



The emergence of renewable energy cooperatives in Spain: A review

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ABSTRACT

Cooperative organizations that aim to foster the production and the consumption of renewable energy are flourishing all over the world. Nevertheless, the scholarly research about these organizations that promote renewable energy has been scattered and limited, especially in the case of countries that do not have a tradition of disseminating green energy (e.g. countries from Southern Europe). Taking into account this gap in the literature, this article sheds light on the phenomenon of renewable energy cooperatives in Spain. Based on primary and secondary data sources the main characteristics, motivations and performance of these organizations that promote community initiatives for renewable energy are reviewed. The implications for stakeholders, policy makers and researchers, as well as avenues for further research, are discussed.

1. Introduction

Community initiatives for renewable energy (RE) can be defined as decentralized, non-governmental initiatives of local communities and citizens to promote the production and consumption of RE [1]. Community owned RE projects have long been advocated as a way to foster the dissemination of RE technologies [2]. Local community energy initiatives and projects can involve very different legal and financial models of ownership [3]. Cooperative organizations are perhaps among the most relevant [4] and have received increased attention from scholars and policymakers [5], as cooperatives that aim to foster the production and/or the consumption of RE are flourishing all over the world, especially in Canada, the US, UK, Denmark or Germany [6].

These cooperatively-owned organizations can constitute a substantially different model of energy provision and distribution [7]. As underlined by Walker et al. [8], this trend could be linked to a more general community approach to fostering support for RE technologies and investments. Interest in the scholarly research into cooperatively-owned RE initiatives offers a complementary model for RE deployment and such initiatives have several advantages over the prevailing “top down” strategy, as they can be proactive agents of change [9,10] in both the economic and political dimensions [11].

Scholarly research about cooperative organizations that foster RE

(hereinafter referred to as RE co-ops) has been the subject of a very limited number of academic studies. This gap is even more obvious in countries such as Spain where the RE sources are in an emergent stage, even though, in recent years, these sources have experienced intensive growth [12]. The few and scattered research works published in the literature have focused on the spread of RE co-ops in countries with a long tradition of adoption of RE, such as Germany [11,13] and the Netherlands [14]. Taking into account this gap in the literature, the aim of this paper is to explore and review the main characteristics of RE co-ops in Spain, in order to make a contribution to both the scholarly and practitioner literature.

2. Renewable energy cooperatives (RE co-ops)

Cooperatives represent a legal business form that exists all over the world, notably in the fields of agricultural production, general consumption, finance and, to a lesser extent, industrial production. According to the International Co-operative Alliance (ICA) [15] ‘a cooperative is an autonomous association of persons united voluntarily to meet their common economic, social, and cultural needs and aspirations through a jointly-owned and democratically controlled enterprise’.

Built on the idea of achieving goals with joint force, cooperatives empower single players to realize projects that they would not be able

Abbreviations: RE, renewable energy; RE co-ops, renewable energy cooperatives (RE co-ops); ICA, International Co-operative Alliance; ILO, International Labour Organization; S. Coop., Sociedad Cooperativa; REScoop, European Federation of Renewable Energy Cooperatives (REScoop); PV, photovoltaic; MW, megawatt; kW, kilowatt; kWh, kilowatt hour; GW h, gigawatt hours; kWh_e, Variation of unit of electric energy generation cost; MVA, mega-volt ampere; UNCCUER, National Union of Renewable Energy Electricity Cooperatives

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to realize by themselves [16]. As recently underlined by Beggio and Kusch [17], the common aspects shared by these very different types of RE co-ops are the principles of the ICA guidelines, which are the following [15]:

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

These common principles applied to a heterogeneous day by day activity can be illustrated by looking at the European network REScoop.eu (see Section 4 for more details). Very different types of organization are associated, but they share a common perspective. Single RE co-ops are groups of citizens, in any legal form, which share a common long-term view of a sustainable future of energy and advance energy transition through involvement in active citizenship [17].

As pointed out by Tarhan [18], the energy sectors of most industrialized countries are marked by a long history of state and corporate-owned and highly centralized energy generation (mostly from fossil-based sources) and distribution and the increased uptake of renewable energy (RE) technologies since the early 1990s, has not changed the hegemony of those actors, who own the large-scale RE projects. Nevertheless, with the appearance of RE co-ops and other forms of community groups, new alternatives are emerging to provide bottom-up and collective solutions to the local needs of communities and global environmental issues [18].

As stated, there is no unified and common definition of RE co-ops. Various different typologies of RE co-ops can be found in the specialized literature, and these are summarized in Table 1.

