



# **Faculty of Business Economics** Master of Management

**Master's thesis** 

Jan Rasia Laurel and Innovation Management

**SUPERVISOR :** Prof. dr. Stephan BRUNS **MENTOR:** De heer Anthony FORD

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Regulatory Frameworks and Community Engagement Strategies: A Comparison of Belgian Policy Against Denmark and The Netherlands

Thesis presented in fulfillment of the requirements for the degree of Master of Management, specialization Strategy



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#### SUMMARY

#### **Research Purpose and Methodology**

Global climate change is accelerating due to the world's dependence on fossil fuels, leading to an urgent need for innovative solutions. Energy communities, which involve local stakeholders in generating, distributing, and consuming energy, offer a promising approach to addressing these challenges. These communities encourage local participation and provide a sustainable model for energy production and consumption, aligning with the European Union's emphasis on promoting energy efficiency and empowering consumers.

This study seeks to understand how regulatory frameworks and community engagement strategies influence the development and success of energy communities in Belgium, Denmark, and The Netherlands. The paper aims to investigate how the regulatory frameworks and community engagement strategies in Belgium, Denmark, and The Netherlands influence the development and success of energy communities. Additionally, the research explores the differences in regulatory frameworks and engagement strategies among these countries to identify best practices and areas for improvement.

To address these, a systematic literature review was conducted, focusing on academic literature, policy documents, and case studies related to energy communities. This approach provides a comprehensive analysis of how different regulatory frameworks and community engagement strategies impact the growth and effectiveness of energy communities, offering insights for policymakers and stakeholders involved in energy transitions within the European Union.

#### Findings

Energy communities are collaborative initiatives involving individuals, businesses, and local governments in the production, distribution, and consumption of renewable energy.

The European Union has implemented a comprehensive regulatory framework to support energy communities, centered around key directives like the Recast Renewable Energy Directive (RED II) and the Internal Electricity Market Directive (IEMD). RED II focuses on Renewable Energy Communities (RECs), legal entities dedicated to renewable energy generation and consumption, prioritizing environmental, economic, and social benefits over profits. IEMD introduces Citizen Energy Communities (CECs), which include both renewable and non-renewable energy activities, empowering consumers through energy generation, distribution, and storage. Additionally, the Governance Regulation and Electricity Market Regulation integrate these communities into national plans, promoting a competitive and consumer-centric electricity market across the EU.

#### **ECs In Belgium**

Belgium's approach to energy communities is unique due to its federal structure, where energy policy is divided between the federal government and the regional governments of Flanders, Wallonia, and the Brussels Region. This division of responsibilities has led to the development of distinct regulatory frameworks within each region, reflecting their specific energy needs and priorities.

The Belgian regions have each established regulatory frameworks to support RECs and CECs. In Flanders, the Flemish Energy Decree emphasizes local participation, energy sharing, and community autonomy, supplemented by financial incentives like the Call Groene Stroom subsidies for renewable energy installations. Wallonia's approach, guided by the Walloon Energy Decree, promotes community-driven renewable energy projects through collective self-consumption frameworks and subsidies for companies investing in renewables, with a focus on democratic governance within energy communities. Meanwhile, Brussels Region's Energy Communities Ordinance of 2021 legally recognizes energy communities, offering financial and technical support, including grants, loans, and subsidies, all aligned with the Brussels Energy Transition Plan, which fosters decentralized energy production and citizen participation.

#### **ECs in DENMARK**

Denmark has been a leader in supporting energy communities, particularly through its emphasis on community ownership of renewable energy projects. The country's regulatory framework is underpinned by the Renewable Energy Act and the Energy Supply Act, which provide robust support for RECs by ensuring grid access and offering financial incentives like feed-in tariffs. Denmark's policies include a mandatory local ownership requirement, ensuring that at least 20% of new wind projects are owned by local residents. This has fostered widespread public support and participation in renewable energy projects, making Denmark a global leader in community-driven energy initiatives. Additionally, Denmark offers financial mechanisms such as grants, subsidies, and the Net Metering Scheme to support the development and sustainability of energy communities.

#### **ECs In The Netherlands**

The Netherlands has adopted a comprehensive approach to energy communities through national policies like the Energieakkoord and the Klimaatakkoord. These agreements set ambitious targets for renewable energy and CO2 reduction, supporting the growth of energy communities through financial incentives such as the SCE and the SDE++ Scheme. The Regional Energy Strategy (RES) process is a key component of the Dutch approach, involving extensive stakeholder engagement to ensure that local communities play a significant role in regional energy planning. The Dutch policies emphasize decentralized energy production and local ownership.

#### **Policy Implementation and Key Differences**

Belgium's fragmented energy community regulations provide solid support for local energy projects, but this regional tailoring can create challenges for nationwide initiatives. In contrast, the Netherlands has a centralized regulatory approach with national frameworks like the Energieakkoord and Klimaatakkoord guiding energy community development. While complex tariff structures and fossil fuel dominance present challenges, the RES empowers local participation and alignment with regional needs. The Netherlands has nearly 700 energy cooperatives, benefiting from national regulations and supportive policies.

Denmark has a strong tradition of community-owned energy, especially in wind projects, supported by mandatory local ownership and financial incentives. Denmark's flexible regulatory approach allows communities to choose organizational structures like associations or cooperatives. By 2020, Denmark hosted 633 energy communities, with significant citizen ownership of wind capacity.

Denmark's success with community ownership and citizen engagement in renewable energy projects stands out. Belgium, with its strong cooperative tradition, can emulate Denmark by promoting local ownership and establishing clear legal frameworks, enhancing community involvement and investment in the energy transition. This could aid the development of energy communities in Belgium, which, in 2019, had only 34 energy communities - a modest figure compared to the more advanced progress seen in the Netherlands and Denmark.

#### **Community Engagement Strategies**

Community engagement is crucial for the success and sustainability of energy communities in Belgium, the Netherlands, and Denmark, where various strategies have been employed to foster local participation, ownership, and support for renewable energy initiatives. In Belgium, initiatives like Ecopower and Courant d'Air engage members in decision-making through participatory mechanisms such as general assemblies. The Netherlands' RES process exemplifies a systematic approach to stakeholder engagement, ensuring local communities play a significant role in regional energy planning. Denmark, with its long-standing tradition of consulting the public in renewable energy projects, deeply embeds community input into the planning process, fostering a strong sense of ownership. Financial incentives have also been pivotal across these countries.

In Belgium, supports like feed-in tariffs and tax reductions have facilitated the development of energy communities. The Netherlands has used subsidies like the SDE++ scheme to promote community participation, while Denmark's grants and favorable loans for community-owned wind farms demonstrate how sustained financial support can cultivate a robust culture of local ownership. Capacity building and education further empower communities to participate effectively in energy projects. Belgian organizations like REScoop Flanders provide essential training, while the Netherlands and Denmark emphasize education through programs that enhance energy literacy and project management skills, with the Netherlands also utilizing energy coaches. Effective communication is also vital, with Belgian communities using multiple channels to engage members and the public and Denmark benefiting from a deeply ingrained culture of public engagement cultivated over decades. Collaboration with local authorities is another common strategy, providing crucial support in resources, expertise, and facilitation of renewable energy projects. Belgian energy communities often partner with municipalities to access land and funding, while the Netherlands' RES process encourages partnerships between various stakeholders, and Denmark's regulatory framework ensures that community projects align with broader regional goals and benefit from local government support.

#### Conclusion

Belgium can learn from the Netherlands and Denmark by fostering greater national coordination and promoting local ownership. Implementing a centralized regulation framework, as in the Netherlands, and adopting Denmark's citizen ownership model could enhance community engagement and support energy transitions. Furthermore, Belgium could strengthen its approach by incorporating education strategies similar to the Netherlands. Adopting these strategies can help Belgium become one of the leading EU countries in Energy Community.

#### Implications

This study reinforces the significance of decentralized energy systems and community-based resource management, emphasizing that local ownership, democratic governance, and collective action are crucial for the success of energy communities. By comparing the regulatory frameworks and community engagement strategies in Belgium, Denmark, and The Netherlands, it enhances our understanding of how different policy approaches influence the effectiveness of these initiatives, thus providing a roadmap for the Belgian regulators to growing ECs.

For policymakers, the study highlights the importance of supportive regulatory frameworks and effective community engagement strategies. Simplifying administrative processes, promoting local ownership, and providing financial incentives are key actions. The study suggests that Belgium could improve its approach by adopting best practices from Denmark and The Netherlands, ensuring that national and EU-level support continues to align local efforts with broader energy transition goals.

#### Limitations

The study is limited by its reliance on secondary data, which may not capture the latest developments or socio-cultural factors. Furthermore, data gathering on energy communities in the EU is still in its early stages, highlighting the need for systematic data collection and reporting across Europe. Additionally, the rapidly evolving energy sector means that the findings may quickly become outdated, emphasizing the need for ongoing research.

#### **Suggestions for Future Research**

Future research should incorporate primary data collection, such as interviews and surveys, to gain deeper insights into stakeholder experiences. Expanding the scope to include more EU member states and exploring socio-cultural dimensions of community engagement would provide a more comprehensive understanding and inform more effective policy design.

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#### **CHAPTER 1: Introduction**

Global climate change has been accelerating at an alarming pace due to the world's dependence on fossil fuels. According to the World Meteorological Organization (2024), last year was the warmest year on record, with the global average near-surface temperature at 1.45 °Celsius pre-industrial levels. This report highlights the need and urgency for innovative solutions to mitigate the negative impact fossil fuels produce and promote sustainable practices.

Energy communities offer a promising approach to addressing climate change through decentralized energy generation and local empowerment. These communities involve collaborative initiatives where citizens, local businesses, municipalities, and other stakeholders generate, distribute, and consume energy, primarily from renewable sources. Energy communities enhance community participation and provide a sustainable model for energy production and consumption, aligning with the European Commission's emphasis on promoting renewable and efficient energy while empowering consumers (European Commission, 2020).

Over the past decades, energy communities in the European Union have evolved significantly, driven by a combination of grassroots initiatives, technological advancements, and supportive policy frameworks. The evolution of these communities reflects broader trends in energy policy, technological advancements, and societal shifts towards sustainability and local empowerment. Due to the Clean Energy for All Europeans package, passed in 2019, the past few years have seen an increase in the number of energy communities within the European Union. On top of the favorable policies, technological advancements, and growing public awareness of environmental issues, this package of laws provides specific provisions to support and facilitate the development of energy communities. The purpose of these policies is to remove barriers to citizen participation in the energy market, facilitating the creation and operation of energy communities (European Commission, 2019). It also acknowledges the potential of energy communities to drive energy transitions by integrating renewable energy sources, reducing energy poverty, and fostering social innovation (European Commission, 2020b). In addition, directives like the Renewable Energy Directive (RED II) provide a supportive framework or structure for the establishment and operation of energy communities, promoting citizen participation and equitable access to the energy market (European Commission, 2020b).

This study focuses on energy communities in Belgium, Denmark, and The Netherlands. Like many other EU member states, each of these countries has adopted the concept of energy communities and implemented national policies to support their growth. For instance, Belgians have many incentives to support the development of renewable energy, like tax reductions, feed-in tariffs, and grants (Huybrechts & Mertens, 2014). Notable Belgian energy communities such as Ecopower and Courant d'Air are highlighting the potential for community-driven energy projects. These Belgian communities have successfully mobilized local resources and engaged citizens in sustainable energy practices. However, regional variations in regulatory approaches can lead to different levels of

support and obstacles for energy communities within the country (Huybrechts & Mertens, 2014). Denmark's policies focus on integrating renewable energy into local grids and promoting community ownership, while The Netherlands emphasizes technological integration and public participation (Brummer, 2018; Government of the Netherlands, n.d.).

Despite the growing interest and policy support, there is a need to consolidate existing knowledge on energy communities across the EU and conduct a comprehensive analysis of the regulatory frameworks and community engagement strategies that underpin their success. Current literature often focuses on individual countries with little comparison of regulatory frameworks and community engagement strategies. This thesis aims to fill this gap by comparing the regulatory framework and community engagement strategies in Belgian energy communities with those in Denmark and The Netherlands. Huybrechts and Mertens (2014) emphasized that developing standardized frameworks for technical, legal, and financial aspects will facilitate smoother replication and integration into existing energy systems. By identifying similarities, differences and best practices, this study aims to enhance the effectiveness of energy communities, thereby supporting the EU's broader goals of achieving a sustainable and inclusive energy transition (Bauwens & Devine-Wright, 2018). Effective community engagement is a fundamental aspect of successful energy communities, which includes strategies such as public consultations, participatory decision-making processes, financial incentives, capacity building and educational campaigns, information and communication strategies, and collaboration with local authorities and organizations.

This study employs a systematic literature review (SLR) approach to collect information on regulatory frameworks and community engagement strategies in energy communities. By examining these factors, the findings will contribute to a deeper understanding of how different approaches can influence the growth of energy communities. Moreover, this research aims to offer practical recommendations for policymakers, researchers, and stakeholders involved in developing and replicating energy community initiatives.

Identifying best practices is crucial for promoting energy communities and knowledge from this can support policymakers achieve EU's broader goals of a sustainable and inclusive energy transition. Due to the diverse regulatory approaches throughout the European Union, we have the opportunity to analyze different models and adapt strategies to local conditions. This thesis aims to highlight the potential of energy communities to significantly contribute to the EU's renewable energy targets and overall decarbonization goals. By providing a comprehensive comparison of regulatory frameworks and community engagement strategies in Belgium, Denmark, and The Netherlands, this study will inform stakeholders on best practices and areas for improvement. The ultimate goal is to enhance policy implementation and community engagement to pave the way for a more sustainable and inclusive energy future. Aligning energy community initiatives with broader EU energy transition goals will drive synergies and maximize their impact, promoting holistic approaches to decarbonization (Bauwens & Devine-Wright, 2018).

### **1.1 Research Question**

#### Primary Research Question:

How do the regulatory frameworks and community engagement strategies in Belgium, Denmark, and the Netherlands influence the development and success of energy communities?

#### Sub-Questions:

- 1. How do these regulatory frameworks in Belgium compare to those of other European Union countries, specifically Denmark and The Netherlands?
- 2. What are the key differences in regulatory frameworks governing energy communities between Belgium and European Union countries, specifically Denmark and The Netherlands?
- 3. How do community engagement strategies in Belgian energy communities differ from those in Denmark and The Netherlands?

#### **CHAPTER 2: LITERATURE REVIEW**

#### **2.1 Introduction to Energy Communities**

"Energy communities offer a means to restructure our energy systems by harnessing energy, allowing citizens to participate actively in the energy transition, and providing direct potential benefits to citizens such as increasing energy efficiency, lowering their electricity bills, reducing carbon emissions, as well as supporting the local economy and creating local job opportunities." (European Commission, n.d.)

