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Contents

1.Introduction

The development of business models (BM) for local energy communities (LEC) is a dynamic process that requires continuous adaptation to an evolving energy landscape. While business models are crucial for the successful implementation of local energy projects, they cannot be viewed in isolation but rather as part of a comprehensive development process. The rapidly changing regulatory framework, technological advances, and shifting stakeholder expectations necessitate regular re-evaluation and adjustment of these models.

This report will analyze the critical aspects of BM for LEC, beginning with their fundamental definitions and core components. Following the definitions, we will explore how BMs fit within the broader development cycle of local energy projects, from initial community engagement and feasibility studies through to implementation and operation, highlighting their role as a crucial bridge between concept and execution. The analysis will examine how these models are continuously evolving in response to technological advancements and regulatory changes in the energy sector. We will investigate the various challenges faced when developing and implementing BMs for LECs. The report will establish why having a well-structured business model is essential for the success and sustainability of local energy communities. The analysis will cover different theoretical frameworks and methodologies used in designing these business models, supported by real-world examples of successful LECs from various regions. Finally, we'll conclude with practical recommendations and next steps.

2. Definition and context

2.1 Definition

A business model for local energy communities represents a comprehensive framework that fundamentally diverges from traditional corporate energy models, which typically focus solely on maximizing shareholder returns (McGovern & Klenke, 2018). As formally defined by the European Economic and Social Committee, these innovative models enable "decentralized renewable energy generation owned or operated by citizens, local initiatives, communities, local authorities, charities, non-governmental organizations (NGOs), farmers, cooperatives, or small and medium-sized enterprises (SMEs), creating a stream of local value that can stay within the region" (McGovern & Klenke, 2018).

The effectiveness of these business models is predicated on two fundamental criteria: first, the integration of permanent civic identity into governance and decision-making procedures, and second, the implementation of robust continuous improvement processes to systematically monitor and achieve stated objectives. These models must orchestrate a delicate balance between economic viability and broader socio-environmental benefits, transcending the conventional focus on financial returns to deliver tangible community value.

Key components of such business models include: clear geographical boundaries for value retention, specified community benefits extending beyond energy provision, identified enabling factors,

technical energy supply chain elements, defined organizational structures with transparent stakeholder roles, and comprehensive risk management frameworks. This holistic approach ensures that local energy communities can effectively manage their energy resources while generating sustainable value for their constituents.

2.2 Context

The business model for Local Energy Communities (LECs) is a fundamental component that integrates across all phases of the Civic Energy Cycle framework developed by Interreg North Sea Project COBEN, serving as a comprehensive blueprint for successful local energy project development.

In the Initiation Phase, the business model development begins with articulating the community's vision and engaging stakeholders. This critical first step requires clear specification of targeted community benefits that will drive the entire business model structure. Early policy alignment and formation of a strong stakeholder consortium are essential to ensure long-term viability. These foundational elements represent a departure from traditional corporate energy models that focus solely on financial returns (McGovern & Klenke, 2018).

Moving into the Planning Phase, the business model guides the selection of appropriate enablers (such as regulations, participation of local citizens, financial subsidies, ...) that can deliver the specified community benefits. A thorough feasibility assessment must validate both technical and economic aspects of the chosen model. The business model framework needs to incorporate several key components: clear organizational structure, defined roles and responsibilities, risk management strategies, financial planning and investment structures, and technical energy supply chain components. This comprehensive approach ensures that local energy communities can effectively manage their resources while generating sustainable value for their constituents.

During the Roll-Out Phase, the business model serves as an operational guide for implementation, ensuring proper management of both energy services delivery and community benefits. It provides a structured framework for monitoring performance against objectives, allowing for real-time assessment of progress and necessary adjustments.

In the final Reflection and Adoption Phase, the business model facilitates the assessment of achieved benefits against targets and enables continuous improvement through model optimization. Importantly, it supports the transfer of successful approaches to other communities, contributing to the broader adoption of civic energy initiatives.

The success of these business models depends fundamentally on two criteria: maintaining permanent civic identity in decision-making procedures and implementing robust continuous improvement processes throughout all phases. This ensures that the model remains responsive to community needs while adapting to changing circumstances and opportunities for enhancement.