Although RE co-ops are very diverse and are shaped by a set of contingent factors in their environments, they operate along similar lines [21]: a core group establishes the feasibility of a project, often helped by grant funding and advice from other RE co-ops or not-for-profit agencies; the group formally establishes and publishes a share prospectus, explaining its business plan, intended return on investment and plans for community benefit; the scheme is marketed, often locally, and attracts owner-members of the co-operative; when the funds are raised, the scheme is constructed and the RE co-op is launched. As underlined by Willis and Willis [21], although this process seems

Table 1

Typologies of RE co-ops reviewed in the literature.

Source: Own work based on Rijpens et al. [19]; Yildiz et al. [13]; Enercoop [20].

Typology	
Energy sources	<ul style="list-style-type: none"> ● RE co-ops that foster the Biomass energy production ● RE co-ops that foster the Wind-energy production ● RE co-ops that foster the Solar energy production ● RE co-ops that foster the Geothermal energy production ● RE co-ops that foster Natural/Biogas energy production ● RE co-ops that foster the Tidal energy production ● Hybrid RE co-ops that foster a mix of any of the previous REs
Added Value	<ul style="list-style-type: none"> ● RE co-ops focused on the consumption or purchasing of RE ● RE co-ops focused on the production of RE ● RE co-ops focused on the distribution of RE ● RE co-ops focused on the trading of RE ● Hybrid RE co-ops which include any of the previous
Business models	<ul style="list-style-type: none"> ● Local group of citizens' RE co-ops ● Regional-national RE co-ops ● Fully integrated RE co-ops ● Network of RE co-ops ● RE co-ops with a Multi-stakeholder governance model ● RE co-ops as Non-energy-focused organizations

straightforward, each stage is a significant challenge for groups that are mainly composed of volunteers.

Many potentially positive aspects of RE co-ops that act as motivational factors to launch this type of cooperative can be identified. RE co-ops encourage people to take a longer-term view by creating common expectations and provide a more sustainable basis, as they are embedded in local development [22]. RE Co-ops deliver 'triple bottom line' returns, addressing environmental and social issues while also generating economic benefits for members and/or for members' communities [23]. Energy cooperatives, in general, have also been found to be resilient to crisis, making them sustainable over the long term [24]. Moreover, community project ownership helps overcome public opposition facing RE development such as wind-farms, increasing uptake [25]. Indeed, the emergence of RE co-ops can be partly explained by the dissatisfaction of consumers and their desire to control the origin of their energy better [23,26] and to keep production in the hands of citizens [27]. The potential of RE co-ops to reduce the price of electricity is another factor mentioned in the literature [20,23,26]. Similarly, in their recent work Coenen et al. [28] summarized the main benefits or added value of RE co-ops as shown in Table 2.

Despite the reported success of RE co-ops in generating positive impacts, the specialized literature also raises concerns and challenges in relation to their limitations, including various community-specific factors and financial and perceptual barriers to the emergence and development of RE co-ops [18]. Among these challenges are the financial and technical complexity and the need for people, especially skilled and knowledgeable people, to volunteer their time, [21,27]. In their recent study Mignon and Rüdinger [5] found that RE co-ops are specifically affected by a lack of financial infrastructure, a lack of knowledge infrastructure and a hard institutional context that hinders their deployment.

3. RE co-ops in the European Union: a story of a heterogeneous dissemination

The dissemination of RE co-ops in Europe has been very heterogeneous, with some member states of the European Union having very few RE co-ops operating and other member states having an important amount of cooperatives operating and a growing amount of new cooperatives launched each year. As recently underlined by Bauwens et al. [11] various major influences or factors have been explored to explain such disparity, such as the formal institutional rules (i.e. public regulation), the support mechanisms for RE and spatial planning, attitudes toward the cooperative model and the cultures of local energy activism.

The REScoop.eu network — the Federation of Groups and Cooperatives of Citizens for Renewable Energy in Europe (see the next section) — reports that as of early 2014, approximately 3000 RE co-ops were operating [29]. In Germany alone, 656 RE co-ops were established between 2005 and 2013, while in the UK just close to 30 were established between 2008 and 2012 [18]. Among the 3000 RE co-ops operating across Europe, almost 80 per cent are located in Germany and Denmark [11,29].

In those member states of the European Union with certain traditions — that could be called the frontrunners in terms of RE co-op dissemination — RE co-ops and other types of energy cooperatives have been an important building block of the energy transition [30]. Germany, Denmark and the Netherlands are three good examples of frontrunners regarding the prominence of RE co-ops. Nevertheless, as underlined by Yildiz et al. [13] their practical importance is neither quantitatively nor qualitatively reflected in the academic literature.

In Germany the tradition of energy cooperatives dates back to the early 20th century when decentralized cooperatives based on fossil fuels were set up to assure electricity provision in remote areas [1]. Originally these cooperatives were owned by municipalities but they are now often owned by local cooperatives. Since 2009 they have

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