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# Energy Communities in Serbia and Europe: A Comparative Analysis of Regulatory Frameworks

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***Abstract*** – The energy transition involves a careful shift away from conventional energy production, guided by principles of equity and fairness. In this context, energy communities have emerged as a new model, enabling citizens and local communities to play a crucial role in driving energy change. This paper analyses the regulatory frameworks that govern the functioning of energy communities in Denmark, the Netherlands, and Serbia. The goal is to identify key similarities and differences in the legislative approaches of these countries, highlighting factors that encourage or hinder the development of energy communities. The paper examines how European regulations are adapted into national frameworks, with a particular focus on aligning Serbia's legal system with European practices. Also, based on examples of best practices, the paper offers recommendations to enhance citizen participation in the energy transition process.

***Index Terms*** – Energy community, Energy transition, Just energy transition, Energy policy

## I INTRODUCTION

The transition to low-carbon technologies represents one of the key challenges today, grounded not only in changes to energy production and conversion methods but also in evolving societal perceptions of energy systems. Consequently, the shift from fossil fuels to renewable energy sources (RES) is a comprehensive and long-term process that entails both social and political transformations. The active involvement of citizens and local communities in the energy system, particularly through participation in the production of energy from RES, constitutes a pathway toward a sustainable energy transition [1], and as such, can foster societal acceptance of energy-related changes [2]. Energy communities (ECs) contribute not only to the expansion of RES capacities but also to the shaping of the energy system by educating citizens and establishing a foundation for long-term RES project planning [3]. Through this approach, citizens united around RES projects can reduce energy inequality, support energy-vulnerable consumers [4], and assist rural communities by promoting social values such as solidarity, empowerment, local engagement, and the creation of local jobs [5]. Thus, the growing popularity of the EC concept is rooted in the principles of a just energy transition, emphasizing the decentralization and democratization of the energy system [6].

Due to their numerous advantages, ECs have become a focal point of energy policy at various governance levels. The European Green Deal [7], developed as the European Union's (EU) response to climate change with the goal of establishing the first climate-neutral continent by 2050, ensuring that no one is left behind, emphasizes that "*consumers should be at the heart of the energy transition*". Simultaneously, the Clean Energy for All Europeans package [8] introduced directives regulating ECs, among which the most significant are the Renewable Energy Directive (EU 2018/2001) [9], the Directive on Common Rules for the Internal Market for Electricity (EU 2019/944) [10], and the Energy Efficiency Directive (EU 2023/955) [11].

Within this legislative package, ECs were formally defined for the first time through two legal categories: Citizen Energy Communities (CECs)[1] and Renewable Energy Communities (RECs)[2]. Although both concepts are grounded in the active involvement of citizens in the energy transition process, their primary distinction lies in ownership structures and operational approaches. In both cases, financial profit is not the principal objective; rather, the focus is on achieving economic, environmental, and social benefits. Energy communities may engage in the production, distribution, or consumption of locally generated energy. It is important to note that citizens can come together not only to participate in the electricity sector but also in the domains of thermal energy and energy efficiency**.**

In September 2024, the European Commission published a guidance document to support Member States and relevant stakeholders in implementing the revised Renewable Energy and Energy Efficiency Directives [12]. Among various recommendations, the guidelines in Article 20a on sectorial integration of renewable energy [13] emphasize the importance of ECs for enhancing the flexibility of the energy system through

[1] A Citizen Energy Community (CEC) is a legal entity based on voluntary and open participation, and is effectively controlled by its members or shareholders, who may be natural persons, local authorities—including municipalities—or small enterprises (Directive (EU) 2019/944).

[2] A Renewable Energy Community (REC) is a legal entity established in accordance with applicable national law, based on open and voluntary participation. It operates independently and is effectively controlled by shareholders or members who may be natural persons, small and medium-sized enterprises, or local authorities, including municipalities (Directive (EU) 2018/2001).

the active engagement of members as energy consumers. Additionally, distribution system operators (DSOs) are required to provide (anonymized) data on the potential use of electricity supplied to the grid by ECs, thereby improving the position and economic viability of citizen-led renewable energy projects.