By integrating these elements across the Civic Energy Cycle, the business model serves as more than just a financial framework - it becomes a comprehensive tool for managing the complex interplay of technical, social, and economic factors that determine the success of local energy communities.

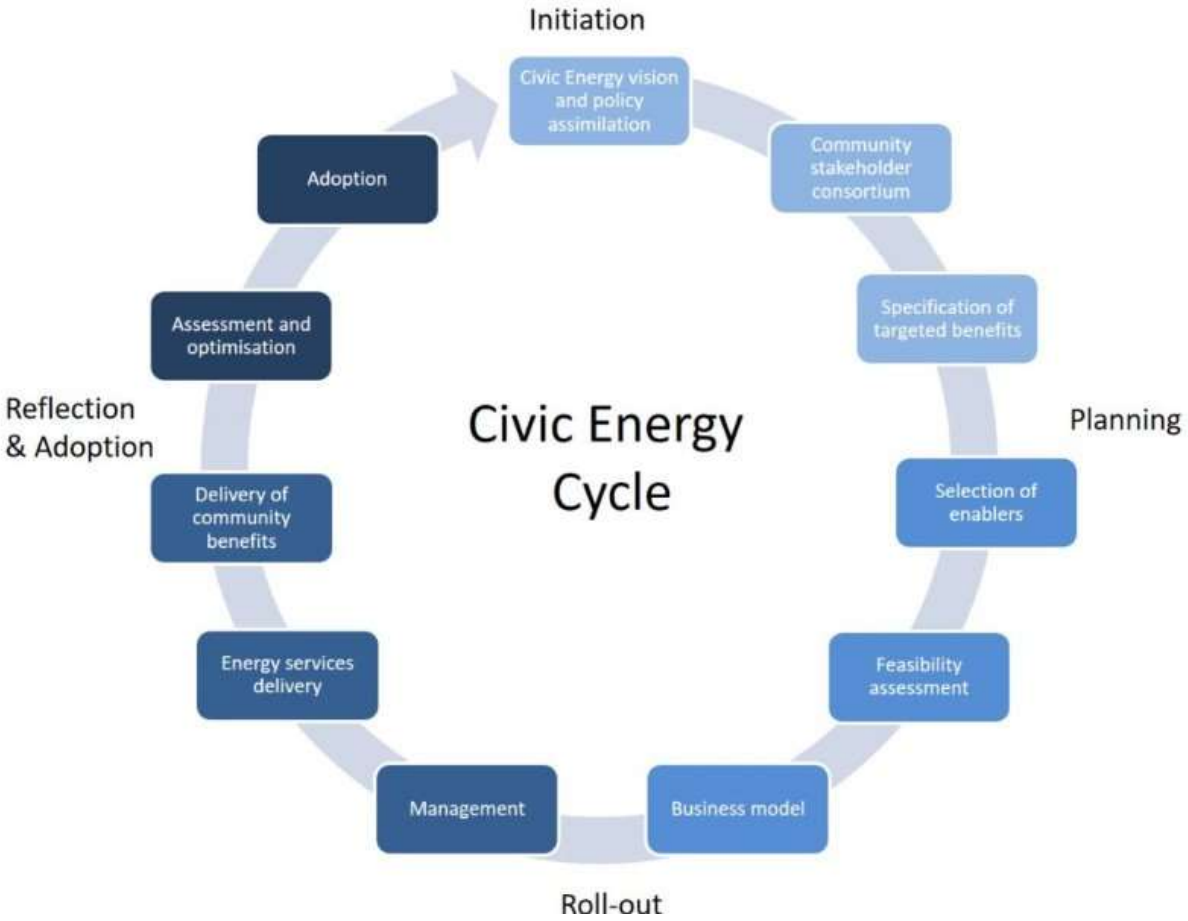


Figure 1: Civic Energy Cycle by the project COBEN.

