

# Shifting paradigms in practice?

Investigating the compatibility of Germany's energy cooperatives with  
sustainable degrowth

**Leon Bartling**

Supervisor

Frans Libertson

Thesis for the fulfilment of the  
Master of Science in Environmental Management and Policy  
Lund, Sweden, May 2023



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Published in 2015 by IIIIEE, Lund University, P.O. Box 196, S-221 00 LUND, Sweden,  
Tel: +46 – 46 222 02 00, Fax: +46 – 46 222 02 10, e-mail: [iiiiee@iiiiee.lu.se](mailto:iiiiee@iiiiee.lu.se).

ISSN 1401-9191

## **Acknowledgements**

I would like to start by expressing my sincere gratitude to my thesis supervisor, Frans Libertson. Thank you very much for your continuous support throughout this thesis journey. Our regular check-in meetings, the discussions we had and all of your supportive and motivating words helped me enormously, gave me the necessary confidence, and kept me going. Thank you so much for your support, Frans!

Next, I would like to thank all the participants of my research project. Thank you so much for taking the time and sharing your experiences and perspectives with me. It has certainly helped me to better understand the business model, current challenges, and opportunities of community energy projects in Germany. It is truly inspiring to see with how much passion and drive you are facilitating the decentralised energy transition in Germany.

I would also like to thank my partner, Lena. Thank you so much for your support throughout this thesis process (and beyond). Thanks also to my family for supporting me during my studies and always believing in me. A special thanks also goes to Sören and Simon for your valuable feedback.

Finally, I would like to thank the entire Batch 28 for this exciting, challenging, sometimes frustrating, but ultimately absolutely rewarding and great experience in Lund. It has been an absolute pleasure to meet so many inspiring and value-driven people. Thanks also to the IIIEE, all of the staff and teachers for providing such an amazing learning environment over the past two years.

## **Abstract**

The concept of sustainable degrowth presents itself as a normative response to some of the most pressing socio-ecological challenges of our time. The energy sector plays a prominent role in the degrowth debate, however, there is limited conceptual and empirical understanding of how energy production and consumption might look like from a degrowth perspective and which actors might be compatible with the degrowth ideals. Renewable energy cooperatives are widely recognised as an important actor in facilitating a decentralised and participatory transition to renewable energy. Although research has highlighted the commonalities between community-based forms of energy production and degrowth, their potential for putting degrowth into practice is subject to an ongoing debate. This study aims to better comprehend the relationship between renewable energy cooperatives and degrowth by developing a conceptual degrowth framework for community energy and translating the broad degrowth vision into operationalisable elements for this particular actor. By conducting twelve qualitative, semi-structured interviews and a complementary document analysis, this study then applies the framework and explores to what extent renewable energy cooperatives in Germany are already compatible with the degrowth vision. This study also sheds light on drivers and barriers that are influencing the ability of renewable energy cooperatives to pursue degrowth. The results show that the renewable energy cooperatives could currently be considered as being partially degrowth compatible. While this actor did not explicitly strive towards degrowth, their compatibility with the degrowth vision was observable in terms of being locally embedded, strongly purpose and not profit-driven, open to collaboration and striving for independence and community wellbeing. However, other key elements of degrowth, such as the promotion of demand-side energy sufficiency or the deviation from organisational growth, were only evident in practice to a limited extent. Several practical and structural factors, as well as tensions between degrowth elements, were found to influence the ability of community energy cooperatives to put degrowth into practice. Researchers, policymakers, and businesses who are researching degrowth at the micro level and are interested in implementing degrowth policies or strategies in practice can learn from the framework, its practical application, and the potential challenges and drivers for implementing degrowth.

**Keywords:** Degrowth, community energy, cooperatives, renewable energy transition, degrowth framework for community energy

## **Executive Summary**

### ***Problem Definition***

In the face of a pressing climate emergency and the global overshooting of multiple planetary boundaries, largely caused and exacerbated by the growth imperative of the current economic system, sustainable degrowth as a democratic downsizing of production and consumption in countries of the Global North while enhancing societal wellbeing (Schneider et al., 2010), presents itself as a normative response to address some of these socio-ecological challenges. To date, the academic degrowth debate has largely revolved around macro-level policies and changes in regulatory and institutional framework conditions that are needed to facilitate a degrowth transition. In contrast, much less conceptual and empirical attention has been paid to the implications for and role of micro-level actors, such as businesses. However, as businesses can be identified as a key driver of economic growth, there is an urgent need to explore the interrelationship between degrowth and businesses. While there have been initial attempts to do so, the literature suggests that empirical evidence should be gathered from organisations that may already be successfully implementing degrowth strategies and elements today, in order to facilitate learning on how to best put degrowth into practice.

The energy sector plays a prominent role in the degrowth debate, as economic growth is highly dependent on energy consumption, and its production contributes significantly to global greenhouse gas (GHG) emissions. While it is widely recognised that a rapid transition to renewable forms of energy is necessary, research on how energy production and consumption might look like in a degrowth society, and in particular, which actors might be suitable to ensure energy production in such a system, remains limited. Renewable Energy Communities (RECs) are widely recognised as an important actor in facilitating a decentralised and participatory transition to renewable energy, both among researchers and policymakers. Several scholars have highlighted that there might be some common ground between decentralised, community-based forms of energy production, particularly those governed in the legal form of cooperatives, and degrowth. However, to date, there is very limited understanding of how degrowth could be conceptualised for RECs and mixed empirical data on whether RECs in Germany as a specific form of business could be compatible with the degrowth vision and thus be considered as an actor that could put the degrowth vision into practice.

### ***Aim and Research Questions***

In order to address this dual research gap, the overarching aim of this study is to better comprehend the relationship between degrowth and RECs operating in the legal form of cooperatives in Germany. More specifically, the study aims to investigate whether, to what extent and in what form, RECs in Germany are already adopting certain degrowth elements in their organisational practices in order to subsequently analyse their degrowth compatibility. For this purpose, the study develops and applies its own conceptual degrowth framework for community energy, which intends to translate the broad degrowth vision into operationalisable elements that illustrate what degrowth for RECs would entail and how RECs could contribute to achieving degrowth in practice. Finally, the study aims to identify key drivers and barriers that influence the ability of RECs in Germany to adopt those degrowth elements. The study answers the following three research questions (RQ):

- *RQ1: How can degrowth be conceptualised for RECs?*
- *RQ2: Which degrowth elements can be identified in the organisational practice of RECs, to what extent and in what form?*
- *RQ3: What are the main drivers and barriers for RECs to adopt degrowth elements?*

## ***Research Design***

This study adopts a qualitative, multiple-case study research design. A qualitative approach was considered appropriate for exploring the relatively new research area and for gaining an initial understanding of the multifaceted phenomenon under study. The research process and associated design choices can be divided into two main parts. The first part of the research, which informs RQ1, involves the development of a comprehensive and holistic literature-based, qualitative framework. The framework aims to conceptualise what degrowth would concretely entail for RECs by translating the broad degrowth vision and principles into operationalisable degrowth elements that can help to a) analyse the compatibility of RECs with the degrowth vision and b) indicate how RECs can contribute to achieving degrowth in practice. The conceptual framework was developed based on a comprehensive literature review and desktop research on three core typologies identified in the literature: 1) general degrowth principles and values, 2) degrowth business elements, and 3) characteristics of a degrowth energy system. The core themes that emerged in the literature were compiled, synthesised, and organised according to seven organisational dimensions and 14 degrowth elements, which together form the degrowth framework for community energy. The framework informed the data collection and analysis for RQ2 and RQ3.

In the second part of the thesis, 12 semi-structured interviews were conducted with representatives of RECs in Germany in which the degrowth framework for community energy (RQ1) was applied in order to answer RQ2 and RQ3. The interviews provided in-depth, nuanced insights and perspectives on whether, to what extent and in what form the pre-defined degrowth elements can already be identified in the practice of RECs, indicating their degrowth compatibility. In addition, the qualitative semi-structured interviews were used to explore drivers and barriers RECs perceive when applying degrowth practices. A complementary document analysis of publicly available REC documents was conducted to complement the qualitative interview findings, further contextualise the case study organisations and enable data triangulation. The collected data was then analysed by means of a thematic content analysis (TCA) using a deductive-inductive coding approach.

## ***Results***

The results for RQ2 suggest that although the interviewed RECs did not explicitly refer to degrowth as one of their objectives, several degrowth elements were observed in their organisational practices. However, the extent to which the pre-defined degrowth elements were evident and the associated strategies for implementing them varied considerably across the case study organisations. Each REC fulfilled at least some of the degrowth elements, but no REC was fully compatible with the degrowth vision. Some of the degrowth elements were clearly evident in the practice of several RECs, highlighting their degrowth compatibility in these specific areas. In this respect, RECs were found to be strongly embedded in their local community contexts, collaborating openly with other actors to create regional economic value, social/cultural wellbeing and some level of independence and self-sufficiency from the current energy system. However, other key degrowth elements, such as the promotion of demand-side energy sufficiency in the customer/member relationship, the attempts to absolutely reduce the material and energy throughput, the deviation from organisational growth and the aim to promote energy justice, were not, or only to a very limited extent evident in the practice of the case study organisations. These overall mixed results underline the partial compatibility of RECs with the degrowth vision, which this study explains in terms of 1) the existence of key drivers and barriers affecting the ability of RECs to adopt certain degrowth elements and 2) complementary and conflicting relationships between some of the framework elements.

In relation to RQ3, a total of 17 external and internal drivers and barriers were identified that either hinder or enable RECs to put degrowth into practice. These include, for example, 1) the legal structure of cooperatives (internal driver), which enables democratic and collectively owned governance structures, 2) the strong network of RECs in Germany (external driver), which encourages open collaboration with other RECs, 3) the voluntary nature of RECs and limited resources (internal barrier) that compromises their ability to promote energy sufficiency and getting politically involved, and 4) the German energy policy context (external barrier), which favours larger-scale and profit-oriented forms of energy production, thus putting RECs under cost and profitability pressure. It was observed that these key drivers and barriers were often not tied to a single degrowth element but apply to several. The study also identified some conflicting and complementary relationships between different degrowth elements of the framework, which either positively or negatively affected their adoption. A key tension which was identified was that almost all of the interviewed RECs were striving for organisational growth (e.g., capacity, project size, membership, employees), as they considered it necessary to fulfil their core organisational purpose of accelerating a decentralised renewable energy transition or have sufficient resources to engage politically, which are two elements of the framework. However, this growth ambition also negatively impacted RECs' ability to align with other degrowth elements of the framework (e.g., aligning energy production with local energy needs), underpinning the complex and, in some cases, ambiguous relationship between degrowth and business.

### ***Conclusion and Recommendations***

This thesis aimed to better comprehend the relationship between degrowth and RECs by exploring whether this specific form of business is compatible with the degrowth vision and what factors might influence their ability to put degrowth into practice. First of all, when conceptualising degrowth and community energy, these two concepts were found to share some common ground, as several of the framework elements are closely related to key concepts discussed in the community energy context (e.g., energy justice and energy democracy). Furthermore, the variety of degrowth elements provides different entry points for RECs to engage with degrowth. Although the degrowth literature suggests cooperatives and RECs to be potential precursors of businesses that might be able to put degrowth into practice, the results suggest that this is only partially the case. The research also showed that some of the elements that were adopted relate to the nature and legal form of being a cooperative. Certain barriers, however, are systemic in nature and related to the growth mindset that is embedded in the current economic and energy system, which to some extent, prevents RECs from being more degrowth compatible. The study thus suggests that RECs as micro-level, bottom-up initiatives are important for envisioning how degrowth can be put into practice, but macro-level regulatory and policy changes that support degrowth actions on the ground are certainly needed as well to enable RECs to take a fully degrowth-compatible pathway.

Although this study has found RECs to be only partially degrowth compatible, it has attempted to provide a deeper understanding of what degrowth, as a multifaceted and abstract concept, concretely means for the energy sector, and in particular for decentralised and community-based forms of energy production. The degrowth research community, policymakers, RECs, and other businesses could learn from the practical implementation of those degrowth elements that are already observable today, but also from the challenges that RECs face in putting other parts of degrowth into practice. Future research could be dedicated to exploring the interrelationships between degrowth and RECs in other country settings, to better understanding the role of (degrowth-oriented) RECs in a society-wide transition towards degrowth or to exploring policies that would support degrowth action on the ground.

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## **Abbreviations**

AGM	Annual General Meeting
CO <sub>2</sub>	Carbon Dioxide
DRSC	Degrowth-Related Selection Criteria
EEG	German Renewable Energy Sources Act
EROI	Energy Return on Investment
EU	European Union
GDP	Gross Domestic Product
GHG	Greenhouse Gas
kWh	Kilowatt-hour
MF	Material Footprint
NET	Negative Emissions Technologies
OECD	Organization for Economic Cooperation and Development
PJ	Petajoules
PV	Photovoltaic
REC	Renewable Energy Community
RQ	Research Question
TCA	Thematic Content Analysis
UN	United Nations



# 1 Introduction

## 1.1 Background

### ***The urgent need for an alternative to the current economic system***

Humanity is facing a multi-dimensional ecological crisis: climate change is intensifying, biodiversity loss is accelerating, and many natural ecosystems are under extreme stress (IPCC, 2023; Ripple et al., 2021; Rockström et al., 2009; Steffen et al., 2015). The natural systems that sustain life on Earth are being pushed to their limits, with humanity having just recently exceeded the fifth and sixth out of nine planetary boundaries (Persson et al., 2022; Wang-Erlandsson et al., 2022). Scientists have warned that irreversible and non-linear environmental consequences could be a result of humanity surpassing these “safe operating space[s] for humans in relation to the Earth system” (Rockström et al., 2009, p. 472). Anthropogenic activities taking place within the global capitalist economic system are at the very core of this problem, as the current economic system is highly dependent on continuously increasing production and consumption levels, ultimately leading to higher resource and energy use and associated greenhouse gas (GHG) emissions (Haberl et al., 2020; Hickel & Hallegatte, 2022). There is a clear relationship between economic growth (measured as GDP), natural resource consumption (measured as the material footprint<sup>1</sup> (MF)) and GHG emissions (measured as CO<sub>2</sub>), resulting in adverse environmental and social consequences (Steinmann et al., 2017; Wiedmann et al., 2020). Therefore, the critical question remains whether and how it is possible to decouple<sup>2</sup> global MF and GHG emissions from economic growth in the remaining timeframe available to stay on a 1.5°C pathway and respect planetary boundaries (Parrique et al., 2019).