The empowerment of citizens to unite around joint energy initiatives has led to the establishment of more than 7,700 ECs across Europe by 2021, with a total installed capacity of 6.3 GW from RES [14]. Projections suggest that by 2050, citizens could contribute to the production of up to 45% of renewable energy in the EU [15]. In this context, the establishment of clear legal frameworks is of critical importance, and EU Member States as well as candidate countries are obliged to align the directives with their national legal systems.

The aim of this paper is to provide a comparative overview and analysis of the adapted regulatory frameworks of leading EU countries in the field of citizen energy production, alongside Serbia, with a focus on identifying barriers and opportunities for the implementation of this concept. Furthermore, based on the experiences of Denmark and the Netherlands, the paper proposes potential improvements to Serbia's existing regulatory framework that would facilitate greater citizen participation in the energy transition process.

## II Energy Communities in Denmark

Denmark has a long-standing tradition of civic cooperation and is one of the EU countries with the highest share of citizen ownership in energy investments, with more than 633 established energy cooperatives. Members of cooperatives have most commonly organized around heating projects or the production of energy from RES. It is estimated that 52% of the total installed wind power capacity in Denmark is under some form of citizen ownership, as well as 64% of district heating [16], with more than 320 registered cooperatives [17]. However, the sharing of electricity produced among citizens was not permitted until 2019[3], when the Danish Energy Agency (DEA) introduced a new energy community concept in response to proposed European regulations. According to Denmark's National Energy and Climate Plan (NECP) [18], the term "energy community" serves as an umbrella designation for both CECs and RECs. In the case of RECs, members must reside near the renewable energy project, whereas no such geographic restrictions apply to CECs [19].

In order to implement the principles of Directive (EU) 2018/2001 and to develop a legal framework for energy communities in Denmark, the *Executive Order on Renewable Energy Communities, Citizen Energy Communities, Electricity Trading Companies, and Collective Electricity Supply Companies*[4] stipulates that ECs may participate in energy production, supply, consumption, aggregation, and storage, as well as in energy efficiency services, electric vehicle charging, or the provision of other energy-related services. However, they are not permitted to own, establish, purchase, or lease distribution networks [20]. According to the Order, ECs must be treated in a non-discriminatory manner compared to other companies or consumers operating in the same sector. In this regard, Ecs are granted access to the electricity market, may engage in energy trading, or operate as electricity aggregators. They are expected to function under transparent and straightforward procedures, while also assuming financial responsibility for any potential disruptions they may cause to the distribution energy system [20].

These legislative changes have resulted in a clear distinction between energy communities and energy cooperatives. Unlike cooperatives, members of energy communities are allowed to share the electricity they produce via a collective network, which subjects them to grid tariffs and taxes. One way to mitigate the full cost of electricity sharing is through the so-called *local collective tariff for ECs*. By introducing a reduced tariff for energy used within 15 minutes of its production, Ecs can help alleviate grid congestion. This approach encourages the participation of multiple stakeholders with diverse consumption patterns, thereby maximizing benefits, reducing costs, and enhancing the positive impact of energy communities on the electricity distribution system [21]. Figure 1 illustrates the energy communities in Denmark where electricity sharing among members is permitted [22].

With regard to thermal energy, the Danish Heat Supply Act [23] aims to promote socio-economically and environmentally sustainable solutions for consumers. Similarly, the Act encourages the use of RES in the heating sector and ensures equal treatment of all stakeholders. District heating companies are required to have district heating as their core business activity, which implies that a district heating system can be operated as an activity of an EC only if it is owned by individuals or municipalities. In the case of district heating energy communities, all energy produced may be used and distributed solely within the community, but not beyond its boundaries. At the same time, district heating companies may also be members of ECs.

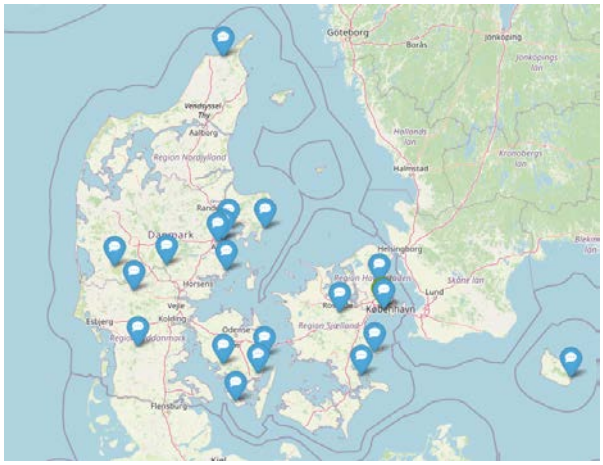


**Figure 1.** Map of (New) Energy Communities in Denmark Where Energy Sharing Is Permitted [22]

[3] With the exception of housing associations acting as prosumers, as well as behind-the-meter arrangements (the most well-known example being Hvide Sande).

