

# Typologies of energy community initiatives and their social implications

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## Overview

With the enforcement of the *Clean Energy for All Europeans Package* [1] in 2019, supranational legislations for Renewable Energy Communities (RECs) and Citizen Energy Communities (CECs) were laid down in the *Renewable Energy Directive* [2] and the *Electricity Market Directive* [3], respectively. However, the concepts of ‘energy community’ or ‘community energy’ have been existing much longer already, and, in the past different forms of such initiatives have evolved. These initiatives must not be confused with RECs and CECs as defined in the EU directives. However, so far, in scientific literature, only a limited number of studies are concerned with different types of ‘energy community initiatives’, and a detailed distinction of these different types is lacking.

Regardless of the type of ‘energy community initiative’, the scientific community has put much effort into researching different topics, such as economic viability, optimal community configurations, emission reduction, self-sufficiency improvement, electricity allocation, peer-to-peer trading, pricing, multi-carrier solutions, and many more. However, studies concerned with social aspects of ‘energy community initiatives’ are rare, even though social aspects become increasingly important in times of instability (e.g. Russia’s war against Ukraine) and an ever-widening gap between rich and poor. However, the importance of social aspects of ‘energy community initiatives’ should go far beyond aspects of security/poverty, and should, in general, enable/incentivise an active participation of individual citizens to ultimately aid towards a successful energy transition.

## Methods

To address the issue of a large variety of existing ‘energy community initiatives’, this work aims to provide a collection of different forms of ‘community energy initiatives’ in Europe, along with explanations regarding their similarities, and, more importantly, their differences. With the increasing number of different ‘energy community initiatives’, also the detailed characteristics of these initiatives differ significantly. Therefore, a conceptual framework for clustering ‘energy community initiatives’ needs to be developed. This enables the analysis of ‘energy community initiatives’ by different features/parameters, and provides the possibility of classifying scientific works, not least to enhance comparability.

Combining knowledge regarding different forms of ‘energy community initiatives’ and using the clustering framework to classify these, leads to a basis upon which the social compatibility of the different initiatives can be assessed. The social compatibility analysis focuses, besides parameters such as, for example, organizational efforts, required knowledge, initial investments, reduction of the electricity bill, especially upon the potential of making use of increased levels of automation in people’s homes. This is of significant importance when assuming that in the future ‘energy community initiatives’ are required to be operated such that peaks of generation and load are minimized. In this respect, not only the social acceptance to adopt increased levels of technologies (‘social license to automate’) is discussed, but also the possibilities of such in households with limited financial means.

## Results

The analysis of different ‘energy community initiatives’ shows that besides RECs and CECs, energy cooperatives have a long tradition in many European countries, especially in Spain and Italy. Besides these, individual countries developed characteristic national ‘energy community initiatives’. There are, for example micro-scale ‘energy

community initiatives' in Germany ("Mieterstrommodell" – in engl. "tenant electricity model"), in Austria ("gemeinschaftliche Erzeugungsanlage" – in engl. "joint generation unit") and in Switzerland ("Zusammenschluss zum Eigenverbrauch" – in engl. "joint self-consumption"). In Spain, 'local energy communities' (which are similar but not equal to RECs) are to be found, whereas Scotland focuses on implementing 'community energy projects'.

For the clustering of 'energy community initiatives', different categories are identified: (1) Mode of initiating/setting up, (2) initiating actors, (3) Governance, (4) Financing options and resulting ownership model, (5) Values & visions of the energy community, (6) Included (levels of) technologies, (7) Location and settlement patterns, (8) 'market model' within the community.

Regarding social aspects, it is found that the extent of social inclusiveness or social responsibility in the different 'energy community initiatives' depends heavily on the individual initiatives. This is because it is hardly possible to include rules for taking into account 'social aspects' in legislation and thus make it mandatory. For example, the guideline "*...the participation in the renewable energy communities is accessible to all consumers, including those in low-income or vulnerable households*" (RED, Article 22, (4f)) might be impossible to be laid down in law. However, a possibility to fulfil this guideline is to allow/motivate social housing companies to engage with or implement energy communities, wherefore also vulnerable or low-income households could be included more easily. Moreover, it is believed that 'energy community initiatives' in general can contribute significantly towards people's social acceptance towards increased levels of technologies in their homes, once they understand related benefits increase. Also in this respect, the inclusion of social housing companies is crucial, because without their investments, a large number of households with limited financial means might not have the chance to make use of increased levels of technologies in their homes.

## Conclusions

This work is of significant importance to increase the understanding of the different 'energy community initiatives' in general, as well as in detail by using the developed clustering framework. Using this as a basis for analysing the social potentials of different 'energy community initiatives' has proven effective. This work will be carried forward towards a detailed analysis regarding 'energy community initiatives' potentials towards achieving a full 'social license to automate'.

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