COME RES

Advancing Renewable Energy Communities

Deliverable 4.3

REPORT ON TAILOR-MADE BUSINESS MODELS FOR RECS IN FOUR SELECTED TARGET REGIONS

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SUMMARY

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ABOUT COME RES

COME RES - Community Energy for the uptake of renewables in the electricity sector. Connecting long-term visions with short-term actions aims at facilitating the market uptake of renewable energy sources (RES) in the electricity sector. Specifically, the project focuses on advancing renewable energy communities (RECs) as per the EU's recast Renewable Energy Directive (RED II). COME RES takes a multi- and transdisciplinary approach to support the development of RECs in nine European countries; Belgium, Germany, Italy, Latvia, the Netherlands, Norway, Poland, Portugal, and Spain.

COME RES covers diverse socio-technical systems including community PV, wind (onshore), storage and integrated community solutions, investigated in nine European countries. The project has a specific focus on a number of target regions in these countries, where community energy has the potential to be further developed and model regions where community energy is in a more advanced stage of development. COME RES analyses political, administrative, legal, socioeconomic, spatial and environmental characteristics, and the reasons for the slow deployment of RECs in selected target regions. COME RES synchronises project activities with the transposition and implementation of the Clean Energy Package and its provisions for RECs in policy labs. Policy lessons with validity across Europe will be drawn and recommendations proposed.

ABSTRACT

In 2019, Renewable Energy Communities (RECs) were formally defined in the European regulatory framework within RED II. As Lowitzsch et al. (2020) state, RECs are regarded as a valid option for an inclusive energy transition in Europe. RED II defines that the motives for a REC shall not be purely economic but mostly driven by ecological aims and social benefits.

As a REC still represents a business that has to be economically viable, a focus on successful business models is necessary in order to assist the various COME RES regions and beyond to get a good element for their individual toolboxes to promote/engage in RECs. In the context of COME RES transfer activities, workshops have been carried out in Germany, Italy, Latvia and Poland scrutinizing best practice cases from the Netherlands, Belgium, Italy and Poland. During these workshops, a good practice business model from a concrete REC (or energy cooperative/cluster) from an EU member state has been discussed in a so-called learning region. The transferability of the business model to the learning region was assessed and necessary adaptations due to national legal frameworks and market conditions have been discussed.

Methodologically, the Business Model Canvas by Osterwalder and Pigneur (2013) was applied to structure the focus of the transferred business models and to evaluate how a tailor-made business model could look like in the learning regions. Some similarities were noticeable over all transfer cases: Local municipalities are regarded as key partners of a well-functioning REC business model, as those are key actors in any local context, and can provide suitable areas for the installation of RES plants (e.g. rooftops) and also stand as an enabler of the project in general. Funding is regarded as a key resource, alongside knowledge and members of a REC. The cost structure is similar as well and revolves around the initial cost that relates to the setup of the RES infrastructure and tariffs or fees that have to be considered for the use of public distribution grids.

In conclusion, the transfer of business models from other contexts is possible, if those are translated and adjusted and not only copied to another context. To facilitate the business possibilities of a REC,

the proper transposition of RED II, especially regarding enabling conditions for Energy Sharing should be implemented.

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1. Aim and Background

Following Tasks 4.1 and 4.2 of Work package 4 in which different types of specific business models and financing instruments for RECs were analysed, the purpose of Task 4.3 is to formulate business model proposals for the following couples of transfer regions & learning regions:

- The Netherlands (North Brabant) & Germany (Thuringia)
- Belgium (Flanders) & Italy (Apulia)
- Italy (Piedmont) & Latvia
- Poland (energyREGION Michałowo) & Poland (Warmian-Masurian Voivodship)

This task considers the local conditions (available resources, local regulations, market structure, financial conditions and support mechanisms in place) and barriers (both financial and technical) in the selected regions in order to identify which business model would be the most appropriate and therefore suitable to enable the implementation of Renewable Energy Communities (RECs). The outcome consists of first tailor-made business model proposals for the selected regions. The partners in the respective regions also assessed the ability of local and regional financial institutions to provide financing for REC projects. Synergies between WP 6 and WP 4 of the COME RES project were fully exploited[1]. Therefore, tailor-made business models for the transfer cases which are in focus in WP 6 were selected. This means that business models could be developed for the respective transfer cases in Germany, Italy, Latvia and Poland.

Tailor-made business models proposals comprise measures to enhance the development of renewable energy communities (RECs) with the specificities for models which have to respond primarily to non-profit, sharing-society-enhancing renewable citizen projects. The focus lies on the selected target regions and are based on the overall outcome and findings of work packages 2-7, such as:

- D2.3 Synthesis report of case studies on drivers and barriers in 5 selected target regions (Standal et al. 2022)
- D4.2 Summary report of novel financing instruments for RECs (Fouquet et al. 2022)
- D5.2 Good Practice Portfolio of Renewable Energy Communities (Maleki-Dizaji et al. 2022)
- D7.1 Comparative assessment of enabling frameworks for RECs and support scheme designs (Krug et al. 2022)

This Deliverable describes the transfer cases and addresses the following questions:

- Can a business model from an existing good practice example from another part of Europe be transferred to be viable in another place within the EU?
- Are fundamental adaptations necessary?

[1] Previous work of COME RES is available online: https://come-res.eu/resources

- What are (legal and/or technical) barriers and restrictions and how can those be overcome?

Additionally, this study elaborates on the ability of local and regional financial institutions to engage with RECs (regardless of the legal possibilities of establishing a REC). Such questions are highly relevant. Ahlgren Ode & Lagerstedt Wadin (2019) state that the transfer of business models is a process that requires translation and adaptation instead of mere diffusion.

This Deliverable is structured as follows: First of all, the term 'Business Model' will be explained in detail, especially against the background of recent literature in the field of renewable energies and cooperatives. We heavily drew on the Business Model Canvas as presented by Osterwald & Pigneur (2010). Afterwards, the methodology of data collection for this Deliverable will be explained. Subsequently, the main results are presented, sorted by transfer case in the alphabetical order of the country of the learning region (Germany, Italy, Latvia, Poland). The sections illustrating the outcomes are structured in the same way and include an overview, a brief characterization of the transfer case, a context and restriction analysis, principle business model options and the Business Model Canvas. Finally, the conclusion summarises the most important findings.

2. Business Models

A business model presents the base for socially embedded 'commercialisation' of a RES project (Aslani & Mohaghar 2013). In the following section a definition of a business model will be provided alongside its major elements, themes and challenges, derived from case studies and literature reviews.

2.1. Definition & State of Research

In general terms, there is no single understanding of what a business model comprises, many authors take different approaches and stress different aspects (Zott et al. 2011). Osterwalder & Pigneur (2013:14) provide the following definition: A business model is *"the rationale of how an organization creates, delivers, and captures value"*. Generally, a business model is a framework for how an organization (in our case – an energy community) will create added value for potential customers and secure a return for the organisation (Richter 2013). A business model provides a legal, organisational, and economic basis to address technological, political, market-related, and financial uncertainties that occur during the operation of a RES project (Aslani & Mohaghar 2013). Additional common themes are how firms keep their business running and business activities (Zott et al. 2011).

As the business model comprises the *"firm's underlying core logic and strategic choices for creating and capturing value within a value network"* (Shafer et al. 2005:202), Larosa & Mysiak (2020) stress that a business model does not revolve around innovation in a product, but rather in the way that the business is carried out. The design of a RES business model strongly relies on market conditions (Karakaya et al. 2016) and country-specific contexts (Strupeit & Palm 2016), as institutional mechanisms, such as feed-in tariffs, tax credit systems, or clean-energy quotas strongly influence business models, especially

in the RES sector (ADB 2015). In the results chapter, such specificities will therefore be addressed accordingly.

Four key elements appear repeatedly in the business model literature, namely value proposition, customer interface, infrastructure, and revenue model (Ballon 2007; Johnson 2010; Osterwalder & Pigneur 2013; Richter 2013). In order for a business to successfully function, those elements need to be addressed. Due to changes from central energy systems towards decentralised systems, new market actors emerge that are less experienced than established developers and professional firms. Richter (2012) describes a transformation of business models in this context, towards customer-side business models that follow a different logic of value creation than traditional business models, that solely focus on economic growth. Especially in RES cooperatives, such as RECs, social and environmental goals and values play an equally important role as economic value creation (Kahla 2017). Nonetheless, such customer-side business models are still in an early developmental state (Richter 2012), especially compared to large-scale businesses. In the initial phase, a business model has to address the aforementioned factors, such as the understanding of its end-users (Piterou & Coles 2021).

Why is it important to put such emphasis on business models for RECs in Europe? Schwarz & Bosch (2020) provide an example of how the way of business-related value creation is carried out affects the spatial compatibility of a RES plant, which is made up of social, economic, and ecologic suitability. Schwarz (2020) additionally provides an example that local RES plants are not a sure-fire success for local acceptability. As local, decentral actors tend to be less professional than established developers or firms, it is even more important that such actors place more emphasis on their business model in the set-up phase of a REC.

Geissdoerfer et al. (2018:407) describe different ways to set up business models to proof to failure: start-up (creation of new business model), business model transformation (current model is adapted), business model diversification (additional business model next to an existing model), and business model acquisition (integration of additional business model). In this study the second approach is followed., An existing business model is ‘transferred’ to a learning region in order to prevent the failure of a newly initiated RES project. Challenges such as the triple-bottom-line (co-creation of profits, social and environmental benefits and their balance), mindset (business rules, guidelines, behavioural norms, performance metrics), resources, technology innovation (and integration), external relationships, and methods and tools shall thereby be addressed (Evans et al. 2017:599). As Herbes et al. (2021) present from a conducted study among German RES cooperatives less than 50% of those are not willing to newly develop a business model but rely on already-existing blueprints. In conclusion of translation of existing business models is regarded as helpful.

2.1. Business Model Canvas

In order to meaningfully combine the findings in business model literature and to translate the challenges into a functioning business model that pays tribute to the market dependencies and national, regulatory

frameworks in place, we rely on the Business Model Canvas developed by Osterwalder and Pigneur (2013). This model comprises nine segments that form the building blocks for a business model in a visual way. The elements are presented in Table 1.

Table 1: Elements of the Business Model Canvas[2]

Segment	Content	Guiding Elements
Value Proposition	Products and services a business offers to meet the needs of its customers	Uniqueness (USP), reasons for customers to buy, target customers, unique services
Key Activities	Most important activities in executing an organization's value proposition	Main functions, strategy, field of action
Key Resources	Necessary resources to create value for customers (human, financial, physical)	Main assets, resources, and necessities to satisfy customers' needs
Key Partnerships	Required stakeholders to be able to perform business activities (e.g. manufacturers, suppliers)	Main stakeholders, motivations for partnership
Customer Segments	Target audience and their segmentation	Major customers, customers' perception of a business, important customers (e.g. VIPs)
Customer Relations	Activities to motivate and impress customers (different approaches due to market segments possible)	Means to maintain customers, incentives and rewards for customers
Channels	Means by which goods and services reach customers	Channels (e.g. social media advertisement), alternatives
Cost Structure	All costs that incur during the operation	Major cost drivers, relation of costs and revenue, main expenses

[2] A detailed version that was used by the contributors of this Deliverable can be found in the annex.