[4] Bekendtgørelse om VE-fællesskaber og borgerenergifællesskaber og forholdet mellem VE-fællesskaber og borgerenergifællesskaber og elhandelsvirksomheder og kollektive elforsyningsvirksomheder

## III Energy Communities in The Netherlands

Until 2024, the concept of energy communities in the Netherlands most commonly referred to energy cooperatives, but also included foundations, associations, or companies operating in the fields of energy efficiency, district heating, or the production of electricity from renewable energy sources (RES) [24]. As energy cooperatives are defined as private companies, their members face barriers when entering the electricity market. Specifically, in the event of any changes or the addition of new infrastructure, energy cooperatives are required to participate in tendering procedures alongside private companies, resulting in unequal market competition. The government addressed this issue by introducing a subsidized support scheme for cooperative energy production, with a total budget of €100 million [25]. Nevertheless, despite existing obstacles,such as complex bureaucratic frameworks-by 2023, the Netherlands had 714 energy cooperatives (Figure 2), including 301 focused on energy savings, 70 involved in cooperative district heating projects, and 243 engaged in RES-based energy production projects [26].

**Figure 2.** Map of Energy Cooperatives in the Netherlands [26]

The number of energy cooperatives involved in heat supply is increasing, with nearly 30 new district heating projects underway in 2024[5]. This shift emerged in response to the need to reduce dependence on imported gas. To promote the establishment of new energy cooperatives in district heating, Danish company EBO Consult A/S and the Dutch umbrella organization for energy cooperatives, Energi Samen, received financial support for the implementation of a project under Denmark's *Energy Export Initiative Support Program* [17]. The funded project will focus on establishing a foundational framework for cooperative support to facilitate the implementation and development of local district heating initiatives.

Under the previously applicable Electricity and Gas Acts, electricity sharing among cooperative members was practically impossible [24]. To overcome this regulatory barrier, energy cooperatives would first sell the energy produced in their own facilities to a supplier and then repurchase it for their own use. The only exceptions were experimental schemes under the *Stimulation of Sustainable Energy Production (SDE+) Program: the new experimental scheme of the Electricity Act and the Dutch Green Deal* [24]. In addition, a national program for regional energy strategies was developed [27], aiming for 50% of wind and solar projects to be citizen-owned. Furthermore, under the leadership of Energi Samen, pilot projects were launched to enable energy sharing among community members, under the name Local4Local. These projects include energy-sharing initiatives, typically in the form of virtual energy sharing, involving both citizens and small and medium-sized enterprises [28].

However, in order to align with EU regulations, on December 10, 2024, the Senate approved a new Energy Act[6], which, for the first time in Dutch legislation, defines the term "energy community." ECs are recognized as legal entities operating in the energy market, established with the aim of achieving environmental, economic, and social benefits, without the intention of generating profit [30].

According to Article 2.4 of the Energy Act, energy communities must meet the following conditions:

- Participation in the EC must be open and voluntary;
- Members, owners, or shareholders of the EC must have the right to leave the community;
- Decision-making must be based on the input of members, owners, or shareholders of the EC, who may include natural persons, small and micro enterprises, municipalities, regional authorities, or provinces, with all parties having equal voting rights.

In the case of energy communities developing renewable energy projects, the Energy Act stipulates that members, owners, or shareholders must reside in proximity to the projects.

Article 2.30 of the Energy Act provides that citizens, businesses, and/or local governments are permitted to share energy produced within the community. Every active energy consumer in the community must hold a consumption and production contract with an energy distribution company that enables energy sharing (Art. 2.30, sub a/b), and must use a metering device (Art. 2.30, sub c). Additionally, energy sharing must occur within a 15-minute time frame and within geographically defined areas, which may be specified according to local jurisdiction (Art. 2.30.2). The promotion of energy communities and their positive impact were also discussed and presented during the introduction of the draft Energy Act in the Dutch Senate [31].