3. Challenges

Business models for Local Energy Communities (LECs) face numerous complex challenges that require careful consideration and innovative solutions to ensure successful implementation and long-term sustainability (McGovern & Klenke, 2018). These challenges span across multiple dimensions, from stakeholder management to technical requirements, each demanding specific attention in the business model design.

The first major challenge lies in managing multiple stakeholders with diverse interests and expectations. Different stakeholders - including citizens, local authorities, NGOs, and SMEs - often have diverging visions for local energy projects (Soeiro & Ferreira Dias, 2020). This diversity requires sophisticated governance mechanisms to balance competing interests while maintaining a strong community focus. The varying levels of stakeholder engagement and commitment over time can significantly impact project stability and decision-making processes.

The evolving regulatory framework presents another significant challenge. Business models must be adaptable to continuous changes in governance rules and energy regulations, including new EU directives and national policies (McGovern & Klenke, 2018). Complex licensing and permit requirements can delay project implementation, while varying interpretations of regulatory requirements across different jurisdictions add another layer of complexity.

Integrating economic and social benefits poses a particular challenge for LECs. Business models must strike a delicate balance between ensuring financial sustainability and delivering meaningful community benefits (Soeiro & Ferreira Dias, 2020). The difficulty in quantifying and monitoring non-financial impacts, combined with different stakeholder priorities regarding economic versus social outcomes, requires careful consideration in the business model design.

Market dynamics and price volatility create significant uncertainty. Energy price fluctuations impact revenue stability and affect investment decisions, while grid integration costs and requirements can be unpredictable (McGovern & Klenke, 2018). Competition from traditional energy providers and uncertainty in long-term energy price developments further complicate the financial planning process.

The decentralized nature of LECs presents operational challenges. Coordinating distributed decision-making processes, managing technical complexities of decentralized energy systems, and maintaining effective communication and control systems all contribute to higher transaction costs (Soeiro & Ferreira Dias, 2020). The maintenance and operation of distributed assets requires careful planning and resource allocation.

Financial and investment challenges are particularly critical. Access to capital, risk assessment in community-based projects, and long payback periods can affect investor interest. The limited track record of LECs often makes traditional lenders hesitant, necessitating innovative financing mechanisms (McGovern & Klenke, 2018).

Technical and infrastructure requirements add another layer of complexity. Grid connection and integration challenges, technology selection and implementation, and ongoing infrastructure maintenance needs require significant expertise and resources. Ensuring system reliability and stability while managing technical requirements presents ongoing challenges (Soeiro & Ferreira Dias, 2020).

These multifaceted challenges underscore the need for flexible and robust business models that can adapt to changing circumstances while maintaining their core community focus and benefits of delivery. Successful LECs must develop business models that effectively address these challenges while creating sustainable value for all stakeholders involved.

4. Importance

Business Models (BMs) play a crucial and foundational role in the success of Local Energy Communities (LECs) and local energy projects, serving as the architectural framework that determines how these initiatives create, deliver, and capture value while ensuring long-term sustainability.

First and foremost, business models provide the essential structure for translating community energy visions into viable operational realities. They serve as the blueprint that defines how LECs will generate both economic and social value, ensuring that projects remain financially sustainable while delivering meaningful benefits to the community (McGovern & Klenke, 2018). This dual focus is particularly important as it distinguishes LECs from traditional energy projects that prioritize only financial returns.

Business models are instrumental in stakeholder alignment and governance. They provide the framework for managing multiple stakeholder interests, defining roles and responsibilities, and establishing decision-making processes. This is crucial because LECs typically involve diverse stakeholders - from citizens and local authorities to NGOs and SMEs - each with their own expectations and objectives (Soeiro & Ferreira Dias, 2020). A well-designed business model ensures these various interests are balanced and aligned toward common goals.

From a practical perspective, business models are essential for securing funding and investment. They demonstrate project viability to potential investors and funding sources by clearly articulating the value proposition, revenue streams, and risk management strategies. This is particularly important given the challenges LECs face in accessing traditional financing due to their innovative nature and community-based structure (McGovern & Klenke, 2018).

Business models also play a critical role in ensuring regulatory compliance and adaptation. They provide the flexibility needed to respond to evolving energy policies and regulations while maintaining operational effectiveness. This adaptability is crucial in the rapidly changing energy sector, where new directives and requirements frequently emerge.