While the need to rapidly decarbonise and dematerialise the economy is increasingly recognised (IPCC, 2023; Kallis, 2017), the question of how to best achieve this transition has led to a controversial debate between proponents of ‘green growth’ and those of ‘post-/degrowth’ (Buch-Hansen & Carstensen, 2021; Hickel & Kallis, 2020). Many international organisations and institutions, such as the European Union (EU) or the Organization for Economic Cooperation and Development (OECD), follow a green growth paradigm, which promotes the narrative that decoupling economic growth from GHG emissions and resource consumption is achievable through the use of market-based instruments and the large-scale deployment of resource- and energy-efficient technologies (Capasso et al., 2019; Hickel & Kallis, 2020). As a result of the abovementioned measures, researchers have identified indications for global relative decoupling of GDP growth from GHG emissions and MF (Haberl et al., 2020; Hickel & Kallis, 2020). However, there is no long-term evidence that it would be possible to achieve absolute and permanent decoupling of GDP from GHG emissions and MF on a global scale and within the short timeframe that is left to stay within planetary boundaries (Haberl et al., 2020; Hickel & Kallis, 2020; Parrique et al., 2019; Vadén et al., 2020; Wiedmann et al., 2020). As a result, scholars are urgently calling for a fundamental transformation of and alternatives to the current economic system (Hickel & Kallis, 2020; Parrique, 2019; Schmelzer et al., 2022). Embedded in the field of ecological economics, post-growth scholars examine various alternative economic models that challenge the growth hegemony of the global capitalist economic system and seek to embed the economy within environmental and social boundaries (Kallis et al., 2018; Schmelzer et al., 2022). One such alternative is the normative concept of

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<sup>1</sup> "Material Footprint (MF) is the attribution of global material extraction to domestic final demand of a country while the total MF is the sum of the material footprint for biomass, fossil fuels, metal ores and non-metal ores" (UNEP, n.D.).

<sup>2</sup> Decoupling refers to the desynchronisation between two variables and can either be absolute or relative. Relative decoupling indicates that GDP growth and MF/GHG emissions move in the same direction but not at the same rate, while absolute decoupling indicates that they move in different directions (Parrique et al., 2019).

sustainable degrowth<sup>3</sup>, which represents the idea of equitably and democratically downsizing production and consumption levels in industrialised countries of the Global North to reduce energy and resource throughput while enhancing human wellbeing (Hickel, 2021; Schmelzer et al., 2022; Schneider et al., 2010).

### **The energy sector**

The energy sector features prominently in the degrowth debate (Rommel et al., 2018; Tsagkari et al., 2021). This is because GDP growth is highly dependent on energy consumption (Dai et al., 2022; Stern, 2011), and energy production contributes significantly to global GHG emissions. The EU's energy sector alone contributed 25% of the bloc's total GHG emissions in 2020 due to its persistently high dependence on fossil fuels (Eurostat, 2023). The large-scale expansion of renewable energy production and distribution systems is thus considered to be a crucial strategy for successfully mitigating climate change (IPCC, 2023). However, according to a study by Nieto et al. (2020), the technological transition from fossil fuel-based to renewable energy systems alone will not be sufficient to stay on a Paris-aligned pathway. This is because “growth increases energy demand, making the transition to renewable energy more difficult” in the remaining timeframe left to stay on the 1.5°C pathway (Hickel & Kallis, 2020, p. 12). Additionally, the energy return on investment (EROI)<sup>4</sup> for renewable energy is significantly lower than for fossil fuels, which makes it more difficult to simply substitute the increasing demand for energy with renewables (Mastini et al., 2021). Therefore, in addition to the supply-side substitution of fossil fuels with renewable energy technologies, several scholars increasingly call for the consideration of degrowth scenarios based on reduced energy production and consumption levels (Grubler et al., 2018; Keyßer & Lenzen, 2021; Nieto et al., 2020), which would fundamentally transform the way energy is produced, distributed, and consumed.

The energy systems of many countries, including Germany, have traditionally been characterised by large-scale and centralised energy production and distribution structures (Bauwens et al., 2022; Schmid et al., 2016). In recent years, however, decentralised and community-based forms of energy production, often referred to as Renewable Energy Communities (RECs), have attracted political and academic attention. Although there is no universal definition of community energy, RECs can be defined as local, citizen-owned, and controlled initiatives focused on producing and distributing renewable energy, both in the form of electricity and heat (Bauwens et al., 2022; Seyfang et al., 2013). RECs aim to decentralise energy generation and promote the participation and democratisation of renewable energy production, distribution, and consumption (Bauwens et al., 2022; Hanke et al., 2021; Krug et al., 2022). Previous research suggests that RECs are often collectively run and owned, incorporate democratic forms of governance, are deeply embedded in their community context, and can thus build local acceptance for the energy transition (Hanke et al., 2021; Klagge & Meister, 2018; Krug et al., 2022). Although several scholars have identified some common ground and started to explore RECs from a degrowth perspective (Kunze & Becker, 2015; Rommel et al., 2018; Tsagkari et al., 2021), the interrelationship between degrowth and community-based forms of energy production and consumption remains under-researched.

## **1.2 Problem definition**

This study addresses a twofold, interdisciplinary research gap that arises from two different strands of research. The first gap stems from the organisational literature on degrowth, which indicates the need for a profound conceptual understanding of the relationship between

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<sup>3</sup> This definition refers to sustainable degrowth. For the sake of simplicity, the term degrowth will be used in the following.

<sup>4</sup> EROI can be understood as „the ratio of the amount of usable energy delivered from a particular energy resource to the amount of usable energy used to obtain that energy resource“ (Mastini et al., 2021, p. 3).

degrowth and business and more empirical evidence on different types of businesses that might already be successfully adopting degrowth strategies today. The second research gap arises from the research field of renewable energy and degrowth and calls for a better understanding of how degrowth might be conceptualised for community-based forms of energy and which actors in the energy sector might be compatible with the degrowth vision. The following chapter discusses these two research gaps in more detail.

### **Degrowth and the role of businesses**

First, it has been observed that although degrowth research has grown over the past decade (Kallis et al., 2018), the focus has primarily been on exploring the macroeconomic and policy implications required for a transition towards degrowth (Cosme et al., 2017; Fitzpatrick et al., 2022; Hardt & O'Neill, 2017). Meanwhile, the role of and implications for micro-level actors, such as business organisations, in a transition towards degrowth have largely been overlooked (Hankammer et al., 2021; Khmara & Kronenberg, 2018; Nesterova, 2020). Only recently researchers have started exploring and conceptualising the relationship between business and degrowth by theorising and defining concrete degrowth elements, which mark a first attempt to translate the degrowth vision into more applicable strategies and general business principles<sup>5</sup> (see Table 3-2) (Banerjee et al., 2021; Hankammer & Kleer, 2018; Hankammer et al., 2021; Khmara & Kronenberg, 2018; Nesterova, 2020; Raith, 2021).

However, as business organisations play a crucial role in the current economic system by influencing the nature and scale of production and consumption and driving economic growth and capital accumulation, researchers have emphasised the importance of further conceptualising and empirically exploring this interrelationship (Hankammer et al., 2021; Johansova et al., 2013; Khmara & Kronenberg, 2018; Nesterova, 2020). In particular, there is a need to explore how the concept of degrowth can be conceptualised for different types and forms of business organisations and gather empirical evidence of specific business forms already successfully implementing degrowth strategies today (Hankammer et al., 2021; Johansova et al., 2013; Nesterova, 2020). In this regard, Hankammer et al. (2021, p. 14) stress that “organizations explicitly striving for degrowth should be assessed in further research”, and this is precisely what this study aims to do. An appropriate research focus to address this gap would be to examine a specific type of business closely aligned with the ideals of degrowth in a particular industry and country. This would allow for a deeper understanding of the contextual drivers and barriers and ensure comparability across the case-study organisations included in this research project. Therefore, the choice was made to focus explicitly on one type of business in one specific country context, namely RECs in the legal form of cooperatives in Germany. As a specific form of business that already seems quite close to the ideals of degrowth, “small-scale, community-owned or local renewable energy projects are [...] interesting studies to investigate from a degrowth perspective, as they combine low-scale energy systems, often with a sufficiency orientation and, potentially, elements of democracy and local control” (Tsagkari et al., 2021, p. 1). According to Kunze and Becker (2015, p. 425), this particular type of business can thus be seen as a “potential precursors of a sustainable degrowth society”. Understanding this interrelationship is highly relevant as the literature suggests that systemic, transformative change towards degrowth requires both top-down and bottom-up initiatives (Asara et al., 2015; Schmelzer et al., 2022), implying that business organisations themselves can potentially be seen as an important bottom-up agent for systemic change.

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<sup>5</sup> In this study, degrowth elements are understood as concrete strategies and business principles that help to 1) translate the broad degrowth vision into more applicable strategies for organisations to illustrate how degrowth can be put into practice, and 2) assess whether particular businesses are already compatible with the degrowth vision. Table 3-2 provides an overview of several degrowth elements identified in the literature.

## **Degrowth and RECs**

Secondly, only a few studies have examined RECs from a degrowth perspective to date, suggesting that research on this particular relationship remains limited. The studies that have been conducted so far show mixed results regarding the extent to which RECs might already be aligned with the degrowth vision (Alarcón Ferrari & Chartier, 2018; Kunze & Becker, 2015; Rommel et al., 2018; Tsagkari et al., 2021). First of all, these studies have focused on a limited number of degrowth elements and principles (e.g., localisation of production, strengthening of energy self-sufficiency) and have explored whether these elements are observable in the organisational practice of RECs. However, there is a clear lack of a conceptual framework that comprehensively covers a broader range of degrowth visions, practices, strategies, and elements that could be used to determine the degrowth compatibility of RECs. Hence, a logical first step for this research would be to comprehensively understand how degrowth can be conceptualised for RECs. This will be done by reviewing the existing literature on degrowth and businesses, subsequently synthesising this information into a conceptual framework and adjusting it to the specifics of the energy sector. Second, in terms of geographical scope, the only study to date that examined RECs in Germany from a degrowth perspective found RECs to be “at a crossroads” (Rommel et al., 2018, p. 1751). The researchers highlighted that RECs could either pursue a green growth path, for example, by focusing on technological innovation and larger, more profitable projects, or they could follow a degrowth path by staying small-scale, involving members directly and democratically, and promoting sufficiency in energy production and consumption (Rommel et al., 2018). The study by Rommel et al. (2018), a conceptual study with no empirical investigation, should be updated to investigate whether or not RECs can follow this degrowth path and thus be considered a degrowth-compatible form of business. Furthermore, Tsagkari et al. (2021, p. 58) emphasise “that future studies are needed to explore the potential of varied organizational models of energy for degrowth [and] the challenges they face”, which this study addresses by particularly exploring the degrowth compatibility of RECs in a cooperative organisational form, and investigating concrete drivers and barriers that might influence RECs ability to approach degrowth in practice.

To summarise, the research problem is rooted in the literature’s lack of conceptual and empirical understanding of the relationship between the degrowth concept and micro-level actors in the form of business organisations, in particular RECs. Empirical evidence of specific business forms that are aligned with the degrowth vision is urgently needed to facilitate learning from these best-practice examples. Furthermore, there is a limited understanding of how degrowth could be comprehensively conceptualised for community-based and decentralised forms of energy production. Finally, there is mixed empirical evidence on whether RECs can be understood as degrowth-compatible actors and what drivers and barriers may influence the ability of RECs to adopt degrowth practices. Exploring these interrelationships could help to illustrate what energy production and consumption might look like in a degrowth society.

### **1.3 Aim and Research Questions**

The overarching aim of this study is to better comprehend the relationship between degrowth and RECs, particularly those legally operating as cooperatives. More specifically, the study investigates whether renewable energy cooperatives are already aligned with the degrowth vision. In order to explore this interrelationship, this study aims to develop a comprehensive, literature-based degrowth framework for community energy and consequently applies this framework to RECs in Germany. The research problem identified above underlines the importance of empirically identifying best practice examples of business organisations that could be considered as already compatible with the degrowth vision. By conducting an in-depth, qualitative case study that applies the self-developed framework, the study aims to determine whether, to what extent and in what form RECs in Germany are already adopting certain



degrowth elements in order to identify their compatibility with the degrowth vision. The study further aims to explore the drivers and barriers that influence the ability of RECs to engage with and adopt concrete degrowth practices. In order to account for contextual factors, the study has been designed to focus exclusively on the German context. Based on the research findings and the resulting degrowth compatibility of RECs, the study aims to shed light on how energy production and consumption could look like in a potential degrowth society. The study aims to make a two-fold contribution. First, it aims to contribute to the growing body of academic research by investigating the interrelationship between business organisations, energy and degrowth and developing a new conceptual framework. Second, depending on the findings, the thesis aims to provide some practical insights into how degrowth can be put into practice and what challenges and opportunities might arise along the way. The research questions (RQ) and their rationale are summarised in Table 1-1.

*Table 1-1. Research questions and underlying rationale*

<b>Research Question</b>	<b>Rationale</b>
<i>RQ1: How can degrowth be conceptualised for RECs?</i>	RQ1 aims to identify and synthesise specific degrowth elements that should help to a) assess the degrowth compatibility of RECs and b) illustrate how to put the degrowth vision into practice. In order to answer RQ1, a literature-based, qualitative degrowth framework for community energy will be developed.
<i>RQ2: Which degrowth elements can be identified in the organisational practice of RECs, to what extent and in what form?</i>	RQ2 aims to determine the degrowth compatibility of RECs, by exploring whether, to what extent and in what form the degrowth elements included in the conceptual framework can be identified in the organisational practice of RECs.
<i>RQ3: What are the main drivers and barriers for RECs to adopt degrowth elements?</i>	RQ3 aims to explore the main drivers and barriers that influence the ability of RECs to incorporate the previously discussed degrowth elements.

