

Energy Cooperatives and Communities to Foster Social Innovation in the EU – a Bulgarian Case Study – Prospects and Barriers

Lyubomira GANCHEVA

Sofia University "St. Kliment Ohridski", Sofia, Bulgaria

lggancheva@gmail.com

Abstract. *The paper aims to identify how energy cooperatives and energy communities could affect the social innovation within the European Union as a whole and specifically in Bulgaria. It begins with an applicable legislation and energy policy analysis and provides a helicopter view of the regulatory framework connected with the energy communities and cooperatives on both European and national level, as well as the opportunities for their future development. A systematic literature review was conducted to identify the gaps, which consists of a bibliometric and a content analysis and outlines a growing interest in those relatively new energy formations that promote renewable energy sources, enhance energy security and empower local communities. It highlights the current research gap and endorses the need for the conduction of some additional deeper researches and empirical studies. The SWOT analysis provides an in-depth assessment of the strengths, weaknesses, opportunities and threads of those energy formations in Bulgaria, with an emphasis on their advantages and the challenges in front of them. The results provide a clear understanding of the factors that can help the growth and sustainability of those energy organizations and how they can endorse the energy transition in the country and in the European Union as a whole.*

Keywords: energy cooperatives, energy communities, social innovation, renewable energy, energy policy, sustainable energy transitions.

Introduction

Cooperatives in general represent a specific type of a non-profit association of natural persons, based on democratic values - this is their main distinguishment from the vastly spread economic and business models. They are relatively new, but still have a proven track record on economic development and social progress on regional and country level.

Energy cooperatives are such special purpose entities, that center around the core values of volunteerism, democracy and shared social and economic values and which provide each and every individual member with the access to new markets, technologies and funding possibilities and enable them to favor the common added values. They usually focus on renewable energy sources (RES) and thus could play an essential role in the process of the green transition. Energy communities are a more comprehensive form of civil union, which inherently includes energy cooperatives and is dedicated to developing community-based energy projects and sustainable solutions and inspiring active public participation and mutual investment in the energy sector. They aim to foster democracy as inevitable part of the energy management process and strive to share the common benefits amongst their members. They usually specifically address social challenges such as energy poverty, inequality, social inclusion and energy security and promote environmental goals alongside the economic ones. The thin red line between energy communities and cooperatives is tricky to be precisely fixed and often lies in their legal and operational frameworks. They are especially popular and widely spread in Germany, Denmark, and Spain. The communities on the other hand are usually smaller by size and predominantly socially focused.

For countries such as Bulgaria is exceptionally important to study the current state of energy cooperatives and communities and to formulate the driving forces for their potential development,

as they possess the opportunity to become a powerful driving force for a green and inclusive future sustainable energy architecture.

EU's usage of energy cooperatives and communities to boost decentralization and accelerate the Green Deal

The EU has gone a long way in its ambitious determination to become entirely carbon neutral by 2050. Such a startehic goal inevitable includes radical reforms in the structure and action of the energy sector and marks the occurrence of new trends that would help achieving the ambitious aims.

Amongst those tendencies is the strive for decentralization, defined in a series of legislative EU framework policy papers, implicated in the 'renewable energy communities' (REC) and 'citizen energy communities' (CEC). The European Green Deal (EGD) and its legislative package and action plan - the 'Fit for 55' package (Fit for 55, 2021) and the RePowerEU plan (RePower EU, 2021), further upgraded those trends and focused on the promotion of citizen-driven initiatives for small and decentralized power production with the goal to encourage their integration into the power grid and to boost the usage of renewable energy sources (RES) as a whole.

This resulted in a number of projects, amongst the most successful of which is the Sun4All one ('Solar power to the project', 2023), funded by the EU and focused on the promotion of energy communities as a mechanism against energy poverty on the base of RES usage. It offers an innovative business model, where the power production from renewables is merged and the received cash flows are allocates to cover the energy expenses of vulnerable households. In line with the ongoing energy poverty programs Enercoop in France designed and implemented a micro-donation scheme.