#### 2.1.1 Evolution and Development of Energy Communities in the EU

#### **Early Beginnings and Cooperative Movements**

The idea of community-led energy projects can be traced back to the early cooperative movements in Europe, particularly in Denmark and Germany, where local communities began to invest in wind energy projects during the 1970s and 1980s. These early initiatives were driven by the oil crises of the 1970s, which highlighted the vulnerability of relying heavily on imported fossil fuels. Denmark's success with wind cooperatives, where communities collectively owned and managed wind turbines, set a precedent for future energy communities (Brummer, 2018). These early cooperative models demonstrated the feasibility and benefits of community ownership in energy projects, paving the way for more structured and diverse forms of energy communities.

#### **Policy Support and Expansion**

The development of energy communities has been significantly influenced by policy frameworks at both the national and EU levels. The adoption of the Renewable Energy Directive (RED) in 2009 marked a critical milestone, as it set binding targets for renewable energy production and required member states to create favorable conditions for community energy projects (European Commission, 2020). This directive laid the groundwork for subsequent policies aimed at promoting citizen participation in the energy transition.

The Clean Energy for All Europeans package, adopted in 2019, further solidified the role of energy communities in the EU's energy policy. This comprehensive legislative package includes specific provisions for Renewable Energy Communities (RECs) and Citizen Energy Communities (CECs), recognizing their potential to contribute to energy sustainability, security, and social innovation (European Commission, 2019). The package mandates member states to remove barriers to the establishment and operation of energy communities and to provide supportive regulatory frameworks, fostering the growth of energy communities across Europe. By providing a clear regulatory pathway and supporting policies, the EU has laid the groundwork for the continued expansion and success of energy communities.

#### Technological Advancements and Innovation

Technological advancements in renewable energy technologies, such as solar photovoltaics, wind turbines, and energy storage systems, have played a crucial role in the proliferation of energy communities. The decreasing costs of these technologies have made it feasible for communities to invest in and benefit from renewable energy projects. Additionally, the advent of digital technologies and smart grids has enabled more efficient management of energy production and consumption at the local level (Sciullo et al., 2022)

Social innovation has also been a driving force behind the growth of energy communities. These initiatives often prioritize community benefits over financial profits, fostering social cohesion and empowerment. By involving local residents in decision-making processes, energy communities promote democratic governance and ensure that projects align with the community's needs and preferences (Veelen, 2018).

#### **Current Developments and Future Directions**

Energy communities in the EU are currently experiencing rapid growth due to a convergence of technological advancements and social innovation. Frieden et al. (2021) highlight that "Smart grid technologies and digital platforms are facilitating the efficient management of distributed energy resources (DERs) and enhancing the operational capabilities of energy communities." These technological advancements are crucial for optimizing energy production, consumption, and distribution, which is vital for the sustainability of these communities. Collaborative models, such as cooperatives and public-private partnerships, leverage community resources and expertise to promote social cohesion and local empowerment (Brummer, 2018). The emergence of various business models, including collective self-consumption and peer-to-peer energy trading, enables energy communities to create value in different market segments. In recent years, the concept of energy communities has gained traction across Europe, with numerous projects emerging in countries like Belgium, Denmark, and The Netherlands. These initiatives have demonstrated the potential of community-driven energy projects to contribute to the EU's renewable energy targets and climate goals. The ongoing support from the EU, coupled with national policies and incentives, is expected to drive further growth and innovation in the sector (van Summeren, Breukers, & Wieczorek, 2022).

Looking ahead, the scalability and replication of successful energy community models will be essential for widespread adoption. Enhancing grid flexibility and resilience by integrating advanced energy storage systems, demand-side management, and microgrid solutions will become a key focus. Furthermore, exploring innovative financing mechanisms, including green bonds, crowdfunding, and public-private partnerships, will be crucial to mobilize the necessary investments for energy community projects as emphasized by Lowitzsch et al. (2020). Harmonizing regulatory frameworks across EU Member States and fostering cross-border cooperation will enable energy communities to operate seamlessly within the internal energy market. Leveraging digital technologies like blockchain and artificial intelligence will enhance transparency, efficiency, and security in energy transactions and data management, supporting the growth and success of energy communities in driving the EU's energy transition towards sustainability and resilience (European Commission, 2020).

#### **2.2 Definition and Theoretical Framework**

Energy communities are collaborative initiatives that engage individuals, businesses, and local governments in the production, distribution, and consumption of renewable energy. These communities aim to enhance energy independence, increase the use of renewable energy sources, and foster local economic development. They are often characterized by local ownership and democratic governance, where community members have a significant say in decision-making processes. (Rescoop.eu, n.d., (European Commission, 2023)

#### **Theoretical Framework**

The theoretical framework for energy communities is grounded in the principles of decentralized energy systems and community-based resource management. Decentralized energy systems refer to the shift from large, centralized power plants to smaller, local generation units that provide energy directly to local users. This approach increases energy security, reduces transmission losses, and makes the energy system more resilient to disruptions (Huybrechts & Mertens, 2014).

Community-based resource management emphasizes the role of local communities in managing and benefiting from their own resources. In the context of energy communities, this means that the local population has control over energy production and consumption, leading to more sustainable and socially equitable outcomes. Key principles of this framework include local ownership, participatory decision-making, and the reinvestment of profits into the community (Frieden et al., 2021). Energy production within these communities primarily involves generating renewable energy through technologies such as photovoltaics, small wind turbines, and small hydro projects. This energy is often produced within the region of the energy community and can be managed through virtual net metering and other collective self-consumption schemes, allowing for efficient distribution and use of locally generated power.

Energy communities operate on the basis of collective action, where community members jointly invest in renewable energy projects and share the benefits. This collective approach not only facilitates the pooling of financial resources but also enhances social cohesion and trust among community members. By involving local stakeholders in decision-making, energy communities can ensure that energy projects align with the community's needs and preferences (Brummer, 2018).

The governance structures of energy communities typically feature democratic decision-making processes, where each member has an equal say in important decisions. This democratic governance ensures transparency, accountability, and inclusiveness, which are crucial for the long-term sustainability of these initiatives. Furthermore, energy communities often adopt innovative business

models that prioritize environmental and social goals over profit maximization, reflecting their commitment to sustainability and community welfare (Lowitzsch, Hoicka, & van Tulder, 2020).

#### **Forms of Energy Communities**

Energy communities vary in their structure and objectives, but all share a common goal. The key guiding principles of energy communities are characterized by:

- Local Ownership: Energy communities are founded on the principle of local ownership, where community members have a stake in the energy projects and share in the benefits. This ownership model fosters a sense of responsibility and commitment to sustainable practices (Huybrechts & Mertens, 2014).
- Democratic Governance: Decision-making processes in energy communities are typically democratic, ensuring that all members have an equal voice - voting rights and participation. This governance structure promotes transparency, accountability, and inclusiveness, which are essential for the long-term sustainability of the community (Lowitzsch, Hoicka, & van Tulder, 2020).
- Collective Action: Energy communities operate on the basis of collective action, pooling resources and efforts to achieve common goals. This approach enhances social cohesion and trust among community members, and allows for the efficient allocation of resources (Brummer, 2018).
- 4. **Community Benefits:** The primary purpose of energy communities is to provide environmental, economic, and social benefits to the community. This purpose-driven approach aligns the interests of the community with broader sustainability goals (European Commission, 2020)
- 5. **Sustainability:** Energy communities prioritize sustainable practices in their operations, aiming to reduce greenhouse gas emissions, enhance energy efficiency, and increase the use of renewable energy sources. This commitment to sustainability is reflected in their business models and operational strategies (Frieden et al., 2021).

Two prominent types defined under EU legislation are Renewable Energy Communities (RECs) and Citizen Energy Communities (CECs).

**1. Renewable Energy Communities (RECs):** Defined under the Recast Renewable Energy Directive (RED II) Directive (EU) 2019/944, RECs are legal entities based on open and voluntary participation, autonomous, and effectively controlled by shareholders or members located in proximity to renewable energy projects owned and developed by the community. The primary purpose of RECs is to provide environmental, economic, or social community benefits rather than financial profits.

**2. Citizen Energy Communities (CECs):** Defined under the Internal Electricity Market Directive (IEMD) (Directive (EU) 2019/944), CECs can engage in generation, distribution, supply, consumption, aggregation, storage of electricity, provision of energy efficiency services, charging services for electric vehicles, or provide other energy services to its members or shareholders. CECs are designed to empower consumers to participate in the energy market and promote local energy initiatives.

	RENEWABLE ENERGY COMMUNITIES	CITIZEN ENERGY COMMUNITIES
LEGISLATIVE FRAMEWORK	Renewable Energy Directive II (RED II), Directive (EU) 2018/2001	Internal Electricity Market Directive (IEMD), Directive (EU) 2019/944
ACTIVITIES	Generation, distribution, supply, consumption, aggregation, storage, and energy efficiency services related exclusively to renewable energy	Generation, distribution, supply, consumption, storage, aggregation, and other electricity market activities of both renewable and non-renewable energy source.
PARTICIPATION	<ul> <li>Legal Entity</li> <li>Voluntary and Open Participation</li> </ul>	Legal Entity     Voluntary and Open Participation
CONTROL	Shareholders or members, located in the proximity of the RE project, including natural persons, micro-, small- or medium-sized enterprises or local authorities, including municipalities. Should be capable of remaining autonomous from individual members and other traditional market actors.	Members or shareholders who are natural persons, local authorities, including municipalities and small enterprises. Decision-making powers are only given to members or shareholders that are not engaged in large-scale commercial activity and for which the energy sector is not a primary area of economic activity.
GEOGRAPHIC LIMITATION	Located in the proximity of the renewable energy project	Not specified
AUTONOMY REQUIREMENT	Must remain autonomous	Not specified

Table 1: Overview of RE	C and CEC
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Both RECs and CECs have similar characteristics. They share the fundamental goal of empowering local citizens and stakeholders in the management and generation of energy. They are established as legal entities with specific ownership and governance structures. However, due to some differences regarding scope of activities and eligibility criteria, RECs can generally be seen as a subset, or type, of CECs (Rescoop.eu, n.d.)

The main distinction between RECs and CECs are their definitions and regulatory frameworks. RECs are defined under the Recast Renewable Energy Directive (RED II) (Directive (EU) 2019/944) and focus exclusively on renewable energy sources that includes renewable energy generation, consumption, and sales activities whereas CECs are defined under the Internal Electricity Market Directive (IEMD) (Directive (EU) 2019/944) and have a broader scope of activities. While CECs also

focus on renewable energy, they can engage in broader energy-related activities that include generation from both renewable and non-renewable sources, distribution, supply, consumption, aggregation, storage, and provision of energy efficiency services, and charging services for electric vehicles.

For CECs, decision-making should be limited to non-commercial members, such as natural persons, micro- and small enterprises, and local authorities. While medium and large companies can participate, they are restricted from exercising control over the community, ensuring that decision-making processes remain locally focused and community-driven. Whereas the effective control for RECs must rest with members who are in proximity to the community's projects. Additionally, RECs emphasize autonomy, a principle not specified for CECs. RECs must remain autonomous from individual members and market actors to avoid abuse. This ensures democratic governance, where all members are represented equally, regardless of their investment, and business partnerships do not undermine the community's independence. The autonomy principle, however, is not specified in the definition of CECs (Rescoop, n.d.).

Choosing between REC or CEC depends on several factors. If the primary focus is exclusively on renewable energy and local sustainability, REC is the choice. However, if other non-renewable energy sources are also in play and are involved in a broader range of activities, CEC would offer more flexibility. Additionally, regulatory requirements and policies are also factors in determining which type of energy community to establish. Different regions offer different incentives and support mechanisms which could affect the decision.

#### 2.3 Importance and Relevance

Energy communities play an important role in the transition to a sustainable and resilient energy system. Their importance and relevance are broad, including environmental, economic, social, and policy aspects, which all the more highlights the substantial contribution energy communities play towards the broader objectives of renewable energy adoption and promoting sustainable development.

#### **Environmental Benefits**

Energy communities significantly contribute to reducing greenhouse gas emissions by promoting the use of renewable energy sources such as solar, wind, biomass, and small-scale hydroelectric power. By generating electricity from these renewable resources, energy communities help mitigate climate change and reduce dependency on fossil fuels (Ossowska, 2019).

Energy communities support the transition to a low-carbon economy by integrating renewable energy technologies at a local level. This decentralization of energy production is essential for achieving the EU's climate goals, as it reduces the carbon footprint associated with energy generation and consumption by several million tons annually across Europe, according to The European Commission. A global analysis published in 2024 found that "the transition from non-renewable energy sources to renewable energy sources can reduce carbon inequality" (Patel, Pal, & Sahu, 2024). This implies that as energy communities prioritize renewable sources, they contribute to a reduction in carbon emissions. Furthermore, a 2023 review discussed the effectiveness of energy-efficient technologies and low-carbon energy sources, which are often prioritized by energy communities (Mneimneh, Ghazzawi, & Ramakrishna, 2023). These communities focus on implementing diverse strategies that include demand reduction, cleaner energy production, and the integration of renewable energy sources. By adopting such measures, energy communities aim to minimize emissions and energy leakage thus promote sustainability.

According to the European Environment Agency, "the EU's total greenhouse gas emissions decreased by 24% between 1990 and 2019, but further reductions are needed to meet the EU's 2030 and 2050 climate targets" (EEA, 2020). By prioritizing renewable sources, energy communities help to displace fossil fuel-based energy, contributing to a reduction in greenhouse gas emissions.

#### **Economic Advantages**

Energy communities can drive local economic development by creating new job opportunities, particularly in rural or underdeveloped areas. Additionally, community members may benefit from financial gains in relation to energy costs as their energy bill can include a reduction or decrease (Caramizaru and Uilhlein, 2020). The cost savings from reduced energy prices can add to their disposable income and consequently add value to the local economy.

Local ownership of energy projects can stimulate regional economies by generating local revenue, and retaining financial benefits within the community. Energy communities often reinvest their profits into further renewable energy projects or local development initiatives, fostering economic resilience and self-sufficiency. This economic model can also lead to lower energy costs for community members by bypassing intermediaries and benefiting from economies of scale (Hoffman & High-Pippert, 2010).

The localized nature of energy production within communities also minimizes transmission losses, further enhancing the overall efficiency of the energy system (Bauwens et al., 2016). Through transmission loss reduction, the grid is then supported which leads to decrease in the cost of electricity.

