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Article

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Energy cooperatives in southern European countries: Are they relevant for sustainability targets?

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Abstract

The transition to low-carbon energy is a reality in Europe and most countries are on track to achieve their 2020 targets. However, there is a debate about the role of each stakeholder in this process and which of the parties most contribute.

Our research focus is the role of energy cooperatives as contributors to sustainability targets, namely to energy transition, based on a database of cooperatives in southern European countries. The aim is also to compare the results with prior results on the literature.

Our paper aims at answering the following questions: Are energy cooperatives important actors in the energy transition for southern European countries? Is this role different from the role of energy cooperatives in northern countries?

The answer to these questions may be a starting point for discussion of different regulations and different behaviours of energy cooperatives throughout Europe and draw attention to the best way of supporting energy cooperatives.

Differently, from the northern countries, the appearance of RE co-ops in Southern countries might be due to the dissatisfaction of citizens and consumer with the energy model, characterized by the dominance of the electric companies on the energy market for electric power.

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Keywords: Energy cooperatives; Energy transition; Sustainability; Renewable energy

1. Introduction

Climate change and the introduction of renewable energy (RE) policies, as one of the priorities in the United Nations Agenda 2030 for Sustainable Development, are main topics to be studied. Thus, the emergence and role

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of the RE communities as a different stakeholder in the energy market has been addressed by a large part of some recent literature. has addressed the emergence and impact that have in Europe.

In recent times, a new type of Cooperative is emerging, so that the UN has declared 2012 as the International Year of Cooperatives, “recognizing that cooperatives in their various forms promote the full participation in the economic and social development of all people” [1]. Cooperatives are based on the values of “*self-help, self-responsibility, democracy, equality, equity and solidarity*” and express seven principles: *voluntary and open membership; democratic member control; economic participation and direct ownership; autonomy and independence; education, training and information; cooperation between cooperatives and community; and environmental concern*” [2].

This new cooperative organization model, the Renewable energy cooperatives (*RE co-ops*¹), extremely complex and diverse, it is called “social enterprises”, emerging when certain different types of stakeholders have a strong appeal to become owners while sharing mutual interests and visions. Among its interests are sustainable development, social inclusion and poverty reduction, and access to energy as a crucial issue for development processes, including to eradicate poverty and help meet basic human needs [2].

Although they are not as present as agricultural cooperatives or credit unions, *RE co-ops* have a long history in Germany [4]. Throughout the nineteenth century, cooperatives were formed to produce energy, to install and operate a distribution network in remote locations, since large companies did not operate due to low profitability. Thus, with the focus of the 20th century on fairly cheap and abundant fossil fuels, it led to an attempt to promote renewable energies through a revival of energy cooperatives.

Thus, cooperatives have a very important function, since they are in a position to unite individuals with economic and local actors, achieving a broad social consensus. That is, cooperatives become a crucial pillar for a turnaround in the energy transition. In addition, they are companies that seek “the economic, social, and cultural advancement of their members, pursuing goals other than maximizing profit (p.60)” [5].

Vieta and Lionais [6] state that “*Rooted in the unique principles and values that distinguish them from other business types, cooperatives, in a nutshell, embody what has been called “the cooperative advantage”*”(p.1). This advantage is achieved through a *win-win* relationship with *stakeholders*. Such a “*win-win*” relationship ensures that there is loyalty among members of the cooperative and allows more members to be attracted over time.

Šahović and da Silva [7] point out that cooperative enterprises are, in their legal form, very different from those companies whose primary purpose is profit making and even non-profit-making enterprises. These differences are reflected in objectives, policies and financial activity. This form of organization arose from the combination of the Principles of the International Cooperative Alliance and the legislation on cooperatives in each country.

It is, therefore, necessary to further study *RE co-ops* for the relevant role they already play in some energy markets, but essentially for the key role they can play in the future. This new generation of cooperatives is democratizing the energy sector through production, sale, consumption and energy supplied [7].

The paper is organized as follows. The next section reviews the role of energy cooperatives. This brief introduction to the history of *RE co-ops* in the selected countries is relevant to understand the state of the art. Section 3 explores through statistical analysis the importance of *RE co-ops* in southern countries. Section 4 combines all results together to draw conclusions.