In recent years energy community projects across the EU contributed significantly to the energy transition of the Union, involved millions of citizens from different countries and represented a sizeable share of the RES production capacities. However, even though there are thousands of successful projects, still there is a great challenge in their expansion and the distribution of their know-how across the Union, as well as in the effective reaching the vulnerable groups and redistributing the profits equally. The participation of hpuseholds with limited resources is still not stable, which in combination with the volatility of energy prices makes it even harder.

Literature review

The literature review over energy communities and cooperatives indicates that lately the number of researches grows fast. However, it is not yet applicable within the Bulgarian context, as while Europe has paid systematic and consistent steps into outlining energy community importance and promoting community engagement and RES integration, Eastern Europe and especially Bulgaria lacks prominently. There is a scientific gap, which brings the opportunity for further exploration of energy cooperativeas and communities with specific accent over the barriers they face and the role they can play to promote social innovation. A combination of legislation and policy framework studies and empirical studies and analysis of community on-ground examples is needed to deepen the understanding of such energy formations. Those were conducted and cover both the available scientific literature on the subject and the legislative framework as well.

In the evolving landscape of energy systems, energy communities (ECs) symbolize a shift from centralized to more decentralized and democratized models, promising a fair and participatory energy transition that grants citizens influence and ownership in local energy networks. Bauwens

et al. (Bauwens T., Schaven D., Drawing E., Radtke J., Holstenkamp L., Gotchev B., Yildiz O., 2022) scrutinized 183 concepts within community energy, uncovering a diverse array of meanings and goals without a single defining essence, necessitating a nuanced discussion on ECs. Walker and Devine-Wright (Walker G., Devine-Wright P., 2008) explored how policymakers interpret “community renewable energy,” emphasizing projects that combine participatory processes with tangible outcomes like enhanced renewable energy use. Schweizer-Ries (Schweizer-Ries, 2008) examined “energy sustainable communities” from a socio-technical standpoint, acknowledging the intertwining of social and technological dimensions across various energy types and uses. Building on this, Koirala et al. (Koirala B., Koliou E., Friege J., Hakvoort R.A., Herder P.M., 2016)’s concept of “integrated community energy systems” describes them as collaborative local systems adept at blending energy generation, demand flexibility, and storage. Lowitzsch et al. (Lowitzsch J., Hoicka C.E., van Tulden F.J., 2020) further refined the idea into “renewable energy clusters,” aligning it with the European definition of ECs, characterized by diverse energy sources, system flexibility, actor interconnectivity, and two-way energy flows, extending the concept beyond EU borders and emphasizing both process and outcome as critical attributes.

Initially, the exploration delves into these approaches based on abstract analyses, drawing from Van den Bergh et al. (Van den Bergh, CJM J., Truffer B., Kallis G., 2011), who outline systemic methodologies such as Innovation Systems, Multi-level Perspective, Complex Systems, and Evolutionary Systems. These methodologies are not strictly demarcated, sharing overlapping concepts and policy perspectives. Another significant framework is Social Practice Theory, which, according to Shove (Shove E., Walker G., 2010) offers insights into the evolution of social practices related to energy use and community engagement.

The research further extends into cross-disciplinary approach, which covers social, political and spatial sciences, organizational management and landscape design, particularly in the context of urban or rural energy development and individual behavior. Specifically, the Innovation Systems approach, detailed by Jacobsson and Bergek (Jacobsson S., Bergek A, 2011), identifies institutional and knowledge barriers to renewable energy diffusion as highlighted by Negro et al. (Negro S.O., Floortje A., Hekkert M.P., 2012). The Multi-level Perspective, foundational to Geels’ work (Geels, 2002 and Geels, 2011), offers insights into strategic niche management, with community energy initiatives conceptualized as protective niches poised to disrupt existing energy regimes, a notion further explored by Seyfang and others.

Despite the the benefits it entails, such complex systems approach can hardly be implicated in energy systems research, let alone in energy cooperatives and communities. The theory for evolutionary systems development, on the other hand, could successfully delve into path dependence and technological lock-ins, as discussed by Heiskanen and colleagues. In that same direction, Shove and Walker use the social practice theory to reveal the connection between the motivational factors of energy initiatives ver the usage of renewable energy.