Brummer (2018) highlights that in Germany, energy cooperatives have played a significant role in rural economic development by creating jobs and enhancing local infrastructure. This is complemented by Huybrechts and Mertens (2014), as they note that in Belgium, local energy communities have reinvested their profits into additional renewable energy projects, infrastructure improvements, and social programs, demonstrating the economic potential of community-driven energy initiatives.

#### Social and Community Engagement

Energy communities enhance social cohesion by bringing people together to work towards common goals. They promote social innovation by encouraging collective decision-making and participation in sustainable practices. Community engagement in energy projects empowers individuals, increases awareness of energy issues, and promotes energy literacy. While energy communities can contribute to addressing energy poverty by providing affordable and stable energy supply to vulnerable populations, this issue often requires a broader approach involving both community-based initiatives and policy interventions (Walker & Devine-Wright, 2008). By producing and distributing energy locally, these communities can offer electricity at a lower cost and ease the financial burden on low-income households. For instance, some energy cooperatives reinvest profits into local projects, including energy efficiency upgrades for homes of low-income families. These initiatives not only lower the energy bills but subsequently improve their living conditions and contribute to overall social welfare. However, the reduction of energy poverty through energy communities requires integrated efforts that combine community-driven projects with supportive policy measures to ensure sustainability and widespread impact (Joint Research Centre, 2024).

The participatory nature of energy communities fosters a sense of ownership and accountability among members. This engagement can lead to higher levels of public acceptance for renewable energy projects. By involving local stakeholders in decision-making, energy communities ensure that projects align with the specific needs and preferences of the community, thereby enhancing social buy-in and support (Walker & Devine-Wright, 2008).

In Belgium and other EU countries, energy communities empower citizens by involving them in the decision-making processes related to energy production and consumption. This empowerment not only increases awareness and understanding of energy issues but also encourages active participation in sustainable practices (Bauwens & Devine-Wright, 2018). In Belgium, energy cooperatives have played a crucial role in promoting citizen participation in renewable energy projects, contributing to the country's transition towards a more sustainable energy system.

#### **Energy Security and Resilience**

By decentralizing energy production, energy communities can contribute to energy security and resilience by diversifying energy sources and reducing reliance on large, centralized power plants. Energy communities have the potential to increase resilience by implementing storage solutions and demand-response measures, enabling more effective energy management and increasing the grid's flexibility against disruptions (Koirala et al., 2016).

#### Primary energy consumption

Dur World

Primary energy<sup>1</sup> consumption is measured in terawatt-hours<sup>2</sup>, using the substitution method<sup>3</sup>.



Data source: U.S. Energy Information Administration (2023); Energy Institute - Statistical Review of World Energy (2024) Note: Data includes only commercially-traded fuels (coal, oil, gas), nuclear and modern renewables. It does not include traditional biomass.

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1. Primary energy: Primary energy is the energy available as resources – such as the fuels burnt in power plants – before it has been transformed. This relates to the coal before it has been burned, the uranium, or the barrels of oil. Primary energy includes energy that the end user needs, in the form of electricity, transport and heating, plus inefficiencies and energy that is lost when raw resources are transformed into a usable form. You can read more on the different ways of measuring energy in our article.

2. Watt-hour: A watt-hour is the energy delivered by one watt of power for one hour. Since one watt is equivalent to one joule per second, a watt-hour is equivalent to 3600 joules of energy. Metric prefixes are used for multiples of the unit, usually: - kilowatt-hours (kWh), or a thousand watt-hours. - Megawatt-hours (MWh), or a million watt-hours. - Gigawatt-hours (GWh), or a billion watt-hours. - Terawatt-hours (TWh), or a trillion watt-hours.

3. Substitution method: The 'substitution method' is used by researchers to correct primary energy consumption for efficiency losses experienced by fossil fuels. It tries to adjust non-fossil energy sources to the inputs that would be needed if it was generated from fossil fuels. It assumes that wind and solar electricity is as inefficient as coal or gas. To do this, energy generation from non-fossil sources are divided by a standard 'thermal efficiency factor' – typically around 0.4 Nuclear power is also adjusted despite it also experiencing thermal losses in a power plant. Since it's reported in terms of electricity output, we need to do this adjustment to calculate its equivalent input value. You can read more about this adjustment in our article.

Figure 1: Primary Energy Consumption (Source: Our World in Data)

Research suggests that local energy cooperatives and communities can play a role in integrating energy storage systems and demand-response technologies to ensure a stable energy supply and enhance resilience to grid disturbances (Hufen & Koppenjan, 2015). These demand-response measures include price-based programs such as Time-of-Use (TOU) pricing, Critical Peak Pricing (CPP), and Real-Time Pricing (RTP), which encourage consumers to shift energy usage to off-peak periods through dynamic pricing models (International Energy Agency, n.d.; FERC, 2021). Key technologies facilitating demand response include smart meters, Home Energy Management Systems (HEMS), Advanced Metering Infrastructure (AMI), Automated Demand Response (ADR), and Distributed energy Resources (DER), which allow for real-time monitoring and automated adjustments in energy consumption (SEPA, 2018; Zhang et al., 2018) By leveraging real-time data, these cooperatives and smart grids optimize energy distribution and support grid stability (Hufen & Koppenjan, 2015; Zhang et al., 2018).

#### Policy and Regulatory Support

The European Union and national governments recognize the potential of energy communities and have implemented supportive policies and frameworks. The Clean Energy for All Europeans package, the Recast Renewable Energy Directive (RED II), and the Electricity Market Directive (EMD) provide a legal basis for the development and operation of energy communities, emphasizing the importance of citizen participation and local empowerment (European Commission, 2020). These policies aim to remove barriers, promote citizen participation, and ensure fair access to the energy market.

National policies also play a crucial role in fostering the development of energy communities. Belgium, for example, has introduced various incentives such as feed-in tariffs, grants, and tax reductions to encourage the growth of renewable energy projects within local communities (Huybrechts & Mertens, 2014).

Supportive policies and regulatory frameworks are essential for the successful development and operation of energy communities. By providing a clear legal framework and removing barriers to entry, these policies encourage citizen participation and local investment in renewable energy projects. Incentives such as feed-in tariffs, grants, and tax reductions make renewable energy projects financially viable and attractive to community members. Furthermore, by ensuring fair access to the energy market, policies like the Clean Energy for All Europeans package promote a level playing field for energy communities, enabling them to compete with traditional energy providers and contribute to the broader energy transition.

#### **CHAPTER 3: METHODOLOGY**

#### 3.1 Research Design

This study employs a systematic literature review (SLR) approach to collect information on regulatory frameworks and community engagement strategies in energy communities. This method is chosen for its ability to identify, evaluate, and synthesize relevant research studies and documents comprehensively.

#### 3.2 Data Collection

The data collection methods include the selection of academic literature, articles, legislative and policy documents, official websites, recorded videos of forums and discussion on energy communities in Europe.

Data for this research were collected through a systematic approach involving multiple sources to ensure a thorough and diverse understanding of the subject matter. The primary method was a selection of academic literature, which included peer-reviewed journal articles and conference papers, systematically searched using the Google Scholar database.

This paper reviewed the literature on energy communities, regulatory framework, and community engagement. The study is focused on the European context, specifically on the countries of Belgium, Denmark, and The Netherlands. The countries of Denmark and The Netherlands were chosen for comparison due to their pioneering status in the development of energy communities. Both countries have established a large number of energy communities, offering valuable insights and best practices. Belgium can learn and adopt successful strategies to enhance its own energy community initiatives. However, reviews on the other countries were still done to gain more insights and comparison.

An initial search of the literature on "Energy Communities in Europe" yielded approximately 6,450,000 results on Google Scholar. To refine the scope of the research, the term "Regulatory Framework" was added, reducing the results to 2,800. Given the study's geographic focus, the keywords "Belgium," "Denmark," and "Netherlands" were incorporated, further narrowing the results to 460. To ensure the relevance and quality of the sources, inclusion criteria were applied to select peer-reviewed literature published within the last 15 years, resulting in 438 sources. An exclusion criterion was then used to eliminate non-English publications and those with 10 or fewer citations, ultimately yielding 108 articles for review.

For community engagement, an initial search for "Energy communities" and "Community Engagement" resulted in 1,440 searches on Google Scholar. To concentrate on the geographical focus of the study, the terms "Belgium," "Denmark," and "Netherlands" were added, narrowing the

results to 137. These 137 papers were subsequently reviewed to assess their relevance and contribution to the study.

In addition to academic sources, relevant articles and reports from industry publications, and energy organizations were utilized to provide practical insights and up-to-date information on energy communities. Legislative and policy documents from Belgium, Denmark, and The Netherlands, as well as directives from the European Union, were analyzed to understand the formal regulatory environment. Official websites of government bodies, regulatory agencies, and energy organizations served as resources for accessing official documents, guidelines, and updates on policy developments. Additionally, recorded videos of forums, webinars, and panel discussions on energy communities in Europe were reviewed to gain insights from expert opinions, stakeholder perspectives, and real-time discussions on regulatory and engagement strategies. This comprehensive data collection approach ensured the inclusion of a wide range of perspectives and information relevant to the research questions.

#### 3.3 Data Analysis

The data collected were analyzed using thematic analysis to identify and report patterns within the data. Initially, the data were thoroughly reviewed to gain a comprehensive understanding, and notes were made to capture initial impressions. The review process involved collating information into potential themes by grouping related data to identify broader patterns. These themes were then refined to ensure they accurately reflected the data. Each theme was defined and recorded to capture its essence and relevance to the research questions. This thematic analysis provided a structured narrative that integrates the themes and addresses the research questions, offering insights into the regulatory frameworks and community engagement strategies in energy communities across Belgium, Denmark, and The Netherlands.

Upon completion of analysis, it was concluded that Belgium, Denmark, and The Netherlands share many similarities in encouraging energy communities through policy and legislation. All three countries laid the groundwork for energy communities' governance by introducing a renewable energy law, following the EU's Renewable Energy Directive. Financial incentives in the form of subsidies and tax write-offs, as well as tariff schemes were employed to facilitate and encourage the growth of energy communities, accompanied by supporting mechanisms and regulatory frameworks to manage and direct their evolution.

While there are some differences between the distinct laws of each country, the general idea remains the same. However, it is notable that Belgium is playing catch-up with Denmark and The Netherlands, where legislation in Belgium is lagging behind Denmark and The Netherlands.

In terms of community engagement strategies, all countries employed similar strategies ranging from providing information and technical assistance, to offering financial assistance and favorable loan terms, which proved successful in driving engagement and accelerating community engagement. The following section will discuss in detail the different policies, financial schemes and strategies employed by Belgium, Denmark, The Netherlands and the EU.

#### **CHAPTER 4: RESULTS**

#### 4.1 Policy and Regulatory Framework for Energy Communities

The European Union (EU) has developed a comprehensive policy framework to support the development and operation of energy communities, aiming to promote renewable energy, enhance energy security, and foster community participation in the energy transition. Key directives and regulations form the backbone of this framework, providing legal and regulatory support for energy communities across EU member states.

#### 4.1.1 European Union Directives and Regulations

#### **Clean Energy for All Europeans Package**

The Clean Energy for All Europeans Package Adopted in 2019 aligns the EU energy policy with the EU's climate objectives, including the Paris Agreement and the European Green Deal. It aims to address all 5 dimensions of the Energy Union (1) energy security, (2) the internal energy market, (3) energy efficiency, (4) decarbonization of the economy, and (5) research, innovation and competitiveness.

Key component relevant to energy communities include:

- Electricity Market Directive (EMD): Directive (EU) 2019/944 aims to create a competitive, flexible, and consumer-centric energy market. It ensures that energy communities have the right to generate, consume, store, and sell renewable energy and access all electricity markets.
- **Electricity Market Regulation**: Regulation (EU) 2019/943 establishes rules for the internal electricity market, emphasizing consumer empowerment and ensuring equal market participation for energy communities.
- Governance Regulation: Regulation (EU) 2018/1999 requires member states to develop integrated national energy and climate plans (NECPs) that include measures to support energy communities, ensuring their contributions to renewable energy targets are recognized.
- Recast Renewable Energy Directive (RED II): Directive (EU) 2018/2001 introduces the concept of renewable energy communities, which allows citizens, local authorities, and small businesses to invest in and benefit from renewable energy projects.

#### **Recast Renewable Energy Directive (RED II)**

RED II or Directive (EU) 2018/2001, adopted in 2018 as part of the Clean Energy for All Europeans package, sets binding renewable energy targets for each member state. Initially aiming for at least 32% of the EU's total energy consumption from renewable sources by 2030, the directive was revised in 2023, raising the target to at least 42.5%, with an aspirational goal of 45% (Eurostat, European Commission, n.d.).

RED II specifically emphasizes the role of Renewable Energy Communities (RECs) in achieving renewable energy targets. The directive includes several key provisions aimed at supporting the establishment and operation of RECs:

- Legal Recognition and Support: Member States are required to establish an enabling framework that supports the development of RECs. This includes ensuring that RECs can operate as legal entities, produce, consume, store, and sell renewable energy, and access all suitable energy markets without discrimination.
- Market Access: The directive mandates that RECs should have non-discriminatory access to relevant energy markets, including electricity wholesale markets, balancing markets, and ancillary services. This provision is designed to ensure that RECs can participate in energy markets on an equal footing with other market players.
- Financial Incentives and Support Schemes: Member States are encouraged to design support schemes that are accessible to RECs. This could include grants, loans, and subsidies tailored to the specific needs and challenges of RECs, thereby facilitating their development and sustainability.
- **Governance and Participation**: RECs must adhere to principles of open and voluntary participation. They should focus on providing environmental, economic, and social benefits to their members and the local communities they serve. This includes fostering a cooperative and inclusive governance structure.
- **Integration into National Planning**: Member States are tasked with integrating RECs into their national energy and climate plans. This includes considering the potential contributions of RECs to national renewable energy targets and ensuring that they are reflected in policy and regulatory measures.

#### Internal Electricity Market Directive (IEMD) DIRECTIVE (EU) 2019/944

IEMD or Directive (EU) 2019/944 complements RED II by defining Citizen Energy Communities (CECs). It is adopted as part of the EU's efforts to create a more integrated and competitive internal market for electricity, sets the framework for improving consumer rights, enhancing market transparency, and promoting new market participants like Citizen Energy Communities (CECs).

