Energy Communities as Catalysts for Sustainable Development: A Global Perspective

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This essay presents a study of the possibilities and challenges associated with establishing and operating energy communities in Amager, Denmark, focusing on integrating international experiences and sociological theories. By examining global perspectives from countries such as Germany, the USA, Austria, Spain, the Netherlands, and Sweden, the essay identifies successful models and challenges associated with community-driven energy projects. Drawing on a literature review, the essay explores the socio-economic and environmental consequences of energy communities. It also incorporates theoretical perspectives such as communitarianism and sociological systems theories that shed light on the complexity of community-based energy systems. The results of the study reveal that energy communities can strengthen the local economy, promote social cohesion, and reduce CO2 emissions, but they also face challenges such as complex decision-making processes and initial costs. By applying Niklas Luhmann's theories on societal complexity, including functional differentiation, and contingency, the essay offers an understanding of some of the background dynamics affecting the establishment and operation of energy communities. Based on these findings, the essay provides recommendations to HF Sundbyvester and other associated stakeholders within the residents' association on how they can navigate and optimize their economic, social, and environmental impact as a community. Finally, communitarianism and system theory are combined in the analysis of energy communities as a concept.

Key words: energy communities, communitarianism, systems theory, sustainability

Introduction

The global energy sector is currently undergoing a historic and pivotal phase, with challenges related to climate change and the need to limit CO_2 emissions from energy production at the forefront. Containing climate change requires new innovative solutions as well as alternative ways of organizing. Energy communities are a newer way for citizens to collectively take on global responsibility at the local level. This essay elucidates how energy communities, as a community-based organizational model, can be a potential solution model for addressing the urgent climate challenges, while also potentially strengthening social cohesion within local communities. The Sundbyvester Housing Association (HF Sundbyvester) has in recent years contemplated whether it may be both economically and socially beneficial to establish an energy community. On one hand, this essay provides insights and recommendations

addressing the existing residential community before potentially establishing a more energy-focused energy community. From a research perspective, it is also pertinent to examine whether energy communities, as techno-social organizational models at a more general level, provide economic benefits to existing residential communities, reduce CO2 emissions, and contribute to increasing social capital among residents. In this context, the following research question is formulated:

Research question:

How can international experiences regarding the establishment and operation of energy communities support a future initiation of an energy community in Sundbyvester, Denmark - and what should prospective owners of energy communities generally be aware of before starting up?

By investigating the aforementioned research question, I aim to establish a foundation for decision-making and strategic planning regarding the establishment and operation of the energy community. Focusing on global perspectives, I seek to integrate international best practices and insights into HF Sundbyvester's considerations to ensure a holistic and effective approach to the project.

Methodological considerations

For the pre-analysis, a desk research-oriented approach to empirical data was utilized. In the course of the analysis, the starting point is a literature review, supplemented by information from authorities, industry associations, and a study of global examples of energy community establishment. The aim of this approach was to gain an understanding of the economic aspects and potential challenges associated with the establishment and operation of the energy community. Desk research enables, on one hand, an understanding of the subject by allowing the collection of detailed data from various sources such as authorities, industry associations, and academic research. This contributes to creating a holistic understanding of the economic aspects and potential challenges associated with the establishment and operation of the energy community. On the other hand, desk research can be time-consuming as it requires careful analysis of the collected data to identify patterns and trends. Additionally, it may be more susceptible to subjectivity and bias, as the researcher's interpretation of the data can be influenced by their own assumptions and perspectives.

Literature Review

When considering which character of communitarianism may be most appropriate to work towards in establishing an energy community in Sundbyvester, it is important to look at the different aspects of communitarianism and how they fit with local conditions and values. Brugger (Brugger, 2003) has categorized communitarianism into three dominant variants: ***Conservative, Liberal,*** and ***Egalitarian Universalist***. Drawing inspiration from this classification, the following can be considered:

1. **Conservative Communitarianism:** A conservative approach to communitarianism often focuses on preserving traditions, values, and cultural norms in society. In the case of an energy community in Sundbyvester, a conservative communitarian approach could emphasize maintaining and strengthening existing community bonds and traditions in the local community (MacIntyre, 2007 & Brugger 2003).