Revenue Streams	Income from the customer segment	Main revenue sources, possibilities to increase revenue from the customer segment

Source: adapted from Osterwalder & Pigneur (2013)

Osterwalder & Pigneur (2013) have structured those elements into a canvas model. The Business Model Canvas offers the possibility to focus on the offered product, involved people (e.g. customers), development paths, and resources for a business to work. Thereby, a Business Model Canvas provides a full overview of a certain business. Especially for RECs this is helpful, as most RECs have weaknesses in management (Herbes et al. 2021). Figure 1 presents the structured template of the Business Model Canvas as developed by Osterwalder & Pigneur (2013).

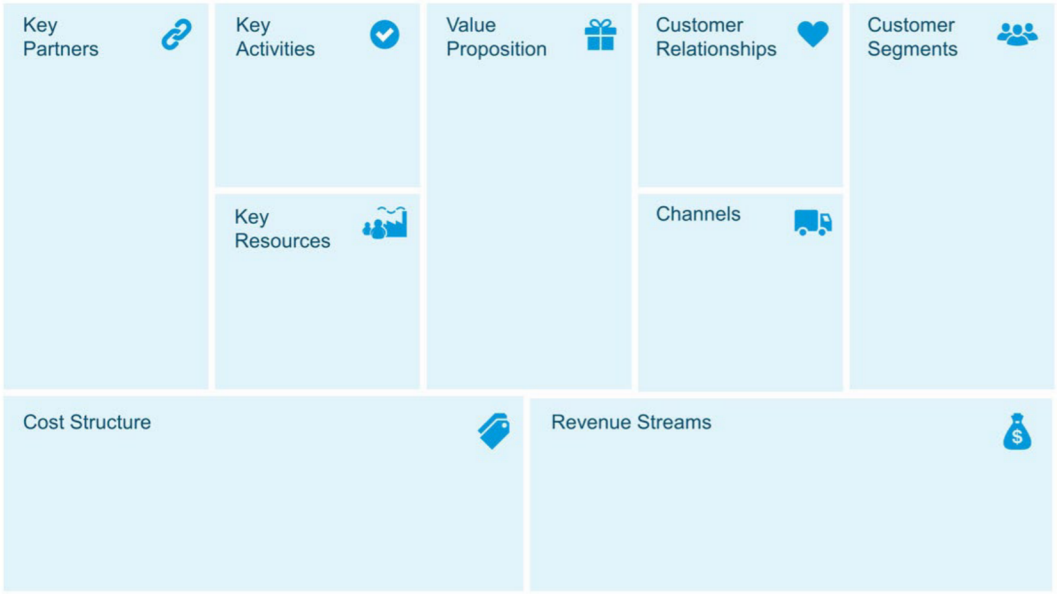

Figure 1: Business Model Canvas

Source: Osterwalder & Pigneur (2013)

3. Methodology

As the Business Model Canvas provides an ideal framework to transfer existing business models to another geographic location and simultaneously adapt it to local and national circumstances and frameworks, this template was used in so-called transfer workshops to access the transferability of certain good practice business models to a learning region.

To examine those business models, the stakeholders that carried out the transfer workshops in Germany, Italy, Latvia and Poland were provided with a template that specified the aforementioned

aspects of the Business Model Canvas. Those forms can be found in the Annex (1 and 2). During the data collection phase, the stakeholders organised so-called transfer workshops and country desks to access the transferability of the best practice business models (see Del. 6.3 Best practice transfer roadmaps for learning regions (forthcoming)). During those workshops, the stakeholders from the so-called learning region got in contact with stakeholders from the good practice and had an exchange and discussions about the existing good practice examples. Later on, the stakeholders of the learning regions discussed the transferability of the good practice and by the end of the workshop, open questions were addressed by the stakeholders from the best practice businesses.

Members of the COME RES consortium filled out the template (provided in Annex 1 and 2) and were given the chance to provide additional information to every individual aspect of the Business Model Canvas.

4. Results from the Target Regions

In this section, the results from the exchange with the involved stakeholders from the learning region and stakeholders from the good practice business model will be presented in the following order: Germany, Italy, Latvia and Poland.

4.1. The Netherlands (North Brabant) and Germany (Thuringia)

4.1.1. Brief Characterization of the Transfer Case

The German target region Thuringia was chosen for the case of the transfer of the best practice “Multifunctional Energy Gardens” from the Netherlands, in particular, due to their ecological and participatory quality in addition to the generation of renewable electricity.[3].

For the business models, this has some important implications: There are two highly different phases: (1) the initial phase, and (2) the operational phase. This distinction is necessary, as the initial phase is strongly participatory and it takes time and resources to prepare the planning and convince (commercial) developers and policy-makers to embark on an Energy Gardens project and organise the relevant infrastructure instead of installing traditional solar parks and to accept lower financial returns. Moreover, it is also necessary to create funding for the maintenance of the societal and recreational functions in the Energy Gardens as well as to organize and support activities by volunteers and visitors in the Energy Gardens. Participation is a key element of the value mapping process, that led to the project design of the Energy Gardens. In the operational phase, participation is not as important but still requires serious consideration. The following figure shortly presents the Business Canvas Model for the German case.

[3] Each transfer workshop is described in detailed in D6.3 Best practice transfer roadmaps for learning regions. This report will soon be available here: https://come-res.eu/resources)

Legal Form and Organizational Structure/Ownership Model of Good Practice

The transfer case for Thuringia (Germany) is the concept of established, citizen-owned 'Multifunctional Energy Gardens' from the Netherlands. These Energy Gardens aim to create synergies between the use of community-owned renewable energy (mostly PV plants), nature conservation, recreation, and education. The project is supervised by "Natuure en Milieufederaties" (NMF), an umbrella organization of the 12 Dutch provincial non-profit federations for nature and environmental protection. Three pilot Energy Gardens started in 2019 and more Energy Gardens projects have been initiated in the meantime. Energy Gardens received a subsidy of €1.6 million for 5 years from the postcode lottery. It is planned that the three pilot projects will be finalized by 2024.

The main motivations for the development of the Energy Gardens are (1) to involve local citizens and stakeholders directly from the start in the design of the project in order to capture the main local natural landscape and cultural-historical values in the project area; (2) to create and maintain a renewable energy generation project with multiple functionalities (due to scarce land), co-owned by the local communities. In particular, the Energy Gardens in Gelderland provide a best practice example for transfer. The coordination is carried out by a local energy cooperative (energietuinen 2022). For each Energy Garden, the ownership model can be different, depending on local circumstances. The developer can be a local energy cooperative (e.g. with the local municipality as a stakeholder) or a private company, or a joint venture of these two. The management and maintenance of the Energy Garden will be allocated to a management foundation in which the developer, the NMF and the local community are represented. In this way, the identification of locals (volunteers) with the Energy Garden is addressed.

In the case of the Energy Gardens, there is no unique model for ownership and it is necessary to differentiate between ownership of land rights and ownership of the PV park. In general, the ownership of land rights can determine the concept, the design options, and the public acceptability of the project. Some Energy Gardens are entirely owned and developed by an energy cooperative, some are owned and developed together with a commercial partner. Another option is that ownership will be opened to citizens via crowdfunding. It is also important that the project owner is ready to accept certain additional costs for adding the ecological functions to the project which might have a lowering impact on returns though.

Attribution of Roles and Functions in Decision-Making

The early and extensive participation of the local population and the financial participation of local communities play a key role. The decision-making process changes over time. During the development phase, the project team with the developer and NMF closely involved citizens and stakeholders in a co-creation process in designing the Energy Garden. Formal decision-making power lies with the developer. During the management and maintenance phase, the managing foundation has the competence to make decisions. Citizen volunteers are represented on the board of the managing foundation. The Dutch Energy Gardens are administered by a managing foundation in which RES

technology developers, the Dutch “Nature and Environmental Federation” and the local community are represented.

Provisions of Economic Benefits

Several economic benefits relate to energy production and distribution, such as financial participation with shares in the project by citizens and local companies, employment for local companies, and a financial fund for the local community.

Provisions of Environmental Benefits

Enhancing ecological value and biodiversity is one of the pillars of Energy Gardens. For each Energy Garden specific ecological design sessions lead to special attention to local species, such as birds, reptiles, insects and flowers. By involving local nature and environmental associations in the maintenance and monitoring of biodiversity, the community keeps the development and protection of nature and landscape on track.

Financial and Operational Support

Local nature and environmental volunteers as well as professionals are consulted and involved in the design and practical maintenance and monitoring of biodiversity. Energy gardens were built on unused industrial grounds, or in one case on a remediated landfill. In addition, a so-called "*omgevingsfonds*" (environmental fund) is created: These funds, earmarked for municipal sustainable projects are managed democratically.

4.1.2. Context/Restriction Analysis

The transfer case of the Energy Gardens provides an inspiring example for the German context in Thuringia; especially regarding how **the transfer case can work under the given conditions in the learning region**. Thuringia has a relatively high number of distinct landfills, abandoned polluted areas and degraded wastelands, particularly due to the military heritage of the German Democratic Republic (GDR) and its tight links to the Soviet Union’s military presence in Eastern Germany. Such sites need to be cleaned up and offer favourable conditions to host an Energy Garden. Additionally, the way the Energy Gardens were planned in the Netherlands, by conducting highly inclusive, participatory processes and stimulating local empowerment, is transferable to the Thuringian case.

Nonetheless, some **barriers and restrictions** remain: Despite the availability of degraded and polluted sites for renaturation, a major bottleneck for Thuringia is the designation of suitable sites. From an economic perspective, lower return rates than for traditional open-space PV plants must be expected. Hence, the economic viability of the project can be a critical barrier to community participation and local contributions.

In principle, **the same business model from the best practice region can work in the learning region under the current framework conditions**. Although the framework conditions are different in the Netherlands and Germany, German legislation provides some useful tools to enable community

energy initiatives including RECs (in the sense of RED II). There are market premiums available for renewable energy plants including open-space solar farms. However, it is questionable whether these will be sufficient to ensure the economic viability of an Energy Garden project. As shown by the Dutch best practice, additional funding sources will likely be necessary.

In terms of the legal form for the Energy Garden, in Germany, various legal forms such as an energy cooperative can be employed to implement the concept. In the Netherlands, operators of renewable energy plants including those of the Energy Gardens benefit from specific operational subsidies (market premiums). There is also a special market premium for energy cooperatives, the 'Cooperative Energy Generation' (SCE) subsidy. It is paid out per kWh produced. Each year a basic amount is set for each type of installation. The basic amount is the amount per kWh produced, which is necessary to make the installation profitable. The basic amount for the year in which a cooperative applies for the subsidy is valid for the entire support period of 15 years. Thus, there is long-term certainty about the return on investment.

In Germany, under certain conditions, solar farms may be eligible for a market premium under the Renewable Energy Sources Act (EEG) (e.g., solar farms on conversion areas that were previously used for military or economic purposes). For projects up to 750 kW, the economic viability of the system can be determined by using a fixed calculation basis specified by law. For larger plants > 750 kW, the market premium is awarded via competitive bidding and tendering procedure in which only those plant operators who demand the lowest market premium are awarded the contract (pay as bid rule) – from 2023, open space PV plants ≤ 6MW will be exempted from the auctions. Hence, usually, there is no certainty that bids will be accepted and there is often a highly competitive pressure. Under the last auctions for ground-mounted PV (June 2022) the average, volume-weighted award values reached 5.51 ct/kWh (Bundesnetzagentur 2022). However, ground-mounted PV systems are increasingly implemented without public support by employing new business models including direct marketing and Power Purchase Agreements with individual customers. In addition, re-naturalisation projects are increasingly important and can be coupled with environmental protection measures.