Last but not least, the studies of government policies provide important analyses of the roles of local authorities over citizen participation, activism, and social rights and reveal how energy projects can facilitate those processes, on the base of RES and thus be in line with climate and environmental policies. Spatial design and policy studies, although categorized separately, show potential overlaps, especially in the context of participatory planning and community engagement in energy initiatives.

Market watch

According to the EU's 2021 State of the Energy Union report¹, since 2000 at least 2 million EU citizens are involved with more than 8400 energy communities and they have successfully realized a minimum of 13 000 project that support the energy transition and contribute to the competitiveness of renewable energy technologies in various ways. The result of that collective energy initiatives is to the amount of 7% of nationally installed renewable capacities estimated at 6.3GW. The conservative estimate of the total invested finances amounts to at least 2.6 billion EUR. According to estimations of the EC by 2030 more than 50 GW of wind and solar are expected to be owned by energy communities, which will represent 17% and 21% of installed capacity. A study (B. Kampman, J. Blommerde, M. Afma, 2016), conducted for the Greenpeace European Unit, Friends of Earth Europe, European Renewable Energy Federation and REScoop, shows that by 2050, almost half of EU households are expected to be producing renewable energy. However, it is still unclear how the collective effort for post 2020 will be shared among Member States.

A recent study (Wierling, A., Schwanitz, V.J., Zeiss, J.P. et al., 2023), published in Nature platform, meticulously mapped energy communities across European countries, revealing variations among member states. While Germany leads with many energy communities, some countries like Bulgaria, Malta, Romania, and Hungary have fewer. They could adopt various legal forms, which all combine individual assets, investments and initiatives for the launch of innovative energy projects.

REScoop, an organization dedicated to the promotion and development of energy communities, boasts around 1,500 member cooperatives and initiatives, engaging roughly 1 million European citizens by 2019. This is a solid mark for the growing interest towards energy community projects, focused on renewable energy. For instance, data from the Energy Atlas 2018 (Energy Atlas, 2018) highlights a notable increase in Germany's investment in community energy projects, rising from 34 GW in 2012 to 42 GW in 2016.

The European Economic and Social Committee outlines (European Economic and Social Committee, 2018) that cooperatives primarily focus on providing economic aid and support to their members. About a quarter of cooperatives rely entirely on member contributions for funding. For the rest, two-thirds of their finances come from cooperative banks. Each member holds an equal say, with a single vote, regardless of their financial input. In situations where a cooperative faces losses, the financial risk to members is confined to their initial investment. According to a publication (deutschland.de, 2018) the rate of bankruptcy within this sector is remarkably low, representing only about 0.1% of all bankruptcies in Germany, indicating a stable operational model. Initially, dividends were in the range of 5-6%, but this has adjusted to an average of 2-3% more recently, reflecting efficient management. Energy communities are a specific type of energy cooperative, which is flexible enough to participate actively in the energy supply chain and promote green transition in them.

Energy communities and cooperatives as part of the EU's transition to a renewable energy system could play crucial roles in promotion of economic development and combat of social issues. Their collective ownership, democratic governance, and commitment to community well-being position them as agents of positive change, despite facing challenges, pointing their their potential to reinforce community solidarity and foster a green and sustainable future for all.

¹ Official Journal of the European Union, Commission Staff Working Document Accompanying the Report from the Commission to the European Parliament and the Council 'Progress on competitiveness of clean energy technologies', 2021, <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52021SC0307>

Similarities and Differences Among the EU Energy Cooperatives

In the classification and analysis of common practices and specific challenges it is advisory to be drawn valuable examples and recommendations or to be formulated successful strategies, which can then be personalized, taking into account the characteristic features of each country. Such a tactic could be particularly useful to support pan-European goals for an inclusive transition, energy sustainability and empowerment of local communities in the process energy transformation. In the phases of such identification and study of common practices and distinctive challenges, it is valuable to share successful strategies and adapt the individual approach - this would increase the effectiveness and impact of cooperatives. In this process it is crucial to pay specific attention on how the varieties of energy cooperatives and the specificities in their implementation can effectively contribute to achieving the EU ambitious goals of sustainable energy development. Such a qualitative benchmarking method can not only facilitate the adaptation of best practices in different economic, regulatory and cultural environments, but is also fully in line with the EU's wider goals of energy sustainability, community empowerment and economic sustainability in the transition to renewable energy sources.