2. **Liberal Communitarianism:** A liberal communitarian approach could be more open to change and innovation while emphasizing community and cohesion in the local community. This could manifest in promoting initiatives in sustainable energy and environmental awareness while working to strengthen the community through participation and collaboration around these initiatives (Sandel, 1998 & Brugger 2003).

3. **Egalitarian Universalist Communitarianism:** There are also other types of communitarian approaches that may be relevant depending on local conditions and values. For example, a focus on economic justice and equality may be central to some forms of communitarianism, while others place greater emphasis on social cohesion and solidarity (Reich, 2019 & Brugger 2003).

This essay explores energy communities based on the perspective of communitarianism and Niklas Luhmann's (1927 -1998) sociological systems theory. Starting from the theoretical concept, the underlying conditions for energy communities in the modern complex society are analyzed. According to Luhmann, modern society is functionally differentiated into a number of functional systems, such as the economic system, the political system, and the legal system, among others (Luhmann,1995).Each of these systems evolves to become expert systems as the political system drives policies, the economic system optimizes scarce economic resources, and the legal system makes legal decisions (Luhmann, 1995; Luhmann, 2012; Luhmann, 2013). In societal development, the political, economic, and legal systems

continuously challenge each other as each functional system has its own agenda, despite being structurally interlinked with each other (Luhmann, 1995).

Analysis – global perspectives

In the international arena, energy communities have positioned themselves as pioneering models for sustainable development. In Germany, the concept has flourished with an impressive diversity of projects, ranging from small local initiatives to extensive collaborations between businesses on the production and distribution of renewable energy. An iconic example is the Middelgrunden Wind Turbine Cooperative in Copenhagen, where more than 8,000 citizens collectively own a wind turbine, exemplifying the compelling positive impact of community-driven projects in renewable energy. (Cowtan & Renssen, 2017).

In the USA, progressive legislation in states like New York has paved the way for the establishment of community-driven energy projects with a particular emphasis on transitioning to local renewable energy sources. This approach underscores a national effort to strengthen community engagement in green energy (Katz & Nowak, 2017). Austria, on the other hand, has seen the flourishing of rural energy communities that not only contribute to local value creation but also intensify awareness of sustainability practices among local communities (Scheer, 2006). Spain has witnessed an increase in the number of energy communities, especially in regions with high solar and wind energy potential such as Andalusia and Catalonia. These communities often include both individuals and businesses working together to produce and consume renewable energy. In the Netherlands, there has been growth in community-driven energy projects, especially in solar energy. Examples include solar cooperatives where local residents come together to install solar panels on their properties or communal areas (Scheer, 2006). Sweden has also seen a rise in the number of energy communities, especially in the form of local biogas plants and wind farms. These projects are often driven by both municipalities and private companies and aim to reduce CO_2 emissions and promote local energy security.

Challenges and Recommendations: While these global experiences are inspiring, it is crucial for HF Sundbyvester to recognize and address potential challenges. International case studies emphasize the importance of a progressive and supportive legislative framework to promote community-driven initiatives in renewable energy. Tackling obstacles caused by existing energy legislation, which may restrict the scope of community opportunities, becomes crucial for the successful implementation of an energy community in Sundbyvester.

This deeper understanding of global challenges and solutions integrates with the overarching goal of optimizing HF Sundbyvester's energy community's economic, social, and environmental impact. It serves as a foundation for tailoring recommendations that are not only relevant at the local level but also bridge local ambitions with global sustainability practices.

Communitarianism emphasizes the importance of community and social cohesion in shaping individual identity and behavior, as opposed to liberalism, which typically prioritizes individual rights and autonomy (Shapiro, 2012). The energy community is an increasingly popular idea aimed at creating local, community-based energy systems where communities actively participate in the production, distribution, and consumption of energy.

