Energy communities in Sweden: barriers and driving forces

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Overview

An association of members who produce, consume, store, sell/buy and share energy within the community is defined as an energy community (EC). ECs have become essential part of the EU's strategy to involve citizens towards sustainable and robust energy transition. In addition, ECs have the potential to contribute to the electricity grid and the electricity system through efficient utilization of the grid, increased local storage capacity, decreased energy losses, locally available flexibility resources, thus a total reduced need for grid expansion/grid reinforcement. Therefore, ECs have enormous potential to contribute to a sustainable energy system, however clearer rules and incentives are missing.

This paper aims at providing comprehensive review of the ECs conditions in Sweden and identifying barriers and incentives to promote. To enable a comprehensive assessment the identified barriers and incentives are defined in four different dimensions: economic, technical, regulatory and social. The results will highlight the most significant barriers and incentives. Methodologies mitigating the identified barriers and promoting incentives will help to bridge the gap and promote ECs in Sweden.

Methods

The work reviews the existing literature, regulation in Sweden and synthesises what are the enablers and what are the barrtiers for ECs in Sweden. Particularly, the paper aims to exploring barriers and challenges in one hand and driving forces and incentives on the other hand in the developments of ECs in Sweden. The identified barriers and incentives are defined in four different dimensions: economic, technical, regulatory and social to enable a comprehensive assessment. The results will highlight the most significant barriers and incentives as well as the policy and regulatory frameworks that support or hamper the growth of energy communities. Mitigating the identified barriers and promoting incentives will help promoting ECs in Sweden.

More specifically, this paper aims to answer the following research questions:

- Which policies and policy instruments are creating barriers of Energy Communities in Sweden?
- Which technical and economic barriers and drivers exist that impact ECs economic sustainability?
- What are the prospects of ECs providing flexibility services through demand-response and storage to address energy challenges and enhance power grid?
- What technical paths will enable ECs to become core actors in the energy transition plan?

Results

ECs in Sweden, like in other parts of the world, are seen as a crucial element of the transition to a sustainable energy system. They play a role in promoting energy independence, resilience, and local economic benefits. However, there are several barriers and driving forces that influence their development in Sweden.

Economic incentive is one of the strongest driving forces. All members of the community should either collectively or individually benefit from the initiative by generating profit or saving on energy consumption cost, which is a strong enabler fostering and further development of the ECs. The incentives concerning other aspects are energy-saving (enhancing energy security or self sufficiency through establishment of local renewable power sources), societal (community cohesion and empowerment), environmental (supporting climate change mitigation) and technical interest (experimentation with new innovations) [1].

Challenging factors include for instance the lack of regulation promoting community-led energy initiatives, the difficulty for smaller actors to compete in Sweden's largely deregulated energy market dominated by large energy companies, the uncertainty about long-term profitability, especially with fluctuating energy prices, the lack of education and awareness, to a great degree the lack of technical knowledge [2]. The most important factor to achieve effectively functioning ECs in Sweden is the development of coordinated actions and enhancing communication between utilities and policymakers. Particularly, the biggest bottleneck presents the absence of optimal, efficient coordination schemes for DSOs and ECs. The cooperation between ECs and DSOs in Sweden is a crucial aspect of ensuring a smooth and effective integration of decentralized renewable energy systems into the energy market. This optimized-smart collaboration, on one side, can enhance grid management and improve energy flow optimization, and on the other hand can create favorable conditions for ECs to provide flexibility.

Conclusions

The overall assessment, based on the conditions identified for ECs in Sweden today, is that further significant efforts are needed. The investigation study carried out by Swedish Energy Agency (SEA) results a list of recommendation summarized in [3]. According to the work, the first recommendation to improve conditions for ECs in Sweden is a clear definition of EC as it will lead to increased clarity, something that is requested by many actors. Moreover, SEA proposes a task for the Energy Market Inspectorate, where EI can design market tariffs reflecting the benefits that ECs can bring to the society. This can entail better financial incentives for ECs. Creation of policy interpretation support can be a joint mission for SEA and EI to enhance understanding of underlying regulation and increase the knowledge in the field.

The implementation of the new electricity market directive [4] provisions in Swedish legislation is expected to create new favorable conditions for energy sharing. Currently existing obstacles for ECs related to energy sharing should be removed partially. An EC that shares energy in existing lines can bring benefits to the electricity system while producing and sharing electricity locally. Locally electricity production and sharing reduces the grid losses significantly as well as increases the efficient use of the network. ECs have great potential to coordinate and offer flexibility to support low carbon energy transition now and in the future. Therefore, ECs that share energy at a local level should be able to receive a reduced grid tariff. Lower taxes and grid fees create a greater financial incentive for prosumers to get involved in energy sharing and ensures ECs economic sustainability. To which extend the conditions will improve for EC is determined by how the implementation will ultimately be in Swedish legislation. EI has a mission to propose regulations for energy sharing in Swedish legislation; the work is due to January 2025.

Enhanced support schemes for new ECs is another opportunity to create better conditions in Sweden. The SEA intends to carry out a targeted investment towards ECs within the framework of its existing research and innovation programmes. This is planned to take place at the beginning of 2025 [3]. Throughout this financial instruments SEA should promote the innovative research and development studies aiming to create a new innovative grid planning tool considering the opportunity to introduce flexibility resources from ECs in electricity distribution grids as an alternative to building new grid elements. This is in line with the goals and principles of the new EC package Clean Energy for all Europeans, which emphasizes the potential usage of flexibility sources in the phases of grid planning and operation as alternative to grid expansion.

Particularly, the research studies should aim to provide optimized instruments to improve the coordination between the DSOs and ECs. The study should improve the exchange of information for monitoring and for the acquisition of congestion management from subjects located in the distribution segment (flexible load and distributed generation). Developing incentivising collaboration for DSOs and ECs is one of crutial techno-economic paths enabling ECs to become core actors in the energy transition plan.

Bibliography

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