## IV Energy Communities in Serbia

The energy transition process in Serbia significantly lags behind that of EU countries, with evident inconsistencies in conceptual alignment and a lack of structural energy reforms introduced in a socially acceptable manner [32]. In this context, the absence of clear legal frameworks is also apparent, as is the lack of harmonization and adoption of new sector-specific secondary legislation that would enable the smooth operation of energy communities (ECs) [33]. Before ECs were legally recognized as

[5] The umbrella organization for energy cooperatives in the Netherlands, Energi Samen, oral statement

[6] „Energija Mokri", The new Energy Act, which consolidates the Electricity Act of 1998 and the Gas Act [29].

actors in the energy market, two energy cooperatives, Elektropionir [34] and Sunčani krovovi [35], were established in Serbia in 2019. Due to the absence of appropriate legal frameworks, these cooperatives were not founded under any energy sector legislation, but rather under the Law on Cooperatives [36]. Operating in this manner was the only available option for initiating active citizen participation in the energy sector. The establishment of energy cooperatives in Serbia was driven by the goal of achieving a just energy transition and reducing the injustices caused by the current centralized energy system [6], with four projects implemented to date (Figure 3).

Two years after the first energy cooperatives were founded, the term REC was introduced into the legal system of the Republic of Serbia through the adoption of the Law on the Use of Renewable Energy Sources. RECs are defined as "*a legal entity established on the principle of open and voluntary participation of its members in accordance with this law, and controlled by members whose residence or registered office is located near the renewable energy facility owned or developed by that legal entity*" [37]. Members of RECs may include natural or legal persons, as well as units of local and municipal self-government, with all members retaining the status of final electricity customers. Business entities or entrepreneurs may also be members of RECs, provided that the production of electricity from RES is not their primary commercial activity. As in the EU Directives, the main purpose of establishing RECs is to use RES to meet the energy needs of community members, while also generating social and economic benefits and contributing to environmental protection.

RECs have the right to produce, use, and store energy from RES and to access the energy market on a non-discriminatory basis. The Distribution System Operator (DSO) is obligated to maintain and regularly update an electronic register of all connected power plants, as well as a publicly available list of all pending connection requests (Art. 67). Since no REC has yet been established in Serbia, the issue of the permissible distance between community members and the shared RES project remains an open question.

On the other hand CECs were officially recognized as actors in the energy market with the adoption of the Energy Act [38], and are defined as "*a legal entity established on the basis of voluntary and open participation, under the effective control of community members, who may be natural persons, local self-government units, or small enterprises, with the aim of providing economic, environmental, or social benefits to its members, shareholders, or the local communities in which it operates, rather than generating financial profit. Such entities may engage in electricity production, including from renewable sources, supply, consumption, aggregation, energy storage services, energy efficiency, electric vehicle charging, or the provision of other services to their members*".

To be registered in the Distribution System Operator's (DSO) records within 30 days of submitting an application (Art. 210đ), a CEC must specify in its founding act the activities it intends to carry out and must meet the other conditions required for supplying final customers. Similarly, if a CEC ceases to meet any of the prescribed conditions, the DSO is obliged to remove it from the register. As the law enables energy sharing, the DSO must maintain records of community members and their metering points. Additionally, the DSO is required to ensure electricity delivery to CEC members and, with the approval of the Energy Agency of the Republic of Serbia, is entitled to a special financial compensation for energy sharing among community members, as a form of non-standard service.