There will be a need for well-balanced spatial planning for these sites especially when in close vicinity to a community, village or town in order to earmark areas for the use of cooperative energy/RECs. Without the interest of local municipalities in such spatial planning in favour of REC usage there might be just an overwhelming interest of commercial developers and investors. With the already adopted amendments to the EEG (German Renewable Energy Act) taking effect on 1 January 2023, the threshold under which citizen-owned PV plants will be exempted from participation in auctions will be raised to 6 MW, which will eliminate a large part of the economic planning uncertainties (Krug et al. 2022). This will make PV systems increasingly attractive for small-scale Energy Gardens.

Some minor adjustments are necessary to make the model feasible in Thuringia. Economic viability is a key prerequisite for transferability. The viability of the commercial part of an Energy Garden (open space PV plant) does not seem to be a problem in Germany. A more critical issue is to find

additional funding to cover the extra expenses for the non-commercial part (ecological/recreational/educational elements). Apparently, additional funding is necessary to finance these elements (which in the Netherlands are partly covered by the postcode lottery). One solution might be to provide special bonus payments for multifunctional open-space PV projects in the frame of the existing support scheme under the EEG (see below). Another solution is to look for complementary sources of funding (e.g., foundations, sponsoring).

Additionally, the implementation of elements of the enabling framework envisaged in RED II can improve the viability of the Energy Gardens in Thuringia (or in Germany in general). In order to create viable business models for community energy initiatives related to the Energy Garden concept, it would be generally helpful to have higher returns per kWh produced in order to compensate for the extra cost incurred by the multiple additional socio-ecological elements of an Energy Garden. Recent amendments to the Renewable Energy Sources Act will help to facilitate the development of community-owned open space PV (≤ 6MW) and wind projects ≤ 18 MW). These amendments which will enter into force on 1 January 2023 will exempt projects of citizen energy companies (including energy cooperatives) from participation in auctions, thus reducing administrative burdens and likely improving the economic conditions for these actors that implement solar parks below 6 MW.

Furthermore, creating an enabling framework for energy sharing would facilitate the implementation of Energy Gardens by community energy initiatives, as this would allow members/shareholders of an energy community to use/share the energy produced in their own plants. This may help to reduce energy costs, increase local acceptance and enable meaningful integration into local contexts.

4.1.3. Principle Business Model Options

Energy communities including energy cooperatives are ideal actors to implement the Energy Garden concept, preferably in cooperation with the local municipality and other local stakeholders. Cooperatives usually have lower profitability expectations than commercial market actors. Moreover, they offer multiple potential advantages including the participation of local residents, orientation towards the common good, local and regional value creation, the trustworthiness of responsible actors and hence local acceptance.

The business model options for energy communities depend very much on the respective geographical, economic, institutional and regulatory framework conditions (e.g., site characteristics, site ownership, electricity market design, availability of investment and/or operational support, actor constellations, a regulatory framework enabling energy sharing, etc.).

Ideally, an energy community should be in a position to identify suitable projects and also to secure ownership of the respective site. Securing land use rights is key to all further activities. The owner of land rights has the power to determine the concept as well as design options, and can also influence the public acceptability of the project (BBEn 2022).

There are different options for business models in Thuringia. Depending on the ownership of the respective site, energy communities may implement Energy Gardens alone, jointly with other energy communities, in cooperation with the hosting municipalities and municipal multi-utility companies (German: *Stadt- und Gemeindewerke*), or even in cooperation with commercial project developers/investors. Another option could be to cooperate with farmers and agricultural firms and to jointly develop environmentally sound agri-PV projects in combination with an Energy Garden. Possible roles of an energy community are securing suitable land, majority/sole ownership, minority ownership, as well as technical and commercial management.

The respective business model for energy communities depends on the way the generated energy (electricity) is marketed. In Germany, operators of ground-mounted PV systems have different marketing options at their disposal:

- Feeding the PV electricity to the grid and direct marketing of electricity with public support (market premium paid by grid operator);
- other forms of direct marketing to third parties (without public support/market premium, e.g., sales to aggregators, sales via Power Purchase Agreements);
- direct delivery to electricity customers via their own electricity lines.

Partly, combinations of these marketing forms are possible. Self-consumption of the PV-based electricity on site is only possible in case of personal identity of the electricity producer and consumer, if the electricity is consumed in the immediate vicinity of the installation and if it is not transmitted through a public grid. In Germany, there is currently no enabling framework for energy sharing that would allow renewable energy communities to share the produced electricity of their own plants within the communities.

If the generated PV electricity is fed into the public grid, the PV system operator receives either a fixed remuneration rate for each kWh of PV electricity or the amount of remuneration is determined by tenders and competitive bidding, depending on the size of the PV system. Other options which can be found in practice include direct sales to aggregators (e.g., Bürgerwerke) or direct marketing via a Power Purchase Agreement (PPA) to potential customers (e.g., electricity traders, energy suppliers or large consumers). The supply can either take place in a spatial context without using the public grid or through the use of the public grid. It is important to bear in mind that taxes, levies and costs for grid use may be due. While in public tenders, revenues of around 5 ct/kWh can be achieved, in the case of electricity supply contracts (PPA) in spring 2022 these amounted to 8 or 9 ct/kWh for a period of ten years (BBEn 2022).

Regarding financing, one option is to separate the commercial part (operation of the solar farm) from the non-commercial part (development, operation and maintenance of the garden/park). Another option is to keep both parts integrated.

One possibility is to establish a foundation (Stiftung) to create a holistic Energy Garden. This might be incorporated into an existing landscape park. In Thuringia, there is already a similar example.

(Landscape park Nohra), but the project was developed differently as in the case of the Dutch Energy Gardens.

More established legal forms are energy cooperatives or limited liability companies. The latter requires a higher starting capital which has to be acquired by individual contributions and funding mechanisms. This is feasible though and has been carried out multiple times in Germany. Energy cooperatives are established as well and have proven to be a viable option to operate RES plants in Germany in civic hands. Cooperation (e.g., joint ventures) of energy cooperatives and municipal multi-utility companies and/or environmental NGOs, and energy supply companies provide another realistic option.

4.1.4. Business Model Canvas

In the previous sections, aspects of the Business Model Canvas have been analysed. This section summarizes the collected information. Figure 2 presents the Business Model Canvas for the German transfer case.

Business Model Canvas for the German Transfer Case

Key Partners
- Members
- NGOs (umbrella organisations)
- DSO and network operators
- SMEs, local enterprises (e.g. farmers, agricultural enterprises)
- Municipalities/ public entities
- Educational organisations
- Federal energy agencies
- Multipliers

Key Activities
- Open-space PV plants (electricity generation and supply)
- Energy sharing (if legally possible)
- Joint decision-making
- Mapping values

Key Resources
- Members (REC)
- Funding (e.g. banks, grants, operational support)
- External expertise
- Knowledge

Value Proposition
- Participatory Value Mapping
- Extensive Participatory Process
- Socio-ecological relation between project and participants
- Participation in energy market (financial benefit)
- Joint investments
- Integration of local skills and knowledge
- Possibility to tackle energy poverty

Customer Relationship
- Direct sale to end users
- Indirect sales through the customers networks of partners (e.g. Bürgerwerke)

Channels
- Social media
- Website
- Participatory meetings

Customer Segments
- Households (especially as soon as Energy Sharing is possible in Germany)
- Multi-tenancy buildings
- Municipalities (as customers and key partners)

Cost structure
- Site acquisition
- System acquisition
- Payments/ fees for use of public distribution network
- Grid charges
- Project costs (e.g. properties, installation costs, reparatory work)
- Ecological measures

Revenue Streams
- Selling of surplus generation
- Energy supply services
- Energy Sharing

Figure 2: Business Model Canvas for the German Transfer Case

Value Proposition

By employing mapping values and extensive participatory processes, the participants are able to directly influence the socio-ecological relations of the project. The participants in the project even argued in favour of high visibility, thus showing a high level of identification with the project. Local residents and stakeholders can participate financially in the project. By getting involved in the design of the Energy Garden (e.g. PV layout, etc.) local stakeholders can actively partake in the local energy market by creating a source of energy supply. Nonetheless, it has been noted during the transfer workshops and visits in the Netherlands that participants potentially have to accept low financial returns. Nevertheless,

Investment barriers can be circumvented with the help of funding associations, support mechanisms, and joint investments (as was the case for the Energy Gardens).

For the Energy Gardens, local jobs and skills play an important role. In a first step, local knowledge is integrated into the project design and layout. Most project partners come directly from the area, some of them even have their headquarters in the area where the Energy Garden will be realised. This is an element that can easily be imitated in the transfer case, as PV plants are not considered as high-tech anymore and local craftsmen can install and provide maintenance services for the plants.

It is not a direct aim of the Energy Gardens to tackle energy poverty (except for enhancing social cohesion). It lies within the realm of possibilities to create low thresholds for low-income households, but given the choice of technology (which is often solar energy), energy poverty cannot be eradicated. This would need technological expansion, such as batteries, etc. If an enabling framework for energy sharing will be in place, members of the energy community may benefit from lower electricity prices. The energy community may offer reduced tariffs to the municipality and municipal buildings, including (nursery) schools, but also to vulnerable households.

Key Activities

The Energy Gardens that are presently implemented in the Netherlands are mostly based on open-space PV plants that contribute to the local energy generation. Pending the German legislation process, Energy Sharing might present an interesting option for a business model. Potentially it will be possible in the future, but specific legislation needs to be in place.

Another key activity is decision-making, which covers the design of the Energy Garden, as well as decisions on return-of-investments or re-investment. Modes of governance can be individually chosen, but need to take into consideration local constraints. These differ from the Dutch to the German case and therefore require careful consideration of the local characteristics. Mapping values in the design of the Energy Garden can be regarded as a key activity to implement a well-accepted plant in which local people (want to) participate.

Key Resources

Members are essential, as they actively partake in the design of the Energy Garden and during a later stage in its promotion (for educational, recreational, and nature conservation purposes). Another key resource is available funding. There are different funding mechanisms available that potentially apply to the Energy Garden project:

- Equity: citizens, municipality, local SMEs and other local actors, municipal utility companies, crowdfunding, etc.
- Debt capital: low-interest loans from promotional banks (e.g., *Thüringer Aufbaubank*, KfW), ethical banks (e.g., *Umweltbank*, GLS), commercial banks (e.g., DKB), crowd-lending, etc.´

- Grants: Start-up financing via revolving citizen energy fund of Thuringia (under development), private and public foundations, other investment grants from the State of Thuringia, grants from the hosting municipality/ies
- Operational support: market premiums via Renewable Energy Sources Act.

In the municipality of Nohra (Thuringia), a landscape park was developed in 2012 on a former military site. Today, the landscape park is managed by a non-profit foundation. In order to be able to secure financing for the Nohra Landscape Park Foundation in the long term, the foundation later installed an open-space PV system in the park. Although the logic of project implementation somewhat differs from the Energy Garden concept, the project in Nohra shows already many similarities with the Dutch Energy Gardens. This project can serve as a reference project for the future implementation of the energy garden concept in Thuringia and its coordinators and other stakeholders from Nohra can work as mentors for the future transfer of the Energy Gardens concept. Cooperation with energy cooperatives is planned in the future. Additionally, there are state-level actors (e.g. Thuringian Energy and GreenTech Agency ThEGA) and regional associations in Thuringia (e.g. *BürgerEnergie Thüringen e.V.*), and actors at the national level (Alliance of Citizen Energy/*Bündnis Bürgerenergie*, German Co-operative and Raiffeisen Confederation/*Deutscher Genossenschafts- und Raiffeisenverband*) that can act as enabling actors by providing knowledge and practical expertise for energy cooperatives (the closest equivalent to a REC in Germany).