The directive aims to empower consumers and promote local energy initiatives by ensuring fair access to the energy market and removing barriers to participation. These includes several key provisions aimed at supporting the establishment and operation of CECs:

- Legal Recognition and Support: Member States are required to provide an enabling regulatory framework for CECs. This includes recognizing CECs as legal entities that can engage in generation, distribution, supply, consumption, aggregation, energy storage, and other services related to energy. The framework should ensure that CECs can operate effectively and are not subject to discriminatory treatment compared to other market participants.
- Market Access: CECs must have the right to access all electricity markets, including wholesale markets, balancing markets, and ancillary services. This provision ensures that CECs can participate in the energy market on an equal footing with other entities, thereby enhancing their ability to contribute to energy system flexibility and integration of renewable sources.
- **Financial Incentives and Support Schemes**: While the directive does not specifically mandate financial incentives for CECs, it encourages Member States to consider support schemes that are accessible to CECs. These may include measures to facilitate their access to capital and investment opportunities necessary for their growth and sustainability.
- Governance and Participation: CECs should be based on the principles of open and voluntary participation. They must be effectively controlled by their members, who can include individuals, local authorities, and small enterprises. CECs are expected to prioritize providing environmental, economic, and social community benefits rather than focusing solely on profits.
- Cooperation with Distribution System Operators (DSOs): The directive mandates that DSOs cooperate with CECs to facilitate the transfer of electricity within the community and ensure non-discriminatory access to the distribution network. This cooperation is crucial for enabling CECs to manage their energy flows efficiently and integrate distributed energy resources.
- Integration into National Planning: Member States are encouraged to integrate CECs into their national energy policies and plans. This involves recognizing the potential contributions of CECs to national energy objectives, such as increasing the share of renewable energy and enhancing energy security.

#### Governance Regulation (2018/1999/EU)

The Governance Regulation (EU) 2018/1999 integrates the EU's energy and climate policies into a cohesive framework to ensure that member states' actions are aligned with the EU's energy and climate objectives. Key aspects include:

- **Integrated National Energy and Climate Plans (NECPs)**: Member states must develop NECPs outlining strategies for achieving renewable energy, energy efficiency, and greenhouse gas reduction targets, including measures to support energy communities.
- **Monitoring and Reporting**: Establishes a robust system for monitoring and reporting progress towards targets, requiring member states to submit biennial progress reports, including information on energy communities.
- **Long-Term Strategies**: Encourages member states to develop long-term strategies that look beyond 2030, with a perspective of at least 30 years, to contribute to the EU's commitments under the Paris Agreement and the transition to a low-carbon economy.
- **Public Participation and Transparency**: Emphasizes the importance of involving the public and stakeholders in the development and implementation of energy and climate plans, ensuring

#### Electricity Market Regulation (EU) 2019/943

The Electricity and Market Regulation (EU) 2019/943 aims to facilitate the creation of a competitive and efficient electricity market in the European Union by promoting market integration, enhancing system flexibility, and ensuring secure and sustainable energy supply. Key aspects include:

- Market Efficiency and Integration: The regulation encourages the establishment of a single EU electricity market by enhancing cross-border trade and ensuring efficient use of electricity interconnections. This integration aims to lower costs and increase reliability across the grid.
- **Capacity Mechanisms**: Establishes guidelines for capacity mechanisms that ensure security of supply while avoiding market distortions. These mechanisms are designed to complement market operations and support the integration of renewable energy sources.
- **Renewable Energy Integration**: Supports the integration of renewable energy by encouraging market-based investments and promoting the use of flexible generation and demand-side solutions. This is aimed at enhancing grid stability and sustainability.
- **Transparency and Fair Competition**: Sets rules to ensure transparency and nondiscrimination in market operations, providing equal access to market opportunities for all participants, including small-scale producers and energy communities.

#### 4.2.1 National Policies and Regulatory Framework in Belgium

Belgium, like many other EU member states, has embraced the concept of energy communities as part of its broader strategy to promote renewable energy and achieve sustainability goals. The national policies in Belgium are designed to support the establishment and growth of energy communities through a combination of legislative measures, financial incentives, and supportive frameworks.

Belgium has implemented various national policies to support energy community initiatives. These policies provide financial incentives, regulatory support, and technical assistance to encourage the growth of energy communities. However, the responsibility for Belgium's energy and climate policy is divided between the federal government and the regional governments of Flanders, Wallonia, and the Brussels-Capital Region. The federal government is responsible for broad energy infrastructure and policy areas such as electricity transmission, large-scale generation, and nuclear energy. The Federal Energy Efficiency Plan outlines Belgium's national strategy for improving energy efficiency, which includes support for energy communities. The plan emphasizes the role of energy communities in achieving national energy efficiency targets by promoting local renewable energy generation and reducing overall energy consumption.

Whereas the regional governments are responsible for renewable energy (excluding offshore energy), energy efficiency, greenhouse gas (GHG) emissions, and the distribution of electricity and natural gas. Therefore, there is different legislation on energy communities in the different regions, resulting in three different fiches created for Belgium- one for the region of Wallonia, one for Flanders, and one for the Brussels-Capital Region. For instance, Flanders has developed the Flemish Energy Decree, which includes provisions for supporting both RECs and CECs, emphasizing open and voluntary participation, autonomy, and local control. Wallonia has a similar framework focusing on providing clear definitions and support mechanisms for energy communities (Energy Communities Repository, 2023).

In Wallonia, a framework for collective self-consumption (CSC) was adopted in October 2018, followed by a decree in May 2019 that defined Renewable Energy Communities (RECs) in line with the Renewable Energy Directive (RED II). This framework allows RECs to produce, consume, store, and sell renewable electricity locally using either the public network or a private grid (Frieden et al., 2020). In Flanders, the government published a draft legal framework in November 2020 to transpose the Electricity Market Directive (EMD) and partially transpose the RED II. This draft law enables energy communities to engage in various activities such as production, distribution, consumption, supply, aggregation, energy sharing, storage, electric vehicle charging services, energy efficiency services, and proposes the introduction of local flexibility markets (Frieden et al., 2020).

Belgium has introduced feed-in tariffs to promote renewable energy generation by energy communities. These tariffs guarantee a fixed price for the electricity produced from renewable sources, providing financial stability and making renewable energy projects more attractive for

community investment. Additionally, tax incentives such as deductions and exemptions are offered to reduce the financial burden on energy communities, encouraging their development (Huybrechts & Mertens, 2014).

#### 4.2.2 Regulatory Framework for Energy Communities in Brussels

#### The Ordinance of the Brussels Capital Region

The regulatory framework for energy communities in Brussels is primarily established by the Energy Communities Ordinance of 22 April 2021. This ordinance not only provides a clear definition and legal recognition of energy communities but also outlines various financial and technical support mechanisms to encourage their development.

#### Key Elements of the Regulatory Framework:

- **Definition:** The ordinance clearly defines energy communities as legal entities based on open and voluntary participation, controlled by their members or shareholders, and primarily aiming to provide environmental, economic, or social community benefits.
- **Market Access:** Energy communities have the right to generate, consume, store, share, and sell renewable energy. They can also participate in energy markets and provide flexibility services.
- **Financial Incentives:** The Brussels government provides a range of financial incentives to support the development of energy communities, including:
  - **Grants:** Financial contributions for feasibility studies, project development, and the installation of renewable energy technologies.
  - Loans: Favorable loan conditions and interest rates for financing renewable energy projects.
  - **Subsidies:** Direct financial support for the operation and maintenance of renewable energy installations.
- **Technical Support:** Guidance and expertise are available from Brussels Environment and BRUGEL, the Brussels energy regulator, to help energy communities navigate regulatory requirements and technical aspects of their projects.
- **Public Participation:** Community engagement is a core principle, ensuring that local residents are involved in the planning and decision-making processes of energy community projects.

#### Brussels Energy Transition Plan (2018-2030)

While not specific to energy communities, this plan outlines a comprehensive strategy to transform the energy landscape in Brussels by promoting sustainable energy practices, enhancing energy efficiency, and reducing carbon emissions. It emphasizes decentralized energy production, renewable energy sources, and citizen participation in the energy transition. This creates a favorable environment for the development and growth of energy communities.

#### 4.2.3 Regulatory Framework for Energy Communities in Flanders

#### **The Energy Decree**

The Energy Decree of November 19, 2010, enacted by the Flemish Government, establishes a comprehensive legal framework to govern energy policy and management within Flanders. It encompasses various aspects of energy policy, including energy production, distribution, supply, and consumption. The decree outlines the responsibilities and operational guidelines for the Flemish Energy and Climate Agency (VEKA), detailing its purpose, governance structure, and delegation of decision-making powers. It also sets forth the organization and regulation of the electricity and gas markets, including the criteria and procedures for designating and operating distribution network managers. Public service obligations, such as time-dependent tariffs and the implementation of digital meters, are specified to ensure efficiency and transparency in energy distribution.

Additionally, the decree promotes renewable energy through incentives Heat-Power Certificates (WKCs) for energy from combined heat and power (CHP). It details financial support measures such as investment subsidies and premium payments for installing renewable energy systems like solar panels and wind turbines. The decree also emphasizes the development and integration of energy communities, defining them as citizen energy communities or renewable energy communities. It sets out guidelines for their establishment, operation, and reporting to the Flemish Energy Regulatory Authority (VREG), emphasizing voluntary participation and clear agreements between the community and its members. By fostering energy communities, the decree aims to enhance local energy resilience, promote sustainable energy practices, and empower communities to actively participate in the transition to renewable energy, thereby supporting environmental goals and enhancing social cohesion and economic benefits at the local level.

## Technical Regulations for the Distribution of Electricity in the Flemish Region of 25 June 2021

This policy sets out the framework for energy sharing and person-to-person energy sales, which are fundamental to the decentralized energy model of energy communities. It includes detailed rules and technical requirements for energy sharing within communities, as well as guidelines for establishing and managing shared energy infrastructure. The policy also covers the legal and operational aspects of direct energy sales between individuals, detailing requirements for pricing, billing, and contractual agreements. To encourage participation, the policy offers incentives such as reduced energy costs and improved energy security, making energy sharing and sales financially attractive. Regulatory oversight is ensured through provisions for monitoring and reporting, which maintain transparency and accountability and ensure that these activities comply with broader regulatory requirements.

#### **Financial Incentives and Supporting Mechanisms**

#### Call Groene Stroom (Green Energy Call/ Call Green Power)

The "Call Groene Stroom" program, a subsidy program by the Flemish Energy and Climate Agency (VEKA) in Flanders, Belgium, promotes renewable energy by offering financial support for new photovoltaic (PV) and wind turbine installations. It specifically targets medium-sized PV systems and small to medium wind turbines, offering up to 100% of eligible costs based on competitive bids. Notably, the program includes provisions for energy communities, providing subsidies for PV installations within these communities to support local renewable energy projects and enhance community engagement in sustainable energy initiatives. This support extends to PV installations on residential buildings, marginal lands, and floating PV systems, aiming to boost renewable energy production comprehensively.

Supporting mechanisms in Flanders are designed to facilitate the establishment and efficient operation of energy communities. The VREG (Flemish Regulator for the Electricity and Gas Market) plays a crucial role by providing regulatory oversight, guidance, and resources. The VREG's support includes detailed documentation, templates, and guidelines to help communities comply with regulatory requirements.

Additionally, the EnergyVille research center offers technical and advisory support, conducting research and providing expertise on energy management and renewable energy technologies.

#### 4.2.4 Regulatory Framework for Energy Communities in Wallonia

#### The Walloon Energy Decree

The Walloon Energy Decree, initially enacted on April 12, 2001, and subsequently amended to comply with EU directives, establishes a comprehensive legal framework for energy policy within the Walloon Region. The decree covers various aspects of energy policy, including production, distribution, supply, and consumption of energy, with a strong emphasis on sustainability and community involvement. This decree sets forth operational guidelines and responsibilities for energy communities, including criteria for their establishment, operational framework, and reporting obligations to the Walloon regulator, the Commission Wallonne pour l'Énergie (CWaPE). It ensures energy communities adhere to principles of democratic governance, transparency, and local engagement, fostering a decentralized, community-driven energy transition.

The Walloon Energy Decree supports renewable energy through financial support measures, such as investment subsidies and premium payments, are provided for the installation of renewable energy systems, including solar panels, wind turbines, and biomass projects. These incentives aim to enhance local energy resilience, promote sustainable energy practices, and empower communities to actively participate in the energy transition.

#### **Financial Incentives and Supporting Mechanisms**

#### Subsidies for Companies Investing in Renewable Energy

Since 2002, the government of Wallonia has provided subsidies covering 15% of investment costs for companies in renewable energy sources such as solar energy, wind energy, hydropower, energy produced from industrial and urban waste, biomass (including biofuels), and geothermal energy.

#### **Municipal Support**

In 2020, the Walloon Region launched a call for municipalities to hire coordinators for their Energy and Climate Action Plans and to make investments to support these plans. This initiative aims to enhance local governance and capacity building for energy transition projects, ensuring that municipalities have the necessary resources and expertise to implement effective energy and climate strategies. The program encourages municipalities to take a proactive role in the energy transition, providing them with the tools and support needed to develop and execute comprehensive action plans. This local approach ensures that energy transition efforts are tailored to the specific needs and contexts of individual communities, promoting greater engagement and effectiveness.

#### 4.3 Comparative Policies in Other EU Countries

A comparative analysis of policies in Denmark and the Netherlands highlights different approaches to supporting energy communities. These countries have developed unique frameworks that reflect their specific energy landscapes and policy priorities.

#### 4.3.1 Denmark

Denmark has established a robust policy framework to support energy communities, particularly in the wind energy sector. The Danish government has promoted the development of wind cooperatives since the 1970s, providing financial incentives and a supportive regulatory environment. The comprehensive policy landscape in Denmark facilitates the growth of energy communities through legislation, financial incentives, and strong public participation.

#### Legislative Framework

#### **Renewable Energy Act**

One of the key legislative frameworks in Denmark is the Renewable Energy Act of 2008 (Act no. 1392 of 27 December 2008). This act facilitates the development of community energy projects by offering guaranteed grid access and favorable feed-in tariffs for renewable energy producers. The Act aims to ensure that renewable energy projects, including those initiated by local communities, have a secure and predictable revenue stream (Act no. 1392 of 27 December 2008). The Promotion of Renewable Energy Act is designed to promote the production of energy from renewable sources, reduce dependence on fossil fuels, and lower CO2 emissions. The Act applies to various renewable
energy sources, including wind, hydropower, biogas, biomass, solar, wave, tidal energy, and geothermal heating (Act no. 1392 of 27 December 2008)

A unique aspect of Danish policy is the mandatory local ownership requirement, which stipulates that at least 20% of new wind projects must be offered to local residents. This policy aims to ensure that the benefits of renewable energy projects are shared with the local community, fostering public support and engagement. By mandating local ownership, Denmark has been able to ensure high levels of community participation and acceptance for wind energy projects. The Act includes a wide range of measures, such as price supplements for renewable energy production, the promotion of wind turbines, and regulations for offshore energy exploitation. It also includes provisions for the connection and safety requirements of wind turbines, ensuring they meet technical and maintenance standards. Additionally, it mandates compensation for property value loss due to wind turbine erection and provides a green scheme to enhance local scenic and recreational values to promote local acceptance. Furthermore, the Act establishes a guarantee fund to support preliminary investigations by local wind turbine owners' associations and sets detailed regulations for offshore wind energy development, including tendering procedures and preliminary investigations. This comprehensive legislation aims to integrate renewable energy sources into Denmark's national grid effectively while ensuring community involvement and financial support.

