



The circular economy: “the number one priority” for the European Green Deal



**The circular economy:
“The number one priority”
for the European Green Deal**



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The articles of the participants of the International Conference “**The circular economy: “the number one priority” for the European Green Deal**”, organized on September 19-21, 2022 in Sremska Kamenica, Novi Sad (Republic of Serbia), are presented. The articles analyze problems, achievements and developments in the field of Circular Economy of the European Union.

The book will be an important work instrument for representatives of academia, researchers, and specialists in the field of Circular Economy (scientists, manufacturers, companies, agencies, etc.), graduate students, young professionals, public and private stakeholders, politicians and civil society.

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Association NEST –

Association for economic development of trade, business and industry enterprises

40, Str. Veslets,

BG-1202 Sofia/BULGARIA

Phone: +359 2 423 59 90,

E-Mail: office@nest-association.org

Home: www.nest-association.org

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Energy transition – looking for a different perspective

D. Živković¹, D. Končalović² and J. Nikolić²

¹Institute for Information Technologies, University of Kragujevac, Kragujevac,
Republic of Serbia
dubravka@uni.kg.ac.rs

²Faculty of Engineering, University of Kragujevac, Kragujevac, Republic of Serbia
davor.koncalovic@kg.ac.rs jelena.nikolic@fink.rs

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ABSTRACT

With challenges ahead of us, the energy sector needs a new culture of energy consumption based on responsibility and democracy, on renewable energies, energy efficiency and savings. Energy communities, especially in the form of renewable energy cooperatives (RE Coops) has brought the increasing acceptance of renewable energy and overcoming uncertainty and indifference regarding renewable energy projects in parts of the world where it was accepted by policymakers and incentivized. This paper is looking at the aftermath of feed-in-tariff withdrawal, its consequences on RE Coops and the lessons learned for business models in today's energy market. It should also be a valuable review of possible business models for RE Coops in the countries that cannot count on the favourable legislative and incentives like countries in South-East Europe.

1 INTRODUCTION

Broadly acknowledged for the long-term energy transition, energy communities occupy a prominent place in the European policy makers' vision of an Energy Union. Energy communities represent an alternative type of market actor, and alternatives to traditional ownership structures. The most common form of energy communities are cooperatives and municipal utilities [1]. Hence, after the liberalization of the energy market and changes in legislation, many RE Coops were founded and they started the implementation of numerous renewable energy projects. However, they are not the only ones. There are two more forms of energy community: Citizen Energy Community (CEC) which is contained in Directive (EU) 2019/944 (recast Electricity Directive) [2], and Renewable Energy Community (REC), which is contained in Directive (EU) 2018/2001 (the recast Renewable Energy Directive) [3].

Even though there are differences within definitions and structures of cooperatives, RE Coops, CECs and RECs, they are a way to 'organise' citizens that want to cooperate together in an energy-sector related activity based on open and democratic participation and governance, so that the activity can provide services or other benefits to the members or the local community. The primary purpose of energy

communities is to create social innovation - to engage in an economic activity with non-commercial aims [4]. All these organizations perform three main economic functions: the generation, distribution and retailing of (renewable) energy, usually under the form of electricity, although examples also exist for heating and transport.

Also important to be notice is the aspects commonly shared by different types of energy communities are the principles of cooperatives, which are the following [5]:

1. Voluntary and Open Membership
2. Democratic Member Control
3. Member Economic Participation
4. Autonomy and Independence
5. Education, Training and Information
6. Cooperation among Cooperatives
7. Concern for Community

Around 3000 organizations have been reported as RE cooperatives across Europe, mostly spread in Western Europe (Germany, Denmark, the Netherlands, Belgium, Austria, Northern Italy, Sweden, the UK and France), and to a lesser extent in Spain and southern Italy. In general, European RE cooperatives started in the 1970s and 1980s with the promotion of community-owned wind energy projects but, as time went by, new technologies are being incorporated such as PV, as well as covering heating needs by the use of biomass boilers or solar thermal panels connected to district heating networks [1]. However, in spite of a high share of wind energy, no signs of local and democratic energy projects were found in Portugal and the Baltic countries. This is also the case for other countries where energy supply is dominated by fossil fuels, such as many of the countries in Eastern and Central Europe. The model, with a great diversity of typologies, is present and growing in other regions of the world, such as Asia, Latin America and Africa [1].

Even though there is no straightforward explanation for addressing the differences in the level of development of RES cooperatives in different countries, key factors are the historical influence of the ecologist and anti-nuclear movements, the spread of municipal utilities, the impact of the oil shocks in the 1970s, together with the related policy-responses and the particular socio-political-cultural context. On the other hand, a widespread mistrust of the cooperative institutional structure, born out of its misuse by the establishment during the socialist era seems to lead to less interest for energy communities in Eastern, Central and South Eastern Europe [6].