Knowledge about the implementation of participatory formats is necessary for the transfer of the spirit of Energy Gardens to Thuringia. The existing projects in the Netherlands can have exemplary character for potential Energy Gardens in Thuringia.

Key Partners

In case an energy garden is operated by an energy cooperative or another type of community energy organisation, the members of the respective energy community are key, as they provide capital and participate in the process of value mapping. They function as enablers of the project and additionally as multiplicators in the surrounding environment. Additionally, NGOs can be considered as key partners: The umbrella organisation *BürgerEnergie Thüringen e.V.* which unites numerous energy co-operatives located in Thuringia provides a knowledge base for energy cooperatives. Its engagement is extremely helpful to enable projects in the future. Depending on the site and context (e.g. site ownership) municipal multi-utility companies that operate as DSOs could represent a suitable partner as well, alongside SMEs and local enterprises or farmers and agricultural enterprises.

The hosting municipalities play a crucial role in the implementation of an energy garden. Municipal ownership of the respective land can facilitate the creation of an Energy Garden, provided that political commitment is given. Moreover, open space PV systems usually need a local building permit for which a municipal development plan (*Bebauungsplan*) is required. Hence, municipalities have a key role to play to promote and facilitate the concept of the Energy Gardens – as potential landowners, local planning bodies (land use planning, development planning) and permitting authorities, but also as

potential investors and shareholders, as potential funders, facilitators, networkers and awareness raisers.

Lastly, multipliers can potentially always play a role. In the Thuringian case, this applies to the Thuringian Energy and GreenTech Agency (ThEGA), the association *BürgerEnergie Thüringen e.V.* (Citizen Energy Thuringia), the energy supplier *Bürgerwerke* as well as educational organisations.

Customer Segments

The customer segment generally depends on the site's location and local context. In the Thuringian project Nohra (landscape park with PV, see above), electricity was sold via a direct marketer to the electricity exchange. The grid operator paid a market premium. Recently, the foundation started a cooperation with *Bürgerwerke*, an energy cooperative that unites more than 100 local energy cooperatives in Germany and acts as an energy supply company. Through *Bürgerwerke*, energy cooperatives and other energy communities may offer their own electricity tariff. Therefore, households can be regarded as direct customers. Additionally, multi-tenancy buildings (tenants as well as flat owners) and municipalities belong to the customer segment.

Customer Relations

Similarly, to the customer segment, customer relations depend on the site's location and local context. Depending on the introduction of Energy Sharing in German legislation, the relation might gain greater importance. Right now, the relation is rather indirect, as the example of *Bürgerwerke* has shown. An indirect sale is a valid option though as in Thuringia there already is the possibility to purchase electricity exclusively from renewable cooperatives only. This is a direct opportunity to sell electricity, even without the introduction of Energy Sharing.

Channels

As the Energy Gardens have a special focus on participation, social media provides a simple way of disseminating information on progress and also to invite local stakeholders to informational and participatory events. Additionally, external communication is possible via local press articles or public events including RECs shareholders.

Cost Structures

Site acquisition (if it is not publicly owned land, municipal land, or land given at no cost) is a major cost factor that determines the cost structure of a REC business model. Project costs can vary and are subject to temporal change. For the project in Nohra (see above) the following cost structure applied: 800,000€ for the property, 900,000€ for the PV plant (own funding via citizens and foundation, as well as external financing via a public bank), 200,000€ for ecological measures over 10 years; project development costs of 120.000€.

Revenue Streams

Revenue can be generated via the sale of surplus electricity generation, energy supply services, and Energy Sharing (as soon as it is possible).

4.2. Belgium (Flanders) & Italy (Apulia)

4.2.1. Brief Characterization of the Transfer Case

For this transfer, a Flemish REC model to the region of Apulia was chosen. The Flemish REC Ecopower started in 1991 as an initiative of a handful of citizens to finance the renovation of the hydropower installation of the watermill of *Rotselaar*.[4]. For a detailed description of the transfer visit also see Bastiani et al. (2022).

Legal Form and Organizational Structure/Ownership Model of Good Practice

Ecopower is a *Coöperatieve Vennootschap* (abbreviated as 'cv') which is a cooperative society, according to Book 6 of the Belgian law on legal entities[5]. The cooperative company (*coöperatieve vennootschap/ société coopérative* or CV/SC) under the new Belgian law of 2019 is reserved for companies with an actual cooperative purpose. Some of the main characteristics highlighted are open and voluntary membership, minimum of three founders required for the establishment of the cooperative and the need to have a minimum initial equity to be established. There is only one category of members and each member has one vote regardless of the number of shares.

Attributes of Roles and Functions in Decision-Making

The General Assembly of all members (AGM) is the highest decision-making entity. It gathers at least once a year and takes strategic decisions, e.g. to become an electricity supplier, not to sell fossil gas, and start production of pellets from locally sourced wood. The AGM also elects the board members and approves the accounts and the destination of profits. In the Board of Directors about half of the directors are volunteers that work for the coop, the others are volunteers that do not work for the coop. The AGM also elects among its members a group of controllers that meet regularly with the coordinator and some board members to follow up on the activities of the coop. They report about their activities to the AGM and give their advice to the AGM about the approval of the accounts and the dividend proposal. Ecopower has a coordinator, who constitutes the daily managing committee, together with the heads of the different teams (supply, engineering, accountancy). The different teams meet regularly and their members each have their say about how things are run.

[4] Each transfer workshop is described in detailed in D6.3 Best practice transfer roadmaps for learning regions. This report will soon be available here: https://come-res.eu/resources)
[5] The new Belgian Code of Companies and Associations (the Code or CCA) came into effect on 1 May 2019. A cooperative company (coöperatieve vennootschap société coopérative or CV/SC) is a company with legal personality.

Provisions of Economic Benefits

Ecopower supplies green electricity to its members and local society at a lower price (1.6% market share households). Moreover, when there is profit (all years since 2002, except for two years) a dividend is paid to the members (the legal maximum is 6%). In terms of the employment effects, presently 54 people work for Ecopower.

Provisions of Environmental Benefits

Ecopower produces green electricity from its own installations, thus contributing to the reduction of CO_2 emissions. Moreover, Ecopower contributes towards the reduction of the energy consumption of its members and in this way increases their climate change awareness, as the average Ecopower member consumes half of the average Flemish household. Ecopower also removes waste out of the river *Dijle* at its watermill in *Rotselaar*.

Financial and Operational Support

Ecopower collaborates with local authorities e.g. Eeklo, Leuven, Mechelen, Antwerpen, Ninove, Asse, Beersel, though there is no established infrastructure of assistance and institutional support. It is rather Ecopower that supports local authorities to reach their commitments e.g. in the frame of their energy/climate plans. Ecopower is mainly funded by its members and can count on the following revenue streams:

- Sale of green electricity to members
- Sale of surplus green certificates to other suppliers
- Sale of surplus green electricity through BRP
- Sale of green electricity on the market
- Grants for participating in EU-funded projects Horizon 2020, Interreg
- Bridge loans

Ecopower counts on support schemes like every renewable energy producer. The revenues of the generating plants are the most important revenue stream. This pays for new developments and dividends. In the turnover, the electricity supply is the largest part. Costs and revenue are equal for the electricity supply.

4.2.2. Context/Restriction Analysis

The Flemish business model could partly work in Roseto. There, the citizens are promoters of the REC, which was created by a group of citizens with the goals of:

- environmental protection,
- energy conservation,
- dissemination of renewable energy sources,
- energy production on the territory,

- energy self-sufficiency,
- combating energy poverty (as per the statute).

Citizens are driven by a strong desire to protect the land, limit CO_2 emissions and increasingly seek independence from fossil fuels. They know that PV plants are a good solution for a municipality in southern Italy, but they lack the appropriate expertise to understand how to proceed. For many citizens main **barriers** are social acceptance and lack of trust in this new energy production model. Economy investment is also a barrier but the Italian state is making wide use of bonuses and funding. In some areas, there are constraints due to management land plans, for this reason, areas must be identified that are suitable for photovoltaic installations and that comply with current regional legislation.

It is important to note, that **the business model could not work in Apulia under the current framework conditions**, because the national regulatory system is different from Belgium. In Italy RECs cannot operate in the market as an economic entity, freely selling energy at the price it sets. The Roseto REC will start without PV plants, but generate its entire revenues from rent and will reinvest revenue to buy PV plants in the next years. The revenue that the energy community generates from the on-site exchange and fees is used for 51% to repay the plant rental, 16% are operation and maintenance costs and the remaining profit will then be reinvested in new plants.

The REC of Roseto is citizen-driven, and like the REC in Eeklo in an embryonal stage. The REC in Roseto does not own PV plants yet, but for the next years, it is planned to reinvest part of the revenues in buying its own PV plants and invest in social activities toward sustainability and environmental actions. Citizen engagement and the role of the municipality (trust role) are transferable elements. The REC in Roseto will become the owner of the production facilities over the years and also plans to expand its production with the exploitation of other resources such as wind and biomass (retrievable in the area). The municipality will act as guarantor and will make sites available for installations; the utility company will supply and install the plants, limiting the business risk for citizens who will be able to verify the actual reductions in withdrawals and therefore in the costs on their bills.

The legal framework has to allow the business role of a REC. In Italy, current legislation does not require RECs to operate as companies and therefore sell the energy produced on the market.

4.2.3. Principle Business Model Options

The role of key stakeholders (municipality and utility company) is strategic for the growth of a REC in Roseto. The municipality makes its buildings and the areas indicated in the settlement plan PIP (Piano Insediamenti Produttivi) available for installation of PV panels. The utility company invests directly by purchasing the panels at its own expense so that in the beginning the REC does not have to incur direct costs and pays back for the use of PV panels with bonuses. The bonus and gains from surplus electricity production and savings are in part paid back from the REC to the utility company and partly reinvested in the REC. The advantage is that there are no direct investment costs for the REC, and it is therefore easier for other citizens to join efforts when they learn of the energy-saving benefits. At the same time,

not having own facilities (utility service is the owner of PV plants) makes it completely autonomous in governance choices over a longer period.

4.2.4. Business Model Canvas

Previously, aspects of the Business Model Canvas have been analysed. This section summarizes the collected information. Figure 3 presents the Business Model Canvas for the Italian transfer case.