Benefits of the energy community from a communitarian perspective include active participation from local residents, which strengthens social cohesion and community spirit (Etzioni, 2011). This can increase trust, cooperation, and solidarity within the local community. Additionally, investments in local energy projects create economic opportunities and jobs locally, which can strengthen the local economy and reduce dependence on external energy suppliers. Furthermore, the energy community promotes the use of renewable energy sources and energy-efficient technologies, reducing CO2 emissions and contributing to combating climate change (Pahl, 2007).

Disadvantages of the energy community from a communitarian standpoint include complex decision-making processes involving many stakeholders that can delay project implementation. Internal conflicts between different interests in the local community may arise, risking undermining cooperation and negatively impacting the project's success. Finally, the initial costs can be significant, posing a challenge, especially for smaller or resource-poor communities (Pahl, 2007).

Overall, the energy community as a socio-techno concept represents an innovative approach to energy production, storage, and consumption, as the concept can help integrate communitarian values such as community engagement, local economic development, and sustainable development. While various challenges may arise in the initial stages, studies and experiences indicate that the benefits for both local communities and society as a whole can outweigh these drawbacks. However, successful implementation requires a balanced approach

that addresses the social, economic, and environmental aspects of the energy community (Pahl, 2007).

Innovation and Sustainability: Sundbyvester (Copenhagen) is known for being a leading center for green technology and sustainable initiatives. A liberal communitarian approach would support this by promoting innovation in energy production and consumption in the local community while maintaining a focus on the community's needs and interests.

Social Justice: Sundbyvester (Copenhagen) has a strong commitment to promoting social justice and equality. A liberal communitarian approach could integrate these values by ensuring that the energy community is accessible and beneficial to all residents of the city, regardless of background or economic situation.

Participation and Collaboration: Liberal communitarianism often promotes participation and collaboration across different interest groups. In a diverse city like Copenhagen, this approach could foster a sense of solidarity and community among residents as they work together to create a more sustainable energy system.

Overall, a liberal communitarian approach in Copenhagen would emphasize values such as sustainability, social justice, and participation, which are key elements of the city's identity and priorities. It would ensure that an energy community is not only a technological advancement but also a strengthening of the community and the local community as a whole.

A local energy community is fundamentally a result of interaction between the political, economic, and legal systems, as politicians in the political system have enacted laws enabling the establishment of energy communities. As energy communities represent a decentralization of energy supply in society, affecting energy companies situated in the economic functional system. Some of the momentum in energy companies' previous profit maximization (particularly high during the recent energy crisis) is slowed when energy communities can produce, store, and sell their own energy production independently of energy companies. Energy companies will thus try to influence the political system to have legislation that suits energy companies as energy communities are competitors to their energy production. A local energy community would be wise to take stock of societal development, including the dynamics between the above-mentioned functional systems, as politicians and energy

company management can respectively improve or worsen the economic framework for energy communities.

Functional differentiation creates contingency, meaning the absence of necessity and an increased degree of randomness as the respective systems can choose to make decisions different from what one or more systems in their environment had expected (Luhmann, 1995). The fact that, for example, political parties in the political system or companies affiliated with the economic system can choose to make decisions different from what their systems in their respective environments had expected is an expression of contingency, but also double contingency as each system must deal with a larger range of possible decisions that their systems in their respective environments can choose to make (Luhmann, 1995). Every system in the complex societal system must therefore try to incorporate how a system in its environment will react in the short or long term. With a decentralization of energy supply, publicly owned energy companies, which have so far had a monopoly on some of the total energy supply to citizens, as well as existing large commercial players, lose some of their previous earnings with the establishment of citizen-based energy communities in Copenhagen and elsewhere in Denmark. A practical recommendation is for energy communities to develop an interest organization that represents the interests of energy communities as local energy communities may be pressured in the interaction between the political and economic functional systems. Thus, energy communities across geographical locations become wiser about the plurality of contexts, i.e., the societal polycontextuality they must reflect on in relation to local, national, as well as global contexts (Luhmann, 1995). Each of these systems evolves to become expert systems as the political system drives policies, the economic system optimizes scarce economic resources, and the legal system makes legal decisions (Luhmann, 1995; Luhmann, 2012; Luhmann, 2013). In societal development, the political, economic, and legal systems continuously challenge each other as each functional system has its own agenda, despite being structurally interlinked with each other (Luhmann, 1995).