*Source: Own illustration*

## 1.4 Scope and delimitations

The following section covers the scope and delimitations of this study, which limit the research focus and help to complete the research project within the given timeframe. First of all, this study exclusively focuses on Germany in terms of its geographical scope. This choice was made because of the country's ongoing and well-documented energy transition, in which community energy has played a central role (Kahla et al., 2017; Krug et al., 2022; Radtke & Ohlhorst, 2021). In the past decades, energy legislation in Germany (e.g., the Renewable Energy Sources Act (EEG)) has created favourable conditions for community energy projects to emerge. The last and most comprehensive survey of RECs to date has shown that around 1,800 renewable energy projects were registered by 2016 (Kahla et al., 2017). This high concentration of RECs provides a diverse sample to choose case study organisations from. Kahla et al. (2017) found that RECs are widely spread across Germany, with a higher concentration of wind projects in the North and West and PV projects in the South and East of the country. Therefore, it was not considered necessary to further narrow down the scope of the study to a specific region. Instead, RECs were chosen from across the country to make a diverse sample. Lastly, Germany was chosen because of the researcher's affiliation with the country and its language, simplifying the process of obtaining and conducting interviews.

In line with the study's aim of exploring RECs' degrowth compatibility, the deliberate choice was made to focus this research on RECs as actors operating on the micro-level. Even though it needs to be acknowledged that a degrowth energy transition will likely also involve other

actors at different levels (e.g., policymakers, movements, and other civil society organisations) (Khmara & Kronenberg, 2020; Kunze & Becker, 2015), including perspectives beyond those of RECs, would have been out of scope of this study. According to Kahla et al. (2017), RECs in Germany can take on different legal forms (e.g., cooperatives, limited liability companies). The degrowth literature identifies cooperatives as a promising organisational form for putting degrowth into practice (Johanisova et al., 2013; Johanisova et al., 2015). According to Cunico et al. (2022, p. 25), cooperatives “share similar values (e.g., people involvement and engagement, commons) [and] [...] adopt a form of governance in line with the degrowth principles (i.e., democratisation and decision-sharing)”. This justifies the study’s choice to focus exclusively on RECs operating in the legal form of cooperatives.

The last delimitation relates to the type of energy that the RECs generate. While RECs across Germany generate renewable energy in the forms of heat and electricity (Kahla et al., 2017), this study focuses primarily on RECs generating electricity. This was done because the number of RECs producing electricity is much higher than that of RECs producing heat, ensuring sufficient access to the field (Kahla et al., 2017). Additionally, it is assumed that the contextual factors for the decentralised production of renewable heat might differ from those for electricity. Therefore, if both RECs producing heat and electricity would have been included, the barriers and drivers may have varied and been incompatible, which would complicate answering RQ3. Therefore, the focus was placed on RECs generating electricity. Amongst the RECs producing electricity, the majority produce electricity from PV and wind (Kahla et al., 2017), which is why the study predominantly focuses on those two electricity sources. Lastly, the choice was made to interview REC representatives that hold either board member or advisory board member positions. This was done based on the assumption that this stakeholder group would most likely be best informed about the strategic direction and have a good overview of the different business dimensions of the organisation. The individual case study organisations were selected based on specific selection criteria listed in Table 5-1.

## 1.5 Ethical considerations

This thesis project was designed and conducted independently from any external funding or support that may have affected the integrity of the research process and the study outcomes (Creswell & Creswell, 2018). Prior to conducting the qualitative interviews, each participant received and signed an informed consent and participation form (see Appendix A). This consent form clearly explained the research project, its purpose, and the voluntary nature of participation. Furthermore, it outlined specific measures that would safeguard the participants’ privacy and personal data, the possibility to access the respective data throughout the research process and to withdraw the participation until a given cut-off date (25. April 2023) (Creswell & Creswell, 2018).

Throughout the study, a strong emphasis was placed on ensuring the privacy of participants and preventing them from any potential harm arising from their participation (Creswell & Creswell, 2018). Concretely, to prevent the personal identification of the interview participants, their names were anonymised and replaced with non-identifiable codes. However, all participants consented to the name of their organisation being disclosed. After having transcribed the interviews, the recording files (audio and/or video) were deleted and the written transcripts were safely stored on a password-protected hard drive. In order to prevent participants from any harm, participants were given the opportunity to provide feedback, raise concerns and review the transcription of their interviews (Creswell & Creswell, 2018). Finally, no outcomes were found in this study which could harm the reputation, dignity or privacy of participants or create false expectations.

## 1.6 Audience

The findings of this study are expected to be useful for the academic research community focusing either on degrowth in relation to businesses, grassroots initiatives, and other micro-level actors; or on the intersection of degrowth and decentralised forms of energy production. As the academic discourse in both fields is still in its infancy, this thesis aims to contribute to the emerging discussion and specifically contribute by developing a new conceptual framework.

The second core audience includes policymakers at different governance levels (including municipal, state, national- and EU levels) that are working on the energy system transition. Depending on the findings, the study might highlight RECs as being an actor that could help to put degrowth energy pathways into practice. Furthermore, the identification of specific drivers and barriers that RECs face when engaging with degrowth may indicate where policymaking can make a valuable contribution towards aligning this form of energy production with degrowth ideals.

Finally, the findings of this study could benefit RECs and other forms of businesses that are already working on alternative business models today. This study is expected to showcase concrete lessons, drivers, and barriers on how to put degrowth into practice, thereby inspiring business organisations to adopt strongly sustainable business practices. Similarly, these lessons could also be valuable for organisations that are interested in but have not engaged yet with sustainable business models, helping them to pioneer and develop their own sustainable business model transformation.

## 1.7 Disposition

**Chapter 1 (Introduction)** This chapter first introduces the research topic and its background and then presents the underlying research problem, aim and associated research questions. This is followed by an explanation of the study's scope, ethical considerations, and the audience.

**Chapter 2 (Background)** This chapter provides some background information on the German energy sector, key policy objectives, and some background information on RECs in Germany.

**Chapter 3 (Literature Review)** This chapter first conceptualises degrowth, synthesises existing literature on degrowth and business, provides an overview of key premises for an energy sector based on degrowth values and reviews the existing literature on degrowth and RECs.

**Chapter 4 (Conceptual Framework)** This chapter presents the degrowth framework for community energy, explains how it was developed, and describes its dimensions and elements.

**Chapter 5 (Research Design and Methodology)** This chapter outlines the research design of this study, including the methods used to collect and analyse the data.

**Chapter 6 (Results and Analysis)** This chapter presents and simultaneously analyses the main findings of the research in order to answer the research questions of this study.

**Chapter 7 (Discussion and Recommendations)** This chapter discusses the study's main results, particularly in the context of the existing literature. It also discusses the study's methodological choices, limitations, and its generalisability.

**Chapter 8 (Conclusion)** The last chapter summarises the main conclusions and points out some practical applications for the intended audience and potential avenues for future research.

## 2 Background on the German energy sector and RECs

This section provides some background information on the characteristics of the German energy sector, the main policy objectives related to the German and EU energy transition plans and the role of German RECs in the energy transition. This section focuses on the most relevant aspects for this thesis without attempting to provide a fully comprehensive overview.

### 2.1.1 The transition of the German energy sector

#### **Characteristics of the German energy sector**

Despite Germany's strong policy focus on shifting energy production and consumption towards renewable energy sources (BMWK, n.D.a), the country's primary energy consumption<sup>6</sup> remains highly dependent on imported fossil fuels (IEA, 2020). Figure 2-1 shows that fossil fuels such as oil, natural gas, and coal accounted for approximately 78% of the country's total primary energy consumption in 2022. In contrast, renewable energy sources accounted for only 17% (AGEB, 2022). The energy crisis caused by Russia's war on Ukraine has underlined Germany's continued reliance on these fossil fuel imports (e.g., natural gas imports from Russia), leading to highly volatile energy prices and the potential risks of lock-in effects in old natural gas-based technologies (Brauers et al., 2021; Wettengel, 2023). It is noteworthy that despite the roll-out of energy efficiency measures, primary energy consumption in Germany has hardly decreased since 1990 (Wagner et al., 2021), which can partly be explained by rebound effects, which are defined as the offsetting of energy efficiency gains by additional consumption in different areas (Parrique et al., 2019).

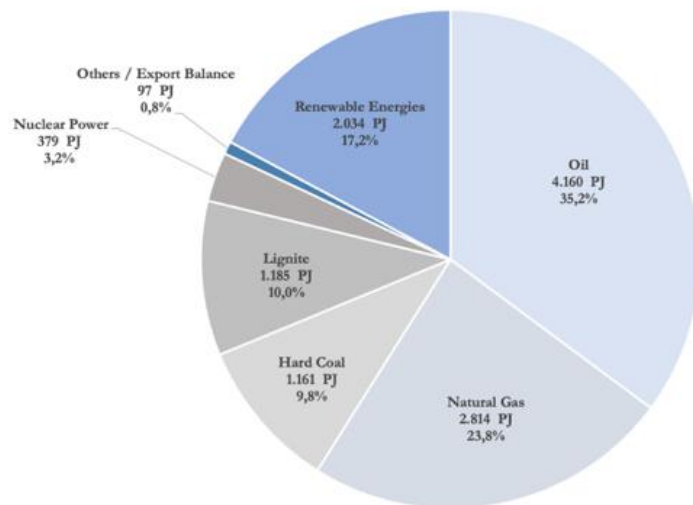


Figure 2-1. Share of energy sources in primary energy consumption in Germany in 2022 (in % and absolute PJ)

Source: Own illustration, Data from AGEB (2022)

Considering the electricity sector, which is the focus of this thesis (see Chapter 1.4), around 44% of total electricity production in 2022 was generated from renewable energy sources. Specifically, onshore wind and solar were the most important sources of electricity production in Germany, accounting for 17% and 11% of the total share of renewable energy production in 2022 (see Figure 2-2) (BDEW, 2022). Over the last ten years, the share of renewable energy sources in

<sup>6</sup> "Primary energy consumption measures the total energy demand of a country. It covers consumption of the energy sector itself, losses during transformation [...] and distribution of energy, and the final consumption by end users" (Eurostat, n.D.).

electricity generation has almost doubled to 44%, while the share of lignite and hard coal has decreased by about 13% and the share of nuclear energy by about 10% (BDEW, 2022). In terms of market concentration, the four largest energy companies in Germany, namely E.ON, RWE, EnBW and Vattenfall, continue to generate a significant share of electricity. However, efforts to liberalise the electricity market, for example, through the implementation of feed-in tariffs in the early 2000s, have significantly reduced the concentration of large players and increased the number of other actors in the market (Holstenkamp, 2021).

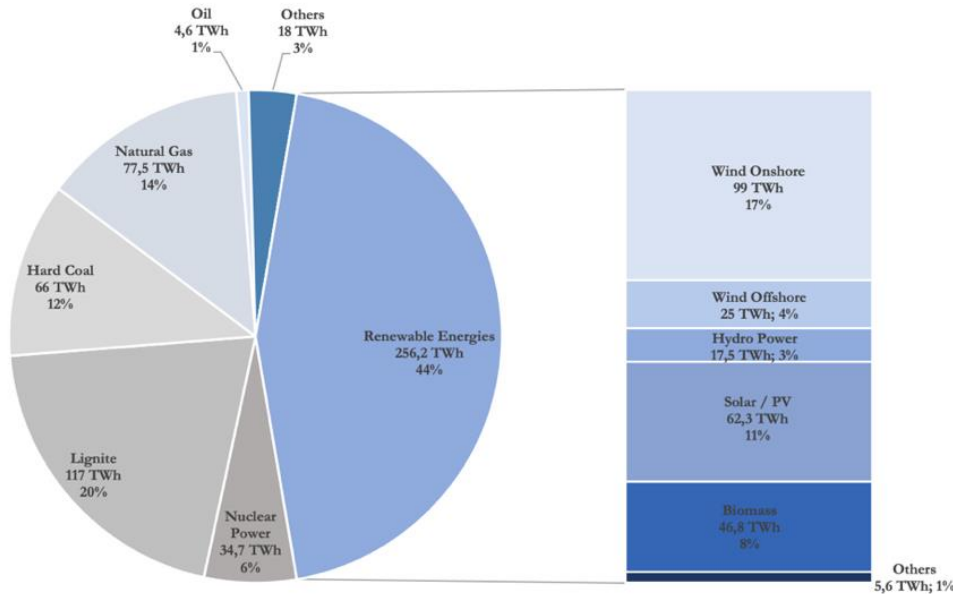


Figure 2-2. Germany's electricity generation mix 2022: Share of electricity generation (in % and absolute TWh)

Source: Own illustration, based on data from BDEW (2022)

### Policy objectives

The German government's long-term energy transition plans, often referred to as the 'Energiewende', outline how the country intends to achieve its energy transition to a low-carbon economy and meet its ambitious climate goals of reducing GHG emissions by around 90% by 2040<sup>7</sup>, achieving climate neutrality by 2045, and phasing out coal by 2038 (BMWK, n.D.b). To achieve these goals, the government is aiming for a fundamental and structural transformation of the German energy sector by focusing on two pillars: 1) reducing primary energy consumption by increasing energy efficiency and 2) increasing the share of renewable energy in energy production and consumption (BMWl, 2021). The electricity sector plays a central role in the overall energy transition. A 2022 amendment to the Renewable Energy Sources Act (EEG), Germany's key renewable energy legislation, stipulates that at least 80% of the country's electricity consumption should be generated from renewable sources by 2030. The German government aims to achieve this ramp-up in renewable energy by, for example, giving legal priority to renewable energy projects, increasing financial incentives for PV projects, and abolishing the EEG levy, thereby reducing the costs that renewable energy projects have to pay (BMWK, n.D.a).

