connection procedures and the integration of distributed generation. Their role is critical for the practical implementation of self-consumption and local energy systems.

In addition to national-level institutions, municipalities and regional energy agencies play a significant role in the development of local energy projects. They often act as initiators, coordinators or facilitators of projects involving citizens, public buildings and small businesses.

Despite the relatively clear division of responsibilities, stakeholders frequently face challenges related to:

- overlapping competences,
- lack of standardised procedures,
- limited communication between regulatory, market and network actors.

These challenges become particularly evident in projects that require coordination across multiple levels, such as energy communities or integrated local energy systems.

Analysis of specific national barriers

Legislative and administrative obstacles

Although Slovenia has established a relatively comprehensive legal framework for renewable energy and collective participation, several legislative and administrative barriers continue to limit the practical development of energy communities.

One of the main issues is the fragmented nature of the legal framework. Provisions related to energy communities, self-consumption and active customers are distributed across multiple legal acts (EZ-2, ZOEE, ZSROVE-1 and secondary legislation). This creates uncertainty for project developers, municipalities and citizens, who often struggle to interpret how different provisions interact in practice. There is no single, consolidated document or practical guideline that would define the full lifecycle of an energy community project—from establishment to operation and market participation. A second important barrier relates to the lack of standardised procedures and definitions. While the legal concepts of citizen energy communities and renewable energy communities are formally recognised, there is still no widely used standard model for:

- legal establishment,
- governance structure,
- contractual arrangements between members,
- or distribution of costs and benefits.

As a result, each project requires significant legal and administrative effort, often involving case-by-case interpretation.

Administrative procedures also remain a challenge. Project development is often slowed down by:

- complex permitting procedures,
- multiple required approvals from different authorities,
- and long processing times for grid connection.

These challenges are particularly pronounced for projects that involve multiple participants, shared infrastructure or public-private cooperation. Another barrier concerns multi-apartment buildings and collective ownership structures. Although self-consumption is legally possible, its implementation in buildings with multiple owners is often difficult due to:

- unclear decision-making procedures,
- the need for agreement among a large number of stakeholders,
- and the absence of simplified administrative pathways.

In addition, multi-site participation remains limited. Current regulatory arrangements are still largely based on geographically constrained models (e.g. same connection point or distribution area), which restricts the development of more flexible or scalable community models. Finally, there is a lack of clear secondary regulation and operational guidelines specifically tailored to energy communities. While general rules exist, stakeholders often report uncertainty regarding:

- accounting and billing mechanisms,
- tax treatment,
- and regulatory obligations for community-based entities.

Overall, the main legislative challenge in Slovenia is not the absence of regulation, but the lack of clarity, coherence and practical operability of existing rules.

Market and Infrastructure hurdles

In addition to legislative barriers, the development of energy communities in Slovenia is significantly affected by market conditions and infrastructure limitations. A major constraint is the capacity of the electricity distribution network. The rapid increase in distributed generation, particularly solar photovoltaics, has placed considerable pressure on local grids. In many areas, especially where renewable deployment has been most dynamic, grid capacity is already limited, leading to:

- delays in connection approvals,

- restrictions on installed capacity,
- or the need for costly grid upgrades.

Distribution system operators are facing growing challenges in managing bidirectional flows and maintaining network stability. While grid modernisation is ongoing, investment cycles are often slower than the pace of renewable deployment. Another key issue is the lack of advanced market integration for local energy systems. Energy communities currently have limited opportunities to:

- participate in flexibility markets,
- provide balancing services,
- or optimise energy use through dynamic pricing.

Most existing models are based on static self-consumption schemes, without full integration into broader market mechanisms. This reduces the economic viability of community-based energy projects. The complexity of electricity market rules also represents a barrier. Participation in the electricity market requires compliance with a range of technical and administrative requirements, which can be difficult for smaller actors to meet. Energy communities, in particular, often lack the capacity to engage directly in market activities and must rely on intermediaries. Metering and data access are additional challenges. Although smart meters are being deployed, the availability and accessibility of real-time data for end users and community operators are still limited. This restricts the ability to implement advanced energy management solutions. Another structural limitation is the absence of standardised aggregation models. Aggregators could play an important role in enabling small-scale actors to participate in the market, but their role in Slovenia is still developing and not yet fully operationalised in relation to energy communities. Finally, pricing structures and network tariffs are not always aligned with the objectives of decentralised energy systems. In some cases, tariff structures do not sufficiently incentivise local consumption, flexibility or efficient use of the network.

Financial and capacity gaps

Financial and organisational barriers are still among the main obstacles to the development of energy communities in Slovenia. Although public funding for renewable energy and self-consumption has increased in recent years, access to financing is still uneven. Most available schemes are focused on investment support (CAPEX), while there is less support for:

- project development,
- feasibility studies,

- legal structuring,
- and early-stage coordination activities.