The main similarities among EU energy cooperatives include their focus on the production of localized renewable energy, based on the principles of collective ownership, democratic governance and community engagement. No matter where exactly in the EU they are based, they prove on practice that they can effectively include and empower local cooperatives by enabling residents to collectively invest in and own renewable energy projects, that bring the same benefits to all individuals. The membership principles are based on the democratic decision-making process, where all responsibilities and advantages are common and equitably distributed. What is more, those energy formations are characterized by local energy production from clean and renewable energy sources – solar, wind, biomass or hydroelectric projects, all of which meet the EU objectives of reducing carbon emissions and enriching energy sustainability. Community engagement and social impact are the other key characteristics of EU energy cooperatives and ensure inclusion of the individuals in all main project phases from decision-making to benefit-sharing activities and that makes such energy policies inclusive for EU citizens. It is notable pointing out that the social impact in those entities goes far beyond RES generation and could include economic growth, job creation and social justice.

The main differences among cooperatives, located on the territory of the EU, arise from regulatory and policy frameworks - these frameworks influence the formation and operation of energy cooperatives across the member states. In this respect, Germany and its *Energiewende* policy could easily be marked as flagship leading force in facilitating the growth of energy cooperatives, especially while in most EU countries the levels of legislative support are far lower and not so clearly formulated, systematic, coherent and ordered. Another hallmark of the energy cooperatives, that varies widely in the EU are the financial models, which from member investments and loans to government incentives, subsidies, or private financing. The scale and scope of projects is very diverse as well, influenced by geographical considerations, resource availability, and community preferences. For example, Denmark has a history of small-scale wind cooperatives, while Spain might have larger solar cooperatives dominating the landscape. The cultural and social factors, especially the specificities among the EU energy cooperatives, transforms the diversity as reachness, not a thread for community involvement, renewable technologies involvement and energy cooperatives acceptance as a whole.

While EU energy cooperatives share fundamental principles, differences in regulatory frameworks, financial models, project scale, and socio-economic contexts contribute to a nuanced

landscape. Accepting and stimulating both commonalities and differences is crucial for analysis and fine tuning of energy policy across the EU.

Key features of energy cooperatives in Bulgaria

Currently Bulgaria faces a growing interest for community self-sufficiency, therefore energy cooperatives could significantly accelerate the needed social cohesion and directly involve citizens in the energy decisions that affect their future. What is more, there is a large and still unexploited potential for sharing common benefits between energy poverty-vulnerable groups and providing them with options for inclusion in order to reduce the inequalities. They can benefit from the usage of local renewable energy resources, which could lead to significant environmental, economic, and social benefits for the society as a whole too. This will also help reduce the dependence of traditionally used energy resources, predominantly from fossil origin and thus will strengthen the resilience and energy independence of EU countries and the Union as a whole. What is more, by promoting the financial inclusion of residents by combining their resources and sharing the common risks, in practice the economic and financial barriers and risks for such sustainable projects are lowered and thus the achievement of green policies is more accessible to different members of society, and not primarily kept for its more profitable representatives.

Energy cooperatives are traditionally directly related to climate policy and environmental protection and the project they implement significantly reduce carbon footprint and support innovative green solutions with positive effects on land use and challenges and environmental concerns. By prioritizing sustainable practices and engaging local communities, energy cooperatives can effectively address environmental issues and promote sustainable and inclusive energy transition in Bulgaria.

Energy communities in Bulgaria are predominantly settled as non-governmental organizations (NGOs) and operate within a legal framework that often requires recognition and adequate support from the government. Thus the establishment of an appropriate legal framework that recognizes their role, provides financial support for initiatives, and ensures their integration into national energy strategies could directly stimulate them.

Unlike traditional NGOs, energy cooperatives in Bulgaria are structured as companies under the Cooperatives law and that marks the requirement to operate as collective entities with shared ownership and democratic decision-making process, which bring to their members the opportunity to combine resources, attract investments, predominantly in RES, and mutually benefit from innovative green production.