<sup>7</sup> The reduction targets of the German Federal Government are based on the baseline year 1990 (BMWK, n.D.b).

Furthermore, the German government recognised that achieving these goals would not only require “a comprehensive transformation of the technical energy supply system and its regulation” (Radtke & Ohlhorst, 2021, p. 1) but also strategies to actively involve citizens in the transition (BMWK, 2022). By actively reducing barriers for community energy projects in Germany, the government tried to strengthen the bottom-up energy transition and involve a broader audience in decentralised energy production, distribution, and consumption at the local level (BMWK, 2022). Significant developments for RECs have also been observed at the EU level. The EU’s renewable energy transition plans, anchored in the European Clean Energy Package for all European (European Commission, n.D.) and the revised Renewable Energy Directive (Parliament/Council Directive 2018/2001/EU), also known under RED II, place a strong emphasis on community-based forms of energy production and recognise the critical role that RECs could play in the renewable energy transition. The EU mandates Member States such as Germany to transpose the Directive into national law and actively support RECs, by ensuring access to relevant information and funding, supporting capacity building, or actively removing barriers (Parliament/Council Directive 2018/2001/EU). Although Germany is legally obliged to transpose the European Directive into national law, it has not yet done so to date (Holstenkamp, 2021; Krug et al., 2022).

### 2.1.2 RECs and the German context

Decarbonising the energy sector requires not only a technological shift towards renewable energy sources but also a profound socio-economic transformation (Ehrtmann et al., 2021; Radtke & Ohlhorst, 2021). As mentioned in Chapter 1.1, RECs have received increasing political and scientific attention for their potential to facilitate the energy transition from a centralised, fossil fuel-based energy system to a decentralised, low-carbon, renewable energy-based system while at the same time engaging local communities and thereby increasing acceptance of the transition (Bauwens et al., 2022; Hanke et al., 2021; Krug et al., 2022). Compared to other EU countries, Germany has a long history of utilising community energy as a way to promote a bottom-up, citizen-driven energy transition. Favourable national legislation in Germany in the early 2000s, mainly in the form of the Renewable Energy Sources Act (EEG) and the provision of attractive and long-term feed-in tariffs, provided financial incentives and reliable investment opportunities which resulted in the formation of a significant number of RECs (Holstenkamp, 2021; Kahla et al., 2017; Krug et al., 2022). In 2016, around 1800 RECs in total and 900 RECs in the form of cooperatives were actively operating in Germany (Kahla et al., 2017). They are quite heterogeneous in terms of their geographical scale, technologies used, financing modes and legal forms (Holstenkamp, 2021; Kahla et al., 2017). However, the predominant legal form that RECs in Germany take on is cooperatives<sup>8</sup> (Kahla et al., 2017; Krug et al., 2022). Renewable energy communities in the form of cooperatives comprise 220,000 members, have invested around 3.3 billion € in renewable energy projects, and account for approximately one-third of total renewable energy production in Germany (Agentur für Erneuerbare Energien, 2021; DGVR, 2022). However, policy changes in the past decade, such as the abolition of the guaranteed feed-in tariff, the introduction of new auction models or complex approval and verification procedures, have led to a stagnation in the number of newly registered RECs and associated projects (Holstenkamp, 2021; Kahla et al., 2017; Radtke & Ohlhorst, 2021). It remains to be seen whether the EU legislation will revitalise the community energy sector in Germany. Whether or not this will happen depends on whether and when Germany transposes the EU law into national legislation (Holstenkamp, 2021).

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<sup>8</sup> Cooperatives can be defined as “an autonomous association of persons united voluntarily to meet their common economic, social and cultural needs and aspirations through a jointly owned and democratically controlled enterprise“ (International Cooperative Alliance, n.D.).

### **3 Literature Review**

The following chapter provides an overview of the relevant and up-to-date literature and background knowledge required to answer the three RQs (see Chapter 1.3). First, a general conceptualisation of degrowth is provided, followed by a review of the literature on degrowth and actors at the micro-level, with a particular focus on businesses. Then, this literature review explores what a degrowth energy system could look like and synthesises the previous research on RECs and degrowth. The different components of this literature review form the foundation for developing the conceptual degrowth framework for community energy (see Chapter 4).

#### **3.1 Conceptualisation of degrowth**

##### **3.1.1 Degrowth – between a radical critique and a visionary concept**

The term degrowth (or 'décroissance' in French) was first introduced in France in the 1970s (Demaria et al., 2013) and can be understood as "a political slogan with theoretical implications" (Latouche, 2009, p. 7). The degrowth movement criticises the growth and capital accumulation hegemony of the global economic and capitalist system and draws attention to its adverse environmental and social impacts (Kallis et al., 2015; Kallis et al., 2018; Schmelzer et al., 2022). Arguing that resource and energy throughput cannot be decoupled absolutely, permanently, and globally from economic growth (Hickel & Kallis, 2020; Parrique et al., 2019; Vadén et al., 2020; Wiedmann et al., 2020), degrowth scholars emphasise that staying within planetary boundaries urgently requires "an equitable downscaling of production and consumption that increases human well-being and enhances ecological conditions at the local and global level, in the short and long term"<sup>9</sup> (Schneider et al., 2010, p. 512). However, such a downsizing of production and consumption would require a profound transformation of the current "economic, social, cultural [...] institutions" (Büchs & Koch, 2019, p. 162) and fundamental changes in the relationship between the economy, society, and nature (Buch-Hansen & Nesterova, 2023).

Since the 2000s, degrowth has gained increasing attention and developed into an umbrella term which encompasses an academic paradigm, a social movement, various critiques of economic growth, and concrete policy proposals that envision a fundamental social-ecological transformation of society that respects social and planetary boundaries by significantly reducing resource and energy throughput (Buch-Hansen & Carstensen, 2021; Demaria et al., 2013; Fitzpatrick et al., 2022; Schmelzer et al., 2022). Degrowth is a multidisciplinary research field that originated in ecological economics but also includes technology studies, political science, anthropology, and other social sciences (Kallis et al., 2018). The concept of degrowth has been applied to various sectors, including energy (Kunze & Becker, 2015; Rommel et al., 2018; Tsagakari et al., 2021), urban development (Savini, 2021; Xue & Kęłbowski, 2022), or tourism (Fletcher et al., 2019; Milano et al., 2019). Appreciating its interdisciplinary background, diverse definitions, and varied applications, three common themes that are frequently discussed in the degrowth literature are presented below.

Firstly, degrowth requires a democratic, equitable, and planned reduction of production and consumption levels in high-income industrialised economies in order to reduce energy and material throughput, alleviate environmental and social pressures (Hickel, 2021; Kallis et al., 2018; Schneider et al., 2010), and ensure global justice (Hickel, 2021; Schmelzer et al., 2022). Although degrowth is likely to lead to a decline in GDP, it is important not to confuse it with economic recession, as degrowth is a planned, orderly and democratic way of deliberately

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<sup>9</sup> The definition of Schneider et al. (2010) is one of the most commonly used definitions for sustainable degrowth, which will be used throughout the thesis.

reducing material and energy throughput until a steady state<sup>10</sup> is reached within planetary and social boundaries (see Figure 3-1) (Kallis, 2011). This first aspect includes two essential components:

1. *Less, but also different production and consumption:* The selective downsizing of production and consumption in high-income industrialised countries consists of two components. On the one hand, degrowth scholars argue that environmentally harmful and socially less relevant sectors, such as the fossil fuel or advertising industries, or common practices, such as planned obsolescence, should urgently be scaled down. On the other hand, degrowth scholars emphasise the importance of expanding socially and environmentally beneficial sectors such as clean energy, health, and education (Buch-Hansen & Nesterova, 2023; Hickel, 2021)
2. *The global environmental justice perspective:* Degrowth scholars differentiate in which countries and economies degrowth policies should be applied, concentrating strongly on industrialised high-income countries in the Global North. This leaves room for the development and growth of economies in the Global South to meet basic needs and ensure wellbeing. There are two reasons for this selective degrowth: 1) growth-based economies in the Global North have historically been largely dependent on and have unevenly exploited natural resources and labour from countries in the Global South, and 2) adverse environmental and social consequences of economic growth are unevenly distributed and predominantly occur in countries in the Global South (Anguelovski, 2015; Hickel et al., 2022; Schmelzer et al., 2022).

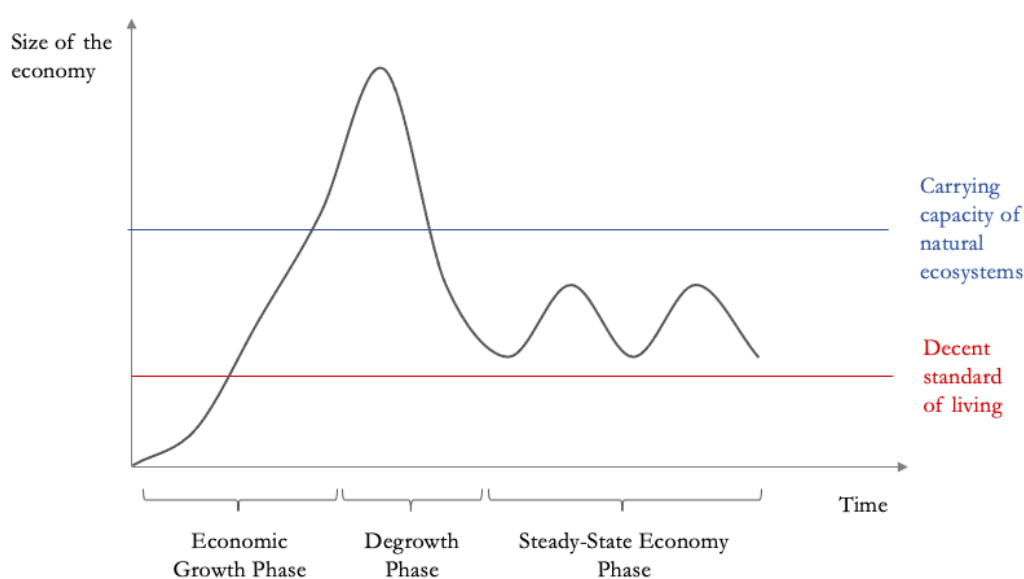


Figure 3-1. From a growth economy to a non-growth economy

Source: Own illustration, adapted from an illustration by Duprez (2022).

This leads to a second core aspect of degrowth, which aims to increase human wellbeing by ensuring an adequate standard of living and the satisfaction of basic needs (Büchs & Koch, 2019; Kallis et al., 2018). In this context, the question arises whether wellbeing can be increased or at least secured while, at the same time, production and consumption levels are reduced

<sup>10</sup> A steady state economy is an economic system that is not geared towards growth and therefore tends to remain in a stable, non-growing but also non-shrinking state (Daly, 2014). Although closely related to the concept of degrowth, the concept of a steady state economy, which is explored in depth in the work of Daly (2014) is not the subject of this study.



(Koch et al., 2017). While degrowth aims to downsize the environmentally and socially harmful sectors and practices of the economy, it deliberately aims to strengthen and increase those areas of the economy that are relevant for human wellbeing (e.g., healthcare, education) (Buch-Hansen & Nesterova, 2023; Hickel, 2021). In the degrowth debate, GDP, as a central indicator used in today's society to assess prosperity and progress, is often criticised for being an inadequate indicator of human wellbeing, because it includes expenditures that are detrimental to human wellbeing, such as “disasters, epistemics, oil spills [and] does not count valuable unpaid work for subsistence or caretaking, nor ecosystem services, and ignores enjoyment of the commons” (Kallis et al., 2018, p. 294). The so-called ‘Easterlin paradox’ empirically describes that there is no clear long-term relationship between economic growth (in the form of increased income) and individual wellbeing and happiness (Easterlin et al., 2010). In this context, degrowth researchers argue that other intangible factors such as social relationships with others, health, personal fulfilment, or meaningful work are essential to human wellbeing and should therefore receive more attention (Sekulova, 2015).

Finally, the transformation towards degrowth requires a profound shift in individual and collective values and principles. Degrowth critiques and emancipates itself from values such as extractivism, productivism, and consumerism deeply embedded in the current growth-based economy (Parrique, 2019). Beyond the critique, degrowth also offers a vision of how society and the economy should and could look like and on what values it should be based (Fitzpatrick et al., 2022; Nesterova, 2021; Parrique, 2019). For example, Banerjee et al. (2021) envision a degrowth economy that equitably distributes resources across society rather than accumulating them for a privileged few, that restores the environment more than it extracts resources from it, and where cooperation and sufficiency replace competition and consumerism. Table 3-1 provides an overview of some of the key degrowth principles and values that authors envision to form the basis of a potential degrowth economy. This table is by no means exhaustive but rather represents the principles and values frequently discussed in the degrowth literature.

Table 3-1. Degrowth principles and values

Degrowth Principle	Explanation
1. <i>Frugal Abundance &amp; Sufficiency</i>	Frugal abundance is a central degrowth principle that focuses on voluntary individual and collective sufficiency, prioritising the satisfaction of everyone's basic needs over infinite (and globally inequitable) materialistic consumption by asking the question of what is enough (Latouche, 2014). Central to this concept is the idea that a sufficient and less materialistic lifestyle can lead to individual happiness and wellbeing, as non-materialistic factors such as social relationships and personal fulfilment often play a central role for individual wellbeing (Banerjee et al., 2021; Demaria et al., 2013; Sekulova, 2015).
2. <i>Conviviality</i>	The concept of conviviality dates back to the work of Illich (1973) and essentially revolves around the question of how society can meet its basic needs autonomously, self-determined, in solidarity and through mutual giving. Within the degrowth literature, conviviality is often discussed in the context of technology (Kerschner et al., 2018; Vetter, 2018). According to Illich (1973, p. 24), conviviality can be understood as the “opposite of industrial productivity”, which implies that technological tools should be purposefully used to increase societal wellbeing rather than increasing productivity without questioning its purpose. Parrique (2019, p. 317) suggests that “technology should be democratically manageable, controllable, reversible, and easily intelligible”.
3. <i>Autonomy</i>	Another important degrowth value that is discussed in the literature is autonomy (Deriu, 2015; Parrique, 2019). Autonomy is the individual and collective ability and capacity to “take decisions critically and deliberately without dominating influences from the outside” (Parrique, 2019, p. 252). This highlights the emancipatory nature of the degrowth movement, which seeks to break free from the taken-for-granted ideologies, power dynamics and growth hegemonies of the current economic system (Asara et al., 2015; Deriu, 2015).