2. Role of energy cooperative

Academic research on *RE co-ops* is widely dispersed and limited, particularly for southern European countries, that is, countries that have no tradition of disseminating green energy [3], but they have an emergent phase. The literature focuses on the dissemination of *RE co-ops* in countries with a long tradition of RE.

As *RE co-ops* attach particular importance to reasonably priced energy supplies and consumers may reduce their environmental impact through production with green energy sources and thereby strengthen the market with cleaner energy. As a member of *RE co-ops*, citizens may actively participate in energy policy debates and may more clearly or quickly see the implications of their actions for a better environmental and energy future. On the other hand, *RE co-ops* promote local development, creating green jobs or by offering additional services such as microfinance, among others [2].

RE co-ops may have more influence in promoting the necessary reduction of consumption, as this is in the interests of consumers/members. The European RES market is still mainly dominated by large companies [8] and

¹ For the sake of simplicity and to avoid creating a new term, in this article, we use Renewable energy cooperatives (*RE co-ops*) [3].

the *RE co-ops* still represent a small part of that market, despite their many advantages associated with, both in terms of economic efficiency and citizens' involvement.

Basically, the European RES market may be divided into two parts: the production of RE and the supply of electricity based on renewable energy sources (E-RES). A market related to the production market is the supply of energy produced, particularly in the form of electricity. This type of market still presents some obstacles to the entry of *RE co-ops* as it is a market recently liberalized and controlled by a small number of (powerful) energy companies [9]. A number of cooperatives have begun to provide RES-based electricity to increase their share and control a significant part of the supply chain.

The RE co-ops present several important economic impacts. One of the most important is their contribution to energy democracy and "energy citizenship". While the first concept refers primarily to joint decision-making on energy policies [10], the second concept refers more broadly to "consciousness among citizens and communities of energy issues", in turn, allows individuals to "contribute more broadly to the energy transition" [11]. Thus, citizens and energy communities become active consumers or "prosumers", and they will also gradually begin to participate in the operation of distribution networks, power supply and energy service companies [11]. This type of democratization of the energy system may lead to greater acceptance of RE projects [12], lower energy prices, especially for low energy consumers [10]. It is quite important for RE co-ops, named several times in their status, the supply of energy at lower prices and the combat to energy poverty. For example, Ecopower was recognized as having the fairest billing structure of all suppliers in the Flemish region. Also in the UK, some cooperatives are known for providing free or low-cost electricity subsidies to members in order to combat fuel poverty in Brixton [13].

Another impact of *RE co-ops* is its contribution to the local economy, i.e. may create jobs directly in the local market and it also show that *RE co-ops* and community projects are likely to hire local firms or use local banks and reinvest community profits [13].

Thus, *RE co-ops* seek to maximize local value, contributing to the social and economic well-being of local communities. Specifically, cooperatives create a "circular" economy at the local level, where RE profits are invested to promote other energy goals, as well as building reforms and energy savings [14].

Finally, *RE co-ops* contribute to the achievement of climate, energy and environmental targets. In turn, they can bring EU national and regional policies closer together, thus improving local responsiveness to energy transitions projects [13]. But they also aim to contribute to the achievement of EU climate policy targets by helping to set up RE capacity, save energy and improve energy efficiency.

While *RE co-ops* have expanded strongly in countries such as Denmark [15], Germany [16] and to a lesser extent, the UK [17], it can be seen that the evolution of *RE co-ops* is much slower in other countries, particularly in southern Europe [3]. An example of this is Portugal, where we can name Coopérnico as the first and only *RE co-ops*. This seems to be in agreement with the overall development of RES in these countries [18] or other factors may be contributing.

Wierling et al. [19] in an analysis of the role of *RE co-ops* in the transition of energy in European countries show that publications focus on single countries or case studies, mostly in countries with a large number of cooperatives.

In a single country analysis, there is a lack of literature for the southern European countries. This may be due to the lack of green energy tradition or/and the lack of *RE co-ops* in these countries. Capellán-Pérez et al. [20] refer for example for Portugal that even being a country with a very high percentage of wind energy, there does not seem to be space for local and democratic energy projects in the country.

Despite the complexity, size, strategies and success of *RE co-ops*, they have common ground for *RE co-ops* in Europe. A very common point in these studies is that they point out as important the actions of communities or cooperatives for the transition to more sustainable energy systems.