Energy communities in Bulgaria as part of the EU energy communities: unveiling commonalities and disparities

Globally, energy communities and cooperatives have gained recognition as instrumental entities in promoting decentralized and participatory models of energy production and consumption. According to Bohnert et al. (Bohnerth J. C., 2015) and Klagge et al. (Klagge B., Meister T., 2018) countries across Europe, such as Germany, Sweden and Denmark have successfully implemented energy cooperative models, allowing local communities to actively engage in renewable energy projects, fostering a sense of ownership and contributing to the broader transition towards sustainable energy practices.

The rise of energy cooperatives brings a new-of-its-kind approach towards sustainable energy production within the EU, amid an evolving landscape. This trend is likely to occur in Bulgaria. Unfortunately, up to date there are no energy cooperatives in the country, but there are many examples of good practice in energy communities. They will be presented in this report, as their

research is crucial for contextualizing the role of energy cooperatives within Bulgaria's unique socio-economic and legislative framework.

The energy communities in Bulgaria and in the EU share several important common distinguishing features, such as their focus on collective ownership and democratic decision-making. They share a significant common feature to focus on local energy production, mainly from renewable energy resources. That reduces the usage of traditional fossil ones and thus addresses environmental concerns and fosters sustainable development on regional, national and EU level and leads to new job formations, increased economic growth and a meaningful and positive impact on society.

It is appropriate to point out some notable differences between the energy communities in Bulgaria and those in the EU. First and foremost are the funding models - while in some EU Member States energy communities often have access to established government and/or community support systems and specifically designed grants or subsidies, in Bulgaria, however, the situation is quite different, as such large-scale financing opportunities, including significant investments, loans or government incentives, are not available yet. A significant difference lies in the scale - energy formations vary largely in size and structure. In several EU countries, amongst which are Germany, Sweden and Denmark for example, predominantly large-scale energy projects are launched on community-based model. Conversely, in Bulgaria energy communities tend to focus more on smaller, localized initiatives. This variation is mostly due to the different resource availability as well as needs and preferences of local communities. Cultural and socio-economic contexts strongly influence the way energy communities operate. Bulgaria's unique historical, cultural and economic background influences the way people view and engage with cooperation models, which may differ significantly from perceptions in some EU member states.

To date in Bulgaria there is no energy cooperative yet, but a series of ambitious projects for establishment of local energy communities. The absence of the cooperatives raises some important questions regarding the factors that influence such a limited presence within the national energy landscape.

Key examples for energy communities and cooperatives in Bulgaria

For the purposes of this article, a concise yet analytical review is conducted on energy communities in Bulgaria, emphasizing the absence of energy cooperatives despite the growing importance of community-driven energy initiatives. Currently there are several positive examples for energy communities in the country:

- In the Bulgarian energy landscape, early instances of energy communities are exemplified by projects such as the rooftop photovoltaic installation in the residential block of 'Hristo Smirnenski' in Sofia. In 2010, the collaborative effort of 117 apartment owners resulted in a jointly owned rooftop photovoltaic installation boasting a capacity of 28 kW. Unlike typical energy communities, where energy production caters to community needs, in this case, all generated energy is funneled into the grid under the feed-in tariff scheme. Notwithstanding this distinction, the venture yields consistent monthly income for the legal entity, defraying communal bills and maintenance costs.
- Urban energy cooperatives, such as EcoVarna established in 2012 in Varna, illuminate the potential of collaborative initiatives. EcoVarna actively involves residents in energy-saving renewable energy initiatives and provides community education. There are several projects under that initiative, which include solar installations on public buildings and prove the

capacity of urban energy cooperatives to foster sustainability at the local level. That project possesses the potential to become the first energy cooperative in Bulgaria.