This creates a gap in the initial phases of project development, where many potential initiatives fail to progress.

For smaller municipalities, cooperatives and citizen groups, the lack of technical and administrative capacity is a major constraint. Developing an energy community project requires a combination of legal, technical, financial and organisational expertise, which is often not available at the local level. In addition, there is limited availability of standardised financial models. Banks and financial institutions are still relatively cautious in financing community-based energy projects, particularly those with complex governance structures or shared ownership models. This leads to higher transaction costs and longer preparation times. Another challenge is the lack of long-term revenue certainty. Changes in support schemes, regulatory conditions and market prices create uncertainty for investors and project developers. This is particularly relevant for projects that rely on collective participation and require long-term commitment from multiple stakeholders. Awareness and understanding among citizens also remain limited. While interest in solar energy and self-consumption is high, the concept of energy communities is still relatively new and not widely understood. This affects participation rates and the ability to scale projects.

Finally, there is a need for stronger institutional support structures. While regional energy agencies and municipalities play an important role, their capacities are uneven and often dependent on project-based funding.

Overall, Slovenia faces a combination of:

- financial gaps in early-stage project development,
- limited local capacity,
- and insufficiently developed support mechanisms.

Addressing these issues will be essential for moving from isolated pilot projects to a broader and more stable ecosystem of energy communities.

Case studies and pilot capitalisation

Best practice example

One of the most frequently referenced examples of local energy innovation in Slovenia is the Luče local energy system, which has been developed as a pilot demonstration of a smart, decentralised and community-oriented energy approach. The project was implemented in the municipality of Luče as a collaboration between local stakeholders, technology providers and national-level actors.

Its primary objective was to demonstrate how a local energy system can integrate renewable energy production, consumption, storage and grid management within a single coordinated framework.

The system is based on a combination of:

- distributed photovoltaic installations,
- local energy storage,
- advanced metering infrastructure,
- and digital tools for monitoring and optimisation.

A key feature of the Luče project is the use of a local flexibility platform, which enables better coordination between production and consumption at the local level. This allows participants to optimise energy use, reduce peak demand and improve the overall efficiency of the system.

The project also explored new roles for different stakeholders, including:

- households acting as active consumers (prosumers),
- the municipality as a facilitator and coordinator,
- and system operators as enablers of local flexibility.

While Luče is not a fully formalised energy community in the strict legal sense (i.e. as defined under REC or CEC frameworks), it represents an important functional model of local energy coordination, which reflects many of the principles associated with energy communities.

Key lessons from the Luče case include:

- the importance of strong local leadership and municipal involvement,
- the need for clear technical and organisational coordination,
- the value of digital tools for managing decentralised systems,
- and the challenges related to regulatory alignment and long-term sustainability.

The project has shown that local energy systems can significantly improve energy efficiency and integration of renewable sources but also highlighted the need for clearer regulatory frameworks and scalable business models.

Results of the NRGCOM pilot project

Within the framework of the NRGCOM project, Slovenia has contributed to the testing and development of community-based energy models, with a focus on identifying practical barriers and enabling conditions for replication. The pilot activities have primarily focused on community

self-consumption models, as these are currently the most feasible and operational forms of collective energy use within the Slovenian regulatory framework.

The pilot activities carried out within the project have highlighted several recurring issues:

First, there is strong interest from local stakeholders, particularly municipalities, public institutions and small businesses. In several cases, projects were initiated at the local level, with support from regional energy agencies and project partners.

Second, technical feasibility is not the main constraint. The required technologies—solar PV, smart metering and basic energy management systems—are widely available and well understood. The main challenges arise in organisational and regulatory aspects.

Third, pilot implementation has highlighted the complexity of administrative procedures, particularly in relation to:

- project preparation and permitting,
- coordination between multiple participants,
- and alignment with distribution system operators.

Fourth, the pilots have demonstrated that current regulatory arrangements favour simpler models, such as single-site or limited community self-consumption, while more advanced models (e.g. multi-site communities, dynamic sharing of energy or market participation) remain difficult to implement.

Another important result is the identification of capacity gaps at the local level. Many municipalities and local actors require additional support in:

- legal structuring of projects,
- financial planning,
- and long-term operation of community-based systems.

The pilot activities have also shown that financial support is necessary but not sufficient. Even where funding is available, projects may not progress without adequate technical assistance and institutional support. Finally, the NRGCOM pilots have contributed to a better understanding of the role of intermediaries, such as regional energy agencies, which can act as facilitators between citizens, municipalities and technical partners.

Overall, the Slovenian experience within NRGCOM confirms that the country has:

- a solid technical base,
- increasing interest in local energy solutions,

- but still faces structural barriers related to regulation, coordination and capacity.