Moreover, business models serve as essential tools for project implementation and management. They outline the technical and operational requirements, define resource allocation, and establish performance metrics. This comprehensive approach helps ensure that projects are well-executed and can achieve their intended outcomes while maintaining financial sustainability.

Perhaps most importantly, business models for LECs help bridge the gap between community aspirations and practical implementation. They provide the framework for translating social and environmental goals into concrete actions while ensuring economic viability. This is particularly crucial as LECs often aim to achieve multiple objectives beyond energy provision, such as local economic development, environmental sustainability, and social cohesion.

The importance of business models extends to their role in knowledge sharing and replication. Successful business models can serve as templates or inspiration for other communities, helping to accelerate the adoption of local energy initiatives. They provide valuable insights into what works and what doesn't, helping new projects avoid common pitfalls and build on proven approaches.

In conclusion, business models are not just administrative tools but are fundamental to the success and sustainability of LECs and local energy projects. They provide the essential framework for balancing multiple objectives, managing diverse stakeholders, ensuring financial viability, and delivering community benefits. As the energy sector continues to evolve toward more decentralized

and community-based approaches, the importance of well-designed business models will only increase.

5. Frameworks

Business Models (BMs) for Local Energy Communities (LECs) can take various forms, but it's crucial to understand that no single framework fits all situations. The key is to adapt these models to local conditions, resources, and community needs while maintaining sufficient flexibility to evolve over time (McGovern & Klenke, 2018). Understanding the various frameworks available and their characteristics helps communities make informed decisions about which model, or combination of models, best suits their specific circumstances.

The Cooperative Ownership Model represents one of the most traditional approaches, where members jointly own and operate renewable energy assets. This model emphasizes democratic decision-making and shared benefits among members, making it particularly suitable for communities with strong social cohesion and a desire for direct involvement in energy management. The structure ensures that benefits and responsibilities are distributed fairly among participants, fostering a strong sense of community ownership.

Peer-to-Peer (P2P) Energy Trading Models have emerged as an innovative approach, enabling direct energy trading between community members. This model typically utilizes blockchain or similar technologies for transactions and promotes efficient use of local energy resources. While it requires more sophisticated technical infrastructure, it offers significant flexibility in managing energy flows and can be particularly effective in communities with varying energy needs and generation capabilities.

Community Renewable Energy Projects, such as shared solar or wind installations, offer another viable framework. These projects typically operate on a subscription basis, allowing members to participate without requiring large individual investments. This model is particularly effective in communities with suitable renewable resources and can be scaled according to community needs and capabilities.

The Energy-as-a-Service Model provides a solution for communities that may lack technical expertise or prefer not to manage operational aspects directly. In this framework, a professional third party operates and maintains the systems while community members pay for the energy they use. This reduces the technical burden on the community while still providing the benefits of local energy generation.

Microgrid Models represent a more comprehensive approach, where communities operate their own local grid with integrated storage and generation capabilities. While this model offers high energy independence, it also requires significant technical expertise and infrastructure investment. It's particularly suitable for remote or island communities seeking energy autonomy.

The Aggregator Model allows communities to pool their resources to participate more effectively in energy markets. This approach can enhance bargaining power and provide professional market interface capabilities, making it particularly suitable for larger communities or consortiums of smaller communities working together.

Hybrid Models, combining elements from multiple approaches, often provide the most flexible and resilient solutions. These models can be tailored to address specific community needs while maintaining adaptability to changing circumstances. For example, a community might combine storage-as-a-service with P2P trading or integrate cooperative ownership with professional management services.

Regardless of the chosen framework, successful implementation requires careful consideration of local contexts and stakeholder needs (Soeiro & Ferreira Dias, 2020). Communities must consider various factors including the local regulatory environment, available resources and infrastructure, community capabilities and preferences, financial resources, technical expertise availability, and long-term sustainability requirements.