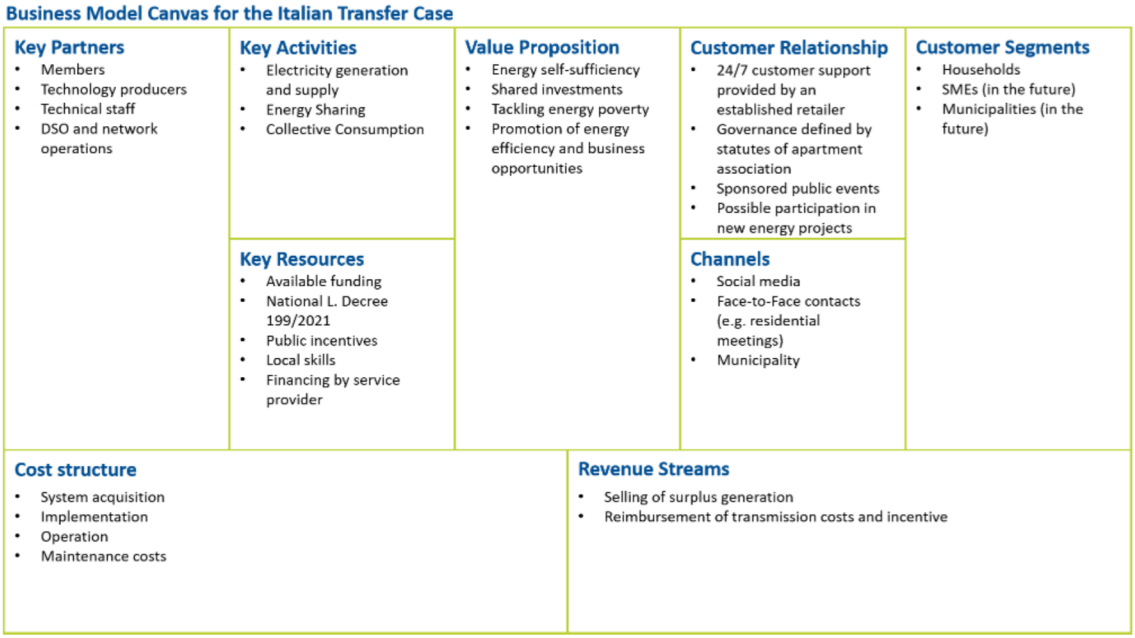

Figure 3: Business Model Canvas for the Italian Transfer Case

Value Proposition

Value can be created by achieving energy self-sufficiency. Sharing of investments additionally creates value, especially among stakeholders that later profit from revenues (this does not apply to community prosumerism, local energy markets and collective generation though). Energy poverty can be addressed by the transfer business model, but only to reduce electricity costs.

The Roseto REC aims to make energy consumption more efficient, favouring self-consumption and intends to contribute to reducing the impact of CO_2 emissions. The promotion of energy efficiency works as the key stakeholder owns the PV plants and receives fixed fees from the REC. The REC also invests its revenues in new PV installations that will be owned by the REC instead of the utility company. This is inspired by the Ecopower good practice business model.

Key Activities

Key activities comprise electricity generation and supply, Energy Sharing, and collective consumption. Energy sharing among prosumers is the main activity. Public, small business and residential users will

be part of the community. The energy produced will also be made available to those in energy poverty, with an overall reduction in grid withdrawals.

Key Resources

The funding of risk costs (e.g. costs for PV plants) is a key issue. In the transfer case, the private service provider will install the PV plants and own them, to begin with. This is a key resource, as the service providers will also manage, maintain and operate the PV plants. The utility company will own the PV panels that will be installed on both public and private buildings and on public areas (PIP areas) made available by the municipality. Thanks to national legislation, the on-site exchange will be repaid with a remuneration considering the minimum value between the energy fed-in and withdrawn plus a bonus.

The regulatory framework in Italy – which complies with RED II –provides additional support for a REC. Public incentives will help the REC to generate revenues via a feed-in premium.

Key Partners

Key partners of the project are members, technology producers, technical staff and DSO and network operators. As already indicated for the key resources, the service provider plays an extremely central role in the transfer case in Apulia and takes responsibility for the technical operation of the PV plant.

Customer Segments

Potential customers are households (as Energy Sharing is already possible in Italian legislation, due to compliance with RED II). In the future, local small and medium enterprises as well as municipalities might act as customers as well.

Customer Relations

The relation is direct via 24/7 customer support provided by an established retailer. As the PV plants will be placed on public and private buildings the governance is defined by the statutes of the apartment associations. Customers can be acquired via sponsored public events and societies. Such activities can be initiated by the service provider in the course of their public relations actions. Additionally, participation in new RECs is possible and can be initiated through customer relations.

Channels

Different channels can be employed to attract attention to the project. Social media provides an established channel for communication, but as the municipality is small, the main channel of information is the spoken word exchanged between residents. Face-to-face contact enables the dissolution of doubts within the area of the REC. Additionally, the municipality should have a contact point where residents can have a personal contact at a certain time. It is recommended to establish the initiating group of the REC to make direct contact with residents. This is also a way to attract potential new members for the REC.

The municipality plans to promote the PV plants and the benefits of the REC via the municipality's Facebook page. News and information will be included in a publication printed by the municipality and

distributed free of charge over town. The service provider will share data on the energy generation and saving of the PV plant as well as a feasibility study and scenarios that include involving mobility and the inclusion of biomass energy production in the future.

Cost Structures

The REC bears different costs: the leasing of the PV plant, administrative costs for the management of relations between the community, the GSE (Gestore Servizi Energetici – agency for energy-related funding) and the DSO, as well as the maintenance of the plants.

Revenue Streams

Revenues can be generated via the sale of surplus energy and the reimbursement of non-used transmission costs and incentives. These reimbursements will be used for the purchase and installation of new PV plants that will be owned directly by the REC. The national regulation provides for the repayment of energy exchanged on-site in quantities equal to the minimum value between energy produced and consumed, as well as a fixed amount bonus.

4.3. Italy (Piedmont) & Latvia

4.3.1. Brief Characterization of the Transfer Case

The transfer case from Italy to Latvia is a municipality-driven REC example. In particular, the transferability within the existing legal and enabling framework of RECs in Latvia is considered.

Legal Form and Organizational Structure/Ownership Model of Good Practice

The REC to serve as a transfer case is named „Energy City Hall REC-1". The public administration of Magliano Alpi (Italy, Piedmont region) has made a 20 kWp PV panels system available on the town hall roof and smart meters to manage data from the points of delivery of the REC members, as well as two EV charging points. The REC-1 was established in December 2020. Another REC-2, coordinated by the municipality, was established at the end of 2021. Members of REC-1 comprise the municipality and several private consumers (both households and SMEs).

The municipality is the promoter, coordinator, and main prosumer (energy is produced on and used within its buildings) of the REC. Anyone can be part of the REC; either as a prosumer offering electricity for sharing (following the normative framework defined provisions) or as a consumer.

Attributes of Roles and Functions in Decision-Making

The current legal form of REC is an association under Italian law. The President of the REC is the Mayor of Magliano Alpi. The REC has a Technical Scientific Committee, which addresses and supports technical issues related to the REC's constitution. The Committee is made up of the President, an expert in innovative business models for the energy transition, and six members. GO-CER (*Gruppo Operativo Comunita Energetishe Rinnovabili*) acts as the operational arm, which, with the support of the Technical

Scientific Committee, favours the creation of local supply chains of professionals and businesses to stimulate local value creation. Additionally, designers and installers, together with communication and marketing experts from the operational group, reach a large number of private citizens, companies and organisations.

Provisions of Economic Benefits

Energy cost reduction represents the main benefit. REC-1 is aimed at guaranteeing the self-sufficiency of the involved municipal buildings and sharing surplus electricity with the participating families and small enterprises. The economic benefits are directly forwarded in a reduction of the electricity costs for the REC participants – municipality and households, followed by the social benefits. Environmental benefits based on reducing emissions are reflected in the position of the municipality as a leader in this area. The municipality-driven REC is one of the activities of the municipal 'Sustainable Energy and Climate Action Plan' (SECAP). The reduction of energy costs is the main benefit. REC-1 is aimed at guaranteeing the self-sufficiency of the involved municipal buildings and sharing surplus electricity with the participating families and small enterprises.

Provisions of Societal Benefits

The RECs are the catalysts for local short-supply chains and skill aggregation by involving wide membership - the local SMEs, designers and technicians, installation and maintenance workers – in the development and operation of the RECs. The RECs also secure the necessary resources for coping with energy poverty. Fighting energy poverty by sharing the surplus of electricity production with families of vulnerable classes is one of the aims of the local authority.

Provisions of Environmental Benefits

The environmental benefits – reduction of greenhouse gases and emissions - are related to the reduction of fuel needed to generate electricity.

Financial and Operational Support

The investment model is made up of entirely municipal public investments during the initial phase. It is enlarged by public-private and entirely private investments.

The use of shared electricity is supported by a grid-tariff repayment. Variable components of the grid charges are returned to the RECs. Additionally, there is safety for long-term planning, as feed-in premiums are set for 20 years for the shared electricity.

The RECs have the following key co-operations:

- The Energy Centre of Politecnico di Torino - the technical and business & finance innovation partner. The implementation of REC has been carried out following the steps provided by the *Manifesto of the Energy Communities*, promoted by the Energy Centre.
- Cooperation with Research Institutions. The municipality of Magliano Alpi refers to itself as a pilot territory.

- Support for IoT management: In parallel with the calculations provided by the Italian DSO, the RECs are equipped with an IoT platform for the management of energy flows and allocation of shared energy to REC members, which is managed by the GO-CER.
- Energy4COM: an innovative start-up involved in the technical-operational management of activities.

4.3.2. Context/Restriction Analysis

The **Latvian learning region can learn from the three main activities provided by the municipality within the municipality-driven REC** (electricity self-consumption, sharing and surplus selling). Although this is a promising approach and represents a new business model for the Latvian context, some **barriers and restrictions** remain. There is a lack of knowledge regarding REC operation and possible benefits, both on the municipal side and also for potential members of RECs, that promotes the establishment of RECs. Thus, the relevant capacity-building needs should be identified, possible cooperation partners and available financing programmes for the knowledge, skills and capacity building should be identified, and cooperation with them should be established.

The Italian experiences might be **partially transferable** to the Latvian learning region. Some key elements of the Italian case can be transferred. Those include the key activities of RECs, such as electricity generation via PV plants, electricity sharing and future perspectives regarding the charging of electric vehicles. Knowledge development and capacity building of REC and involved parties are necessary. Establishing successful co-operations with national and international research and academic institutions and afterwards a continuous development of such co-operations.

The REC membership structure as a 'municipality plus residential households' appears highly transferable to the Latvian case. This also comprises communication channels, however, this largely depends on particular national circumstances. It has to be stressed that the regulatory framework and key funding mechanisms and financial options for RECs are currently hardly comparable between Latvia and Italy.

In Latvia, the option of co-funding for investments can be considered. As the REC starts with the initial investment of the municipality, the municipality can reasonably argue that issues such as why the municipality provides/rents its property (land, public building roof) to the REC - to determine what purposes, particularly social ones, the REC will be met. A methodology will be established to determine for what fee the municipality will rent its property if the municipality is an owner of RES plants. Another issue concerns at what prices the municipality will share electricity with other members of the REC. Vulnerable households might be included, applying special conditions for them. Local perceptions and public opinion regarding the REC should be investigated.

Latvia's legislative framework on energy communities states a range of various legal forms that a REC can choose (RECs can be associations, foundations, cooperative associations, commercial companies, partnership or capital companies, and other civil liability associations). In the Italian case, an association

was chosen. According to Latvia's 'Law on Local Governments', municipalities can participate in associations (societies), if municipal participation is necessary to ensure social-driven local development. This means that clear links between the REC operation and local sustainable development should be provided. At the same time, a study about the pros and cons of each legal form concerning municipal participation in the REC is very useful, in particular when considering the possibility of public-private and private investments in PV plants within the initial growth phase of the REC. To ensure viability during the establishment and an economically viable operation of the municipality-driven REC, national regulation and both energy communities' legislation and municipal legislation (municipal law) are relevant and both legislative frameworks should function in a non-mutually exclusive manner. There is the principal option for municipality-driven REC in Latvia - therefore the particular municipal-level normative document (municipal by-law) should be elaborated.