<p>4. <i>Solidarity &amp; Care</i></p>	<p>Degrowth emphasises the importance of refocusing society on caring for humans (solidarity), but also for non-humans (stewardship) (Banerjee et al., 2021; Dengler &amp; Lang, 2022; Parrique, 2019). In the current growth-based economy, paid and unpaid care work (such as childcare, which is overwhelmingly performed by women) is often taken for granted and systematically undervalued (Dengler &amp; Strunk, 2018). It is, therefore, crucial to structurally recognise that “social practices that promote daily wellbeing in families, friendships, neighborhoods, communities and nations are essential building blocks for constructing a viable post-growth world” (Banerjee et al., 2021, p. 344).</p>
<p>5. <i>Relocalisation &amp; Smallness</i></p>	<p>According to degrowth scholars, production and consumption in a degrowth economy are organised in small-scale and localised structures to reduce material and energy throughput. By moving production to the local level, supply chains are shortened, value creation remains in a specific region, and production moves closer to the actual needs of consumers (Banerjee et al., 2021; Liegey &amp; Nelson, 2020). The commonly used degrowth slogan of “small is beautiful” (Raith, 2021, p. 46) represents the idea of economic processes characterised by local thinking, simplicity and sufficiency that aim to transform the structures of the system from the bottom up (Trainer, 2020).</p>
<p>6. <i>Cooperation &amp; Sharing</i></p>	<p>A degrowth society would be based on cooperation, collaboration and the sharing of ideas and resources to increase societal wellbeing (Nesterova, 2020; Trainer, 2020). Instead of competing with each other by accumulating resources individually, people in a degrowth society would be open to sharing so that everyone can benefit (Banerjee et al., 2021).</p>
<p>7. <i>Re-politization &amp; Democracy</i></p>	<p>Finally, degrowth calls for the repoliticisation and democratisation of economic processes and relations (Asara et al., 2015; Fournier, 2008; Schneider et al., 2010). Economic growth has become structurally hegemonic and often remains “an unquestioned imperative and naturalized need” (Asara et al., 2015, p. 375). To challenge this dynamic, economic decision-making processes need to be re-politicised (Fournier, 2008; Schmelzer et al., 2022). A meaningful way to do this is to democratise and involve the wider society in economic decision-making and debates (Schmelzer et al., 2022).</p>

Source: Own illustration based on the categorisation of degrowth values and principles by Banerjee et al. (2021), D’Alisa et al., (2015), Parrique, (2019).

### 3.1.2 The two levels of a degrowth transition – top-down vs. bottom-up

A degrowth transition would require a far-reaching and systemic reconfiguration of various socio-economic structures and institutions to ensure that production and consumption do not exceed social and ecological limits (Buch-Hansen & Nesterova, 2023; Büchs & Koch, 2019; Hug et al., 2022). Degrowth scholars suggest that achieving this level of transition requires both top-down interventions at the macro level (e.g., institutional changes and regulatory policy interventions) and bottom-up initiatives at the micro-level (e.g., grassroots initiatives, alternative organisational forms, movements, individuals) (Asara et al., 2015; Kallis et al., 2015; Schmelzer et al., 2022). It should be recognised that these two levels are often closely interlinked and interdependent (Fitzpatrick et al., 2022).

#### **Top-down degrowth policies**

At the macro level, several top-down policies have been proposed that address the question of how the regulatory and institutional policy framework could be reshaped to facilitate a degrowth transition. Cosme et al. (2017) systematically reviewed 128 peer-reviewed articles to extract specific policies being discussed in the degrowth research community. The review was structured around three core degrowth objectives, namely “(1) Reduce the environmental impact of human activities; (2) Redistribute income and wealth both within and between countries; and (3) Promote the transition from a materialistic to a convivial and participatory society” (Cosme et al., 2017, p. 321). The identified policies ranged from advertising bans, caps on resource extraction (Goal 1), basic income, redistributive tax systems and work-sharing models (Goal 2) to policies aimed at reducing working hours and providing high-welfare public investment (Goal 3). Interestingly, Cosme et al. (2017) found most analysed degrowth propositions and policies to be top-down rather than bottom-up, as many of the policies require

direct government control and implementation. Fitzpatrick et al. (2022) took a similar approach by systematically mapping degrowth policies according to different themes (e.g., energy & environment, governance & geopolitics, or production & consumption). The most commonly cited policies in the degrowth literature were the introduction of “universal basic incomes, work-time reductions, job guarantees with a living wage, maximum income caps, declining caps on resource use and emissions, not-for-profit cooperatives” (Fitzpatrick et al., 2022, p. 10). The researchers found many policies to be vaguely formulated, focusing more on the policy goal (what to achieve) than on the means (how to achieve it). In addition, Fitzpatrick et al. (2022) stressed that many of the degrowth policy proposals were studied in isolation, without examining the synergies between different measures. Without covering the individual policies in more detail, this section has illustrated the variety of degrowth policies that are being discussed, which are mostly top-down.

### ***Bottom-up initiatives and the role of business organisations***

In addition to the macro-level policies that are undoubtedly necessary for the transition to a degrowth society, significant changes to the status quo are also required at the levels of individuals, business organisations, and civil society (Asara et al., 2015; Kallis et al., 2015; Schmelzer et al., 2022). In this context, Kallis (2011, p. 874) emphasises “that big social change does not take place by appealing to those in power, but by bottom-up movements that challenge established paradigms.” Indeed, the degrowth literature highlights the central role for grassroots initiatives in envisioning and demonstrating the viability of alternatives to the growth-based status quo and thus facilitating a transition from the bottom (Demaria et al., 2013; Kallis et al., 2015; Petridis, 2022; Schmelzer et al., 2022). Schmelzer et al. (2022) argue that visionary grassroots initiatives which experiment with new modes of production and consumption are particularly interesting for exploring attempts to disrupt the structures of the system. Examples of grassroots initiatives are cooperatives, ecovillages, urban gardens, community currencies, producer-consumer networks, and common good organisations (Kallis et al., 2015). These initiatives are often called ‘nowtopias’, encompassing “really-existing alternative institutions like cooperatives or community-based organizations [which] allow people to test changes to institutions, infrastructures, or forms of social organisations in the crack of capitalism” (Schmelzer et al., 2022, p. 254).

While the critical role of grassroots initiatives is widely recognised, the role of and implications for business organisations in a transition towards degrowth were found to have been largely excluded from the discourse (Johanisova et al., 2013; Khmara & Kronenberg, 2018; Nesterova, 2020; Raith, 2021). However, as businesses play a central role in the current economic system by accelerating economic growth and capital accumulation, these actors would be directly affected by, but could also proactively steer a socio-economic transition towards degrowth by changing the way they operate and create value (Froese et al., 2023). Initial attempts have been made to fill this gap and explore the role of businesses in relation to degrowth, however, a significant need for both conceptual and empirical research remains. Several recent studies have begun to conceptualise various degrowth business elements, strategies, value creation patterns and principles that, if adopted, could help businesses to align themselves with the degrowth vision (Banerjee et al., 2021; Hankammer & Kleer, 2018; Hankammer et al., 2021; Hinton, 2021; Johanisova et al., 2013; Khmara & Kronenberg, 2018; Nesterova, 2020; Raith, 2021). Table 3-2 synthesises 13 key degrowth elements which have been identified in five recent and frequently cited studies on degrowth and businesses. These elements attempt to translate the degrowth vision to the operational level of organisations, making the concept more practical and applicable to businesses.

Table 3-2. Key elements of businesses approaching degrowth

Organisational Dimensions	Degrowth business elements	Khmara and Kronenberg (2018)	Nesterova (2020)	Hinton (2021)	Hankammer et al. (2021)	Froese et al. (2023)
Purpose, Values and Vision	Repurpose of the business and fundamental change in values – ecological and social concerns at the centre	X	X	X	X	X
	Reorientation from economic growth and profit maximisation to alternative forms of success	X	X	X	X	X
Environment and Resources	Reduction of environmental footprint in own operations and the value chain	X	X	X	X	X
	Product design for sustainability – increase durability, circularity, reparability, sharing	X	X	X	X	X
Customers	Encourage sufficiency and degrowth thinking – within the organisation and among stakeholders		X	X	X	X
Organisational Structure and Governance	Democratic governance and ownership structures	X	X	X	X	X
	Focus on employee’s wellbeing and social inclusiveness		X		X	X
Community and Society	Relocalisation of production – small-scale, embedded in local context & community based to increase value creation in the region and shorten supply chains		X	X	X	X
	Strong cooperation, collaborative value creation and openness to share resources	X	X	X	X	X
	Enabling autonomy and capacity development specifically among vulnerable parts of society				X	X
	Re-politising activities – engagement to create regulatory, financial, cultural framework conditions enabling degrowth transition	X				X
Technology	Convivial use of technology – open access and source technology		X	X		X
Finance	Non-prioritisation of large investors, so that profits can be democratically distributed in a socio-ecological way	X		X		

Source: Own illustration, organisational dimensions adopted from Froese et al. (2023), Hankammer et al. (2021), Hinton (2021), Khmara and Kronenberg (2018), Nesterova, (2020). X= included in study; greyed out box = not included in study

Some of the studies applied their frameworks to business organisations<sup>11</sup> to determine which, if any, degrowth elements were already identifiable in practice. However, the studies show mixed results, as the predefined degrowth elements were only partially identified (Hankammer et al., 2021; Khamara & Kronenberg, 2018). This implies that underlying barriers, socio-economic structures, or systemic forces prevent them from being adopted in practice (Froese et al., 2023; Hankammer et al., 2021; Khamara & Kronenberg, 2018; Raith, 2021). These barriers may be related to contextual factors such as the “regional, cultural, and political context in which organizations are embedded” (Hankammer et al., 2021, p. 12), but also to businesses’ relation to growth and profit, which is often linked to their legal structure and can make it more difficult for these organisations to strive towards degrowth (Hinton, 2021; Nesterova & Robra, 2022). Indeed, the question of whether and how typical forms of businesses within a capitalist system are compatible with the degrowth vision is part of an ongoing debate. Some researchers argue for the inclusion of traditional, growth and profit-oriented forms of business in the degrowth discourse (Khamara & Kronenberg, 2018; Raith, 2021), while other scholars argue that degrowth in its purest form would imply far-reaching changes that are incompatible with the business model logic and sustainability approaches of traditional forms of business (Nesterova, 2020; Nesterova & Robra, 2022). Nesterova (2020, p. 2) concludes that “rather it may be a question of which forms of firms and which types of ownership are most compatible with the ideals of degrowth, and how firms can become degrowth businesses”. In this respect, two main strands of research have been identified that examine the relationship between business organisations and degrowth. Accordingly, researchers have focused either on growth-neutral firms or organisations exploring degrowth in the context of alternative business forms.

Liesen et al. (2013) identified 14 growth-neutral<sup>12</sup> firms in Germany and explored their drivers and motivations. They found that although the analysed firms had heterogeneous reasons for not growing, having normative business objectives (e.g., regional value creation or environmental protection), specific business strategies (e.g., quality leadership in a niche), and certain organisational and ownership structures allowed these firms not to pursue growth maximisation. Other studies support these findings by conceptualising successful non-growing firms as those striving to maximise product or service quality rather than quantity, focusing on the quality of working life for the employees, provisioning of services (Liesen et al., 2014), collaborative business development (Cyron & Zoellick, 2018), or financial independence by not having to raise external capital (Leonhardt et al., 2017).

The second research stream examined degrowth and business in the context of alternative forms of organisations, such as social enterprises (Johanisova et al., 2013), commons-based forms of businesses (Kostakis et al., 2018; Robra et al., 2020), non-profit-organisations (Hinton, 2020), sufficiency-oriented businesses (Bocken & Short, 2016), and cooperatives (Cunico et al., 2022; Johanisova et al., 2015). The reason why these organisational forms are regularly analysed as valuable examples that may already, to some extent, be embracing the values and principles of degrowth is because of their unique business model logic and the attempt to fundamentally rethink production and consumption (Kostakis et al., 2018; Robra et al., 2020). Researchers highlight the importance of further conceptually and empirically exploring common patterns, potential drivers, and barriers of these alternative organisational forms in relation to degrowth and gathering empirical evidence of successful implementation cases (Hankammer et al., 2021).

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<sup>11</sup> Khamara and Kronenberg (2018) applied their framework to Patagonia, Hankammer et al. (2021) to four ‘B-Corps’.

<sup>12</sup> Growth-neutral or non-growing firms can be understood as organisations that do not seek to grow by the means of traditional business metrics (e.g., revenue, profit, number of staff) (Liesen et al., 2013).

## 3.2 Understanding degrowth in the context of energy

Turning to the energy sector, which is the primary focus of this thesis, the following section first conceptualises some key characteristics of an energy sector guided by the degrowth vision. Then it sheds light on the existing literature that examines RECs from a degrowth perspective.