As researchers and part of academy, we have been observers and actors in energy policy creation and implementation in Serbia since 2004. Unfortunately, we have been the witnesses of the controversy over small hydropower plants in Western Balkans (mostly Serbia and Bosnia and Herzegovina). Under pressure of growing civil movement the Assembly of the Federation of Bosnia and Herzegovina adopted a declaration on the protection of rivers and prohibited the construction of small HPP on the territory of this entity (in June 2020). On the other hand, the new law in Serbia (adopted in 2021) has increased the controversy regarding public criticism of small hydropower plants. Part of the Serbian public is concerned about the proposed new legal norms. Incentives for (small) hydropower plants are a point of issue due to the

potential damage to the environment and the negative impact on natural habitats and on quality of life [7].

From the technical aspect (known and mature technology) and examples of good practice all over the world, the failure of small hydropower plants in energy transition was quite a surprise. Driven by this situation and inspired by the paper of Capellán-Pérez et al. [1], the researchers of this paper have joined the energy cooperative Elektropionir in 2020 (one of two energy cooperatives established in Serbia).

Elektropionir is a pioneering, Serbian member-owned energy cooperative [8]. It was established in 2019 with the aim to become one of the key actors in empowering ordinary people to more actively participate in the transition of the Serbian energy sector to renewable energy sources. The cooperative aims at establishing a network of decentralized rooftop solar power plants and collective, citizens-owned solar parks throughout Serbia. Elektropionir is also active in facilitating households to become prosumers. Their team is multidisciplinary (architects, engineers, sociologists, philosophers, political scientists, etc.) well connected with research and civil society organizations and other cooperatives in Serbia, the region and the EU. They are also a member of REScoop, the European federation of citizen energy cooperatives, with a growing network of 1.900 energy cooperatives [9].

2 THE DEVELOPMENT AND EVOLUTION OF RENEWABLE ENERGY COMMUNITY BUSINESS MODELS

In this section of the paper, a review of past, current and potential business models of RE Coops will be analysed. The development of community photovoltaic (PV) projects has been dominating activity so in the paper will be analysed energy coops and communities gathered around solar energy generation, distribution and retailing.

Community energy, especially in the form of renewable energy cooperatives (RE Coops), has been credited both by researchers and policy makers with increasing acceptance of renewable energy and overcoming uncertainty and indifference regarding renewable energy projects. Community energy is further said to increase the positive socio-economic impacts of renewable energy projects and to provide an opportunity for democratic governance of renewable energy [10].

Community energy projects typically combine market available technologies with novel technical and social ideas, such as business models, in context-specific arrangements. In so doing, communities are said to perform ‘configurational work’ and are influenced by learning processes internal to the community and from the wider flow of ideas, knowledge and competences via intermediaries moving from project to project. This implies that no two community energy projects are alike. Rather, they share common elements, such as technologies, business models, funding sources etc., that are packaged together according to local circumstances and needs, and according to available policy and regulatory support at a given time. What distinguishes community-orientated projects from developer-led projects is the extent to which they follow participatory processes and deliver local and collective outcomes [11].

There have been three archetypal community PV business models as having played a key role in the evolution of community renewable energy to date:

- Community renewable business models based on grant funding
- Small community PV projects based on Feed-in Tariff scheme (FITs)
- Large community solar PV projects based on FITs and Power Purchase Agreements (PPAs)

By the early 2000s, and through continuous research and development activities, PV costs had dropped to the extent that various governments started providing incentives for deploying solar PV [12]. From then on a range of government support programmes were launched to help community initiatives to form, network and develop capacities before taking on a range of energy efficiency and renewable energy projects. The business model was underpinned by grants and was ‘savings-based’, deriving its revenue from substituting power purchases on the community site. Grants provided support for communities aspiring to own renewable generation projects and certainty for winning groups. They facilitated access to market finance, making projects economically viable. The resultant business model focused on grant specifications and the application process. Groups benefited where they had previous grant writing expertise. Grants also proved surprisingly good at developing a thriving community ecosystem despite the fact they could only ever support single projects: further grants were required to expand group activities [11].

The introduction of FITs significantly altered the landscape in which community PV projects were designed and delivered. It removed community groups’ previous reliance upon grants and encouraged the formation of ‘community enterprises’ with revenue-based business models. The FITs allowed community groups to develop their business cases and secure additional finance around a guaranteed source of income and grid connection [11]. Numerous renewable energy projects were implemented, seemingly in alignment with long-term energy policy [10].