4.3.3. Principle Business Model Options

The first (initial phase of the REC) of the business models is the "Collective self-consumption (public)". It is based on the initial investment of the municipality. The model envisages energy generation from the technologies owned by the municipality (PV sited on municipal buildings rooftops and municipality-owned open space) and is used to cover the consumption of the members of the REC, maximizing self-consumption of municipal buildings and sharing of electricity to REC members. Any electricity surplus can be sold. Storage options and e-mobility charging options could be included as well. This model is considered the basic model.

The expansion phase of the REC also includes public-private partnership investments and fully private investments. Municipal investments can continue step-by-step to involve more municipal buildings or other municipal sites. Thus, two new business models might be added:

- 'Collective self-consumption (residential)' – based on the interests of local households to install their owned solar PV technologies. Within this model also local households jointly produce and share electricity and sell their surplus.
- 'Collective self-consumption (commercial)' – the same model as 'Collective self-consumption (public)', includes SMEs as investors. However, as presented in the next section, SMEs might be invited to participate in the REC, but this should not be considered the 'first priority".

Combining the model 'Collective self-consumption (residential)' and the model 'Collective self-consumption (commercial)' to the basic model 'Collective self-consumption (public)' contributes to improve the overall business model because it ensures complementary electricity load profiles and thus increases the collective self-sufficiency of REC members.

4.3.4. Business Model Canvas

In the previous sections, aspects of the Business Model Canvas have been analysed. This section summarizes the collected information. Figure 4 presents the Business Model Canvas for the Latvian transfer case.

Business Model Canvas for the Latvian Transfer Case

Key Partners	Key Activities	Value Proposition	Customer Relationship	Customer Segments
• Members • Homeowner associations • Neighborhood associations • NGOs • Local professionals and experts • Installers • DSO & network operator • Electricity trader • Municipality	• Electricity generation and sharing • E-mobility services • Energy Sharing • Member recruitment • Selling surplus electricity	• Energy self-sufficiency • Participation in energy markets and financial benefit • Sharing of investments • Tackling of local energy poverty • Reduction of energy costs • Creation of remuneration streams	• Governance defined by statutes of REC • Sponsored events • Participation in energy projects • External relations	• Households • Multi-tenancy buildings • Public entities • Municipalities • SMEs
	Key Resources • Members • Funding • Regulatory framework • Public incentives • Knowledge • Physical space • Connection to power distribution grid		**Channels** • Social media • Information campaigns • Website • Face-to-face contact • Public relation tools of municipality	

Cost structure	Revenue Streams
• System acquisition, implementation, operation, maintenance costs • Payment of fees for using public grids • Asset depreciation • Soft costs (e.g. legal and licensing costs, studies, environmental and landscape evaluation) • Administration costs • Re-investments	• Sale of surplus electricity generation • Sale of e-mobility services • Cost reduction for consumed electricity • Return of investments • Revenues from a reduced share of transmission and distribution tariffs

Figure 4: Business Model Canvas for the Latvian Transfer Case

Value Proposition

Value can be created by energy self-sufficiency as well as the opportunity to participate in the energy market while financially enjoying benefits. Latvia's Electricity Market Law provides that the surplus (not-shared) electricity can be sold to the electricity trader at the agreed price. Additionally, shared investments present an opportunity for value proposition. Tackling energy poverty depends on whether the vulnerable households are sited in the REC area. Two options are possible:

- Supply of electricity to social housing buildings (also installation of PV panels on rooftops of these buildings) owned by the municipality.
- If the household is a low-income household but does not live in social housing, inclusion as a member of REC to benefit from the electricity sharing is possible.

A classic way of value creation is the reduction of electricity costs. Additionally, remuneration streams due to electricity sharing and the sale of surplus electricity can be created.

Key Activities

The key activity of the business model is the generation of electricity. Another principal activity is sharing between REC members (maximizing the collective self-consumption) and selling surplus (not-shared)

electricity to the electricity market. These activities are based on the REC agreement with the electricity trader. As the municipality participates, the installation of e-mobility charging points (EV) should also be considered, particularly as a next-stage activity of the REC development. Other key activities are energy sharing, member recruitment, and selling the surplus of (non-shared) electricity.

Key Resources

Members are the primary resource for any REC. The "first priority" members or shareholders of the REC are the municipality and households, as members join RECs due to (geographical) proximity. Financial key resources are funding sources: The municipality can provide (or attract the funds) the first financial contribution for the installation of PV panels. The municipality can bear the upfront costs for the REC establishment (risk capital). The REC enlargement phase should also be based on private investments by motivating the residents of the area to become members of the REC.

The regulatory framework determines the relationship between members of the REC and the relationships between the REC and DSO and electricity trader. Additionally, public incentives can play a key role. Possible sources for incentives or funds are:

- Investment co-financing (state budget, EU funds)
- Providing capacity building by national as well as regional planning authorities, providing financing for capacity building for the municipalities and REC members,
- The Guidelines for the Formation of Energy Communities, including the recommendations for public persons (public authorities) regarding the support for energy communities and their participation in energy communities to be elaborated by the Ministry of Economics, in co-operation with the Ministry of Environmental Protection and Regional Development in 2023.

Important pre-conditions for the REC are both the skills and knowledge of municipality specialists as well as the knowledgeable local residents – local leaders/local champions and the professionals in the field – which have trust among the residents and can motivate them. If necessary, technical know-how should be outsourced.

Although Latvia is a comparatively sparsely populated country, physical space is a key resource: Municipality buildings (or municipal land) are predestined to site PV plants as well as electricity storage equipment. In the REC enlargement phase other REC, members may offer additional sites. Thus, the conditions for installing PV plants should be carefully considered by the municipal by-law on the use and building of (municipal) territory. Moreover, the availability of system capacities ensuring the connection of the PV plants to the power grid has to be considered.

Key Partners

Members are the primary key partners for a REC in Latvia. This mainly comprises the municipality and households (as natural persons). Additionally, homeowner and neighbourhood associations can be key partners as well. According to the Energy Law, homeowner associations are not stated as REC

members or shareholders. At the same time, homeowner associations as well as neighbourhood associations can provide important enabling functions to be an organizational vehicle helping to motivate and coordinate residents or owners of apartments. In this perspective, NGOs can function as multipliers as well, alongside local professionals or experts. Particularly professional associations, for instance, solar energy associations, as well as relevant professionals in spatial proximity can provide helpful technical expertise.

For the construction of the PV plants, installers are necessary as well as the DSO and network operators to ensure the connection to the power grid. All in all, the municipality is a key partner. As a local authority, the municipality ensures the success of the REC, and provides property (municipal building or land) to site PV plants. As a member (or shareholder) of the REC, it provides financial contribution for the installation of RES, and initiates and provides a leadership role in the creation of RECs. Participation of the municipality facilitates legal-technical issues to be solved by households as REC members.

Customer Segments

The customer segment is made up of households, multi-tenancy buildings, public entities and municipalities. SMEs might be invited to participate however they should not be considered the 'first priority".

Customer Relations

Customer relations are defined by the statutes of the REC. Relations with the public and customers can be built via sponsored events and sponsored social programmes. Additionally, customers should also be given the chance to participate in new REC projects.

Some relations that cannot be directly considered customer relations are the relation with the electricity trader, the DSO, and the State Construction Control Bureau of Latvia.

- An agreement with the electricity trader is necessary. The Electricity Market Law states that electricity sharing has to be carried out by the REC. Before the start of REC operations, the REC is going to finalise an agreement with the electricity trader regarding the sharing of electricity and the sale of surplus (not shared) electricity to the trader at an agreed-upon price.
- Relations with the DSO (SC "Sadales tīkli") are important: Before the start of the operation, the initiators of the REC have to ensure that there are available system capacities. The DSO separately enumerates and publishes information on its website on available system capacities to ensure a match between generation and grid capacity. Applying the DSO to connect the electricity generation facility with a capacity below 500 kW is a required legal step, also to gain access to DSO services.
- Register of the energy communities is required. The responsible state authority for the Register is the State Construction Control Bureau of Latvia. The application for the registration and annual reports have to be submitted.

Channels

Established channels are social media platforms, informational campaigns and websites. Face-to-face contacts seem to have an important role though: A REC covers a certain area; this area could be subdivided into smaller units and particular meetings could be held within those. Furthermore, Latvia has the experience of the communities of the apartment-owners (within the boundaries of the single multi-apartment building) which can be used to communicate about the REC. The municipality should have a contact point where the residents can contact face-to-face at a certain time. Additionally, the REC members should be available for communication as a direct source of information and insight.

Communication should also be provided via the municipality itself, e.g. via its website or printed and distributed free of charge (e.g. to homeowners or on local markets and local events). It is advisable to involve and use the communication channels of the administration and territorial units of the municipality and the elected councils of local communities. Cities, particularly the capital Riga, can involve local neighbourhood associations as a relevant channel for communication. It is advisable to join the information campaigns with the annual municipality days, organized by a large range of Latvian municipalities.

In its turn, after the establishment of the REC, the communication between the REC members should correspond to the provisions of the REC's legal form. For instance, Latvia's Associations and Foundations Law states the administrative bodies of an association are the members' meeting (general assembly) and the executive body (board) as well as other administrative bodies may be provided for in the Articles of the Association. Audit institution of economic and financial activity is stated. Control Rights of a Members' Meeting are provided, for instance, the association board shall convene a members' meeting immediately if so requested in writing, indicating the reasons for the convening, by not less than one tenth of the members and if a lesser number of members is not laid down in the Articles of Association.

Cost Structures

Relevant costs include system acquisition, implementation, operation and maintenance costs. Additionally, fee payments for using the public distribution and transportation network have to be considered. Another main post is soft costs: Those include legal and licensing costs, costs for technical and economic feasibility studies, and costs for environmental and (urban) landscape evaluation (if applicable).

Furthermore, costs for administration relate both to (a) ensuring the obligations imposed for the REC by the Electricity Market Law, and (b) other administration costs, including communication, work with vulnerable groups, and bookkeeping. Partially these services can be outsourced. At the same time, a limited number of workplaces (remuneration and social guarantees) will be employed by the REC. Mark-up and contingency costs should be considered alongside re-investments to improve the existing infrastructure of the PV plant.

In the case of a REC using PV panels, the majority of costs are investment costs. Those include both cost of the PV panels, the cost of inverters and installation. Additionally, the necessity for energy storage to absorb peak generation should be evaluated. Investment costs might also include EV charging point(s).

It should be evaluated whether the investment could be co-financed by the particular national public investment programmes, thus reducing the investment by municipalities and REC members (also considering interests). The operation and maintenance costs of PV panels are relatively low.

The REC uses the public distribution grid for electricity sharing, thus the grid connection costs, if applicable, and relevant payments of grid services tariffs, defined by the Electricity Market Law and the Law on Regulators of Public Utilities, are in place.

Revenue Streams

Considerable revenue streams comprise the sale of surplus electricity generation and e-mobility services. As the municipality is a member of the REC, EV charging points should be installed. This service could be free for REC members.