### 3.2.1 Envisioning the energy sector from a degrowth perspective

The energy sector is central to the degrowth discourse because economic growth, in the form of increased aggregate production of goods and services, is closely linked to society's overall energy consumption (Dai et al., 2022; Stern, 2011). In the current growth-based economic system, the dominant form of energy production is still organised by large, profit-driven, privately owned, and controlled companies that produce energy mostly from fossil fuels (Díaz Muñoz, 2022). Applying Schneider et al.'s (2010) degrowth definition to the energy context, a degrowth energy system would provide equitable access to renewable energy for all members of society, while reducing energy production and consumption to levels that ensure human wellbeing and respect planetary boundaries. The following section attempts to envision how an energy sector could be conceptualised from a degrowth perspective by providing an overview of some potential guiding principles and characteristics. It is important to note that these characteristics are by no means prescriptive but should be understood as a first starting point.

First, to reduce environmental pressures, the energy sector in a degrowth economy would need to be decarbonised by shifting the supply-side energy production to predominantly renewable energy sources while phasing out fossil fuel-based energy production (IPCC, 2023). Adopting energy efficiency measures across all economic sectors is crucial for decarbonising the economy (Brockway et al., 2021). However, researchers predict a supply-side technology and efficiency-driven transition to renewables alone to be insufficient for achieving the emissions reductions needed to stay on the 1.5°C pathway (Grubler et al., 2018; Keyßer & Lenzen, 2021). This is partially because renewable energy has a lower EROI than fossil fuels, resulting in less energy being available to meet a growing demand for energy (Mastini et al., 2021). Another important reason is that often, “energy-saving innovations induce an increase in energy consumption that offsets the technology-derived saving” (Stern, 2011, p. 40), also known as the rebound effect (Brockway et al., 2021; Parrique et al., 2019).

Therefore, researchers argue that the current technology-driven pathway, which relies on energy efficiency measures and a large-scale transition to renewable energy, needs to be complemented by a socio-economic degrowth energy pathway, which calls for energy sufficiency and demand-side energy reductions (Millward-Hopkins et al., 2020). In their study, Grubler et al. (2018) developed a low-demand energy scenario and concluded that in order to stay within the 1.5°C limit by 2050 without relying on negative emission technologies (NET)<sup>13</sup>, global energy demand would need to be reduced by around 40% compared to current energy demand levels. While there is no standard definition of energy sufficiency, the concept refers to “the strategy of achieving absolute reductions of the amount of energy-based services consumed, notably through promoting intrinsically low-energy activities, to reach a level of enoughness that ensures sustainability” (Zell-Ziegler et al., 2021, p. 2). Similar to the degrowth definition proposed in this study, energy sufficiency aims to reduce energy consumption to a level that a) allows society to stay within planetary boundaries and b) is necessary to meet human needs and wellbeing (Thomas et al., 2019). However, this would require a profound reconfiguration in terms of how energy is generated, distributed, and consumed (Díaz Muñoz, 2022).

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<sup>13</sup> NET can be understood as technological solutions to remove CO<sub>2</sub> from the atmosphere. Many of the IPCC mitigation scenarios rely on these technologies, but they are often unproven or not yet deployed on a large scale (Hickel & Kallis, 2020).

One possible way to organise energy production and distribution in a degrowth economy is in a local, small-scale, and decentralised form (Rommel et al., 2018; Tsagkari et al., 2021). This shortens supply chains, cuts out intermediaries, strengthens local economies, and builds community acceptance and legitimacy for renewable energy projects (Brummer, 2018; Rommel et al., 2018). Kallis (2011, p. 876) notes that the “gradual decentralization and relocalisation of the economy [can be understood] as a way to reduce throughput and manage a stable adaptation to a smaller economy”. Furthermore, the relocalisation of energy production and distribution could help to increase autonomy from the current centralised, growth- and profit-oriented energy system and build resilience to energy market fluctuations (Burke & Stephens, 2018; Rommel et al., 2018). This may be particularly important in situations such as the current energy crisis caused by Russia’s war on Ukraine (Vrettos, 2022).

Energy democracy would also be a central component of a degrowth energy system (Kunze & Becker, 2015; Rommel et al., 2018; Tsagkari et al., 2021). Even though there is no common definition, energy democracy might be understood as “structural changes such as formal participation in energy-related decision-making and the democratisation of energy infrastructure” (Wahlund & Palm, 2022, p. 12). Therefore, the energy system would be largely owned, governed, and operated by the community itself, enabling democratic decision-making processes, direct public participation, and collective ownership (Alarcón Ferrari & Chartier, 2018; Gunderson et al., 2018; Kunze & Becker, 2015). Consumers become producers (prosumers), thereby aligning production more closely with local needs (Rommel et al., 2018). According to Kunze and Becker (2015), collective ownership is an important precondition for politically motivated and normative action, as it could motivate RECs to generate and distribute renewable energy, while at the same time pursuing ambitious ecological and social objectives, such as reducing environmental pressure and achieving energy justice.

Energy justice is regularly identified as a central component of a degrowth energy system (Rommel et al., 2018). A just energy transition might be based on “a global energy system that fairly disseminates both the benefits and costs of energy services, and one that has representative and impartial energy decision making” (Sovacool et al., 2017, p. 677). Energy justice is often conceptualised and analysed in terms of three pillars (Hanke et al., 2021; Van Bommel & Höffken, 2021), namely: recognitional justice (gaining awareness of and accounting for energy vulnerable and marginalised groups in society); distributional justice (physically just allocation of costs, benefits, and responsibilities within the energy system); and procedural justice (equitable decision-making processes that engage all stakeholders and their views).

In a degrowth energy system, technology would be sourced locally and sustainably to ensure that one country’s energy transition does not shift problems (e.g., negative environmental and social impacts of mineral extraction) to other countries (Hickel, 2021; Mastini et al., 2021). Technology would be embedded into the local community context and used in a convivial way to ensure technical sovereignty (Kerschner et al., 2018). This implies that “technology should be democratically manageable, controllable, reversible, and easily intelligible” (Parrique, 2019, p. 317). Technical capacity and resources would be openly shared in a collaborative way (Hankammer & Kleer, 2018). As illustrated in the following chapter, RECs are frequently being discussed as potential actors to put some of those degrowth energy premises into practice.

### **3.2.2 Previous research on RECs and degrowth**

Although first attempts have been made to investigate community energy projects in the context of degrowth, studies combining both research fields are limited. The following section discusses the main findings of the few existing studies that have already been conducted.

Tsagkari et al. (2021) conducted a qualitative and empirical case study which investigated the degrowth potential of island energy communities with mixed ownership models in the Mediterranean by comparing their goals and ambitions with four key degrowth principles, “namely: ‘energy democracy’, ‘energy self-sufficiency’, ‘localized production’, and ‘revitalization of the local economy’” (Tsagkari et al., 2021, p. 2). They found that the energy communities had only partially and often implicitly adopted degrowth principles, specifically with respect to their ambition to localise energy production and revitalise the local economy through slow tourism. The projects created local employment by partially letting local and regional actors carry out installation and maintenance activities (localisation of production) and promoting slow tourism on the island (revitalisation of the local economy). However, the authors argue that certain activities “remain tied to an economic growth mindset” (Tsagkari et al., 2021, p. 8) and therefore, certain degrowth ideals were not observable in practice. The researchers conclude that future research should explore different organisational models of local energy projects and the challenges these organisations face in pursuing degrowth objectives.

The study by Rommel et al. (2018), which is purely conceptual, focuses on the German context by analysing the extent to which RECs, as key actors in the German ‘Energiewende’, embrace the following six degrowth goals: “(1) localization of production, (2) changes in business models, (3) equity and fairness, (4) strong sustainable consumption, (5) the convivial use of technology, and (6) a sense of community” (Rommel et al., 2018, p. 1747). Similar to Tsagkari et al. (2021), the study found mixed results. Current legislative changes (e.g., reduced feed-in tariffs) were found to favour larger, non-regional energy producers. While RECs have the potential to build a sense of community and encourage broad participation through democratic governance structures, the study found that RECs are often homogeneous and non-diverse groups that do not deliberately include marginalised parts of society. The authors conclude that RECs in Germany are at a “crossroads” (Rommel et al., 2018, p. 1751): they could either follow a degrowth or a green growth path in the future. Therefore, it is necessary to empirically update the study and identify the direction that RECs in Germany have taken in recent years.

A qualitative study by Alarcón Ferrari and Chartier (2018) investigated the degrowth potential of the municipal energy provider in Växjö, Sweden, through a critical discourse analysis. They examined the combined heat and power project from the perspective of energy democracy and technology, concluding that the municipal energy provider does not follow a degrowth pathway, as the project generates a growing demand for biomass in the form of wood chips, which is an ecologically contested resource in the region. The researchers discussed how technological innovation and the growing demand for biomass could be balanced with environmental and social objectives. However, the study did not observe a “shift from capitalism towards alternative wider social-ecological relations” (Alarcón Ferrari & Chartier, 2018, p. 1764), as the project focused on growing economic processes in the local context. It should be noted that the study did not cover degrowth elements in depth but rather initiated a conceptual and empirical discussion on energy democracy and the use of technology in the degrowth context.

In their empirical, case study-based research, Kunze and Becker (2015, p. 425) explored the degrowth potential of four “collective and politically motivated renewable projects” in Wales, Spain, Italy, and Germany. They looked at both small and large energy cooperatives and found collective ownership, democratic decision-making, and a political-normative orientation to be important prerequisites for energy market actors to engage with degrowth and facilitate a bottom-up transition. The study found the four case study organisations to promote a reduction in per capita energy consumption through information and incentives, be centrally organised around environmental principles, promote democratic governance and participatory structures, and have a strong political-normative commitment. Kunze and Becker (2015, p. 435) thus



concluded that “the debate on degrowth can benefit from a careful look at these specific sites of renewable energy production”.

In addition, two other non-peer-reviewed contributions should briefly be mentioned at this point. The first contribution is a master's thesis by Vrettos (2021), who developed a post-growth transformative framework for community energy projects and applied it to renewable energy communities in Greece. While Vrettos's (2021) framework includes post-growth elements for community energy, the emphasis of the framework was placed on transformative aspects, drawing on the theory of multi-level transition and strategic niche management. Also worth mentioning is a discussion paper by Klagge and Meister (2017), which presents some of their findings from a quantitative survey of energy cooperatives in Germany, with a particular focus on their post-growth potential. They examined the qualitative and quantitative objectives, growth-orientation and use of surpluses and dividends of around 200 renewable energy cooperatives in Germany. Klagge and Meister (2017), distinguished between three groups: 1) RECs that only generate electricity; 2) diversified RECs that generate electricity but also engage in other activities; 3) RECs that operate heat networks but do not generate electricity. The researchers found that renewable energy cooperatives are a heterogeneous group and that particularly diversified cooperatives with more than one business model tend to be growth oriented. However, environmental objectives, regionality and democratic decision-making play an important role in all RECs. Given the central task of decarbonising the energy sector as quickly as possible, the researchers do not see the growth orientation as critically as the authors of the above-mentioned studies (Klagge & Meister, 2017).

### **3.3 Key findings from the literature review**

Degrowth, as a planned and democratic downsizing of production and consumption, requires a profound and systemic reconfiguration of various socio-economic structures and institutions to prevent society from overshooting social and ecological limits. The literature has revealed that research on degrowth has largely focused on the macroeconomic level, discussing the regulatory, institutional and policy changes needed to steer a degrowth transition, while much less research has been conducted at the micro level. Although there have been initial attempts to explore the implications for and role of micro-level actors, such as businesses, in the transition towards degrowth, conceptual and empirical research on the subject is limited. While envisioning a degrowth energy sector, it was found that many concepts often discussed in the community energy literature are closely related to the degrowth vision (e.g., energy democracy, energy justice). Therefore, a few studies investigated the interrelationship between local and community-based forms of energy production and degrowth. Although the results were rather mixed, and the majority of studies only identified specific degrowth elements in the practice of community energy projects, it became clear that there is still a significant need for further research linking degrowth and community energy, both conceptually and empirically. In a nutshell, previous contributions have focused on different selected sets of degrowth dimensions in the context of community energy, which this study aims to expand holistically. To date, there is a lack of a conceptual framework that covers specific degrowth elements for community energy projects in a comprehensive way. Furthermore, there is a lack of understanding of the contextual factors, in terms of specific drivers and barriers, that influence the ability of RECs to engage with degrowth. This study aims to fill these gaps by a) developing a comprehensive degrowth framework for community energy, b) applying this framework to explore whether, to what extent and in what form RECs are already adopting degrowth practices, and c) exploring the key drivers and barriers to doing so.

## 4 The degrowth framework for community energy

This chapter develops the conceptual framework that informs RQ1. This framework is formulated based on some of the key findings of the literature review and will be used to analyse whether, to what extent, and in what form RECs in Germany are already implementing degrowth practices today (RQ2), and what drivers and barriers they perceive in doing so (RQ3). Chapter 4.1 first describes the process of developing the conceptual framework. Chapter 4.2 then outlines the respective dimensions and degrowth elements that are included in the framework.

### 4.1 Development of the conceptual framework

As Table 1-1 outlines, RQ1 investigates how degrowth can be conceptualised for RECs. As indicated in the literature review, there is currently no comprehensive framework that conceptualises the key degrowth elements for RECs, thus the development of a new conceptual framework was deemed necessary. Therefore, this chapter develops a conceptual degrowth framework for community energy to answer RQ1 and to guide the data collection and analysis required for RQ2 and RQ3. The framework aims to translate the widely discussed degrowth premises, principles, and elements into concrete organisational strategies that RECs can implement to put degrowth into practice. This, in turn, helps to empirically determine whether and in what form these elements can already be identified in practice today, which will help to indicate the degrowth compatibility of RECs (see Chapter 5.3).

The framework has been developed based on the synthesis of three core typologies identified in the literature review (see Figure 4-1): 1) the general principles and values of degrowth (Chapter 3.1.1, Table 3-1), which serve as the underlining and core values on which the conceptual framework is based; 2) degrowth business elements (Chapter 3.1.2, Table 3-2), which provide a set of concrete strategies that could help RECs to increase their degrowth compatibility and thus form the operational core of the conceptual framework; and 3) characteristics of a degrowth energy sector (Chapter 3.2.1), which were used to tailor the framework precisely to the energy context. The core themes that emerged in the literature were compiled, synthesised, and organised according to seven organisational dimensions and 14 degrowth elements, which together form the degrowth framework for community energy (see Figure 4-2).