Policy recommendations based on NRGCOM experience

The development of energy communities in Slovenia does not require entirely new concepts, but rather clearer implementation, better coordination and targeted adjustments to existing frameworks. The following recommendations are based on the current regulatory context, pilot experience and identified structural barriers.

Improve legal clarity and consolidation

Although Slovenia has formally transposed EU concepts of energy communities, the current legal framework remains fragmented across several acts (EZ-2, ZOEE, ZSROVE-1 and secondary legislation). This creates uncertainty for project developers and slows down implementation.

It is recommended to:

- prepare consolidated national guidelines that clearly explain how citizen energy communities and renewable energy communities can be established and operated in practice,
- define standardised legal and organisational models for energy communities (e.g. cooperative, association, limited company structures),
- clarify the relationship between energy communities and community self-consumption, which are currently often conflated in practice,
- provide clear rules for multi-site participation and cross-municipal projects, which are currently difficult to implement.

These measures would not require major legislative changes, but rather interpretative guidance and harmonisation of existing provisions.

Simplify administrative procedures

Administrative complexity remains one of the most significant barriers to project development. Current procedures are often designed for individual installations and are not well adapted to collective or multi-actor projects.

Key improvements should include:

- simplification and standardisation of permitting procedures for community-based renewable projects,
- introduction of one-stop-shop mechanisms for energy community development, ideally coordinated at national or regional level,

- development of standard contract templates for participation, energy sharing and governance,
- shorter and more predictable timelines for grid connection approvals.

Particular attention should be given to multi-apartment buildings, where administrative and ownership complexities currently limit the uptake of collective solutions.

Strengthen grid integration and infrastructure

The capacity of the distribution network is becoming a critical limiting factor for further expansion of decentralised energy systems.

It is recommended to:

- accelerate investment in distribution grid modernisation, including digitalisation and flexibility management,
- introduce more transparent and predictable procedures for capacity allocation and connection conditions,
- enable and incentivise local flexibility solutions, including storage and demand response,
- improve coordination between distribution system operators and local project developers, particularly at early stages of project planning.

In the medium term, tariff structures should be reviewed to ensure that they:

- encourage local consumption of locally produced energy,
- support efficient use of the network,
- and do not unintentionally penalise collective energy models.

Enable market participation and new business models

Energy communities in Slovenia currently operate mostly within static self-consumption schemes and have limited access to broader market opportunities.

To unlock their full potential, it is necessary to:

- enable easier participation of energy communities in electricity markets, including aggregation and flexibility services,
- support the development of aggregator models that can represent small-scale actors,
- improve access to real-time data and metering infrastructure,
- allow for more flexible energy sharing arrangements beyond strictly defined physical boundaries.

This would allow energy communities to move from simple consumption models towards active participation in the energy system.

Expand financial support beyond investment subsidies

While Slovenia has introduced several funding mechanisms for renewable energy and self-consumption, current schemes are still focused primarily on capital investment.

To support the development of energy communities more effectively, it is recommended to:

- introduce dedicated funding for project development phases (feasibility studies, legal structuring, stakeholder coordination),
- support pilot and demonstration projects with a focus on replication and scalability,
- develop financial instruments tailored to community-based models, such as guarantees, revolving funds or blended finance schemes,
- ensure long-term stability and predictability of support schemes.

Special attention should be given to smaller municipalities and citizen-led initiatives, which often lack access to financial and administrative resources.

Strengthen local capacity and support structures

One of the key limitations in Slovenia is the uneven capacity at the local level.

It is recommended to:

- strengthen the role of regional energy agencies as facilitators and technical support providers,
- provide targeted training and guidance for municipalities,
- establish a national support platform or competence centre for energy communities,
- promote knowledge exchange between existing pilot projects and new initiatives.

Capacity-building measures should focus not only on technical aspects, but also on:

- governance models,
- financial planning,
- and long-term project management.

Increase public awareness and engagement

Although interest in renewable energy is high, the concept of energy communities is still not widely understood among the general public.

It is recommended to:

- implement targeted communication and awareness campaigns,
- provide accessible information on how to establish and join energy communities,
- support local initiatives that demonstrate tangible benefits to citizens,
- involve municipalities as trusted intermediaries in communication with residents.

Greater awareness would contribute to higher participation rates and stronger social acceptance of collective energy solutions.

Improve institutional coordination

Finally, more effective coordination between key institutions is essential.

It is recommended to:

- establish clearer coordination mechanisms between MOPE, the Energy Agency, Borzen, ELES and distribution system operators,
- define responsibilities for supporting energy communities more explicitly,
- ensure that regulatory, market and infrastructure developments are aligned.

Without improved coordination, even well-designed policies may remain difficult to implement in practice.

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