# **Energy Supply Act**

The Energy Supply Act in Denmark plays a significant role in supporting energy communities and renewable energy projects. The Act provides a comprehensive legal framework for the electricity market, ensuring fair access for renewable energy producers, including community energy projects. It promotes decentralized energy production and the integration of renewable energy into the national grid. The Act has been instrumental in creating a supportive environment for energy communities by removing barriers to market entry and facilitating the participation of local energy projects in the electricity market. Its primary purpose includes promoting sustainable energy use, energy savings, and the use of renewable and environmentally friendly energy sources. Specific support is given to "borgerenergifællesskab" (citizen energy communities), prioritizing community benefits over financial profit. The Act defines and regulates aggregator businesses that aggregate multiple customers' electricity consumption or production for market participation, benefiting community energy projects. Additionally, it ensures consumer rights, allowing consumers to choose their electricity providers freely, and supports active consumer participation in energy production and consumption. Technical and financial provisions ensure the grid can accommodate renewable energy production, further supporting the integration of renewable energy into Denmark's electricity system (Danish Energy Agency, 2020).

## **Financial Incentives and Supporting Mechanisms**

Denmark has implemented various financial incentives to support the development of energy communities. One of the primary mechanisms is the feed-in tariff system, which guarantees a fixed price for renewable energy generated by community projects. This system provides financial stability

and predictability, making it easier for communities to invest in renewable energy projects. The feed-in tariffs are designed to cover the costs of renewable energy production and provide a reasonable return on investment, thereby encouraging the growth of energy communities (Danish Energy Agency, 2020).

Denmark also offers grants and subsidies for renewable energy projects through various programs. For example, the Energy Technology Development and Demonstration Program (EUDP) provides funding for innovative renewable energy projects, including those led by community groups. The EUDP aims to support the development and demonstration of new energy technologies, facilitating the integration of these technologies into community energy projects. By providing financial support for innovation, the EUDP helps to ensure that community energy projects can benefit from the latest advancements in renewable energy technology (EUDP, 2020).

Additionally, Denmark's Innovation Fund supports research and development in renewable energy technologies, including community-led projects. The fund provides grants for projects that demonstrate innovative approaches to energy production, distribution, and consumption. By fostering innovation, the Innovation Fund aims to enhance the competitiveness and sustainability of Denmark's renewable energy sector, including energy communities (Innovation Fund Denmark, 2020).

Denmark has also implemented financial compensation measures for local communities affected by the installation of wind turbines. These measures aim to address potential concerns and opposition from local residents by ensuring that they receive tangible benefits from renewable energy projects. Compensation can include funding for community development projects, such as local infrastructure improvements and social programs, thereby fostering community support for wind energy projects. Additionally, Denmark supports community-led projects that aim to reduce greenhouse gas emissions and promote sustainable development. Grants are provided for projects such as energy efficiency improvements, renewable energy installations, and sustainable transportation initiatives. By supporting a broad range of local projects, these initiatives help to build resilient and sustainable communities.

In addition to financial incentives, Denmark has established various supportive mechanisms to facilitate the growth of energy communities. One mechanism is the Net Metering Scheme, which allows energy communities to offset their electricity consumption with the renewable energy they produce. Under this scheme, any surplus or excess electricity generated by community projects can be fed back into the grid, and the community receives credits that can be used to offset future electricity consumption. This system significantly reduces overall electricity costs, providing a strong financial incentive for communities to invest in renewable energy projects.

# 4.3.2 The Netherlands

The Netherlands has made significant progress in supporting energy communities through a combination of national policies, local initiatives, and financial incentives. The Dutch government's commitment to renewable energy and community involvement is evident in its comprehensive policy

framework, which aims to promote decentralized energy production and foster sustainable energy practices.

# Legislative Framework

# The Energy Agreement for Sustainable Growth (Energieakkoord)

The Energy Agreement for Sustainable Growth (Energieakkoord), signed in 2013, is a fundamental policy document in Dutch energy policy and a pivotal document guiding the Netherlands' transition to a sustainable future. This comprehensive multi-stakeholder pact includes the government, businesses, trade unions, environmental organizations, and civil society groups. The agreement outlines the Netherlands' long-term strategy for renewable energy and energy efficiency, setting ambitious targets for reducing carbon emissions and increasing the share of renewable energy in the national energy mix.

The Energieakkoord's initial target was 14% renewable energy by 2020, with a subsequent goal of 16% by 2023. The agreement continues to actively support the growth of energy communities by promoting decentralized renewable energy production and providing financial incentives like the SDE+ subsidy scheme, enabling community-driven projects such as solar parks and wind farms.

It fosters local involvement in the energy transition by offering tax breaks for community-led initiatives thereby empowering citizens and organizations to invest in renewable energy and improve energy efficiency. Notably, the Energieakkoord introduced the Postcoderoosregeling (Postal Code Rose Scheme), which provided tax incentives to members of energy cooperatives in the same or adjacent postal codes, further encouraging local renewable energy projects. However, the Postcoderoosregeling was phased out in 2021 and replaced by the Subsidieregeling Coöperatieve Energieopwekking (SCE), which simplifies the subsidy process for energy cooperatives. As the Netherlands phases out fossil fuels, energy communities play a crucial role in meeting local energy needs with renewable sources. Through these comprehensive measures, the Energieakkoord empowers energy communities to significantly contribute to the country's sustainable energy transition. (Ministry of Economic Affairs and Climate Policy, 2013; Netherlands Enterprise Agency, n.d.; Government of the Netherlands, n.d.)

# The Climate Agreement (Klimaatakkoord)

The Climate Agreement (Klimaatakkoord), adopted in 2019 in The Hague, builds on the Energy Agreement (Energieakkoord) with more ambitious climate targets and a broader scope. While the Energieakkoord focused primarily on increasing the share of renewable energy and improving energy efficiency, the Klimaatakkoord sets out to reduce the Netherlands' greenhouse gas emissions by 49% from 1990 levels by 2030, with a long-term vision of achieving a 55% reduction at the European level.

This agreement, similar to Energieakkord, is a multi-stakeholder pact involves the government, businesses, civil society, and research institutions. However, it introduces sector-specific

commitments in areas such as the built environment, mobility, industry, agriculture, and electricity, reflecting a more integrated approach to addressing climate change.

To encourage community participation in achieving these national climate goals, The Climate Agreement includes several provisions specifically designed to support energy communities. These include financial incentives such as grants, subsidies, and funding mechanisms like the National Energy Saving Fund to support community energy projects. It also simplifies administrative procedures and provides technical support to ensure effective implementation and management. Emphasizing adaptive governance, regular monitoring, and public participation, the agreement ensures continuous progress and broad societal support for the energy transition (Dutch Government, 2019).

# **Regional Energy Strategy (RES)**

The Netherlands is divided into 30 energy regions, each responsible for developing a Regional Energy Strategy (Regionale Energiestrategieën - RES) to meet national climate goals. The RES process involves extensive stakeholder engagement, ensuring that local communities have a significant role in regional energy planning. By involving communities in the development of these strategies, the RES ensures that local needs and priorities are addressed, fostering greater community participation and support for renewable energy projects (Technopolis Group, n.d.).

### **Financial Incentives**

# The Subsidieregeling Coöperatieve Energieopwekking (SCE)

The Subsidieregeling Coöperatieve Energieopwekking (SCE) is a Dutch subsidy scheme designed to stimulate the growth of renewable energy and energy communities. It provides financial incentives in the form of an exploitation subsidy, where participants receive a subsidy per kilowatt-hour (kWh) of electricity produced. The subsidy amount is determined by the difference between a fixed base amount and the fluctuating market price for electricity. This means that as the market price for electricity increases, the subsidy amount decreases, as participants receive more compensation from the market for their generated kWh. By fostering collaboration and incentivizing local renewable energy production, the SCE empowers communities to develop and operate their own energy projects, contributing to a more sustainable and equitable energy future for the Netherlands (DLA Piper, 2021; Netherlands Enterprise Agency, n.d.; Netherlands Enterprise Agency, n.d.).

**The SDE++ (Stimulering Duurzame Energieproductie en Klimaattransitie) Scheme** The SDE++ (Stimulering Duurzame Energieproductie en Klimaattransitie) Scheme is a subsidy program in the Netherlands that supports renewable energy production and CO2 emission reduction. It covers various technologies, including solar, wind, and biomass. The scheme makes sustainable energy projects financially viable by offsetting costs through subsidies. Energy communities, companies, and non-profit organizations can apply. The subsidy amount is determined by the difference between a base amount and the market price for energy. Subsidies are granted for 12 to 15 years, depending on the project type and scale (DLA Piper, 2021; Netherlands Enterprise Agency, 2020; Clean Energy for EU Islands Secretariat, n.d.).

Apart from SCE and SDE++, The Netherlands offers a range of financial incentives to promote investments in sustainable energy and environmentally friendly technologies, supporting the country's national sustainability goals. The Energy Investment Allowance (EIA) allows significant tax deductions for investments in energy-saving equipment and sustainable energy, benefiting various sectors, including industrial buildings, renewable energy communities, and transportation. Similarly, the Milieu-investeringsaftrek (MIA) offers a tax deduction of up to 36% on eligible green investments, further reducing the financial burden on companies and communities investing in renewable energy projects. The Vamil scheme complements these by allowing flexibility in writing off 75% of investment costs, providing liquidity and interest advantages (DLA Piper, 2021; Netherlands Enterprise Agency, 2024; Netherlands Enterprise Agency, n.d.).

In addition to these tax incentives, the Green Projects Scheme offers low-interest loans to finance renewable energy and energy efficiency projects, benefiting individuals, businesses, and community groups. This scheme is particularly effective in helping energy communities cover the initial capital costs of renewable energy initiatives, such as solar, wind, and biomass energy projects. By making these investments more accessible, the Green Projects Scheme fosters community involvement in the transition to a sustainable energy system, contributing to the Netherlands' broader sustainability and climate objectives (Business.gov.nl, n.d.; Netherlands Enterprise Agency, n.d.).

#### Supportive Mechanisms

#### Net Metering Scheme (salderen)

The Net Metering Scheme in the Netherlands allows households and energy communities to offset their electricity consumption with the renewable energy they produce. Under this scheme, any excess electricity generated by community projects can be fed into the grid, and the community receives credits that can be used to offset future electricity consumption. However, it is important to note that the Dutch government has decided to phase out the net metering scheme. The scheme will remain unchanged until January 1, 2025, after which it will gradually decrease and be completely phased out by 2031 (Diestelmeier & Swens, 2024; PV Magazine, 2024; Zonnefabriek, 2023).

#### **Green Deals Program**

The Green Deals program supports renewable energy and energy communities by addressing legislative barriers, connecting stakeholders, and sharing essential knowledge. It facilitates the development and scaling of renewable energy projects by ensuring access to necessary resources and expertise. By fostering collaboration between government bodies, companies, and other organizations, the program enhances the feasibility and implementation of sustainable energy initiatives, ultimately contributing to the transition towards a more sustainable energy system (Business.gov.nl, n.d.; Green Deals, n.d.).

# 4.4 Implementation of Energy Community Policies and Regulatory Framework in Belgium, Denmark, and The Netherlands

# Ecopower

Ecopower, founded in 1991, is a prominent cooperative based in Flanders, Belgium, dedicated to the production and distribution of renewable energy. When the Belgian energy market was liberalized in 2003, it started its new adventure as an electricity supplier (Ecopower, n.d.). It has become a model for energy communities, promoting citizen involvement in the energy transition. The cooperative is focused on several key objectives: producing electricity from renewable sources such as wind, solar, and biomass; promoting efficient energy use among its members and the broader community; and emphasizing democratic participation and 100% renewable energy system involving citizens as fully fledged partners through its cooperative structure.

Operating as a cooperative society, Ecopower aligns with both Flemish and EU legislative frameworks for energy communities. With over 70,000 cooperative members as of 2023, the cooperative ensures democratic decision-making by ensuring only one vote per member, regardless of the number of shares held. Members can each buy up to a maximum of 20 shares and actively participate in annual general meetings, where they discuss and vote on strategic decisions, financial matters, and project developments (Friends of the Earth Europe, 2020).

Ecopower is involved in various renewable energy projects, demonstrating its commitment to sustainable energy production and community involvement. In wind energy, the cooperative operates several wind turbines across Flanders, contributing a significant portion of its renewable energy production. These projects are financed through member investments and government incentives, with local communities actively involved in the planning and implementation processes, fostering acceptance and participation. Ecopower invests in photovoltaic installations on residential, commercial, and public buildings, often in collaboration with local authorities and organizations. Members benefit from collective self-consumption schemes, optimizing the use of locally generated solar energy. Additionally, Ecopower explores biomass as an energy source, focusing on sustainable and environmentally friendly practices, thereby enhancing energy security and resilience.

Ecopower operates within the regulatory framework established by the Flemish government, which aligns with EU directives on energy communities. Ecopower is committed to a decentralized, democratic and sustainable energy model, where all members have a voice in policy decisions and any profits benefit the local community (Ecopower, n.d.). The Flemish Energy Decree supports Ecopower's identity as a Renewable Energy Community (REC). This decree ensures fair grid access and favorable tariffs, facilitating Ecopower's energy distribution and financial viability. EU directives such as the Renewable Energy Directive (RED II) support Ecopower's rights to self-consumption, peer-to-peer energy sharing, and participation in the energy market.

Ecopower benefits from financial incentives provided by the Flemish government, including subsidies and grants for renewable energy projects, which reduce the financial burden on its members. Moreover, Ecopower is keen on providing solutions to those who want to join the cooperative but cannot financially afford a share (Friends of the Earth Europe, 2020). Cooperative members receive tax incentives for investing in renewable energy projects, encouraging participation and investment.

Despite these challenges, Ecopower has significant opportunities due to policy support and technological innovation. Today, the cooperative supplies roughly 1.64% of household electricity in Flanders (Friends of the Earth Europe, 2020). The alignment of Flemish and EU policies with Ecopower's cooperative model offers growth opportunities. Furthermore, increasing public interest in renewable energy and sustainability supports Ecopower's mission and member growth.