- The Dobrich Solar Park, situated in the north-eastern region and established in 2015, serves as a notable example of a project for energy community, dedicated to solar PV power. The cooperative conducted fundraising from residents and successfully implemented a solar farm.
- In the framework of the European Union's 'LIFE' program, two projects for energy communities are taking root in Gabrovo. Their project 'Development of mechanisms to support energy communities and other civil initiatives in the field of sustainable energy' is based on a collaborative partnership between municipalities and citizens. With a budget to the amount of EUR 1 749 178, it showcases how such innovative energy collaborations can renovate residential buildings for shared energy production and consumption. Commencing in the fall and spanning 36 months, the project involves 11 organizations across four European countries.
- The Municipality of Burgas emerges as one of the proactive regional authorities, committed to renewable energy development. An exemplary project involves the installation of a 30 kWp rooftop photovoltaic system for self-consumption during the municipality building's renovation in 2019. The project costs was BGN 2.28 million (EUR 1.16 million), 65% of which was funded by the European Regional Development Fund and the remainder - by the municipal budget. The municipality equipped kindergartens with rooftop photovoltaic installations, mainly for internal consumption. Despite these endeavours, the municipality notes a significant hurdle in residential buildings where the unanimity of all apartment owners is required for the installation of rooftop photovoltaic systems. This constraint, often rooted in a lack of information and initial scepticism, impedes the realization of more projects of this nature. The Municipality of Burgas, aligned with the Law on Energy from Renewable Sources, has formulated a plan targeting a 32% share of renewable energy within its territory by 2030².

SWOT analysis of energy communities in Bulgaria

The absence of energy communities in Bulgaria and their limited impact thus far can be attributed to various factors, including regulatory constraints, limited awareness, and insufficient financial support. However, through a brief Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis, it becomes evident that despite these challenges, energy communities possess immense potential. The SWOT analysis provides valuable insights for strategizing the development and empowerment of energy communities in Bulgaria.

STRENGTHS	WEAKNESSES
• Potential of renewable energy development • Civic engagement for inclusion and social cohesion • EU grant opportunities	• Limited financial opportunity • Lack of general knowledge and awareness • Regulatory confusion • Central government funding dependency

² https://www.burgas.bg/uploads/posts/2021/burgas_res_longterm1.pdf

OPPORTUNITIES	THREADS
• Diversification of energy resources • Reduction of dependency on traditional energy sources • Energy security and independence • Technological progress • Collaboration with NGOs • Campaigns for community education and awareness • Partnership and collaboration with local authorities	• Economic and financial challenges • Energy poverty • Competition with traditional energy sources • Environmental concerns • Political and regulatory turbulence and uncertainties

Strengths: Bulgaria has a significant RES potential (solar, hydropower, wind and bio-mass), which can stimulate foundation of many energy community projects that can reduce reliance on conventional sources and increase energy independence. Energy communities empower local residents, business and authority to actively participate in production, management and management of renewable energy sources. Beign totally in line with EU's ambitious green aims, they can enjoy different EU funding possibilities. Most of which are unfortunately not popular in Bulgaria.

Weaknesses: Energy communities face challenges for adequate external funding opportunities for their projects and thus predominantly rely heavily on member investments and loans. Lack of general knowledge and awareness is one of the main reasons why there are still just several energy communities in Bulgaria, but that weakness could easily be transformed into a great opportunity with the help of national and local campaigns amongst the citizens. Adaptation of administrative procedures will further accelerate the development of energy cooperatives and that marks the need for simpler and more clear regulations on that topic.

Opportunities: Aligning with national energy goals presents opportunities for energy communities to contribute significantly to Bulgaria's transition to cleaner energy. Collaboration with NGOs could increase their competitiveness and extend their community engagement. Local authorities could be useful partner and provide both administral, public and financial support to them and promote their values.

Threats: The inconsistent political and regulatory support may impact the long-term viability of energy community projects. It highlights the need for specific funding sources in reply to the main challenges for their growth - the fact that energy communities face competition from conventional energy sources and established players on the energy market. Energy poverty can be a significant barrier for the formation of energy communities amongst vulnerable groups of individuals and this should be carefully overcome.

Methodology

The purpose of this paper is to provide a systematic study on literature and legislative framework on energy cooperatives and communities in EU and in Bulgaria. It outlines the factors for their formation and growth, analyses the challenges they face and points out and measures their role in the development of social innovation.

The documents starts with a review of the relevant energy policy documents within that framework, including a specific attention to those applicable within the Bulgarian context and establishes a general understanding of the key factors for their formation and operation. Followed by a market and

literature review, it outlines the importance of energy communities and cooperatives and the need for empirical studies of them.

Combining such a regulatory, legislative, policy and market review, the methodology incorporates a SWOT analysis to assess the strengths, weaknesses, opportunities, and threats, associated with the emergence of energy communities in Bulgaria. This provides a simple and yet useful matrix for evaluation of the factors, which influence the development and growth of energy cooperatives and communities within the Bulgarian context, especially the concrete prospects and barriers they face on a daily basis.

