



## Is renewable energy resources availability decisive for Energy Cooperatives' existence? A spatiotemporal analysis

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Increased adoption of local renewable energy sources and larger active participation of energy end-consumers in the energy transition are attributed to Energy Cooperatives (ECoops). These are the most common organizational form of energy communities, which are currently one of the key strategies of the European Union to advance the energy transition. Getting to understand better which factors facilitate and benefit the existence and development of ECoops might help to foster a larger adoption of energy communities. Most studies addressing this are of qualitative character, while large-scale quantitative studies trying to understand general trends are scarce. None of them has paid attention to the impact of the type and quality of renewable energy resources (RES) available at the location of ECoops.

We conduct an exploratory spatial data analysis on the NUTS2 and NUTS3 regions levels to explore which characteristics of RES availability co-occur with the presence of ECoops across Europe. The characteristics of RES availability include total solar irradiation, average wind speeds, complementarity between solar and wind resources as well as resource droughts. We use multiple decades of ERA5 and ERA5-land data to determine the average RES characteristics for each NUTS region. The location of ECoops is derived from the database on ECoops by ReScoop.

Results contribute to the understanding if there is any spatial relationship between the existence of ECoops and RES availability. Clusters of NUTS regions with rather low RES availability and flourishing ECoops, as well as regions with good resources and a low number or no ECoops, are identified. Further, the study identifies hot-spots that require special attention to become auspicious for energy communities due to the rather challenging conditions of RES availability.