In the case of Latvia, a reduced share of transmission and distribution tariffs represents an option for the future. The Amendments to the Electricity Market Law provide the principal option for different tariffs. It is stated that "the power distribution system services' tariffs might be differentiated between the levels of voltage, power capacity, electricity consumption, electricity delivered to the distribution grid or the profiles of electricity customers". Thus, this opens potential space to elaborate differentiated tariffs for electricity sharing depending on used voltage or other applicable parameters.

4.4. Poland (energyREGION Michałowo) & Poland (Warmian-Masurian Voivodship)

4.4.1. Brief Characterization of the Transfer Case

The Polish energy region Michałowo was chosen as a learning region. Differently from the analyses of the previous case, this transfer case takes place nationally within one country, thus facilitating the exchange as the legal framework and market access conditions are largely similar.

Legal Form and Organizational Structure/Ownership Model of Good Practice

The legal basis of the energy cluster is represented by an agreement, started on the 12th of June 2017 by Green Energy Michałowo and IEN Energy, two companies from the energy industry. It defines the claims and duties of each member and marked the beginning of the showcase cluster encompassing its founding members:

- Green Energy Michałowo is the leader of the cluster. The company is the main electricity and heat producer within the cluster via an agricultural biogas plant with a capacity of 0.60 MWe and

an electricity production via a PV plant with a capacity of 0.66 MWe. GE Michałowo is also the owner of the heat network in Michałowo.

- IEN Energy is the coordinator. It is a trading company that provides services on the Polish energy market, mainly in the field of renewable energy and energy clusters. The company provides support in consulting and organisation in the field of energy trading, energy distribution and balancing services, and is also responsible for trade balancing of the energy cluster members and the members that joined in 2018 and 2019 (municipalities Michałowo, Gródek, Tykocin, Zabłudów; Social Welfare House *Jawor* in Jałówka; Municipal Culture Center in Michałowo).

The cluster has one coordinator (private company), which is responsible for electricity trading, knowledge, and experience transfer between the cluster members, and development and updating of the cluster documentation. The coordinator is responsible for contact with municipalities. Municipalities are other cluster members, which are electricity and heat customers.

Attributes of Roles and Functions in Decision-Making

At the top of the hierarchy, there is a coordinator, who has the key position in the cluster. The coordinator is the link between local energy producers and consumers, and it is also the entity responsible for knowledge transfer within and towards the cluster. Citizens are engaged in projects realized in the cluster, but they do not have any decisive power.

Provisions of Economic Benefits

One of the economic benefits of the REC are greater employment opportunities and stimulation of rural areas to act, e.g. towards the construction of energy installations by farmers and including these installations in the structure of the cluster. Moreover, if more energy is available (the key motivation of the cluster), the cost of energy will be reduced. The development of accommodation and catering services would also bring financial benefits to the community of Michałowo. This can be achieved by constructing a local renewable energy congress and education centre.

Provisions of Societal Benefits

Farmers could engage with the energy cluster by constructing energy installations, which could be included in the cluster. There is a lot of emphasis on meetings conducted by cluster members to increase civic knowledge in the field of renewable energy sources and energy efficiency, and shaping pro-ecological attitudes. Moreover, the construction of a local renewable energy congress and education centre in Michałowo, could have a positive influence on the activation of the local community through the development and adjustment of the accommodation and catering services.

Provision of Environmental Benefits

One of the ecological benefits is to support the production and distribution of energy from renewable sources, promotion of high-efficiency use, and co-generation of heat and electricity. Moreover, there are other projects, which will add environmental benefits e.g. e-mobility, low-emission buses, and e-bikes

for transport. These actions will bring benefits to the environment, such as a fossil fuels phase-out, a directly connected improvement of air quality.

Financial and Operational Support

European funds for the construction of PV and solar collectors already supported projects in the municipality of Gródek. The Regional Operational Programme of the Podlaskie Voivodeship supported the expansion of the heat grid in Michałowo, modernisation of lighting and the installation of an air quality monitoring station. The National Fund for Environmental Protection and Water Management and the National Centre for Research and Development might be considered institutions, which potentially could support some projects in the cluster. The National Fund for Environmental Protection and Water Management for “Green Public Transport” already supported projects in the cluster.

4.4.2. Context/Restriction Analysis

Learning from the inner-Polish transfer is possible. Warmińsko-Mazurskie Province or Warmińsko-Mazurskie Voivodeship is located in the North-East of Poland. In terms of energy infrastructure, it is similar to the province, where an energy cluster already operates in Michalow. For the whole country, there is a common national law that allows the creation and operation of energy clusters. Therefore, the business model for RECs could operate in the Warmian-Masurian province.

The **barriers** that could stop or slow down the creation of such an energy community are related to financial resources and the willingness of municipal authorities, entrepreneurs and residents to set up a REC. A key barrier in the overall energy system are the frequent changes in the law (there have been no changes in the case of clusters and cooperatives though) which increase investment risks in the energy industry.

As the good practice case to be transferred is situated in Poland as well, the same business model could work in the learning region, as the current framework and market conditions are the same. Some adaptations might improve the business model though. The resources available to the municipality and targets should be identified. The business model must be territorially limited to five municipalities or one county (according to the Polish RES Law). This limitation verifies the resources that municipalities and businesses have at their disposal. In the current legal situation, the municipality should create an Energy Cluster Charta, contracts and terms of operation, and develop a cluster development strategy that defines the targets of the organization as well as its members. A resolution should also be passed in the municipality on the desire to create or belong to an energy cluster.

4.4.3. Principle Business Model Options

The best option of the business model is the cooperation of the local government with local entrepreneurs who produce electricity and heat and sell them directly to the municipality (PPA contract). On the one hand, such a beginning will allow the municipality to reduce energy costs, and on the other

hand, it will encourage other entrepreneurs and inhabitants of the municipality to join the energy community.

4.4.4. Business Model Canvas

In the previous sections, aspects of the Business Model Canvas have been analysed. This section summarizes the collected information. Figure 5 presents the Business Model Canvas for the inner-Polish transfer case.

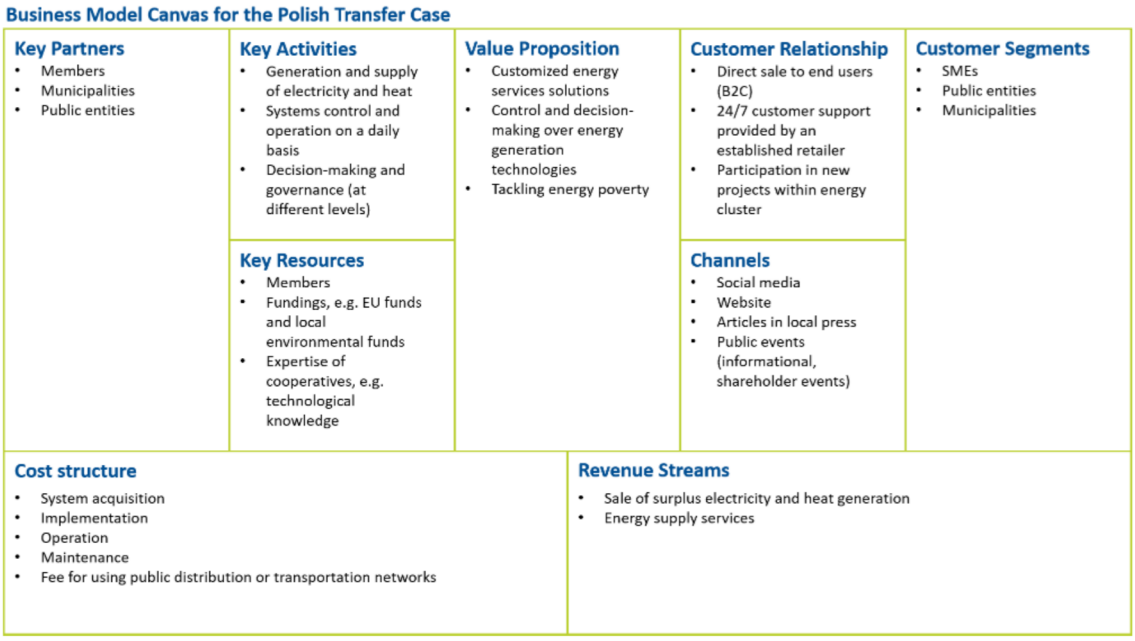

Figure 5: Business Model Canvas for the Polish transfer case

Value Proposition

Value can be created via customized energy service solutions, control and decision-making regarding the technological choice within the REC energy cluster, as well as by addressing energy poverty. This is possible by exempting municipal residents from mandatory fees (such as property tax) or by granting energy allowances.

Due to the savings brought to the municipality by participation in the energy cluster, an energy allowance was created. This is a monetary benefit granted by the municipality of Michałowo upon application of a person who is an energy consumer at a particular location and meets established criteria, such as receiving a housing allowance. The energy allowance is intended to help such people financially by partially reimbursing them for the cost of electricity. For example, the so-called Michałowo's shield allowance is intended to partially compensate for high electricity prices, among other things. Rising heating prices in Michałowo, meanwhile, are to be compensated by a coal allowance and heating subsidies.

Key Activities

Key activities comprise the generation and supply of electricity and heat via local networks, systems control and operation daily within the realm of the energy cluster, as well as decision-making and governance (at different levels).

Key Resources

The key resources for the Polish energy clusters are its members (e.g. municipalities or SMEs), as well as available funding, such as grants from the European Union or local environmental funds from Polish entities. Additionally, knowledge is a key resource, especially when it comes to biomass plants, as such are usually less prominently distributed compared to PV plants. Such knowledge is necessary for RECs, as biomass can be employed almost anywhere.

Key Partners

Similar to the key resources, the key partners are again the members of the energy cluster. Especially municipalities and public entities play an important role here, as enablers of a REC: The municipality was the originator and initiator of the project in Michałowo. It assisted in obtaining funding and land for the biogas plant and solved operational problems. The municipality functioned as a strong local enabler of the REC.

Joining the energy cluster is fairly simple: A completed declaration of participation has to be submitted to be part of the cluster's activities. This is a low-barrier way of joining the cluster and therefore enables wide participation with a multitude of partners.

Customer Segments

The customer segment is made up of SMEs, public entities and municipalities.

Customer Relations

The customer relations are characterized by direct sales to the customers (B2C), 24/7 customer support provided by an established retailer as well as the possibility to participate in new energy projects within the cluster.

Channels

Established channels are employed for communication: Social media and a website. Additionally, articles in the local press and public events provide the opportunity to engage with shareholders and potential new members and customers.

Cost Structures

The following costs require consideration: System acquisition, implementation of energy infrastructure, operation of energy plants and maintenance costs. Additionally, fees apply for using the public distribution and transportation for the electricity and heat grid. RECs or energy cooperatives that act as local DSOs do not need to consider such fees.

Revenue Streams

Revenue can be generated via the sale of surplus electricity and heat. Additionally, energy supply services can be used to generate revenues.

5. Conclusion

The report aimed to assess the transferability of business models from a good practice case to another context in the EU. According to RED II, Renewable Energy Communities should act beyond the purely economic purpose and also deliver ecological and social effects. As this requires special approaches for business models and high professionality, this represents a big challenge for most civic energy cooperatives or communities. The report also focused on these key aspects. As Ahlgren Ode & Lagerstedt Wadin (2019) argue, it is necessary to facilitate the implementation of citizen energy projects by translating and adapting successful practices instead of only disseminating them. Adaptation to national and market circumstances is necessary to establish a well-functioning and sustainable business model for RECs.