Flexibility remains crucial in any business model implementation. The chosen framework must be able to accommodate changes in governance structures, technical systems, financial arrangements, operational procedures, and benefit distribution mechanisms. This adaptability ensures that the model can evolve with the community's needs and respond to changing external conditions.

In conclusion, while these frameworks provide valuable starting points, the key to success lies in thoughtfully adapting and combining elements to create a sustainable and effective solution for each unique community context. This approach ensures that the business model serves as an enabler rather than a constraint for community energy initiatives, supporting both immediate needs and long-term sustainability goals.

6. Examples

6.1. Vivendo pilot (Bruges)

Vivendo, being a social housing company, does not have a traditional business model. The aim of our project is precisely to counter energy poverty within the community of our tenants. The basic understanding of “gain” or “making a profit” as such is a very sensitive subject for the board of directors of Vivendo.

Vivendo starts from the following situation:

- There are no house owners involved: all residents are tenants
- There are no third parties that have to be convinced of the project: everyone agrees that an affordable LEC and accompanying energy transition is needed
- There are no residents that need to invest themselves
- There is no typical “gain business model” as a goal
- The Flemish Government has restrictions on what a social housing company can / may charge as a cost to its tenants

The business model that Vivendo will pursue is a cost-effective strategy that has to compensate for:

- The cost of the complete investment
- The cost of ownership

- The cost of administration
- The cost of accompaniment and support of our tenants

Having taken these 4 last elements into account, the goal is to create a pricing of the warmth - that we will sell via our LEC – that is:

- Cost-effective for Vivendo
- Affordable (in comparison to the current commercial rates) for our tenants
- Socially responsible (to serve as an example for other social organisations who want to copy our model)

6.2. Local Energy Community Saksen Weimar.

The stakeholder are:

1. The inhabitants of the neighbourhood Saksen Weimar who should form the LEC.
2. The social housing company Vivare.
3. The local energy cooperation REIJE.
4. The application and EMS builder Open Remote.
5. The municipality of Arnhem.

The BM should consist of the money flows between members of the LEC who buy/sell energy to each other.
There will be owners of solar panels that sell energy to the heat storage.
There will be a owner of the heat storage (preferably also the LEC but not clear yet) who buys electricity to warm up the heat storage and who sells heat to the social housing apartments.
There will be the social housing company that buys the heat from the storage.
There are no profits as goal but a cost price + model within the LEC.

The main stakeholders are number 1 & 2.
The others facilitate and can change their role during the process.

6.3. Local Energy Community Fourmies

The stakeholders are:

- The potential members of the community in which we find the hospital, local businesses, local firms, citizens (to be determined) etc
- The future operator of the district heating network
- The community of municipalities
- The municipality of Fourmies

- The national support organizations (ADEME, CEREMA...)

The business model of Fourmies LEC :

- Creation of a legal structure (cooperative, SAS... to be determined in the feasibility study)
- Members of the community will be part of the structure
- The newly created structure will manage the energy and sell it to the members
- Non-profit aim --> to avoid generating profits and ensure a competitive price the energy price will be equal to the energy cost
- As the energy community integrates an hybrid PV plant producing both electricity and heat, it will value both.
- As stated earlier the electricity will be shared between members of the community whereas the heat will be injected in either the district heating network or the future passive swimming pool. It is yet to determine if the heat will be sold or given for free.
- The overall business model and every component affected of the price or technical aspect will be determined during the feasibility study (starting september 1st) and is subject to changes.