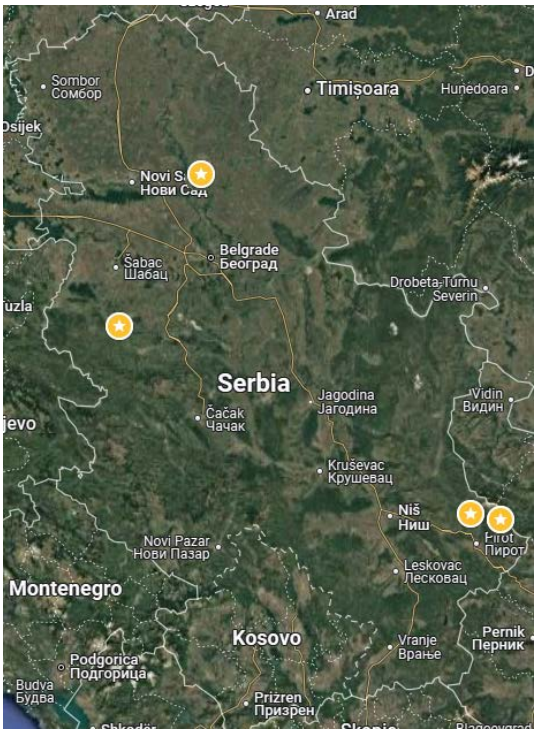


**Figure 3.** Map of projects of existing energy cooperatives in Serbia

The law stipulates that CECs are responsible for balancing obligations. According to Articles 171 and 210e, a supplier may assume balancing responsibility, but only if the energy produced within the community is used solely to meet the energy needs of its members.

Article 57 of the Energy Act establishes that non-discriminatory access is ensured through the work of the Energy Agency of the Republic of Serbia, which monitors unjustified barriers and restrictions affecting the production and use of electricity for community members. However, the law does not specify how the Agency may act to eliminate identified shortcomings.

The Law on Energy Efficiency [39] also defines the existence of Local Energy Communities (LECs), described as "*a legal entity based on voluntary and open participation, under the effective control of community members or shareholders who may be natural persons, local authorities including municipalities, or small enterprises. Its primary purpose is to provide economic, environmental, or social benefits to its members or the local areas in which it operates, rather than generating financial profit. LECs may engage in electricity production, including from renewable sources, distribution, supply, consumption, aggregation, energy storage services, energy efficiency, electric*

*vehicle charging, or the provision of other services to their members or shareholders*".

It can be observed that there is virtually no distinction between LECs and CECs. However, the Energy Efficiency Law specifies that if an LEC operates in the field of high-efficiency cogeneration, the DSO must ensure equal and non-discriminatory participation in the balancing market and the provision of ancillary services. Furthermore, an LEC operating within these parameters is entitled to incentives (Art. 81).

According to the Law on the Use of Renewable Energy Sources, the DSO has the right to postpone the connection procedure for a RES power plant if there is insufficient balancing reserve to ensure the safe and uninterrupted operation of the power system (Art. 67a). This postponement does not apply to power plants that provide new energy storage capacities (at least 0.4 MWh per MW of installed system capacity) or contribute to the secure operation of the system.

## V Comparative Overview of the Status of Energy Communities in the Analysed Countries

A comparison of the barriers and opportunities for establishing ECs in the analysed countries is presented in Table 1. The clearest definitions of ECs are found in Denmark's legislative framework. In this country, the definitions encompass all requirements set forth by EU Directives and include additional details aimed at ensuring equal status for ECs alongside other market participants.

**Table 1.** Comparison of the Status of Energy Communities in the Analysed Countries

| DENMARK | |
|---|---|
| MEMBERS | Citizens, small and medium-sized enterprises, municipalities, district heating companies |
| BARRIERS | 1. EC cannot operate or own the distribution network<br>2. General tariffs and taxes shall apply to electricity shared through the collective network<br>3. The availability of information and assistance by DSOs depends on their relationship with the EC |
| INCENTIVES | 1. Clear technical procedures<br>2. Electricity sharing is possible<br>3. The EC is seen as an opportunity for innovation<br>4. Uncomplicated and clear solution for thermal energy<br>5. Advisory support |
| THE NETHERLANDS | |
| MEMBERS | Citizens, businesses and/or local governments |
| BARRIERS | 1. There are still new and unclear definitions of EC<br>2. The EC shall have the same conditions for participation in the energy market as other actors<br>3. Financial barriers and high investments<br>4. Dependence on other actors (DSOs, municipalities, companies)<br>5. Energy sharing is not yet fully possible due to (sub)legal restrictions |
| INCENTIVES | 1. The business model for electricity supply is more attractive due to the high cost of electricity<br>2. The EC have a strong and very active representative (Energy Samen)<br>3. Cooperation between local self-government and organizations<br>4. The DSO supports the development of the EC |
| SERBIA | |
| MEMBERS | Citizens, small and medium-sized enterprises, Municipalities and local communities |
| BARRIERS | 1. There is still no example in practice<br>2. Waiting to connect<br>3. Suspension of the connection of RES projects<br>4. New and unclear definitions of EC<br>5. Lack of consulting support<br>6. Inconsistency of by-laws |
| INCENTIVES | 1. New legislative frameworks that (on paper) enable the existence of the EC, as well as the sharing of energy<br>2. Existence of examples of good practice in cooperation between energy cooperatives and local self-governments (project „Solara Stara" [34]) |

