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What drives the development of community energy in Europe? The case of wind power cooperatives

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ABSTRACT

The dominant model of energy infrastructure has historically been conceived in a very centralized fashion, i.e., with hardly any citizen involvement in energy generation. Yet, increasing attention is being paid to the transition process towards a more decentralized configuration. This article examines the factors likely to foster citizen and community participation as regards wind power cooperatives in Denmark, Germany, Belgium and the UK. Using Elinor Ostrom's Social-Ecological System Framework, the analysis highlights a double-edged phenomenon: prevailing and growing hostility toward cooperatives, on the one hand, and, on the other, strategic reactions to this evolution. What comes out indeed is that, throughout most of these countries, the emergence of some coordinated inter-organizational actions among cooperatives enables them to survive in their critical environment.

1. Introduction

The dominant model of energy infrastructure has historically been conceived as very centralized, with hardly any citizen involvement in energy production. Yet, an increasing number of scholars, citizens and policy-makers advocate the transition towards a more decentralized configuration, involving geographically dispersed and small-scale generation units located close to consumers [1]. Decentralized systems are said to present several advantages over centralized ones, including reduced costs for transmission and distribution systems, reduced grid power losses, more efficient data management systems and a larger share of zero-carbon technologies [2]. In turn, this configuration requires an active role from energy users, the latter becoming themselves "prosumers" or co-providers of energy services [3].

In this context, it is thus meaningful to study the factors likely to foster citizen participation. Community energy projects, i.e., formal or informal citizen-led initiatives which propose collaborative solutions on a local basis to facilitate the development of sustainable energy technologies, may have an important role to play in this respect. These initiatives are increasingly perceived as key potential actors in the transition toward low-carbon energy systems [4]. While incumbent actors suffer a lack of trust from the public [5], the implementation of decentralized renewable energy installations and many energy efficiency measures need to be steered by trustworthy individuals and organizations rooted in local communities. Community energy enhances social acceptance of technologies at the local level, as evidenced by comparative research for the case of wind power [6,see also 7]. Moreover, it is linked to identification processes in rural areas and can be interpreted as an expression of more participation in decision-making on this vital infrastructure [8]. Against the background of these findings on the possible economic, social and political impacts of community energy, we focus on the conditions under which a specific form of community energy – wind power cooperatives – emerges.

Renewable energy (RE) cooperatives in general enable citizens to collectively own and manage RE projects at the local level [9,10]. From an economic standpoint, cooperatives present a different model of ownership than conventional business organizations. Unlike capitalist corporations, they are owned by their members/users rather than investors. In addition, net earnings are usually divided pro rata among the members – not according to their shareholding – but according to the volume of transactions they have conducted with the firm. In addition, when part of the net income is allocated as a return on capital shares, such profit distribution is subject to a cap, which means maximization of return on capital may not be a key objective. Finally, they present a demo-

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cratic governance structure, which involves equal individual voting rights and the absence of barriers to entry for new members.

However, the weight of the RE cooperative sector varies enormously across Europe. While the RE cooperative model is well-established in some countries, it remains marginal in others. In this article, we conduct a comparative analysis of the contextual factors that affect its development in four countries, focusing on the case of onshore wind power: Denmark, Germany, Belgium and the UK. The analysis highlights how different factors combine to facilitate or, conversely, hinder, the development of RE cooperatives. We emphasize the common patterns that emerge from this transnational comparison without neglecting national specificities. One important pattern observed in these countries can be described as a double movement. The first side of the movement is a convergent observation of an increasingly more hostile environment for cooperatives, a fact which puts them at a relative disadvantage compared to conventional actors. The second side of the movement is a process of strategic reaction from the part of cooperatives, which consists in the emergence of inter-organizational coordinated actions among RE cooperatives in Denmark, Germany and Belgium, such as the creation of joint electricity supply or trading companies. These joint initiatives are the result of strategic responses of small players to regulatory changes and enable them to survive in increasingly hostile environments.