However, in Germany, as in many countries, energy policy has shifted away from providing subsidy support for energy community and towards integrating renewable energies into the energy markets. Changes in the tariffs for solar PV in Germany made typical REC projects less profitable after 2012. Similar happen in UK and Spain in 2010. Structural parallels also exist with developments of wind cooperatives in Denmark and the Netherlands. Under new policy reality, RE Coops have to turn to a new business models.

Reducing margins for small-scale PV projects subsequently pushed communities towards larger installations and encouraged further business models adaptations, which concentrated on the sale of generated electricity through long-term PPA contracts. PPA contracts require a two-step process involving complex legal negotiations, which increases demand for at-risk capital. The ability or nature of borrowing also depends on the PPA contact, which makes it significantly more difficult for community groups to attract investors. This greater emphasis on client-contractor relations increases complexity and transaction costs [11].

2.1 Emerging post subsidy community pv business models

These new emerging business models involve larger, riskier projects that are more complex and require more know-how. For example, one of the most prominent RE Coops in Spain, Som Energia has adapted to this new policy reality through financing the facilities for renewable energy production. Another business model has been adopted by Goiener S. Coop., which acts as an agent in the electricity market and the Technical Accreditation Certificate to access the Spanish Electricity Information Systems.

A variety of post subsidy business models are emerging. New RE Coops business models could be summarized in three areas [13]:

- Investments,
- Energy marketing and
- Energy related services.

Four principal models exist [11]:

1. Existing assets acquired post-construction,
2. Community groups partnering with an established utility to develop renewable energy projects,
3. Refinement of existing PPA models through the incorporation of onsite electricity storage,
4. Reminiscent of virtual power stations and allows generation to be matched with remote clients to create a proxy supply relationship without geographical constraints

Smart energy systems innovations can be used as one of the tools to provide services or other socio-economic benefits to the members and/or the local community, however the main aim of energy communities is to self-organise around an energy-related activity (e.g. generation and sale of renewable energy) in order [14]. One of the prominent examples for that is Som Energia the first Spanish RE cooperative that in order to deal with the regulation shift and pursuing the objective of installing new RES capacity, in 2015 launched the “Generation kWh” project. This innovative project allowed cooperative members to make investments on “energy-shares”, where the investment is returned in the form of energy consumption reduction in the energy bill, with no interest rates (i.e., interest zero loan), during the lifetime of the power plants built in this way. In this system, an energy return is guaranteed instead of a financial one. So far, nearly 3.5 million € have been invested by 3500 cooperative members and the first plant developed by this mechanism (a 2MW PV plant) has been producing energy since the beginning of 2016 [1].

3 CASE STUDY OF SERBIA

Europe has a leading role in the field with over 3000 organizations reported as RE Coops and even more community energy projects, however, these are mostly concentrated in North and West Europe; on the contrary, their spread in post-socialist European countries has been reported to be much more limited. Key factors for addressing the differences in the level of development of RE Coops in different countries appear to be many (the historical influence of the ecological and anti-nuclear

movements, the spread of publicly owned municipal utilities, the impact of the oil shocks in the 1970s and the derived policy-responses). In addition, there is the socio-political-cultural context of post-socialist countries, in particular, widespread mistrust of the cooperative institutional structure, born out of its misuse by the establishment during the socialist era. The purpose of this section is to give review contribution and possibly recommendations for innovative business models to RE Coops growing in this environment with less favourable legislation and incentives.

3.1 Energy cooperatives in Serbia and their role

In 2019, two energy cooperatives have been established in Serbia, Sunčani krovovi in Šabac and Elektropionor (EP) in Belgrade. There are no known energy cooperatives (or other energy communities) in North Macedonia, Bosnia and Herzegovina, Albania, Montenegro and Kosovo*. The one active energy cooperative in Croatia is ZEZ [15] with which EP has established close cooperation.

As already mentioned, authors have been closely observing government creation and implementation of the energy policies and laws, public opinion, civil movements around RES projects in Serbia and the region for the last 18 years. In last two years, pushed by obvious climate change, air pollution and current energy crisis there have been significant changes in the energy legislation in the Western Balkan and subsequent incentive programmes.