Huybrechts and Mertens [12] note that access to energy provided by cooperatives or civil society in general in Europe is especially hard, due to the fact that the market is still owned by large electric companies, allowing a reduced access to the energy grids by the cooperatives and since the number of *RE co-ops* that can offer this service is very small. These considerations apply to the southern Europe countries. Thus, it seems that the resolution of this barrier is of crucial importance for the spread of the consumption and production of RE.

The effective operation of *RE co-ops* involves a flexible and favourable legislative framework, policy environment and enabling conditions, including support measures [2]. Heras-Saizarbitoria et al. [3] note that these points are major obstacles for the growth of organizations, namely in the southern countries.

3. Importance of energy cooperatives in southern countries: Statistical analysis

Our analysis focuses on Portugal, Italy, and Spain (the southern countries). These countries have a small but emergent number of *RE co-ops* within the EU [3]. The exclusion of Greece is due to the present lack of available information.

Table 1 provides details for the countries under analysis and the sources of information used for the analysis of *RE co-ops*. The availability of open data on cooperatives varies from country to country due to the legislative differences and the amount of voluntary information provided by cooperatives, therefore it was not possible to have the same level of detail for all countries and all cooperatives. However, for each country, we collect the date of foundation, the location of each cooperative and the type of activity (see Fig. 1).

Table 1. RE co-ops: Overview of methods of research, sources and information collected.

Source: Own elaboration.

Main sources of information	Search terms	Information collected
Portugal		
Web based searches, grey literature and contacting relevant cooperative members	Community renewable energy; renewable energy cooperatives; RES coop	Addresses; dates of foundation; type of activities; number of members; number of contracts; production capacities; distribution capacities
Spain		
Web based searches, grey literature and literature	Renewable energy cooperatives; community renewable energy; RES coop	Addresses; dates of foundation; type of activities; production capacities; distribution capacities; number of members; number of contracts
Italy		
Web based searches, grey literature and literature	Renewable energy cooperatives; community renewable energy; RES coop	Addresses; dates of foundation; type of activities; production capacities; distribution capacities; number of members; number of contracts

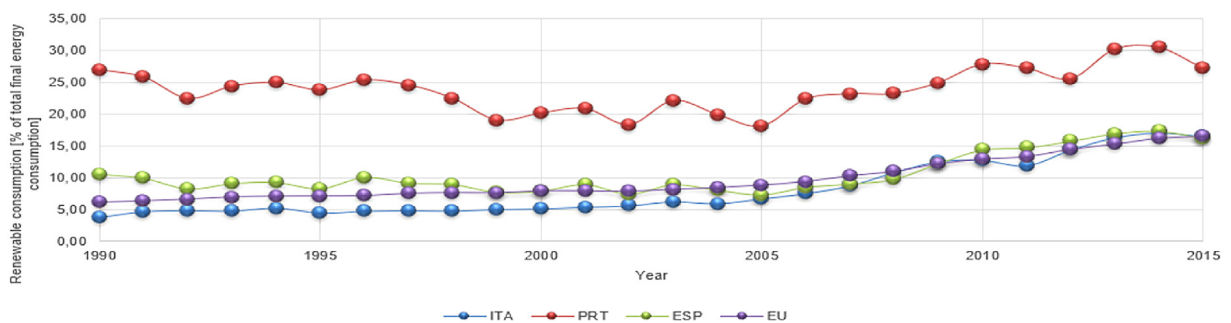


Fig. 1. Share of renewable energy in total final energy consumption for Italy, Portugal, Spain and the European Union, 1998 to 2016.

Source: The World Bank Data Bank 2019.

There is a clear increase in renewable consumption from the lowest values of the 1990s (below 15%) for all countries. The exception is Portugal (~27%), where geothermal and wind energy plays a very important role. In 2005, all countries show a significant increase in the consumption of RE. Compared with the EU average, both Italy and Spain show very similar values and growth. Since 2008, the values are all above 10%. This evolution may echo the first activities of the energy cooperatives in these two countries, whereas in Portugal, the only cooperative still plays a marginal role in the energy market.