2. Analytical framework

Large differences in the development of RE cooperatives have been observed among European countries. Various factors have been explored to explain such disparity. Formal institutional rules, such as support mechanisms for renewables and spatial planning, along with societal norms including attitudes toward the cooperative model and cultures of local energy activism, have been identified as major influences on the occurrence of locally owned community energy [11–13,9,14,7]. Other explanations include (bio-) physical conditions, and the actors' ability to act strategically to changes in their environment. Finally, it has recently been argued that it is meaningful to investigate how these factors interact in a systemic fashion rather than studying them in isolation [1,15,16]. The so-called "Social-Ecological System" Framework may be helpful in this task.

2.1. The energy system as a Social-Ecological System

In a recent article, Hodbod and Adger [15] argue for framing energy systems as Social-Ecological Systems. In this perspective, we build the conceptual framework of this paper using insights from the Social-Ecological System (SES) Framework developed by Ostrom and her collaborators [17]. The SES framework has traditionally been used to study the interactions between the biological basis of ecosystems and social processes. However, recent expansions of the framework make it applicable to questions of the governance of humanly designed technological systems, such as energy infrastructures [18]. The center of this framework is constituted by an "action situation", in which multiple actors interact with each other under the influence of different contextual variables. These interactions produce outcomes, which are linked to contextual variables through feedback paths (see Fig. 1).

Contextual variables include Resource Systems, Resource Units, Governance Systems and Actors. Resource Systems designate the biophysical/technical systems from which Resource Units are extracted. These Resource Units can then be consumed, used as inputs in a production process or exchanged for other goods and services. Governance Systems include "the prevailing sets of processes or institutions through which the rules shaping the behavior of the [actors] are set and revised" [19:181]. Actors are individuals or collective entities who participate in relevant action situations and are defined by some shared attribute(s), such as leadership, social capital, access to technologies, management skills, etc. Social, Economic, and Political Settings and Related Ecosystems respectively represent the broader social and ecological contexts that may influence the focal SES exogenously.

Hence, the SES framework has the advantage of embracing and integrating into one logical entity different approaches: approaches based on agency, which focus on the thoughts and actions taken by actors expressing their individual power in social contexts, and approaches oriented toward structure, which focus on the set of broader social forces and institutions which constrain the choices made by actors. Finally, the framework also sets the biophysical/technical boundaries in which social interactions take place.

2.2. Application of the SES framework to the case of energy systems and RE cooperatives

The factors influencing the development of RE cooperatives involve action situations and actors at multiple levels. For instance, most support instruments for renewables are designed at the national level, while, in the case of wind power, planning regulations are usually located at the regional or local level. The case here is thus characterized by a multi-level or polycentric system [1]. Yet for the purpose of this article, we consider countries as the main geographical area of analysis. The outcome that is relevant for our inquiry is the pattern of occurrence and success of RE cooperatives operating on national power markets.

Regarding Resource Systems and Resource Units, energy systems can be subdivided into two major types of resource systems: biophysical resource systems and technical resource systems. Biophysical resource system variables encompass the type and abundance of primary energy resources, their location, etc. Technological resource system characteristics cover the type and size of technology, the distance from the grid, the intermittency, the storage capacity, and many other factors.

In this article, we are primarily interested in the structural factors, i.e., Governance Systems variables which influence the patterns of appearance and success of RE cooperatives. We consider Resource Systems and Resource Units essential background factors. On the other hand, while idiosyncratic features of RE cooperatives may account for differences between organizations, they are unlikely to explain why this sector displays different degrees of development across the four countries. Yet there are factors under the form of societal norms, such as attitudes toward the cooperative model or cultures of local energy activism, which also play an essential role. We here consider them as Actors variables since these norms exist only to the extent that they are embedded in actors. We return to some important interactions between the elements of the SES Framework in the following discussion.

2.3. Operationalization of Governance Systems and Actors variables

The SES Framework attempts to identify the fundamental building blocks which need considering when studying SESs and their internal interactions. As such, the framework can be applied to all types of SESs. Yet, to conduct our analysis, it is essential to further specify the factors that are relevant in our case. We have identified four main factors based on the literature and our empirical analysis: two Governance Systems variables (support mechanisms for renewables and planning policies) and two Actors variables (attitudes toward the cooperative model and cultures of local energy activism).