Although the Netherlands is an EU member state, it only adopted a new Energy Act at the end of 2024, which defines ECs and mentions the possibility of energy sharing. Until then, there were no clear legal definitions of ECs in the Netherlands, and citizens were actively engaged through energy cooperatives. While ECs are now legally defined, further clarification of their rights and obligations is expected through the adoption of future energy legislation and the development of a new draft National Energy and Climate Plan (NECP).

In Serbia, ECs remain a concept that exists only on paper. Although the legal framework defines the rights and responsibilities of ECs, further harmonization of legislation, the introduction of incentive measures, and the development of pilot projects are necessary to empower citizens for future engagement.

## IV Conclusion

All analysed countries have adapted the EU directives on energy communities and aligned them with their specific legal and regulatory frameworks. Nevertheless, energy communities face several common challenges, including high initial investment costs and complex bureaucratic procedures. Moreover, the involvement of diverse stakeholders remains limited, resulting in restricted access for industry, except for small and medium-sized enterprises. This limitation is significant, as the industrial sector

has the potential to contribute to alleviating grid congestion due to its distinctive energy consumption patterns.

The comparative analysis of regulatory frameworks for ECs in Denmark, the Netherlands, and Serbia reveals differences in legislative approaches. While Serbia is making progress in adopting new legal frameworks, it continues to face challenges in the implementation of regulations and in ensuring the long-term sustainability of energy communities. The experiences of Denmark and the Netherlands may serve as valuable guidance for further regulatory improvements in Serbia, particularly in terms of incentivizing benefits for community members and strengthening their role in the energy sector.

To foster and accelerate a just energy transition, it is essential to clarify and simplify administrative procedures and enable the digitalization of the application process. The introduction of dedicated programs, both financial and procedural, is necessary, especially for the initial citizen energy-sharing projects. Furthermore, the adoption of new secondary legislation for ECs should facilitate a simplified and expedited procedure for connecting citizen energy projects and registering them with the DSO.

It is evident that, despite numerous uncertainties and complex procedures, civic energy and the democratization of energy production are becoming increasingly significant developments in the energy sector, even in countries where traditional structures still prevail and the concept of energy communities is still evolving. In this regard, for citizens to become prominent drivers of the energy transition, it is necessary to remove existing barriers and transform them into opportunities.

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# Energetske zajednice u Srbiji i Evropi: komparativna analiza regulatornih okvira

***Rezime*** *- Energetska tranzicija, koja podrazumeva napuštanje konvencionalih oblika proizvodnje energije treba da bude sprovedena u skladu sa načelima pravednosti. U ovom procesu, energetske zajednice prepoznate su kao novi koncept koji omogućava građanima i lokalnim zajednicama da budu nosioci energetskih promena. U ovom radu analizirani su regulatorni okviri koji definišu funkcionisanje energetskih zajednica u Danskoj, Nizozemskoj, kao i u Srbiji. Cilj rada je sistematizacija ključnih sličnosti i razlika u zakonodavnim pristupima pomenutih zemalja, sa naglaskom na uticaje koji podstiču ili ograničavaju razvoj energetskih zajednica. Analizirano je prilagođavanje evropskih regulativa u nacionalne okvire, uz poseban osvrt na prilagođavanje pravnog sistema Srbije evropskim praksama. Takodje, na osnovu primera dobre prakse, prikazane su preporuke kojima bi se omogućilo olakšano delovanje građana u procesu energetske tranzicije.*

***Ključne reči*** *- energetske zajednice, energetska tranzicija, pravedna energetska tranzicija, energetske politike*