It is hard to argue that, although RECs should not act purely based on economic grounds, such motives still play a major role in any REC project, as these projects need to be self-sufficient and run sustainably (Schwarz et al. 2022). Factors such as the return of investment by benefiting from cheaper energy supply, selling surplus generation or participation shares, or self-consumption are vital but can be enriched in a business model by addressing non-monetary benefits, such as local generation, mitigation of energy poverty, decarbonisation and decentralisation of energy production, inclusiveness of sustainable development and other social targets that centralized energy companies are not able to capture or consider within their business models. As Sgroi et al. (2018) argue, it is necessary to have a business model for RECs that is based on diverse income levels on the economic side, but also on the embeddedness in the local contexts. The stakeholders involved in the transfer workshops agreed with this statement and emphasized the possibilities and synergy effects that a successful business model can open up.

The report showed a broad range of factors that can influence business models for energy communities and collective actions. Such factors have to be properly considered. For example, a solid economic base is also necessary for a REC to even be able to initiate social and ecological measures. For RECs, the national regulatory framework and access to financial resources are very important. A combination of approaches, however, might be needed to achieve a viable business model. Socio-cultural and economic factors are equally significant for RECs. Furthermore, contractual conditions and governance structure are a base to enable a fair distribution of benefits.

The presented business models for RECs cover a wide range of possible activities. Several trends emerged. All analysed business models provide the opportunity for self-consumption and the sale of surplus electricity or heat. The surveyed energy communities aim to engage citizens in local energy

generation to achieve some autonomy from the public power grid and profit from the sale of surplus energy as well as to achieve societal benefits even beyond the renewable energy production and sale. Most of the existing projects are financially supported by local investors, who are simultaneously involved as asset owners, investors and consumers. In addition, energy communities that allow communities to control their distribution network, can optimally manage locally generated resources, develop local energy markets and provide integrated e-mobility services.

Municipalities as members of an energy community have a key role to play in promoting and facilitating the elaboration and later implementation of energy community concepts. Municipalities can act as potential landowners, local planning bodies (zoning, development planning) and permitting authorities, but also as potential investors and shareholders, potential funders, facilitators, networkers (recruit members) and awareness raisers. Municipalities were regarded as key partners for all the analysed business models. An important part of the operation of energy communities is tackling energy poverty, although this is not always a direct goal. REC members, such as municipalities, can benefit from lower electricity and heat prices. The energy community can offer reduced prices to the municipality and public buildings, including schools, but also vulnerable households, thus fulfilling a social target based on economic activity.

It should be emphasized that there is no one-fits-all-solution, but minimum conditions need to be fulfilled to be able to create RECs and use specific business models successfully and sustainably. If a transfer case is taken as an example, adjustments to local, national, and market-related contexts are always necessary, as the prerequisites still greatly vary all over the European Union, due to the unequal progress of the transposition of RED II.

The best business models for RECs are those involving citizens in joint activities. The example of the Dutch-German transfer of the Energy Garden has shown how mapping values helped to gain acceptance and identification with a local RES project. It is the citizens, unlike profit-oriented companies, who can create non-monetary values. Due to the participation of the local population in energy communities, the level of environmental awareness can increase, thus enabling the formation of a local society that warrants the protection of the environment. In this study, only the energy cluster in Michałowo (Poland) does not involve citizens directly. This is due to the lack of legal obligations as well as the lack of incentives and benefits for the members.

For renewable energy communities to develop and offer their members the ability to share the energy that is produced by their community-owned installations among themselves, energy self-sufficiency, control, or the ability to participate in energy markets and reap the financial benefits, the RED II directive needs to be swiftly transposed into national legislation. This study is congruent with a multitude of existing studies: Denktas et al. (2018) argue that peer-to-peer models are necessary to further advance RECs. Engelken et al. (2016) address that policy-makers have to address energy self-supply, as energy cooperatives (and thus RECs) have the potential to handle the increasing complexity of local energy systems. We argue that support from policy-makers is necessary, especially in the initial phase of a

REC, thus in the phase, when the business model is set up. As citizens are usually non-professional actors that want to participate in local energy generation, economic and management skills are not sufficiently available. Organizations, such as energy agencies, can help to bridge this gap and provide a platform to transfer successful business models developed elsewhere. Therefore, we agree with the conclusion of Herbes et al. (2021) that policy-makers have to create such networking platforms, to facilitate the spread of successful business models and speed up the development of local, autonomous RECs.

Our report has shown that the transfer of successful business models is generally regarded as feasible, given some adaptations. This is a promising result for the spread of RECs in the EU. A necessary precondition is the complete transposition of RED II in all member countries of the EU, as the regulatory framework still greatly varies between the member states. Additionally, all the analysed business models have strong local ties, a fact that emphasizes the societal and ecological effects of RECs. Especially ameliorating the conditions for Energy Sharing needs to be enhanced in the EU legal frameworks: This is an integral element and lends a business model robustness, as it opens up other sources of value proposition and revenue streams.

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7. Annex

1. Template of questions regarding the Business Model Canvas for contributing partners

1. **Value Propositions:** Products and services a business offers to meet the needs of its customers.
    a. What is unique that is available to customers?
    b. Why do customers buy from your business?
    c. Which classes are you creating values for?
    d. What unique service do you offer to your customers?
2. **Key Activities:** The most important activities in executing an organization's value proposition.
    a. What are the main functions of the organization?
    b. What does your organization do?
3. **Key Resources**: The resources that are necessary to create value for the customer. These resources could be human, financial or physical.
    a. What are the main assets and resources for the business?
    b. What do you need to be able to satisfy customers' needs?
4. **Key Partnerships**: includes all the key stakeholders that the business requires to be able to perform its activities. These may include manufacturers, suppliers and other businesses in the same category of other entities that a business can collaborate with.
    a. Who are the main stakeholders?
    b. What are the motivations for the partnerships?
5. **Customers Segments:** To build an effective business model, a company must identify which customers it tries to serve. Various sets of customers can be segmented based on their different needs.
    a. Who are the major customers of the business?
    b. What do customers say about the business?
    c. Are there any important customers?
6. **Customer Relationships:** this involves all the activities that are undertaken to motivate and impress customers. Different market segments have different relations which the business should identify and maintain.
    a. What is done to maintain customers?
    b. What incentives and rewards are available for customers?
7. **Channels:** These are the means by which the goods and services reach customers. Recently modern technologies have been used to easily and effectively reach customers.
    a. What channels are used to reach customers?
    b. What alternatives are available to reach customers?
8. **Cost Structure**: describes all costs incurred to operate a business model. Such costs include the costs incurred during the creation and delivery of value, enabling customer value and getting income.
    a. What are major cost drivers? How are they linked to revenue?

b. What are the main expenses for the business?

9. **Revenue Streams:** The way a company makes income from each customer segment.
   a. What are the main sources of revenue?
   b. What is the business doing to get more income?

2. Template of questions regarding the Business Model Canvas for contributing partners

- **Value Proposition**
  The 'unique value proposition' of a business model for REC/ energy community is that next to the economic value, environmental and social values are important as well.
  ☐ Energy self-sufficiency.
  ☐ Offsite energy generation and supply.
  ☐ Control and decision-making over energy supply.
  ☐ Customized energy services solutions.
  ☐ Opportunity to participate in energy markets and to benefit financially from it.
  ☐ Control and decision-making over energy generation technologies.
  ☐ Sharing of investments (e.g. collective generation).
  ☐ Local job creation and skills.
  ☐ Tackling energy poverty by increasing energy security through the community approach.
  ☐ Others

- **Key Activities**
  Most of the 'key activities' building the basis of a potential business model include energy generation (onsite and offsite), consumption, sharing, trading, management, distribution and supply, as provided in the European directives. Additionally, all the backstage activities (as daily operation, repair and maintenance, marketing, recruitment of new members, etc.) must be considered since they are key in supporting the projects over time.
  ☐ Generation and supply.
  ☐ Systems control and operation in a daily basis.
  ☐ Demand aggregation and sales to system operators.
  ☐ EE and mobility services.
  ☐ Energy sharing.
  ☐ Collective consumption.
  ☐ P2P trade.
  ☐ Members recruitment.
  ☐ Decision-making and governance (at different levels).
  ☐ Others

- **Key Resources**

  Key resources include technologies, human capital (with citizens becoming active consumers and promoting innovation), as well as space needed for installation of technologies.
  ☐ Members.
  ☐ Available funding
  ☐ Regulatory framework

☐ Public incentives
☐ Expertise of cooperatives
☐ Skills
☐ Financing
☐ Knowledge
☐ Individual members
☐ Others

- **Key Partners**
  Key partners include stakeholders that are involved with energy communities and collective actions but are not their members or stakeholders. These can include municipalities, DSOs, service or technology providers. Energy service providers including ESCOs for example may operate the energy community or collective action in technical terms, such as installing technologies, providing for energy sharing or data management. Also housing associations may be important as they already have an organizational structure among consumers that energy communities can build on.
  ☐ Members.
  ☐ Homeowner associations.
  ☐ Technology manufactures.
  ☐ Technical staff (engineers, accountants, etc.).
  ☐ External partners.
  ☐ NGO's.
  ☐ DSO and network operations.
  ☐ Others:
  ☐ Municipalities and public entities:

- **Customers Segment**
  The 'members segment', as defined by the IEMD and RED-II, may include households, SMEs and public institutions. Since not all countries have transposed the directives, membership of other entities is allowed.
  ☐ Households
  ☐ Self-consumers
  ☐ Multi-tenancy buildings
  ☐ SMEs
  ☐ Public entities
  ☐ Municipalities
  ☐ Others

- **Customer Relationship**
  Member relationships refer to the governance the energy communities and member relationships in the case of energy communities, in case of collective actions also to external customers.
  ☐ B2C: direct sale to end users
  ☐ B2B: indirect sales through the customer networks of partners
  ☐ 24/7 customer support provided by an established retailer
  ☐ The governance defined by the statues of the apartment association

☐ Social housing companies with well-established governance structure for their members
☐ Personalized communication of program benefits to small enterprises
☐ Upgrade plans for personalized reports through the company's app
☐ Sponsored public events and societies
☐ Possible participation in new energy projects
☐ Digital platform
☐ Others

- **Channels**

Information sharing and communication are vital elements of the proposed classification. One area where energy communities and collective actions need to be very attentive is communicating technical information to non-technical audience, e.g., members of the energy community or participants in a collective action. This requires a deep understanding of the subject, and additional resources spent by an initiative on information campaigns, brochures or leaflets.

☐ Leaflets for broad audience
☐ Social media
☐ Information campaigns
☐ Website
☐ Others

- **Cost structures**

All the business models fixed costs, incurred over the project lifetime (as energy procurement costs, if the project cannot guarantee the total supply of energy to its members and acquires energy from third parties, technology and land acquisition costs, rents, interest expenses, assets depreciation, etc.), and variable costs (as wages and other monthly operating costs). Communities using public distribution or transportation structures must also include the payment of use-off system tariffs.

☐ System acquisition, implementation, operation and maintenance costs
☐ Payment of fees for using public distribution or transportation power networks (except for energy cooperatives acting as local DSO)
☐ Others

- **Revenue streams**

Revenue streams for the consumers include reduced energy costs but also returns on investments. Service providers or aggregators may achieve revenues from offering flexibilities on markets.

☐ Selling of surplus generation
☐ Energy supply services
☐ Demand flexibility
☐ Selling of EE and E-mobility services
☐ Selling of participation shares
☐ Others

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PARTNERS

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