Portugal is well above the EU average, due to the increase in wind farms in the country in the years of 2010. The creation of Coopérnico in 2013 and their cooperative's PV projects in various places in the country may be seen as a small contribution to these levels of consumption.

In order to understand the differences between cooperatives in Southern countries, we performed a comparative analysis among the largest *RE co-ops* in the Southern Countries: Coopérnico, Som Energia and Enostra. All *RE co-ops* belong to the European Federation of renewable energy cooperatives (see Table 2).

Table 2. Comparative analysis among the largest RE co-ops in the Southern countries.
Source: Own elaboration, [3,21,22].

	Som Energia	Enostra	Coopérnico
Country	Spain	Italy	Portugal
Founded	2010	2017	2013
Number of members	56 490	3657	1288
Number of contracts	94 165	1963	750
Energy produced (GWh/year)	13,56	0,56	n.d.
Energy sold (GWh/year)	0,19	4,27	n.d.
Production	Yes	Yes (parcel)	Yes
Distribution	Yes	Yes	Yes
National share of energy from renewable sources (2016)	17,3%	17,4%	28,5%
Total number of cooperative	8	12	1
Date of foundation first RE co-op	1925	2007	2013

When analysing the *RE co-ops* on the South, we may already see great differences. The Som Energy, although recent, has a high number of members, and continues to grow. The Enostra with only two years of activity is in great growth, and with quite interesting values of RES energy sold. In turn, although Portugal is the country with the most share of RE consumption, it has only one cooperative, with almost 800 contracts in a period of 6 years.

Fig. 2A shows the latest data for the share of RE in gross final energy consumption. From a positive evolution over the years, we can see that RE consumption shows a significant increase from 2010 onwards, this may be due to the entry of *RE co-ops* into the energy markets of southern Europe countries.

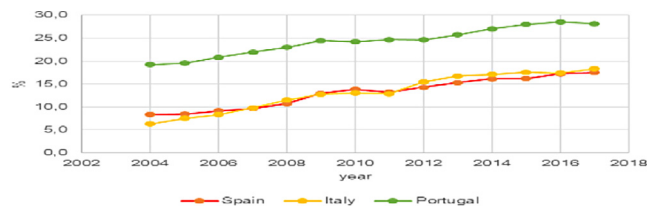


Fig. 2A. Share of energy from renewable sources (in % of gross final energy consumption).
Source: Eurostat.

Fig. 2B shows the data for the year 2017 for the share of RE and the 2020 target for southern Europe countries. The only country that has reached the target was Italy, having already reached that target in 2014. Although Portugal has high RE shares, but also the highest target of all three countries, it has not yet reached this goal. With regard to Spain, it has not yet reached the target, which is the country that is further from the proposed objectives.

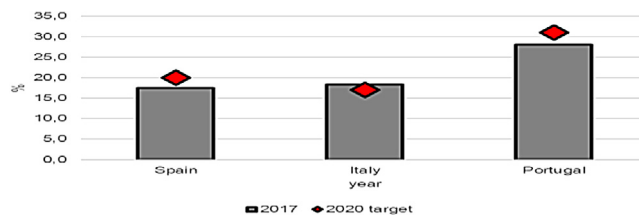


Fig. 2B. Share of energy from renewable sources and 2020 target.
Source: Eurostat.

Thus, with the entry of *RE co-ops* into the energy market, and with the implementation of some policy measures, these can greatly help the southern Europe countries to reach the targets for 2020.

4. Conclusion

Cooperative organizations that encourage the production and consumption of RES are developing around the world. As we can see, the southern Europe countries are a good example of the strength of the new generation of *RE co-ops*. In Spain and Italy, and also in Portugal, but on a still very small scale, *RE co-ops* appear to be legitimate and well-positioned alternatives, with a pretension to compete in markets dominated, in these countries, by large companies.

This recent emergence of cooperatives in southern European countries may be due to the dissatisfaction of citizens and consumers with the current market models. Regrettably, *RE co-ops* seem to have a small weight in the RE market in each country, and this is also true for the number of existents *RE co-ops*. Even though, the role of the *RE co-ops* seems to be determinant for the achievement of the sustainability aims of each country.

Our study has some limitations due to the unavailability of data. Furthermore, this limitation was reflected in not considering Greece in a group of southern countries as it should be. These limitations will be tackled in future research.

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