# **Courant d'Air**

Courant d'Air is a citizen cooperative for renewable energy recognized as a social economy enterprise based in the Walloon region of Belgium. Founded in 2009, its mission is to develop local renewable energy projects while promoting energy autonomy and sustainability through citizen participation. By democratizing energy production and consumption, Courant d'Air focuses on producing energy from renewable sources such as wind, solar, and hydroelectric power, and soon biomass (Courant d'Air, n.d.). The cooperative emphasizes community engagement, fostering a sense of ownership among local citizens, and aims to educate the public on sustainable energy practices. The cooperative is heavily involved in educational initiatives, such as the "Génération Zéro Watt" project, which provides tools for young people to become more conscious of energy consumption (Boulanger et al., 2021).

As a cooperative society, Courant d'Air operates under Walloon and EU legislative frameworks for energy communities. Its membership comprises over 4,850 members who own shares and have equal voting rights, ensuring democratic governance (Courant d'Air, n.d.). These members are ensured access to all of the activities, dividends earnings, and have an active voice in all of the investments made by the company (Boulanger et al., 2021).

Courant d'Air is involved in various renewable energy projects that reflect its commitment to sustainable energy production and community empowerment. It operates six wind turbines in the Walloon region, with projects financed through member investments and public subsidies (Courant d'Air, n.d.). The cooperative collaborates with local communities and authorities to ensure wind projects are well-integrated and accepted. In solar energy, Courant d'Air invests in photovoltaic panels on public and private buildings, often partnering with municipalities and local organizations. It also explores small-scale hydroelectric projects and is working on biomass initiatives to diversify its energy portfolio. Courant d'Air has created, together with nine other Walloon energy cooperatives, the electricity supplier COCITER ("Comptoir Citoyen des Energies") to provide green electricity produced by its members, emphasizing local service and helping members analyze their consumption to reduce costs (Courant d'Air, n.d.).

Within the regulatory framework established by the Walloon region, Courant d'Air aligns with EU directives on energy communities. It benefits from the Walloon Energy Decree, which defines energy communities and grants them rights to produce, consume, store, and trade renewable energy, while

emphasizing democratic governance and local stakeholder involvement. The EU Renewable Energy Directive (RED II) supports Courant d'Air's rights to self-consumption and participation in the energy market, and the Electricity Market Directive allows it to operate within a liberalized market. Furthermore, The cooperative's share operations and dividend distribution supports the financial sustainability of community energy projects. Each share costs 250 EUR and has a limit of 3 shares per person. The investment model, requiring a minimum of five years and offering up to 6% dividends, encourages long-term participation and stability. This financial viability is critical for the successful implementation and growth of energy communities under the regulatory framework (Courant d'Air, n.d.).

Courant d'Air engages in a broader range of activities, including energy generation, distribution, and consumption, with democratic governance and local citizen control. The cooperative's projects maximize local benefits, with wind energy projects developed in partnership with local communities and solar projects enabling collective self-consumption. Their activities highlight their commitment to implementing energy community regulatory frameworks in Wallonia, driving sustainable development and energy transition goals.

# LochemEnergie

Founded in 2010, LochemEnergie is an innovative energy cooperative located in the municipality of Lochem, within Gelderland province, Netherlands. Its mission is to increase local renewable energy production and energy self-sufficiency through various sustainable projects aimed at assisting citizens in switching to renewable sources of power. LochemEnergie is set up as a cooperative, operating under Dutch legal frameworks promoting community involvement in renewable energy schemes and corresponding National/European Union regulatory frameworks for such community-led energy initiatives (Brouwers & van Mierlo, 2019). Their participation stretches back several years when Dutch policies began incorporating collective action amidst rural communities into the development of their renewable-energy sector. As of 2024, their citizen cooperative comprises 1,385 members with democratized voting rights. Supported by volunteers and energy coaches, LochemEnergie ensures its local energy cooperatives work closely together to explore the possibilities of local ownership and spread their message to citizens, companies, and the government (LochemEnergie, n.d.).

To ensure its objectives are met, LochemEnergie employs a democratic governance structure ensuring decisions are made collectively by its members who participate actively during annual meetings for strategy discussions and election of the board of directors overseeing the operations and mission alignment (LochemEnergie, n.d.). For LochemEnergie, local ownership equals collective ownership, meaning they ideally want to achieve 100% investment and control by and for citizens, farmers, and local businesses, with 50% as the minimum.

The regulatory framework is consistent with European Union guidelines on renewable energy and energy communities. The Dutch Climate Agreement (Klimaatakkord) and the Energy Agreement (Energieakkoord) provide the legislative base for renewable energy development and participation of energy communities by offering financial incentives and simplifying administrative procedures to encourage the formation and operation of energy communities. An important addition to the Dutch Climate agreement of 2019 further strengthens and supports LochemEnergie's position in the local community - "We strive to 50% local ownership for large-scale energy-generation.". The EU Recast Renewable Energy Directive (RED II) and the Electricity Market Directive further support LochemEnergie's activities by granting rights to generate, consume, store, and trade renewable energy, thereby increasing community involvement.

However, LochemEnergie faces challenges, including negotiating the complex regulatory environment and competition with large energy providers. The emphasis on community keeps driving membership growth of the cooperative even more while they remain actively involved in their projects. LochemEnergie's example shows that supportive regulation frameworks make it possible for community-based models to work well within their jurisdictions.

#### **Middelgrunden Wind Farm**

The Middelgrunden Wind Farm is a pioneering example of a community-owned renewable energy project in Denmark, showcasing how regulatory frameworks and energy community policies facilitate such initiatives. Located approximately 3.5 kilometers off the coast of Copenhagen in the Øresund Strait, Middelgrunden comprises 20 wind turbines, each with a capacity of 2 MW, totaling 40 MW, which delivers about 4% of the power for Copenhagen (Middelgrunden Vindmøllelaug I/S, n.d.). At the time of its commissioning in 2001, it was one of the world's largest offshore wind farms. The project is 50% energy cooperative and 50% corporate. It is 50% owned by the 8,550 cooperative members and 50% owned by HOFOR (Copenhagen Municipality), reflecting Denmark's supportive regulatory environment, which encourages renewable energy development through community ownership and participation (Sorensen & Chozas, 2021 [Presentation]).

Denmark's regulatory framework plays a crucial role in facilitating projects like Middelgrunden. National energy policy agreements set ambitious targets for renewable energy deployment, emphasizing increased wind energy capacity, both onshore and offshore. These policies encourage local ownership to foster public acceptance and distribute economic benefits within communities. The Renewable Energy Act provides the legal basis for renewable energy development, outlining the rights and obligations of energy producers and ensuring fair grid access. Historically, the act included feed-in tariffs, which guaranteed a fixed price for electricity produced, thereby ensuring stable revenue for wind energy projects.

Support for energy cooperatives is a significant aspect of Denmark's regulatory framework. The law promotes the cooperative model for energy projects, allowing communities to collectively invest in and manage renewable energy installations. The cooperative ownership model ensures that financial benefits are distributed among local residents, enhancing community support and economic resilience. Financial incentives, such as grants and favorable loan conditions, help reduce the financial risk for community investors. Cooperative members purchased shares in the project, representing ownership stakes and entitling them to a share of the revenue generated by the wind

farm. Revenue is primarily generated from electricity sales, supported by feed-in tariffs and later market-based mechanisms.

Local and municipal involvement is also critical, with municipal planning and zoning ensuring that projects comply with land use and environmental regulations. Public consultations are required during project planning, allowing stakeholders to express concerns and contribute to decisionmaking. Regulatory compliance was ensured through an Environmental Impact Assessment (EIA), which evaluated potential impacts on marine ecosystems, visual aesthetics, and other environmental factors, guiding the project's design and implementation. Necessary permits from national and municipal authorities ensured compliance with Denmark's stringent environmental standards.

Despite its success, Middelgrunden faced initial opposition due to concerns about environmental impact and visual intrusion. Extensive public consultation and transparent communication helped address these concerns. The project also encountered technical challenges and financial uncertainties associated with pioneering new technologies as one of the first large-scale offshore wind farms. Nevertheless, Middelgrunden's success provides a blueprint for similar projects in Denmark and internationally, showcasing the viability of community-owned renewable energy. Advances in wind turbine technology and offshore construction methods offer opportunities to increase capacity and efficiency in future projects.

The Middelgrunden Wind Farm exemplifies how Denmark's regulatory framework and supportive policies have facilitated the development of community-owned renewable energy projects. By leveraging cooperative ownership, public engagement, and government incentives, Middelgrunden has successfully integrated renewable energy into Copenhagen's energy mix while empowering local citizens. The project serves as a model for balancing environmental sustainability, community involvement, and economic viability in renewable energy initiatives, demonstrating the potential of energy communities to drive the transition to a sustainable energy future.

#### 4.5 Community Engagement Strategies in Energy Communities

Community engagement in energy communities across Europe refers to the active involvement of local residents and stakeholders in every stage of renewable energy projects, from planning to management. This engagement includes participatory decision-making processes, such as planning meetings, workshops, and consultations, ensuring that community needs and preferences are considered (Caramizaru & Uihlein, 2020). Local ownership and control are emphasized, often through cooperatives or community trusts, which allow residents to directly manage and benefit from energy resources (Berka & Creamer, 2018). Capacity building and education are integral, with programs designed to enhance residents' knowledge of renewable technologies, project management, and governance (Frieden et al., 2021). Transparency and regular communication about project goals, benefits, risks, and progress are essential to build trust and enable community feedback (Walker & Devine-Wright, 2008). Additionally, community engagement fosters social innovation and collaboration with various stakeholders, including local governments, businesses,

and nonprofits, to support the sustainable development of renewable energy projects (Hargreaves et al., 2013).

Five categories were identified as key elements of Community Engagement Strategies in energy communities:

1. Participatory and Collaboration Approaches 2. Financial Incentives 3. Capacity Building & Education 4. Information and Communication 5. Collaboration with Local Authorities and Organizations

# 4.5.1 Participatory and Collaborative Approaches in Energy Communities

Participatory and collaborative approaches are crucial for the successful implementation and scaling of energy communities. These approaches emphasize the active involvement of community members in decision-making processes, fostering a sense of ownership and empowerment. In the context of the EU, the Clean Energy Package (CEP) recognizes the importance of citizen participation in the energy transition and mandates member states to facilitate community arrangements that enable this participation (Mengolini et al., 2016).

Several studies and projects highlight the importance of community engagement and participation in the energy transition. For instance, Mengolini et al. (2016) explore community-oriented approaches in demand-side management (DSM) projects in Europe, emphasizing the increasing trend towards collective dynamics and multi-stakeholder partnerships to enhance consumer participation. The study identifies various participatory strategies, such as community events, social networks, and co-design workshops, as effective tools for fostering community engagement and empowering citizens to actively contribute to the energy transition.

Furthermore, participatory approaches are crucial for addressing the social dimension of energy communities. Gallegos et al. (2024) highlight the importance of community engagement and education in driving the adoption of sustainable energy practices. They emphasize that active participation, local involvement, and co-ownership are crucial for the success of energy communities and the broader energy transition.

Community engagement is seen as a key driver of knowledge acquisition and innovation (Anthony Jnr, 2020). Participatory approaches, such as co-creation and living labs, are identified as effective ways to involve citizens and stakeholders in the design and implementation of innovative energy solutions. These approaches promote collaboration, knowledge sharing, and the development of community-centric services.

However, challenges to participatory approaches exist. Ryder et al. (2023) problematize instrumentally driven community engagement, where the focus is solely on achieving social acceptance of energy projects rather than genuine community participation. They advocate for a more community-centered approach that prioritizes relationship-building, trust, and shared decision-making power.

Participatory and collaborative approaches are essential for the success and sustainability of energy communities. They empower communities, foster local ownership, and ensure that energy projects align with the needs and values of the people they serve. By actively involving citizens and stakeholders in decision-making processes, energy communities can drive the energy transition towards a more democratic, equitable, and sustainable future.

# 4.5.2 Financial Incentives

Financial incentives are crucial for establishing and expanding energy communities, especially in the early stages of development. These incentives can take various forms, including subsidies, grants, tax incentives, and feed-in tariffs. Governments and institutions can provide financial support to energy communities to offset the high upfront costs of renewable energy projects (Khalid et al., 2021). For example, in the Netherlands, the government's "Natural Gas Free Program" (PAW) offers subsidies for community heating projects, incentivizing the transition away from fossil fuels (Teladia and van der Windt, 2023). In Italy, the Recovery Plan allocates funds for photovoltaic systems and energy communities, with a focus on supporting families and small enterprises in municipalities with fewer than 5000 inhabitants (Boulanger et al., 2021). Tax credits or exemptions can make investments in renewable energy projects more attractive for individuals and businesses. Additionally, feed-in tariffs (FiTs) guarantee a fixed price for the electricity generated from renewable sources, providing a stable income stream for energy communities. (Energy Community Secretariat, 2024; Mengolini et al., 2016)

Financial incentives not only reduce the financial barriers to entry for energy communities but also attract investment and make renewable energy projects more accessible to a wider range of participants (Khalid et al., 2021). However, the design and implementation of these incentives require careful consideration to ensure their effectiveness, fairness, and long-term sustainability.

# 4.5.3 Capacity Building & Education

Capacity building and education are essential for empowering individuals and communities to actively participate in the energy transition. These initiatives equip individuals with the knowledge and skills necessary to understand, engage with, and contribute to the development of sustainable energy systems.

In the context of energy communities, capacity building and education can take various forms, including:

- Technical Training: Providing training on the technical aspects of renewable energy technologies, such as solar panels, wind turbines, and energy storage systems. This empowers community members to understand how these technologies work, their benefits, and how to maintain them. (Energy Community Secretariat, 2024)
- Energy Literacy: Educating community members about energy consumption, energy efficiency measures, and the environmental impact of different energy sources. This

knowledge enables individuals to make informed decisions about their energy use and actively participate in the energy transition. (Gallegos et al., 2024)

- Policy and Regulatory Training: Informing community members about the relevant policies, regulations, and legal frameworks governing energy communities. This understanding is crucial for navigating the complexities of the energy sector and ensuring compliance with regulations. (Energy Community Secretariat, 2024)
- Financial Literacy: Providing training on financial aspects of energy communities, such as investment options, cost-benefit analysis, and funding mechanisms. This empowers community members to make informed financial decisions and contribute to the economic sustainability of their initiatives. (Gangale et al., 2020)
- Community Engagement and Facilitation Skills: Developing skills in community organizing, communication, and facilitation to foster collaboration and participation within the energy community. This can include training on conflict resolution, decision-making processes, and leadership development. (Shortall et al., 2022)

By investing in capacity building and education, energy communities can empower their members to become active participants in the energy transition. This not only enhances the technical and operational capabilities of the community but also fosters a sense of ownership, responsibility, and empowerment among its members. Informed and engaged citizens are more likely to support and contribute to the development of sustainable energy systems, leading to a more equitable and resilient energy future.