This methodology presents a case study for Bulgaria as an attempt to present a deeper understanding and provide empirical insights into the specific challenges encountered by energy cooperatives and communities. It studies the legislation framework and through examples reveals the potential for their development in achieving the ambitious goals of the Green Deal on the way of the green transition. Thus it facilitates a socioeconomic analysis of the factors for its development and contributes to a comprehensive assessment of their prospects and barriers for fostering social innovation in the EU.

Results and discussions

Energy communities and cooperatives in the EU goes into drastic changes in recent years due to an innovative cooperation between regulatory frameworks, financial structures, community engagement, technological advancements, and environmental considerations. Unfortunately, Bulgaria significantly lacks in this process. The legal framework provides a robust foundation for their establishment and operation, reflecting a commitment to democratic principles, economic participation, and community development, but at the same time the lack of knowledge and awareness and the scarce government support and funding possibilities challenges such as financial constraints, regulatory complexities, and environmental concerns necessitate strategic interventions and collaborative efforts.

Energy cooperatives in Bulgaria possess the potential and opportunities to greatly fostering community engagement, promote renewable energy resources usage and generate positive social impacts. This is possible thanks to the late technological break-through innovations in RES and the commitment to diversify energy sources on the basis of social innovation, local energy production, competitiveness and sustainability. Still, the threats such as political uncertainties and environmental risks require proactive government and local authority support and emphasize the need for ongoing adaptation and resilience-building.

Currently, the absence of energy cooperatives in Bulgaria is notable, with factors contributing to this absence likely being multifaceted, including legal, regulatory, financial, educational, and socio-cultural dimensions. A comprehensive analyses of Bulgarias success in its green transition towards sustainable future can serve as basis for the factors for the fast growth of energy communities and cooperatives. The forecasts for their development in Bulgaria highlight several key areas, such as: technological advancements and innovation, diversification of energy sources, collaboration with NGOs and policy advocacy and continued legislative support.

Conclusion

The environment for the development of energy communities and cooperatives in Bulgaria is dynamic, it has an enviable potential based on collective ownership, production of renewable energy and strong participation of citizens, but for this purpose it should be unequivocally supported and stimulated by adequate legislation and flexible financing instruments. In order to fully realize the

identified potential, effective cooperation between the interested parties in the country and application of the flexible approaches are necessary. Based on the fact that that energy communities in Bulgaria are just beginning to develop, and there are still no energy cooperatives there, the impact of such new formations for the country will certainly grow extensively, fostered by both legislative and financial support, as well as by the active participation of local communities and the boost of technology innovations based on the use of renewable energy sources. In a realistic mid-term perspective, the future of Bulgarian energy cooperatives will be promising, with an emphasis on a sustainable, inclusive and community-focused energy landscape.