Western Balkan countries have introduced a legal framework to encourage and promote energy production from renewable energy sources. Thus, support policies have received increased attention with a focus on the power generation sector, while much less attention is devoted to transport and heating and cooling. Even though the countries have defined targets for RES in their energy policies, there are gaps between these targets and the actual results, as national government are facing various energy challenges. The main barriers common to all countries are regulatory uncertainty and low levels of transparency, slow and unpredictable planning process and limited regional market integration[7]. Additionally, incentives and subsidies are deployed ad hoc. Just in the period of less than a year, there have been significant increase in number of policies and programmes across Western Balkan that promoted and incentivised RES. One of strongly promoted policies is a prosumer status of households and industry that just backlashed with many unfinished fiscal policies or other obstacles found in practice (for instance mismatch between electricity billing according to the Ministry of Energy and according to the Ministry of Finance). Such uncompleted ad hoc policies in combination with resistance of regime and utility companies create hostile regulatory and economic context. However, it is been known that energy cooperatives have been promoted by citizens and communities in times of crisis [1].

One of the main preconditions for the successful deployment of RE Coops lies in the existence of an informed and confident social base with strong and continued motivation to selflessly support the project over time, thus having the potential to overturn the hostile regulatory context [1].

During two year period authors have observed the work of energy cooperative EP and have been the witnesses growing interest for the work of EP and building the trust of the community in information given by EP. Since the end of 2019,

Elektropionir is opening the space for citizens to become active participants in the energy sector, as well as to add much-lacking renewables power generation to the Serbian energy mix through distributed PV generation. While the cooperative still unfolding its range of activities, in the short time since its inception it has gained recognition in the energy sector and beyond. This culminated in invitation of the Ministry of Energy to EP to join the working group for removing barriers for prosumers.

While the landmark legislation is now in place, crucial bottlenecks for a successful rollout of citizens' renewable generation remain firmly in place. This centres around the difficult position citizens have – due to lack of good accessible information – to set themselves up in this novel field, combined with the current reluctance of vested actors to open up for citizens' participation. Both provide substantial roadblocks and major risks.

Elektropionir has taken a leap in informing citizens that seek to enter PV energy generation through the course *Solartehnika narodu* (Solartech to the People) Households in Serbia that aspire to participate in the generation of renewables face many unknowns: a lack of clear and accessible guidance from the side of regulators, lack of real-world examples, and little insight into the parameters that make PV solar in Serbia a viable option for households (also financially). On top of this, novel prosumers encounter a substantial information gap that they are forced to bridge regarding terminology.

Launched in 2021, the course *Solartehnika narodu* is specifically tailored to provide individuals, households, and communities the necessary background, insight and step-by-step guidance on becoming renewable PV energy producers themselves. The setup is modular, multi-day, and comprised of distinct segments (energy transition, technical components, procedures, sizing, optimisation, etc.) that are largely online, supplemented with an on-site segment including a field visit to a larger PV plant. The current reluctance – even resistance – of vested actors to provide access to the electricity network and market are substantial roadblocks and major risks. This not only blocks individual citizens, but also aggregated households (in citizen energy cooperatives and communities) to successfully take part in the sector and energy transition. It should be noted that RE Coops are social enterprises that share social motivations going beyond the market logic. Hence, these organizations can act as laboratories for innovative solutions. Innovation and resilience is vital to surviving in a hostile context [1].

One of such innovative socio-technical solutions are flexibility services:

- Demand-side flexibility to maximise self-consumption and offer reduced retail electricity prices
- Aggregating loads as resources to use on balancing reserves of Transmission System Operators

As wind and solar energy are variable resources and require flexible ways to integrate them into a decentralising energy system, the electricity market is set to change from commodity-oriented business models towards a market based on a new set of flexibility services to support a dynamic grid. This enables the cooperative at the

same time to unfold a range of innovative activities, further speeding up transitioning the Serbian energy mix towards clean, renewable energy.

Therefore, Elektropionir is now building the roadmap how they could become an energy aggregator holding control over such a crucial gateway by citizens. This provides a much more secure position for the cooperative and can fast track EP for readiness towards a fundamentally changing energy market.

4 CONCLUSION

Confronting the climate crisis and working to mitigate and adapt to climate change will mark the rest of this century. Over two-thirds of the total emission of greenhouse gases is the result of the burning of fossil fuels (coal, oil and gas). Changing this way of energy production is crucial. In Serbia, it is also a solution to one of the burning problems - air pollution.

Citizens have proven to be a significant motivating factor and catalyst for the transition to clean energy. A special emphasis should be placed on active public engagement and raising awareness of all the economic, energy and ecological benefits that the energy transition can bring. The energy cooperatives are one of the key actors in empowering ordinary people to participate more actively in the transition of the energy sector to renewable energy sources.

The Western Balkans energy markets are highly fragmented with resources scattered across six countries. The integration of these markets into a regional network would potentially reduce risks for investors and enable the exploitation of economies of scale [7] and this is also a place where energy cooperatives could have a crucial role.

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