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Energy communities as social innovators driving the energy transition – a typology based on cluster analysis of European databases

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Introduction & outline. Historic and current energy cooperatives have a role to play in driving the energy transition. Historic energy cooperatives often started by seeing a need to organize local access to the central electricity grid (1900-1940) or to enable non-nuclear alternatives to the provision of energy (since 1980s). Today's energy cooperatives seek a variety of goals ranging from realizing business opportunities to fostering a more democratic organization of the energy system. Renewable energy cooperatives are often seen as a promising form of social innovation that is able to drive the low carbon energy transition. First, by analyzing long-term data on European energy initiatives, we look for evidence that supports this view. We utilize the transition theory framework of Geels et al. (2018) as well as technology innovation theory (TIS) of Suurs et al. (2009) and apply it to a statistical analysis of the dominant socio-technical regime (e. g. the role of renewable energy policy support, the role of mega-trends and sudden events). Secondly, we aim at identifying drivers and obstacles that distinguish successful energy cooperatives from those that have been closed down by their members. Our main research questions are: What explains the temporal and thematic clustering of energy cooperatives? Do we observe a spatial clustering? For example, is the sphere of activity of energy cooperatives dominantly local/regional or national/international? How are these clusterings linked to chosen regulatory systems and potential business models? Preliminary results reveal European-wide but also country-specific findings, such as a trend towards larger cooperatives (by number of registered members & complexity of organizational statutes). While the overall shift to renewable energies is stimulated by the policy framework, the renewable mix chosen by the energy cooperatives aligns with the profile of the country.

Source of data & method. The main sources for our statistical analysis are the database of the European Federation of Renewable Energy Cooperatives (RESCOOP) as well as the British, German and Danish Business Registers, in addition to our own mining of data from various gray and peer reviewed literature. The RESCOOP database, for example, provides information on more than 650 different energy cooperatives from various European countries (in particular GBR, DEU, DNK, SWE, and BEL), detailing the year of foundation, location, the cooperatives thematic foci, their legal status etc. We also utilize google analytics and other search engines that provide information on access statistics, web content etc. This is the input for the statistical and network analysis (incl. multi-variant

time-series analysis, time dependent principal component analysis, clustering, geo-referenced network analysis).