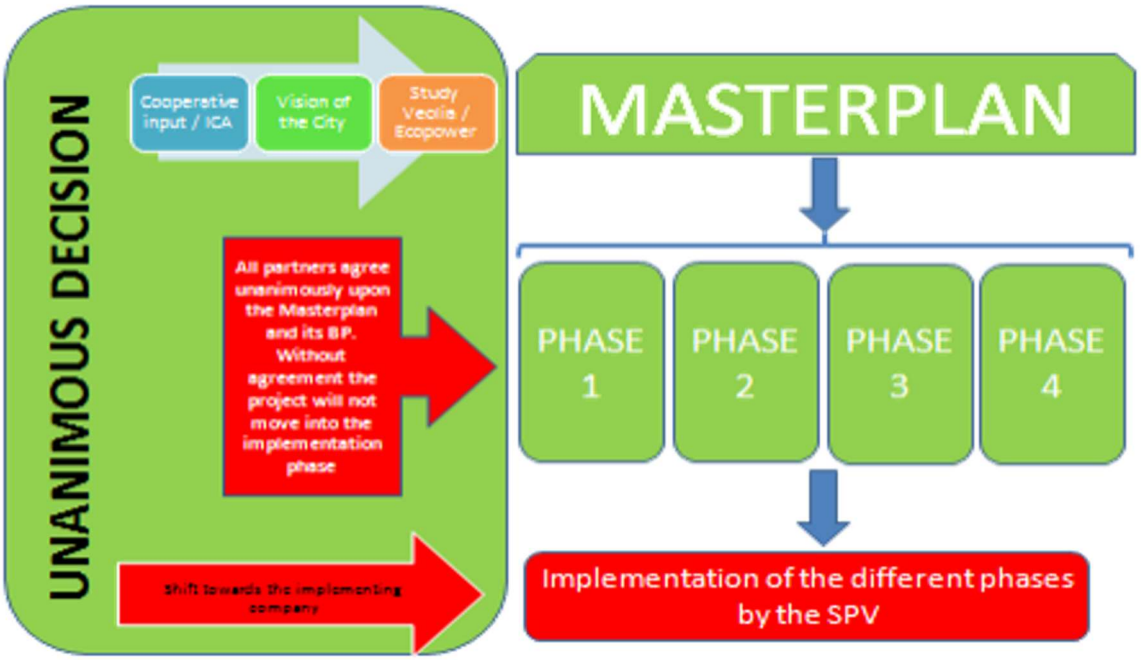
6.4. Example Eeklo (Be - COBEN project)

The BM used in Eeklo is a structured Special Purpose Vehicle (SPV) framework, established for civic energy projects that enables collaboration between Veolia and the energy cooperative, Ecopower. The model's foundation rests on several key principles, with risk sharing being a primary component where "the SPV bears all development and operational obligations and risks" with shareholding aligned with parties' investments.

A fundamental aspect is citizen participation, which is guaranteed through two mechanisms: citizens can invest in the District Heating Network assets through the SPV (either directly or indirectly), and they have participation rights in decision-making processes through share ownership in the energy cooperative.

The governance structure implements a comprehensive decision-making process where "the Master Plan and its Business Plan(s), as well as the project contracts, must be accepted and approved by the SME and the energy cooperative, based on unanimity of votes and as equal partners".

The model could be enhanced through several improvements. The complex multi-layered decision-making structure should be streamlined to enable more efficient operations. More robust dispute resolution mechanisms could prevent potential deadlocks from unanimity requirements. The financing options could extend beyond share ownership to provide greater flexibility. The framework would benefit from specific metrics for measuring community benefits and social impact. The 65% SME ownership requirement needs better balancing with community control mechanisms. The governance structure could be simplified while maintaining necessary protections. Additionally, clear guidelines for profit distribution to community initiatives should be established, along with explicit sustainability performance indicators. These improvements would enhance the model's effectiveness while maintaining its core purpose of enabling community-driven energy projects.


UNANIMOUS DECISION
Cooperative input / ICA
Vision of the City
Study Veolia / Ecopower
All partners agree unanimously upon the Masterplan and its BP. Without agreement the project will not move into the implementation phase
Shift towards the implementing company
MASTERPLAN
PHASE 1
PHASE 2
PHASE 3
PHASE 4
Implementation of the different phases by the SPV