Communitarianism, on the other hand, focuses on the importance of community, social cohesion, and participant engagement in shaping society. This approach highlights the significance of local community values, traditions, and social bonds in forming political and economic decisions, including the establishment of energy communities. Where the two theories intersect is in understanding how the local community and its energy community are both part of and influence the various functional systems in society. While system theory

focuses on the autonomy of systems and their interrelations, communitarianism emphasizes the importance of the community's inherent values and cooperation in shaping these systems. There is also a convergence in understanding the complexity of societal processes, where both theoretical perspectives acknowledge the need for a holistic observational horizon to understand and address the challenges of establishing and operating energy communities. The combined application of system theory and communitarianism can be beneficial for the Sundbyvester energy community in several ways:

1. **Understanding the complexity of the interaction between different systems:**
    - The energy community needs to develop a depth of understanding about the complex relationships between the political, economic, and legal systems, as well as how decisions within each of these systems can affect the operation and development of the energy community. This will enable the energy community to navigate political and economic challenges and opportunities more effectively.
2. **Strengthening community engagement and cooperation:**
    - As a technological and social concept, the energy community can support and cultivate stronger local bonds and collaboration among residents within the existing organic community in HF Sundbyvester.
3. **Development of advocacy organizations:**
    - The energy community, in collaboration with other energy communities, can establish advocacy organizations at both national and international levels. These organizations will be able to help coordinate and strengthen the energy community's influence and capacity to act in relation to political and economic challenges. This will also provide opportunities for cross-contextual exchange of experiences and learning.
4. **Holistic approach to complex challenges:**
    - The energy community can develop a holistic approach to addressing complex challenges and opportunities. This will help ensure that decisions and actions take into account the technological, economic, social, and political aspects involved in the operation and development of the energy community.

Conclusion

The starting point for establishing and operating an energy community in Sundbyvester, Denmark, should be a careful analysis of international experiences and best practices, while also taking into account local conditions and values. By integrating both systems theory and communitarianism, a deeper understanding of the complexity of societal structures and the needs and interests of local communities can be achieved. International experiences show that energy communities can be highly effective tools for promoting sustainable development and local community.

Examples from countries such as Germany, the USA, Austria, Spain, the Netherlands, and Sweden illustrate different models and approaches to the establishment and operation of energy communities, each with their own challenges and successes. These experiences have shown that a successful establishment and operation of energy communities require a combination of progressive legislation, local participation, economic sustainability, and the establishment of effective interest organizations.

To support a future establishment of an energy community in Sundbyvester, there are several key points that prospective owners should be aware of. It is crucial to have a legislative framework that supports and promotes the establishment and operation of energy communities. This involves identifying and addressing any barriers or limitations in existing legislation that may hinder the opportunities for the energy community. By learning from international examples, prospective owners of energy communities can navigate through complex legislative issues and work towards ensuring a favorable legislative framework for their project.

Furthermore, local participation is crucial for the success of an energy community. Experiences show that energy communities thrive when they actively involve and engage the local community in the decision-making process and implementation of projects. Therefore, prospective owners of energy communities should focus on building trust, fostering openness, and promoting collaboration with the local community to ensure broad support for their initiative. Economic sustainability is also essential. A robust business model needs to be developed to ensure sufficient revenue to cover operating and investment costs in the long term. Finally, the establishment of effective interest organizations is important to strengthen the influence and agency of the energy community in political and economic matters.

Collaboration with other energy communities nationally and internationally can also enhance influence and the ability to address common challenges.

In conclusion, the establishment and operation of an energy community in Sundbyvester require a holistic approach that integrates international experiences, systems theory, and communitarianism. By combining these approaches, prospective owners of energy communities can create a sustainable and socially inclusive model that not only addresses climate challenges but also strengthens the cohesion and resilience of the local community.

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