References

- Bauwens T., Schaven D., Drewing E., Radtke J., Holstenkamp L., Gotchev B., Yildiz O., (2022)., 'Conceptualizing community in energy systems: A systematic review of 183 definitions', 'Renewable and Sustainable Energy Reviews' 156, Retrieved from <https://www.sciencedirect.com/science/article/pii/S1364032121012624>
- Bohnerth J. C., (2015). Energy Cooperatives in Denmark, Germany and Sweden – a Transaction Cost Approach, Uppsala Universitet, Retrieved from <http://uu.diva-portal.org/smash/get/diva2:820202/FULLTEXT01.pdf>
- Geels F.W., (2002). 'Technological transitions as evolutionary reconfiguration processes: A multi-level perspective and a case-study', 'Research Policy' 31, Retrieved from https://www.researchgate.net/publication/222533409_Technological_transitions_as_evolutionary_reconfiguration_processes_A_multi-level_perspective_and_a_case-study
- Geels F.W., (2011). 'The Multi-Level Perspective on Sustainability Transitions: Responses to Seven Criticisms', 'Environmental Innovation and Societal Transitions' 1, Retrieved from <https://www.sciencedirect.com/science/article/abs/pii/S2210422411000050>
- Jacobsson S., Bergek A., (2011). 'Innovation System Analyses and Sustainability Transitions: Contributions and Suggestions for Research', 'Environmental Innovation and Societal Transitions', Retrieved from <https://www.sciencedirect.com/science/article/abs/pii/S2210422411000177>
- Energy Atlas, (2018). Facts and Figures About Renewables in Europe, https://eu.boell.org/sites/default/files/energyatlas2018_facts-and-figures-renewables-europe.pdf.pdf
- (2018). 'Creating values together', deutschland.de, Retrieved from <https://www.deutschland.de/en/topic/business/cooperatives-examples-from-germany-and-around-the-world>
- (2018). 'Europe's cooperative banking models (revised edition)', European Economic and Social Committee, Retrieved from <https://www.eesc.europa.eu/en/our-work/publications-other-work/publications/europes-cooperative-banking-models-revised-edition>
- (2021). 'Fit for 55 Package', *European Commission*, Retrieved from https://ec.europa.eu/commission/presscorner/detail/en/IP_21_3541
- (2021). 'RePowerEU', *European Commission*, Retrieved from https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/repower-eu-affordable-secure-and-sustainable-energy-europe_en
- Koirala B., Koliou E., Friege J., Hakvoort R.A., Herder P.M., (2016). 'Energetic communities for community energy: A review of key issues and trends shaping integrated community energy systems', 'Renewable and Sustainable energy Reviews' 56, Retrieved from <https://www.sciencedirect.com/science/article/abs/pii/S1364032115013477>

- Klagge B., Meister T., (2018). Energy cooperatives in Germany – an example of successful alternative economies?, Retrieved from https://www.researchgate.net/publication/323082721_Energy_cooperatives_in_Germany_-_an_example_of_successful_alternative_economies
- Lowitzsch J., Hoicka C.E., van Tulden F.J., (2020). ‘Renewable energy communities under the 2019 European Clean Energy Package – Governance model for the energy clusters of the future?’, ‘Renewable and Sustainable energy Reviews’ 122, Retrieved from <https://www.sciencedirect.com/science/article/pii/S1364032119306975>
- Negro S.O., Floortje A., Hekkert M.P., (2012). ‘Why does Renewable Energy Diffuse so Slowly? A Review of Innovation System Problems.’, ‘Renewable and Sustainable Energy Reviews’ 16, Retrieved from https://www.researchgate.net/publication/257547968_Why_does_renewable_energy_diffuse_so_slowly_A_review_of_innovation_system_problems
- RESCOOP, Retrieved from <https://www.rescoop.eu/federation>
- Shove E., Walker G., (2010). ‘Governing Transitions in the Sustainability of Everyday Life’, ‘Research Policy’ 39, Retrieved from <https://www.sciencedirect.com/science/article/abs/pii/S0048733310000338>
- Schweiser-Ries, (2008). ‘Energy sustainable communities: Environmental psychological investigations’, ‘Energy Policy’, Retrieved from https://www.researchgate.net/publication/23648560_Energy_sustainable_communities_Environmental_psychological_investigations
- Sun4All, ‘Solar power to the project’, Retrieved from https://sunforall.eu/fileadmin/user_upload/Resources/D5.5_Policy_brief_EU_level_part_1_Final.pdf
- Van den Bergh, CJM J., Truffer B., Kallis G., (2011). ‘Environmental Innovation and Societal Transitions: Introduction and Overview’, ‘Environmental Innovation and Societal Transition’, Retrieved from <https://www.sciencedirect.com/science/article/abs/pii/S2210422411000219>
- Walker G., Devine-Wright P., (2008). ‘Community renewable energy: What should it mean?’, ‘Energy Policy’ 36, Retrieved from <https://www.sciencedirect.com/science/article/abs/pii/S0301421507004739>
- Wierling, A., Schwanitz, V.J., Zeiss, J.P. et al. (2023). A Europe-wide inventory of citizen-led energy action with data from 29 countries all over 10 000 initiatives, Scientific Data, issue 10, Retrieved from, <https://www.nature.com/articles/s41597-022-01902-5>

Note: the study is executed with the support of the twin4eco project, reference number BG-RRP-2.005 "Building Connections (TWINING)" under the National Recovery and Sustainability Plan of 16.11.2023.