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### Original research article

# A cooperative of their own: Gender implications on renewable energy cooperatives in Germany



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#### ABSTRACT

Renewable energy cooperatives are crucial for local communities to initiate energy transition. With a mixedmethodological approach, this paper analyses the participation of women in renewable energy cooperatives in Germany and reveals the socio-cultural barriers. This study presents an intersectional analysis that integrates gender with other socio-cultural categories and identities within the social context of cooperatives. This study presents the results from a sex ratio analysis of energy cooperatives (N = 388), online interviews (N = 161), and semi-structured interviews (N = 9). Results show that a lack of awareness of opportunities, financial resources, and time for volunteer-based workload and the lack of recognition of social inequalities in the cooperatives hinder women from actively taking part in leadership roles. This study concludes by discussing how contribution to localised renewable energy production reflects differently on genders. It also provides suggestions such as mentorship and diversity programs that would allow more women to take management roles and encourage a more inclusive and fair transition for all.

#### 1. Introduction

The world must find solutions to better mitigate and adapt to climate change. The energy transition is a central pillar of climate action that supports a sustainable shift in the energy systems [1]. The sociotechnical change aims to diffuse low-carbon energy technologies. This challenge should be reinforced by policies, industry, and changing the behaviour of society [2,3]. Shifting from fossil fuels to renewable energy technologies has social, political, and cultural effects on societies. Changes to the energy sources and uses of the technologies create differences in societal practices and behaviours, such as using LED light for energy efficiency and travelling by train instead of flying [4]. Moreover, the geographical division of these changes in the energy systems tends to create uneven development in different states or regions, which impacts energy politics [5]. This transformation of energy production needs to be achieved on different scales [6]. Local and decentralised energy development is one of the pathways for sustainable energy transition [7,8].

Communities have several different meanings in the energy transition, from actors that have agency to take actions for the local governance of localities that carry out environmental applications [9]. Participation of local communities in the energy transition contributes to the shift in the energy systems and increases the acceptance of renewable energy technologies [10–12]. Addressing the barriers and local factors, such as norms and working with the communities to implement energy technologies can avoid opposition and build bottomup solutions [13]. Renewable energy communities are groups of citizens and other stakeholders that actively and financially participate in local energy production and distribution [14,15]. These local groups could be formed and defined as energy communities [16], energy citizens [17] or energy cooperatives (co-ops) [18]. Overall, the goals of these forms are to consolidate local governance of renewable energy production and contribute to energy democracy and more justice [19–21].

A transition towards low-carbon energy requires a mix of large-scale and centralised energy systems with decentralised and bottom-up approaches for technology implementation [22]. German energy transition (*Energiewende*) is one example that integrates community-level energy production deployment into their energy system [23]. Consequently, political, technological, economic, and social changes affect the country's energy landscape. Germany's energy co-op form of community-led initiatives has a unique structure that allows allocating power shares through public participation [24]. However, local energy governance and public participation do not always guarantee fairness or equality for

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