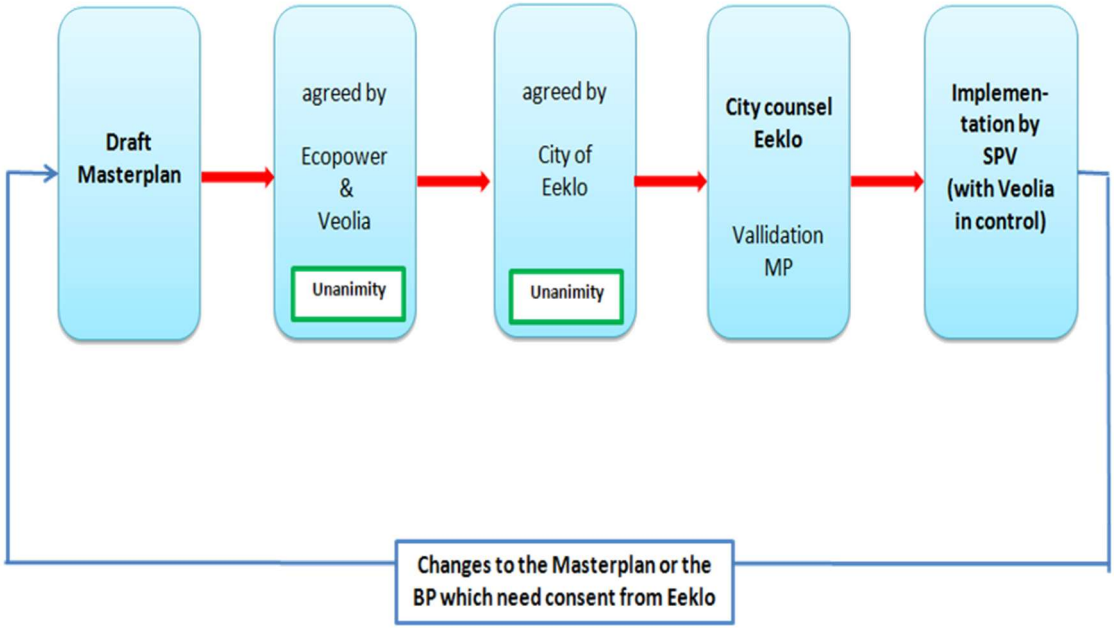

Draft Masterplan
agreed by Ecopower & Veolia
Unanimity
agreed by City of Eeklo
Unanimity
City counsel Eeklo
Vallidation MP
Implemen-tation by SPV (with Veolia in control)
Changes to the Masterplan or the BP which need consent from Eeklo

Table I below provides a non-exhaustive list of decisions requiring unanimity.

TABLE I - DECISIONS TO BE TAKEN IN THE MASTERPLAN-COMITÉ

	Actions or decisions Masterplan-committee	Unanimity	remarks
1.	Conclusion of concession contract	x	
2.	Approval of Masterplan, including a BP, with detailed stages of development and changes thereto which need approval of Municipality	x	
3.	Approval of the project contracts as indicatively listed below	x	
4.	Changes to production matrix and energy mix (including items related to back-up)	x	Governed by contracts between SPV and shareholders: will be set out in the production- agreement
5.	Principles on how to construct, connect, …	x	
6.	- Safety rules, environmental protection, , …	x	Through DBOM-contract
7.	- Corporate Social Responsibility	x	Through concession contract and shareholders agreement
8.	- How to maintain Through O&M contract, on the basis of which the SPV may define the way of maintenance.	x	
9.	Decision on extension of activities under the MP/BP. In accordance with the concession contract, each extension of the MP/BP will have to be approved by the City of Municipality and a specific domain concession (or a specific extension of the then existing domain concession) must be granted.	x	

7. Next steps

In conclusion, the next steps for business models (BM) for local energy communities involve streamlining and professionalizing the CE process through quality-assured procedures to reduce time and resource investments needed to achieve market maturity. This includes pursuing formal quality management standards recognition (like ISO) to gain acceptance by third parties and improve process performance. The business models need to integrate complex CE value propositions and community benefits into appropriate frameworks. There needs to be analysis of the potential for digitalization of social transition processes, rather than just focusing on digitalized harmonization of energy supply and demand. Communities must secure appropriate policy enablers and mandates at regional/municipal levels through creative policy mix strategies. It's crucial to establish a level playing field in energy market rulings to remove competitive obstacles, particularly in alignment with initiatives like the

European Commission's Clean Energy for All Europeans ruling. Finally, there should be facilitation of adoption and transfer of successful approaches to other communities through Multi-Stakeholder Partnerships.