Starting with the seven overarching organisational dimensions (under which the 14 degrowth elements are categorised), the framework draws on several existing conceptualisations of degrowth and business (see Table 3-2). The organisational dimensions were chosen to cover the key organisational areas and activities of RECs in order to provide a comprehensive conceptualisation of degrowth for this type of organisation. The categorisation in this study, however, is primarily informed by the degrowth business framework of Hankammer et al. (2021). The researchers structured their conceptual framework around six organisational stakeholder dimensions, namely: 1) Society, 2) Environment, 3) Customers, 4) Employees, 5) Management and 6) Communities. While the organisational dimensions in this framework are based on this categorisation, the dimensions were further developed by adapting some dimensions and adding a new one. Thus, the final degrowth framework for community energy developed in this study consists of the following seven organisational dimensions: 1) Purpose, Values & Visions, 2) Environment & Resources, 3) Customers, 4) Organisational Structure & Governance, 5) Community & Society, 6) Technology, and 7) Finance (see Figure 4-1).

For each organisational dimension, concrete degrowth elements were derived from the literature (see Chapter 4.2 and Figure 4-2). These degrowth elements operationalise and detail concrete strategies and business principles of how RECs might put the degrowth vision into practice and

thus indicate what a potential, degrowth compatible REC could look like. While it is not expected that all of the degrowth elements will be fully met in practice, they should serve as a baseline to compare it with the current organisational practice of RECs. It should be noted that the framework and its degrowth elements are by no means exhaustive, nor do they represent the final or optimal state of what a degrowth-oriented REC should look like. They should rather be understood as a first starting point to conceptualise degrowth for community-based forms of energy production. The following chapter describes the degrowth elements in more detail.

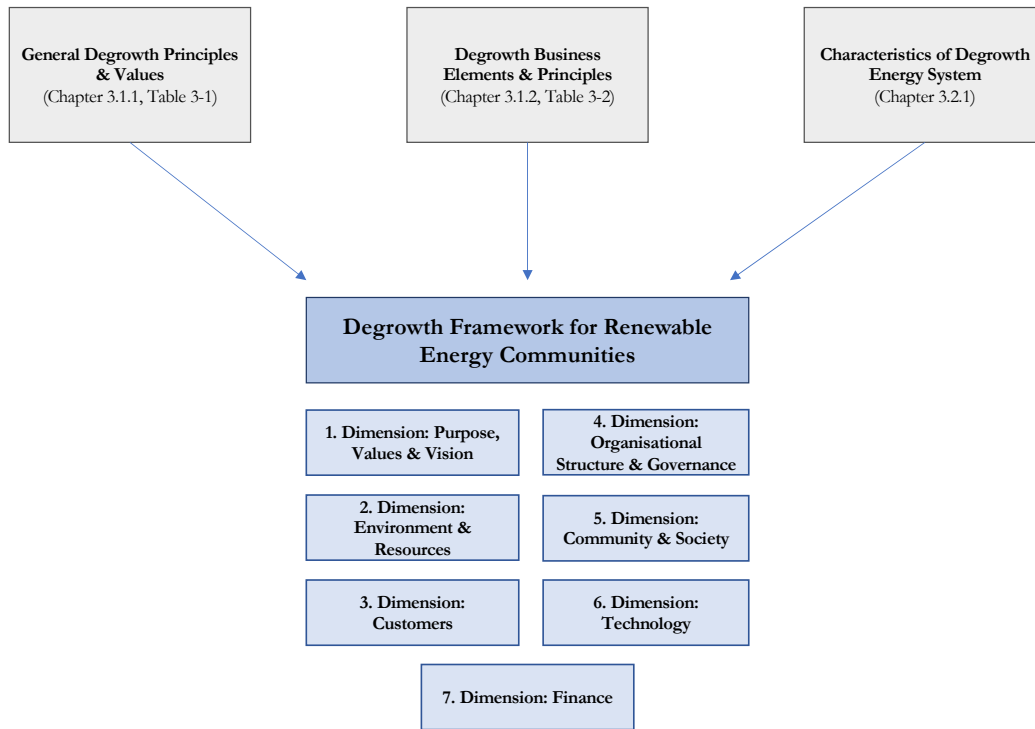


Figure 4-1. Development of the conceptual framework and its sources

Source: Own illustration

## 4.2 Dimensions and elements of the conceptual framework

### 1. Organisational Dimension: Purpose, Values & Visions

a) *Degrowth Element: Primary organisational purpose is to provide value for environment and society*

The primary organisational purpose of degrowth-oriented RECs is to create environmental and social value (Froese et al., 2023; Hankammer et al., 2021), while economic value creation (e.g., in the form of profits) is seen as a means (rather than an end) to achieve this (Hinton, 2021). The adoption of voluntary environmental and social objectives, such as reducing CO<sub>2</sub> emissions or increasing societal wellbeing, plays a central role (Hinton, 2021). RECs pursuing a degrowth pathway recognise that they are embedded in a broader environmental and societal context, which has certain limits and boundaries but can also be positively influenced by their activities (Nesterova, 2020). Prioritising environmental and social value creation may require a fundamental shift in values and priorities compared to traditional forms of energy production, distribution, and consumption (Nesterova, 2021).

b) *Degrowth Element: Deviation from economic growth and profit maximisation*

RECs that follow a degrowth approach deviate from an organisational growth motive and aim to keep their organisational size and energy production capacity stable (Nesterova, 2020). This is important in order to achieve absolute reductions in energy and material throughput, which is a key degrowth objective (Schneider et al., 2010). One way to achieve this is, for example, by being locally embedded and closely aligning the production capacity with the energy needs of the local community (Bloemmen et al., 2015; Froese et al., 2023; Nesterova, 2020). Furthermore, RECs that are aligned with the degrowth vision deviate from a pure profit maximisation motive (Hankammer et al., 2021; Hinton, 2021; Johannisova et al., 2013) as this is considered a central growth driver (Hinton, 2020). Instead, RECs that are striving towards degrowth implement other (mainly qualitative rather than quantitative) factors for success and progress (Liesen et al., 2015).

c) *Degrowth Element: Striving for self-sufficiency and independence from the current energy system*

RECs actively pursuing degrowth embrace the vision of building a self-sufficient and autonomous energy production, distribution, and consumption system in their local context, thus offering a concrete alternative to, and challenging the power dynamics of the current centralised, growth- and profit-driven energy system (Burke & Stephens, 2018; Díaz Muñoz, 2022; Rommel et al., 2018). According to Juntunen and Martiskainen (2021, p. 9), energy autonomy requires a “self-sufficient power balance between demand and supply”, highlighting the importance of closely aligning decentralised energy production with local community needs and engaging citizens (consumers) in the production of decentralised energy (“prosumption”). This can contribute to energy autonomy, self-reliance, and resilience of local communities by providing them with the means and capacity to generate their own energy (Burke & Stephens, 2018; Vrettos, 2022).

d) *Degrowth Element: Politically motivated and normative action in networks*

Degrowth calls for the repoliticisation of the economy by embedding economic activities in democratic and political processes (Demaria et al., 2013; Fournier, 2008). As such, RECs approaching degrowth would “have an agenda of political aspirations, which goes beyond the mere generation of electricity or heat from renewable sources” (Kunze & Becker, 2015, p. 426). In this way, RECs can play an active political role in shaping local, regional, but also national policy framework conditions that enable a smaller, decentralised, and democratic energy system based on degrowth values (Kunze & Becker, 2015; Raith, 2021). Collective ownership structures enable normative and political action that has the potential to catalyse socio-ecological transformation from the bottom up (Kunze & Becker, 2015). Engaging in purpose-driven networks can help facilitate collaboration, knowledge sharing, and collective action among diverse actors striving for a socio-ecological transition (Froese et al., 2023).

## **2. Organisational Dimension: Environment & Resources**

a) *Degrowth Element: Minimising environmental impacts within own operations and supply chain*

RECs pursuing degrowth actively seek to assess and minimise the environmental impacts of their own operations and within their supply chains (Hankammer et al., 2021). With regard to RECs’ own operations, a clear strategic orientation towards reducing the absolute material and energy throughput through energy and resource efficiency, but importantly also through sufficiency measures, should be observable (Banerjee et al., 2021; Froese et al., 2023; Nesterova, 2020). RECs striving for degrowth are clearly aware of the potential negative externalities, such as adverse environmental and social consequences in production of PV modules they are indirectly causing, and rather focus on the creation of positive externalities. Concrete strategies for reducing negative externalities in the supply chain could be to source the technology locally, deliberately prolong its lifecycle, or increase the share of recycled (Khmara & Kronenberg, 2018; Kostakis et al., 2018).

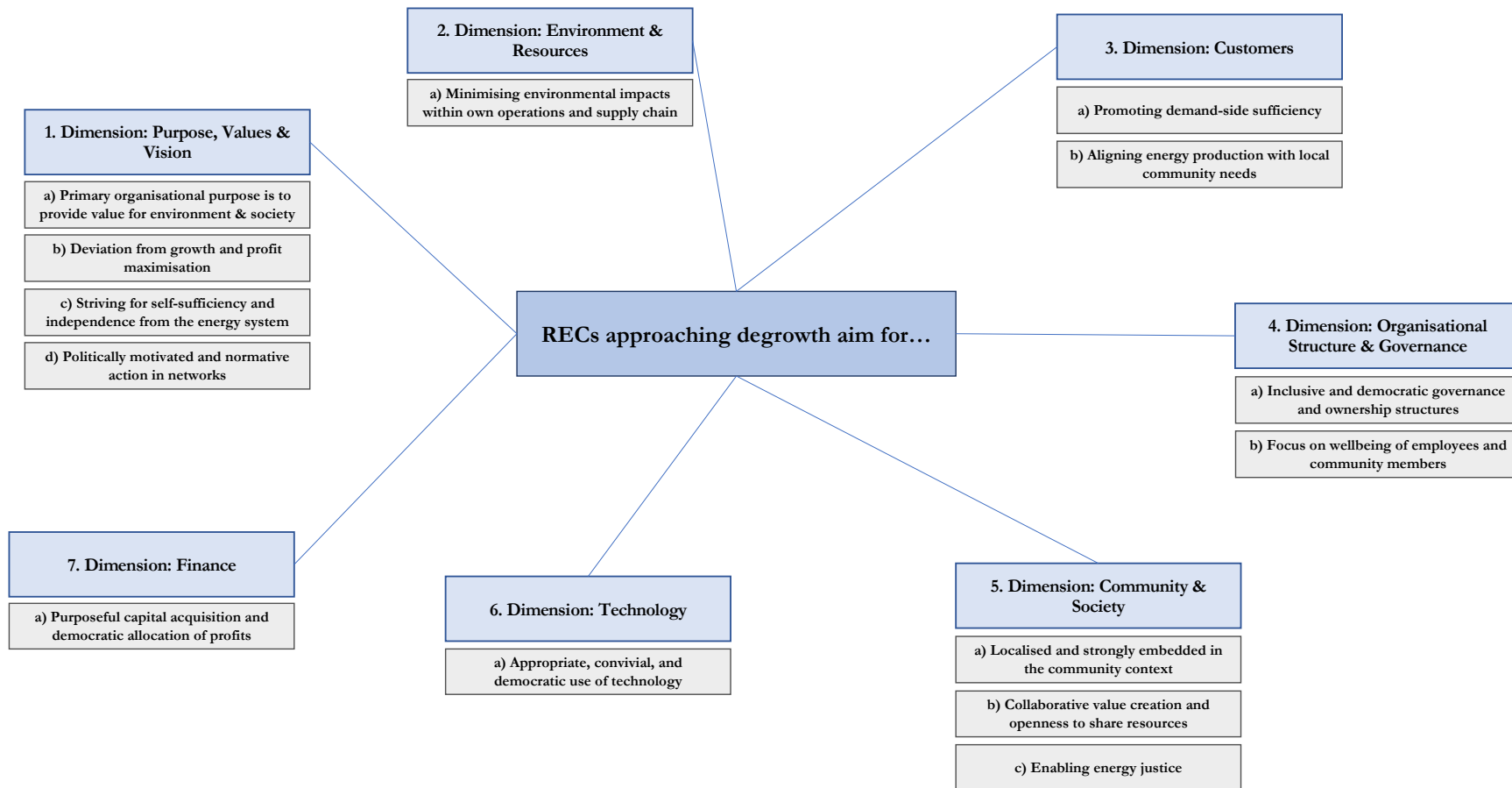


Figure 4-2. Degrowth framework for renewable energy communities

Source: Own illustration

### **3. Organisational Dimension: Customers**

a) *Degrowth Element: Promoting demand-side energy sufficiency*

For RECs approaching degrowth, the promotion of energy sufficiency on the demand side and in the relationship with energy consumers and members is a central component (Froese et al., 2023; Rommel et al., 2018; Tsagkari et al., 2021). Energy sufficiency refers to “the strategy of achieving absolute reductions of the amount of energy-based services consumed, notably through promoting intrinsically low-energy activities, to reach a level of enoughness that ensures sustainability” (Zell-Ziegler et al., 2021, p. 2). Central to the discussion of energy sufficiency is the recognition that reducing energy consumption will require changes in lifestyle and behavioural patterns (Thomas et al., 2015). Energy-sufficient lifestyles can be promoted by moderating energy demand through communication and consumer engagement (Bocken & Short, 2016; Froese et al., 2023), but also by normalising sufficiency-oriented behaviour (Hankammer et al., 2021).

b) *Degrowth Element: Aligning energy production with local community needs*

RECs that embrace degrowth actively seek to identify and meet the energy needs of local community members that are necessary to ensure individual well-being while remaining consistent with environmental limits (Froese et al., 2023; Nesterova, 2020). Aligning energy production capacity with the community’s basic energy needs is prioritised over simply producing renewable energy for the sake of production and feeding it into the grid (Bocken & Short, 2016; Nesterova, 2020; Rommel et al., 2018). Therefore, decentralised energy should also be consumed locally. This is an important prerequisite for downscaling energy production without compromising the energy needs and wellbeing of current and future generations (Trainer, 2020). This degrowth element is closely linked to some other elements of this framework (e.g., ‘striving for self-sufficiency’ or ‘deviation from growth and profit maximisation’) and can therefore be a driver for RECs to adopt other degrowth elements.