# 4.5.4 Information and Communication

Information and communication strategies are essential for raising awareness, fostering understanding, and promoting active participation in energy communities. These strategies encompass a wide range of methods and tools, both traditional and digital, to disseminate information, engage stakeholders, and facilitate dialogue.

Many energy communities utilize traditional communication methods, such as leaflets, posters, brochures, and community events, to inform and educate the public about their initiatives (Mengolini et al., 2016). These methods can be effective in reaching a broad audience and fostering a sense of community involvement.

With the increasing digitalization of the energy sector, energy communities are leveraging digital platforms and tools to enhance communication and engagement. These platforms can provide real-time information on energy consumption, production, and prices, empowering consumers to make informed decisions (Gallegos et al., 2024). Social media platforms, online forums, and dedicated websites are also used to facilitate discussions, share information, and build virtual communities of practice. For instance, the CityOpt project in Nice, France utilized a community-based application to send demand-response requests to participants, encouraging them to reduce energy consumption during peak periods (Shortall et al., 2022).

While information and communication strategies are essential, they can face challenges such as reaching diverse audiences, ensuring accessibility for all community members, and maintaining engagement over time. It is crucial to tailor communication efforts to the specific needs and preferences of the target audience, utilizing a mix of traditional and digital channels to maximize reach and impact. Additionally, ensuring transparency and providing clear and concise information is vital for building trust and credibility within the community.

Effective information and communication strategies are fundamental for the success of energy communities. By utilizing a combination of traditional and digital methods, energy communities can raise awareness, foster understanding, and promote active participation among community members, ultimately driving the transition towards a more sustainable and participatory energy system.

# 4.5.5 Collaboration with Local Authorities and Organizations

Collaboration with local authorities and organizations is a crucial aspect of establishing and maintaining energy communities. These collaborations can take various forms and involve different stakeholders, including municipalities, government agencies, energy cooperatives, and other community-based organizations.

Collaborations with local authorities and organizations offer numerous benefits to energy communities. They can provide access to resources, expertise, and funding opportunities that may not be available to individual community members. For example, local authorities can facilitate permits and approvals for renewable energy projects, while energy cooperatives can offer technical assistance and support in project development and implementation (Energy Community Secretariat, 2024). Additionally, collaborations can enhance community engagement and participation by leveraging the networks and outreach capabilities of local organizations. This can lead to increased awareness, trust, and support for energy community initiatives.

In the Netherlands, community heating initiatives often involve partnerships between energy cooperatives, municipalities, and other stakeholders to co-create solutions and foster community engagement (Teladia and van der Windt, 2023). In Belgium, energy communities collaborate with municipalities, the Association of Flemish Cities and Municipalities (VVSG), and REScoop Flanders to promote and support community energy projects (Alipanahi, 2023). In Denmark, the success of early wind cooperatives was attributed in part to the close collaboration between local authorities and communities in the planning and operation of wind farms (Verde and Rossetto, 2020).

While collaborations offer numerous benefits, they can also present challenges. These challenges may include aligning the interests and goals of different stakeholders, navigating complex bureaucratic processes, and ensuring equitable distribution of benefits and responsibilities. Effective communication, transparency, and trust-building are crucial for successful collaborations. Additionally, it is important to consider the specific context and needs of each community when establishing partnerships to ensure that collaborations are tailored and effective.

By leveraging the resources, expertise, and networks of these stakeholders, energy communities can overcome challenges, enhance community engagement, and achieve their sustainability goals. Collaboration with these stakeholders are key strategies for the successful implementation and scaling of energy communities.

### **CHAPTER 5: Discussion and Insights**

#### 5.1 Impact on Development and Operation of Energy Communities

Assessing the regulatory frameworks of Brussels Capital Region, Flanders, and the Region of Wallonia in Belgium compared to the Netherlands and Denmark provides insights into how these frameworks impact the development and operation of energy communities in each region.

# 5.1.1 Belgium

In Belgium, the regulatory landscape for energy communities is fragmented, with each region having its own set of rules and regulations. This fragmentation can create confusion and uncertainty for potential energy community organizers, hindering their development. Moreover, developing nationwide initiatives can be challenging due to the different regulatory frameworks in the country's region.

Belgium's regulatory framework for energy communities is characterized by its regional governance, with policies varying between Flanders, Wallonia, and the Brussels-Capital Region. While this federal structure can lead to inconsistencies, it also allows tailored approaches to local needs. Each region has developed its policies to support energy communities, such as the Flemish Energy Decree and Wallonia's Energy Decree, which provide the legal basis for establishing and operating energy communities.

In Wallonia, the introduction of a framework for collective self-consumption in 2018 has allowed groups of consumers to share locally produced renewable energy, fostering energy independence and integration of renewable sources. Similarly, the Flemish Energy Decree supports innovative energy community projects by promoting renewable energy generation and self-consumption. It facilitates the development of local flexibility markets for energy sharing, demand response, and storage solutions. These experimental frameworks enable communities to optimize energy use and reduce grid dependency (Llera-Sastresa, 2023; Trevisan, 2024).

Despite regional differences, all regions have seen an increase in community-led energy initiatives, driven by supportive policies such as feed-in tariffs and tax incentives. These policies have encouraged the formation of cooperatives like Ecopower and Courant d'Air, which serve as successful examples of community engagement and renewable energy production.

In the Brussels-Capital Region, the Energy Communities Ordinance of 2021 provides a clear definition and legal recognition of energy communities, along with financial and technical support mechanisms (Spasova & Braungardt, 2022). However, the regulatory complexity and initial costs associated with setting up renewable energy projects can still pose barriers. For instance, the requirement for obtaining permits and licenses, as well as the need for technical expertise, can be daunting for smaller community initiatives.

In Flanders, the Flemish Energy Decree of 2010 establishes a comprehensive legal framework for energy communities, but the "first-come, first-served" system for wind siting processes and the lack of clear guidelines for energy sharing can create challenges for smaller community initiatives. This system often favors larger developers with more resources, potentially excluding smaller community-based projects (Spasova & Braungardt, 2022).

In Wallonia, the region has developed a particularly supportive framework for renewable energy communities, including a decree that explicitly favors their development. This has encouraged the growth of community-led energy initiatives and demonstrates the region's commitment to fostering local energy independence (Spasova & Braungardt, 2022).

However, the development of energy communities in Belgium has shown varying progress. In 2019, there were 34 energy communities across the country (Caramizaru & Uihlein, 2020). By 2023, Flanders alone accounted for 22 energy communities (Krug et al., 2023). While this provides some insight into the presence of energy communities in Flanders, there is insufficient information to determine trends or developments in other regions, making it difficult to assess the overall situation across the country.

# **Models of Energy Communities**

Belgian energy communities primarily operate as cooperatives, which are recognized for their democratic governance and local ownership. This model aligns with the EU's definitions of Renewable Energy Communities (RECs) and Citizen Energy Communities (CECs), emphasizing participation, local control, and community benefits.

Ecopower, based in Flanders, exemplifies a cooperative model, engaging over 70,000 members in renewable energy projects, while Courant d'Air in Wallonia highlights the regional focus on local empowerment and sustainability.

#### 5.1.2 The Netherlands

The Netherlands has a more centralized approach to energy community regulation, with the national government playing a leading role in policy development and implementation. The Energy Agreement for Sustainable Growth (Energieakkoord) and the Climate Agreement (Klimaatakkoord) provide a clear framework for renewable energy development and community participation.

The liberalized electricity market in the Netherlands has facilitated the growth of energy communities, though challenges remain. The dominance of fossil fuel interests and the complex and differentiated tariff structures have limited the expansion of small-scale renewable energy projects (Oteman et al., 2014). The complex and differentiated tariff structures can also create barriers for energy communities to participate in the market and share energy efficiently. While the Dutch government has introduced initiatives like the SDE++ subsidy scheme to incentivize renewable

energy production, the complexities and limited scope of these schemes can still pose challenges for smaller community projects. The phasing out of the net metering scheme, which allowed households and communities to offset their electricity consumption with renewable energy they produced, could further impact the financial viability of energy communities.

The Netherlands' regulatory framework has significantly influenced the development of energy communities. Historical frameworks like the 1989 Electricity Act Experiments Scheme and the 2013 Energy Agreement have catalyzed the growth of these communities. The Electricity Act provided grid access and standard pricing for early initiatives, while the Energy Agreement facilitated local energy projects through incentives like the already phased-out Postcoderoosregeling (Postal Code Rose Scheme) which led to an increase in community-led renewable energy projects.

A key component of the Dutch approach is the Regional Energy Strategy (RES) process, which ensures that local communities have a significant role in regional energy planning. This decentralized approach empowers communities to take ownership of their energy transition and tailor solutions to their specific needs and contexts. By fostering greater community participation and support for renewable energy projects, the RES process enhances local engagement and aligns regional energy strategies with the specific circumstances and goals of each community.

The liberalization of the energy market in 2004 further accelerated the growth of energy communities, with the number of communities increasing significantly post-2010. These regulatory changes have allowed nearly 700 cooperatives with over 110,000 members to establish themselves, demonstrating the framework's effectiveness in promoting community energy initiatives(Nordic Energy Research, 2023).

# **Models of Energy Communities**

Energy communities in the Netherlands adopt various organizational structures, including cooperatives, foundations, associations of owners, and companies. The cooperative model is prevalent due to its compatibility with subsidy requirements. Despite its advantages, the cooperative model is still seen as a private company, limiting its market activities compared to the EU Commission's definitions of Citizen Energy Communities (CECs) and Renewable Energy Communities (RECs). The Dutch regulatory framework has merged REC and CEC into a single concept; however, there are more RECs than CECs in practice.

#### 5.1.3 Denmark

Denmark's regulatory framework for energy communities is deeply rooted in its long history of supporting community-owned wind energy projects, significantly shaping the country's energy landscape. By 2019, 52% of Denmark's installed wind capacity was owned through citizen models, reflecting a rich tradition of citizen engagement in energy initiatives. This historical context has fostered a favorable environment for energy communities, with Denmark hosting 633 energy communities, predominantly in Jutland, by 2020(Nordic Energy Research, 2023). Legislative

support, such as the Renewable Energy Act, ensures fair grid access and includes provisions for financial compensation to local communities affected by wind turbine installations, fostering community support and acceptance.

The Danish government's policies, including mandatory local ownership requirements for new wind projects, financial incentives like feed-in tariffs, and public engagement initiatives, have further encouraged local ownership and participation in renewable energy projects. These measures have contributed to renewable energy accounting for 31.7% of Denmark's total energy consumption by 2020, with wind power alone supplying 47% of domestic electricity. However, the increasing competition in the renewable energy market, particularly with the transition to auction-based systems for large-scale projects, presents challenges for smaller community projects. Additionally, the regulatory complexity associated with establishing and managing community energy projects can act as a barrier for some groups. While Denmark has successfully promoted community ownership, the evolving market dynamics and the need for continuous policy adaptation remain crucial considerations (Bauwens et al., 2016).

#### **Models of Energy Communities**

In Denmark, energy communities are commonly organized as associations, partnerships, cooperatives, or capital companies. The choice of model often depends on the community's preconditions and motives, which can vary widely. Eco-villages and housing cooperatives are popular models, with eco-villages focusing on sustainability and self-sufficiency, and housing cooperatives often using photovoltaic (PV) systems and heat pumps for shared energy production.

Notably, Denmark's regulatory framework does not specifically use terms like Renewable Energy Communities (REC) or Citizen Energy Communities (CEC), which could allow for flexibility in how these communities are defined and organized.

Communities can choose to share electricity behind the meter, applicable within single buildings, or through the collective grid, subject to tariffs and taxes. New tariff legislation aims to tailor tariffs according to each community's contributions to the grid, enhancing the financial viability of energy sharing.

#### 5.1.4 Lessons Learned from Denmark and The Netherlands

Belgium, like many other European countries, is navigating the complex landscape of energy community development. The country faces several challenges, including regulatory fragmentation, financial hurdles, and the need for technical expertise. However, by examining the experiences of other countries, particularly the Netherlands and Denmark, Belgium can identify strategies to overcome these obstacles and enhance the facilitation of its energy communities.

One of the primary challenges in Belgium is the regulatory fragmentation resulting from the division of responsibilities between federal and regional governments. This fragmentation can creates inconsistencies that complicate the national energy transition and hinder the seamless operation of energy communities across different regions. In contrast, the Netherlands benefits from a more unified national approach, which simplifies the regulatory environment for energy communities. Belgium could learn from this by fostering greater national coordination and harmonization of policies to ensure consistency and efficiency across regions. A national platform could also be established to facilitate collaboration between regions, allowing for the sharing of best practices and resources, while still respecting the autonomy of local governments.

Financial barriers also present significant challenges for energy communities in Belgium. High initial investment costs and the complexity of securing funding can deter the formation of new communities and strain existing ones. Denmark offers a valuable lesson here, as it has successfully implemented a unified national framework that supports local energy initiatives, providing financial stability and reducing risks for new communities. Belgium could explore more similar approaches, such as creating financial pools or subsidies that reduce the financial burden on communities, thereby encouraging broader participation and investment.

Moreover, the knowledge and expertise required to navigate the complex energy regulations and technical requirements can be daunting, particularly for new communities in Belgium. This challenge is not unique to Belgium; both the Netherlands and Denmark have also faced similar issues. However, the Netherlands has made significant strides in addressing this through robust educational resources and simplified administrative processes. One innovative solution in the Netherlands is the use of energy coaches—trained individuals who assist communities in understanding and managing their energy needs. These coaches provide tailored advice and support communities in making informed decisions. Belgium could benefit greatly from implementing a similar system, where energy coaches guide communities through the technical and regulatory aspects of energy projects, thereby reducing the knowledge barrier and empowering local initiatives. In addition to energy coaches,

In addition to addressing these internal challenges, Belgium can also draw inspiration from Denmark's strong tradition of citizen ownership and community engagement in energy production. Denmark's approach has successfully fostered high levels of participation and local investment in renewable energy projects. By promoting community ownership and providing supportive legal structures, Denmark has ensured that energy communities are not only sustainable but also deeply rooted in local contexts. Belgium, with its rich tradition of cooperatives, is well-positioned to emulate this model. By encouraging greater local ownership and providing clear legal frameworks, Belgium can enhance community engagement and ensure that the benefits of energy transition are widely shared. Furthermore, Belgium could consider incorporating mandatory local ownership provisions, similar to Denmark's approach, to further strengthen community ties and support for renewable energy initiatives.

Ultimately, Belgium's path forward lies in learning from the successes and challenges of its neighbors. By fostering greater national coordination, simplifying financial and regulatory processes,

integrating energy coaching, and enhancing community ownership, Belgium can overcome its current barriers and create a more robust and sustainable framework for energy communities. This approach will not only help Belgium meet its climate goals but also ensure that its energy transition is equitable, inclusive, and driven by the communities themselves. Additionally, by continuously adapting and refining its strategies in response to evolving market conditions and technological advancements, Belgium can maintain the momentum needed to achieve a successful and enduring energy transition.

# **5.2 Community Engagement Strategies**

Community engagement is pivotal for the success and sustainability of energy communities. In the context of Belgian, Dutch, and Danish energy communities, various strategies have been employed to foster local participation, ownership, and support for renewable energy initiatives.

# 5.2.1 Participatory and Collaborative Approaches

In Belgium, initiatives like Ecopower and Courant d'Air have effectively used participatory mechanisms, such as general assemblies, to involve members in decision-making processes (Huybrechts & Mertens, 2014). The Netherlands' Regional Energy Strategy (RES) process exemplifies a systematic approach to stakeholder engagement, ensuring local communities play a significant role in regional energy planning (Oteman et al., 2014). Denmark stands out with its long-standing tradition of public consultations in renewable energy projects, deeply embedding community input into the planning process (Bauwens et al., 2016).

# 5.2.2 Financial Incentives

Financial incentives have proven critical in supporting community energy initiatives. In Belgium, a range of financial supports, including feed-in tariffs and tax reductions, have facilitated the development of energy communities (Huybrechts & Mertens, 2014). The Netherlands has used subsidies like the SDE++ scheme to promote community participation in renewable energy projects (Oteman et al., 2014). Denmark's approach, with its history of grants and favorable loans for community-owned wind farms, demonstrates how sustained financial support can foster a strong culture of local ownership and engagement (Bauwens et al., 2016).

# 5.2.3 Capacity Building and Education

Capacity building and education are crucial in empowering communities to participate effectively in energy projects. Belgian organizations like REScoop Flanders play a key role in providing the necessary training and support (Huybrechts & Mertens, 2014). The Netherlands and Denmark also emphasize education, with a variety of programs aimed at enhancing energy literacy and project management skills (Oteman et al., 2014; Bauwens et al., 2016).

# **5.2.4 Information and Communication**

Effective communication is essential for building trust and encouraging participation in energy communities. Belgian communities like Ecopower and Courant d'Air use multiple channels to engage their members and the public (Huybrechts & Mertens, 2014). In the Netherlands, a combination of digital and traditional media is employed to keep communities informed and involved (Oteman et al., 2014). Denmark benefits from a deeply ingrained culture of public engagement in energy issues, which has been cultivated over decades (Bauwens et al., 2016).

# 5.2.5 Collaboration with Local Authorities and Organizations

Collaboration with local authorities is a common thread across the three countries, providing critical support in terms of resources, expertise, and facilitation of renewable energy projects. Belgian energy communities often partner with municipalities to access land and funding (Alipanahi, 2023), while in the Netherlands, the RES process encourages partnerships between various stakeholders (Oteman et al., 2014). Denmark's regulatory framework actively involves local authorities in energy planning, ensuring that community projects align with broader regional goals (Bauwens et al., 2016).

# 5.3 Comparative Analysis of Community Engagement Strategies

A comparative analysis of community engagement strategies in Belgium, the Netherlands, and Denmark reveals both similarities and differences in their approaches. All three countries recognize the importance of community participation and have implemented various strategies to foster engagement. Common elements across all three nations include participatory and collaborative approaches, financial incentives, capacity building and education, information dissemination, and collaboration with local authorities and organizations.

However, the specific implementation and emphasis on different strategies can vary. Belgium's regional governance structure can lead to variations in community engagement approaches across different regions. The Netherlands places a strong emphasis on community participation through the Regional Energy Strategy (RES) process (Oteman et al., 2014). Denmark's long history of community-owned wind energy projects has fostered a culture of active engagement and local ownership, making it a leader in fostering and enabling the growth of energy communities (Bauwens et al., 2016).

# Similarities

• Focus on Local Participation and Ownership: All three countries emphasize the importance of local participation and ownership in community energy projects. This is evident in the prevalence of cooperative models, which allow citizens to become co-owners and actively participate in decision-making processes (Bauwens et al., 2016; Oteman et al., 2014).

- Information and Education: Community energy initiatives in all three countries engage in public awareness and education campaigns to inform and mobilize citizens (Huybrechts & Mertens, 2014; van der Schoor & Scholtens, 2015). These campaigns aim to increase understanding of renewable energy, highlight the benefits of community-based projects, and encourage active participation.
- **Collaboration with Local Stakeholders:** Collaboration with local stakeholders, including municipalities, businesses, and civil society organizations, is a common feature in all three countries (Alipanahi, 2023; Oteman et al., 2014). This collaborative approach fosters a sense of shared responsibility and enables the pooling of resources and expertise.

# Differences

- Scale and Maturity of the Sector: The community energy sector in Denmark is more mature and established compared to Belgium and the Netherlands (Bauwens et al., 2016). This is reflected in the larger number of projects, greater diversity of initiatives, and more established support mechanisms in Denmark. For instance, Denmark has a long history of community-based district heating systems and wind cooperatives, while the Netherlands is still in the early stages of developing its community energy sector (Oteman et al., 2014).
- **Ownership Dynamics:** Belgium's approach to community energy initiatives lies between Denmark's strong emphasis on community ownership and the Netherlands' market-oriented strategy (Bauwens et al., 2016; Oteman et al., 2014). Denmark's mandatory local ownership requirement for wind projects has been particularly influential in fostering a strong culture of community ownership and participation, highlighting the government's active role in promoting community energy (Bauwens et al., 2016). In contrast, the Dutch government has faced criticism for its market-oriented approach and inconsistent support for small-scale renewable energy projects, which has hindered the growth of community energy initiatives (Damsø et al., 2016; Oteman et al., 2014). Belgium, while not as proactive as Denmark, still encourages some level of community involvement without fully embracing either community-driven initiatives or market forces (Bauwens et al., 2016).
- Focus on Energy Poverty: While energy poverty is a concern in all three countries, Belgian energy communities have shown a greater focus on addressing this issue through initiatives like offering reduced tariffs and collaborating with social service organizationsThis focus on social justice is less prominent in the community energy initiatives in Denmark and the Netherlands, which tend to prioritize financial returns and environmental benefits.
- **Financial Participation Models:** While all three countries offer financial . example, Belgian cooperatives often offer shares or crowdfunding campaigns, while Dutch initiatives may utilize tax incentives or local government subsidies (Huybrechts & Mertens, 2014; Oteman et al., 2014). In Denmark, the financial participation of local communities in wind power projects is mandated by law, ensuring that they receive a share of the profits generated (Bauwens et al., 2016).
- **Community Engagement Approaches:** The level and nature of community engagement also vary across the three countries. In Denmark, community engagement is often deeply

embedded in the planning and decision-making processes of energy projects, with local communities having a significant say in the development and operation of renewable energy installations (Bauwens et al., 2016). In Belgium, community engagement is primarily focused on raising awareness and providing information about renewable energy projects, with limited opportunities for direct participation in decision-making. In the Netherlands, community engagement is often driven by financial incentives and the desire for energy independence, with less emphasis on broader social and environmental goals (Oteman et al., 2014).

In conclusion, Denmark's model has proven most successful. By involving its citizens in the decisionmaking process and by guaranteeing the community's benefits through legislation, it remains a leader in fostering and enabling the growth of energy communities. Furthermore, community engagement strategies in Belgium, Denmark, and the Netherlands share a common goal of promoting local participation and ownership in renewable energy projects. However, the Danish approach is focused around the community and their benefit, empowering its citizens and engaging them in renewable energy projects, which accelerates project acceptance and adoption. By understanding these similarities and differences, policymakers and practitioners can learn from each other's experiences and develop more effective strategies for fostering community engagement in the energy transition. By following Denmark's lead, countries can design policies focused around their communities, which will increase their engagement and facilitate the country in reaching its energy goals.

# **5.4 Challenges and Opportunities**

While community engagement strategies have been successful in promoting the development of energy communities, several challenges and opportunities remain.

# Challenges

- Ensuring meaningful participation: It is crucial to ensure that community engagement goes beyond mere consultation and involves genuine participation in decision-making processes.
- Addressing potential conflicts: Energy communities may face conflicts with other stakeholders, such as traditional energy providers or local residents who oppose renewable energy projects. Effective conflict resolution mechanisms are essential for navigating these challenges.
- Maintaining long-term engagement: Sustaining community engagement over the long term can be challenging, especially as projects progress and initial enthusiasm may wane. It is important to develop strategies to maintain interest and involvement throughout the project lifecycle.

# Opportunities

- Leveraging digital technologies: Digital platforms and tools can enhance community engagement by providing real-time information, facilitating communication, and enabling virtual participation.
- Fostering collaboration and knowledge sharing: Collaboration between energy communities, local authorities, and other stakeholders can lead to knowledge sharing, innovation, and the development of best practices.
- Scaling up successful models: Identifying and replicating successful community engagement strategies can accelerate the growth and impact of energy communities across Europe.

# Chapter 6: Conclusion, Implications, Limitations, and Suggestions for Further Research

# 6.1 Conclusion

This study has thoroughly examined the regulatory frameworks and community engagement strategies that influence the development and effectiveness of energy communities in Belgium, Denmark, and the Netherlands. Through a comparative analysis, the research reveals that Belgium, while making significant progress, could still learn a lot from Denmark and the Netherlands in both legislative support and active community involvement.

Denmark emerges as a leader in fostering energy communities, largely due to its comprehensive policy landscape, including the Renewable Energy Act and the Energy Supply Act. These policies mandate local ownership of at least 20% in new wind energy projects, ensuring that benefits are distributed within the community. The strong emphasis on cooperative models, where local citizens collectively own and manage renewable energy projects, has resulted in widespread public support and successful projects like the Middelgrunden Wind Farm. This offshore wind farm, partly owned by a local cooperative of over 8,500 members, is a prime example of how policy-driven community ownership can lead to substantial renewable energy contributions while empowering local citizens.

In The Netherlands, the Energy Agreement for Sustainable Growth (Energieakkoord) and the Climate Agreement (Klimaatakkoord) provide a solid foundation for decentralized energy production. These agreements support energy communities through financial incentives such as the SDE++ (Stimulering Duurzame Energieproductie en Klimaattransitie) subsidy scheme and the Subsidieregeling Coöperatieve Energieopwekking (SCE), which offer financial support for renewable energy projects and reduce the financial barriers to community participation. Projects like LochemEnergie, a cooperative in Gelderland, demonstrate how these policies facilitate the growth of energy communities by empowering local residents to take control of their energy production, thereby contributing to the national energy transition goals.

In contrast, Belgium has implemented policies like the Flemish Energy Decree and regional initiatives such as Call Groene Stroom to promote renewable energy within its regions. However, the fragmented nature of Belgium's energy policy, with responsibilities divided between federal and regional governments, has resulted in inconsistencies and slower progress compared to its neighbors. For instance, while initiatives like Ecopower in Flanders and Courant d'Air in Wallonia have shown success, they operate within a more complex and less streamlined regulatory environment. These cooperatives have benefited from regional subsidies and feed-in tariffs but face challenges due to less cohesive national support.

The study concludes that for Belgium to close the gap with Denmark and the Netherlands, it needs to adopt a more unified and supportive regulatory framework that simplifies administrative processes and encourages community ownership. By learning from Denmark's robust community engagement and the Netherlands' innovative financial incentives, Belgium can create a more enabling environment for energy communities.

Ultimately, the success of energy communities across these countries illustrates the importance of well-crafted policies that align with local needs and the active participation of citizens. As Belgium continues to develop its energy community landscape, it can draw valuable lessons from the experiences of Denmark and the Netherlands to drive its own energy transition, contributing more effectively to the European Union's broader goals of decarbonization, energy security, and sustainability.

# **6.2 Theoretical Implications**

This study reinforces the importance of decentralized energy systems and community-based resource management in the context of energy communities. It highlights that local ownership, democratic governance, and collective action are essential for the sustainability and success of these initiatives. By comparing the regulatory frameworks and community engagement strategies in Belgium, Denmark, and the Netherlands, the study adds to the understanding of how different policy approaches can influence the development and effectiveness of energy communities.

#### **6.3 Practical Implications**

For policymakers and stakeholders, the study underscores the necessity of supportive regulatory frameworks and effective community engagement strategies. Incentives like feed-in tariffs, grants, and tax reductions are crucial for promoting renewable energy projects within local communities. The study suggests that Belgium could enhance its approach by adopting best practices from Denmark and the Netherlands, such as simplifying administrative processes and promoting local ownership. The ongoing support from national and EU-level policies is vital to ensure the continued growth and success of energy communities, aligning local efforts with broader EU energy transition goals.

#### **6.4 Limitations**

While this research provides valuable insights into the regulatory and community engagement frameworks of energy communities, it is not without limitations. First, the study relies heavily on secondary data sources, which may not fully capture the latest developments or the nuanced realities on the ground.

Additionally, the study primarily examines the legal and policy frameworks without an in-depth exploration of the socio-cultural factors that influence community engagement. Factors such as public trust in government institutions, historical community involvement in energy projects, and local attitudes towards renewable energy are crucial to the success of energy communities but are

not extensively covered in this research. Furthermore, data gathering on energy communities in the EU is still in its early stages, leaving room for capturing valuable information through systematic data collection and reporting across Europe. The difficulty in finding comprehensive data on the evolution and growth of energy communities in the selected countries, with most studies being conducted only recently, further limits the ability to capture long-term growth trends.

Finally, the rapidly evolving nature of the energy sector means that the findings of this study may soon become outdated as new policies, technologies, and community dynamics emerge. Therefore, ongoing research and data collection will be essential to keep pace with these changes and provide more accurate and up-to-date insights into the development of energy communities in Europe.

# 6.3 Suggestions for Further Research

Future research should address the limitations identified in this study by incorporating primary data collection methods, such as interviews and surveys, to gain deeper insights into the experiences and perspectives of stakeholders involved in energy communities. This would provide a more comprehensive understanding of the challenges and opportunities faced by these communities in different contexts.

Moreover, expanding the scope of research to include a broader range of EU member states would allow for a more comparative analysis, identifying best practices that could be adapted to various national and local conditions. Investigating the socio-cultural dimensions of community engagement and how they interact with regulatory frameworks would also be valuable in designing more effective policies that resonate with local communities.

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