### **4. Organisational Dimension: Organisational Structure & Governance**

a) *Degrowth Element: Inclusive democratic governance and collective ownership structures*

RECs that approach degrowth incorporate inclusive, democratic governance and collective ownership structures that enable direct participation through voting, open participatory decision-making, and collective benefit allocation mechanism (Gunderson et al., 2018; Kunze & Becker, 2015; Rommel et al., 2018; Tsagkari et al., 2021). This allows for local control, ownership, and governance of the energy generation and distribution by community members themselves, increases transparency, and puts into practice the ideals of energy democracy (Alarcón Ferrari & Chartier, 2018; Kunze & Becker, 2015). Collectively owned and participative governed energy systems could be a central precondition for reducing total material and energy throughput (Gunderson et al., 2018), reducing dependencies from the centralised and profit-driven energy systems, and enabling social and environmental objectives (Burke & Stephens, 2018; Kunze & Becker, 2015).

b) *Degrowth Element: Focus on the wellbeing of employees and community members*

RECs that align with the degrowth vision focus on improving the wellbeing of employees and community members. In order to improve employee’s wellbeing, RECs provide access to meaningful work by creating inclusive structures and an atmosphere of trust, creativity, collaboration, respect, and mutual support in the daily operations (Froese et al., 2023; Khmara & Kronenberg, 2018; Nesterova, 2020). Purposeful work can contribute to an individual’s wellbeing, both physically (by providing a stable salary to meet daily expenses) and psychologically (by strengthening the person’s sense of self-efficacy) (Vrettos, 2021). In addition, improving the wellbeing of the wider community in which the RECs are located

is also considered essential. This can be achieved, for example, by being locally embedded and providing added value to the community (Nesterova, 2020).

## **5. Organisational Dimension: Community & Society**

### *a) Degrowth Element: Localised and strongly embedded in the community context*

Energy production, distribution and consumption are organised locally and on a small scale, whereas RECs are strongly embedded in the community context (Johanisova et al., 2013; Rommel et al., 2018; Tsagkari et al., 2021). By organising at the local level (e.g., sourcing from local suppliers), supply chains are shortened, value is retained in the specific region, energy production is brought closer to the actual needs of consumers, and energy autonomy is strengthened (Banerjee et al., 2021; Hankammer et al., 2021; Nesterova, 2020). Community embeddedness also implies the involvement of community members in the production and (self-)consumption of renewable energy, which enables energy citizenship and direct participation of citizens in the energy transition (Campos & Marín-González, 2020). The active involvement of citizens at the local level builds community acceptance and legitimacy for renewable energy projects (Brummer, 2018; Rommel et al., 2018).

### *b) Degrowth Element: Collaborative value creation and openness to share resources*

RECs following a degrowth pathway would base their activities on open cooperation, collaboration and sharing of ideas, resources, and experiences to increase communities' wellbeing and facilitate the socio-ecological transition of the energy system (Hankammer & Kleer, 2018; Nesterova, 2020). This can involve collaboration with diverse actors such as local residents, municipalities, other RECs, or civil society organisations (Rommel et al., 2018). Rather than competing between each other by accumulating resources individually, RECs following a degrowth pathway would operate in networks (Bloemmen et al., 2015; Hankammer et al., 2021) be open to sharing and exchanging skills, knowledge, and technology so that everyone can benefit (Banerjee et al., 2021; Kostakis et al., 2018).

### *c) Degrowth Element: Enabling energy justice and equity*

RECs that are committed to contributing to a degrowth transition actively promote energy justice within their community and beyond (Hanke et al., 2021; Rommel et al., 2018). This would include the equitable distribution of costs and benefits associated with energy production, distribution, and consumption (Sovacool et al., 2017) and the deliberate inclusion and engagement of vulnerable and marginalised social groups in society that are often excluded from participating in the energy transition (Hanke et al., 2021; Rommel et al., 2018). First, in order to ensure recognitional justice, RECs should gain awareness of and explicitly engage with energy vulnerable groups (e.g., those susceptible to experiencing energy poverty). RECs could ensure distributional justice by providing equal access to the energy services and benefits of participating in RECs (e.g., providing lower energy tariffs for vulnerable groups) (Hanke et al., 2021; Van Bommel & Höffken, 2021). With respect to procedural justice, RECs could create structures that enable vulnerable groups to join and participate in the cooperative (e.g., through reduced membership fees or targeted information) (Hanke et al., 2021).

## **6. Organisational Dimension: Technology**

### *a) Degrowth Element: Appropriate, convivial, and democratic use of technology*

RECs approaching degrowth would apply the technology used to generate and distribute energy in an appropriate, convivial, and democratic way to ensure technological sovereignty and avoid technologically induced rebound effects (Alarcón Ferrari & Chartier, 2018; Kerschner et al., 2018; Rommel et al., 2018). Concretely, this would mean utilising energy producing technology convivially, "as the opposite of industrial productivity" (Illich, 1973, p. 24). Thus, the technology is used collaboratively and openly, primarily to meet the needs

of the local community, to ensure community wellbeing, and environmental sustainability (Kerschner et al., 2018). Appropriate use of technology would require technology to be integrated and adjusted to the local community context, which helps to produce only as much as needed and enables to maintain, and repair technology in a local and decentralised manner in order to reduce dependence on external actors (Kerschner et al., 2018; Vetter, 2018). Making renewable energy production technologies and the necessary know-how, production and repair skills and benefits available to everyone is a key component of democratising the energy technologies, as it prevents any individual from being excluded from achieving technological and energy autonomy (Kerschner et al., 2018).

## **7. Organisational Dimension: Finance**

### *a) Degrowth Element: Purposeful capital acquisition and democratic allocation of profits*

RECs aligned with the degrowth vision primarily acquire capital to increase their environmental and social value within their community rather than for growth and profit maximisation purposes (Hankammer et al., 2021; Nesterova, 2020). To avoid that raising debt and equity becomes a strong growth and profit driver (e.g., through external financial expectations) (Froese et al., 2023), collective ownership structures and financial self-sufficiency are prioritised (Kunze & Becker, 2015; Leonhardt et al., 2017) over larger investor structures (Khmara & Kronenberg, 2018). Democratic decision-making is used to allocate profits and financial surpluses (reinvestment or distribution in the form of dividends) (Kunze & Becker, 2015).



## **5 Research design, materials, and methods**

The following chapter explains and justifies the research design choices (Chapter 5.1) that guide the research process in this study. The chapter then describes the data collection methods, the materials collected (Chapter 5.2) and the data analysis methods (Chapter 5.3).

### **5.1 Research design**

This study's research process and associated design choices can be divided into two main parts. The first part of the research, which informs RQ1, involved the development of a literature-based, qualitative degrowth framework for community energy. The framework was based on a comprehensive literature review and conceptualised what degrowth would concretely entail for RECs by translating the broad degrowth vision and principles into operationalised degrowth elements (see Chapter 4). As such, the framework was designed to structure and guide the second part of the research process by informing the data collection and analysis processes for RQ2 and RQ3. In this respect, the framework informed the questionnaire (used during the data collection process), the coding structure (used to analyse the data), and the structure of the findings and analysis chapter (see Figure 5-1). To explore whether, to what extent and in what form RECs in Germany are already applying degrowth practices to date (RQ2), and what drivers and barriers they may face in doing so (RQ3), the second part of this study was designed as a qualitative, multiple-case study research applying the conceptual framework. This section describes and justifies the research design choices made and highlights the role of the framework throughout the research process.

Firstly, a qualitative research design was considered most appropriate as previous research exploring the relationship between degrowth and RECs is limited (see Chapter 1.2). Therefore, "a need exists to explore and describe the phenomen[on] and to develop theory" (Creswell & Creswell, 2018, p. 162). Qualitative research helps to provide an initial understanding of participants' perspectives and experiences in a natural setting (Bryman, 2012; Creswell & Creswell, 2018). Thus, while exploring the specific strategies, motivations, challenges, and enabling factors of RECs putting degrowth into practice, a qualitative approach can better capture the nuances and multidimensionality of the research phenomenon under study than a quantitative approach (Creswell & Creswell, 2018). This is particularly relevant for this research, as the ability of organisations to adopt degrowth practices and strategies is not straightforward and highly dependent on the "regional, cultural, and political context in which organisations are embedded" (Hankammer et al., 2021, p. 12).

Secondly, the research was designed as a multiple-case study, investigating the cases of 12 different RECs in Germany, which cumulatively shed light on whether, to what extent, and in what form this specific type of business is already adopting degrowth practices to date, and what drivers and barriers they may face in doing so (Yin, 2014). A case study "investigates a contemporary phenomenon (the "case") in depth and within its real-world context, especially when the boundaries between phenomenon and context may not be clearly evident" (Yin, 2014, p. 16). A case study design, therefore, allows for the detailed exploration and analysis of the complex relationships and factors influencing RECs' ability to adopt degrowth principles. Case studies are typically characterised by collecting data from multiple sources and through multiple methods, enabling the triangulation of the data (Yin, 2014). Therefore, this study conducts 12 semi-structured interviews with REC representatives in management positions and performs a complementary document analysis. Yin (2014) highlights that case studies can either be descriptive, explanatory, or exploratory, however, this thesis adopts an exploratory case study approach by exploring a relatively new area of research and providing initial empirical evidence so that further theoretical considerations can be undertaken in future research (Yin, 2014).

In qualitative research, the researcher’s academic and professional background, personal set of values and worldview, which can be understood as the “general philosophical orientation about the world and the nature of research that a researcher brings to a study” (Creswell & Creswell, 2018, p. 44), might influence the research process and its outcomes. Given that degrowth itself can be understood as a strongly normative concept with far-reaching implications (Kallis et al., 2018), it was considered important to be aware of and critically reflect on my normative background and worldview that was brought to this study (Creswell & Creswell, 2018). Without being a degrowth activist, a positive attitude towards the concept was undoubtedly present, and both my professional and academic background as a researcher have shaped me to advocate for systemic socio-ecological change. Although not fully aligned, the transformative worldview, as outlined in Creswell and Creswell (2018), comes closest to describing the worldview of the researcher in this study. Figure 5-1 illustrates the research design of the study, which will be further explained in the following chapters.

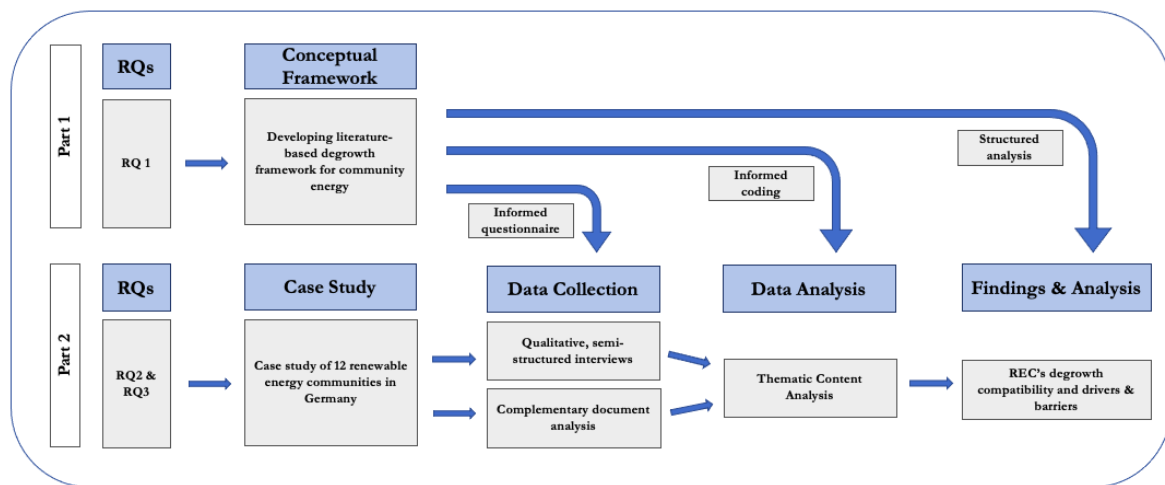


Figure 5-1. Visualisation of the research design

Source: Own illustration

## 5.2 Methods for data collection and materials collected

This subchapter first describes the process of identifying and selecting the case study organisations to be included in this study (see Chapter 5.2.1). It also explains the two different methods which were used to collect data, namely a) conducting semi-structured interviews with RECs representatives (see Chapter 5.2.2) and b) performing a complementary document analysis of REC documents (see Chapter 5.2.3).

### 5.2.1 Case study selection

Potential case study organisations were identified using online platforms and databases listing REC projects in Germany (e.g., Rescoop, Bürgerwerke eG, Bündnis Bürgerenergie e.V.). In addition, an online keyword search was conducted using keywords such as ‘Bürgerenergiegenossenschaft’, ‘Bürgerenergie’, and/or ‘Energiegenossenschaft’. In order to select a representative sample of case study organisations (Bryman, 2012; Creswell & Creswell, 2018), selection criteria (see Table 5-1) were developed based on previous studies that used similar sampling approaches (Kunze & Becker, 2015; Tsagkari, 2020). The criteria were developed to a) narrow the sample size and b) ensure rigour and transparency in the case study selection process (Creswell & Creswell, 2018). Next to the general selection criteria, degrowth-related selection criteria (DRSC) were used to provide an initial indication of whether the potential case study organisations address some of the degrowth elements, to ensure the

sufficient applicability of the conceptual framework. Therefore, certain degrowth elements of the framework that were considered to be practically identifiable when scanning the RECs websites were included as DRSC. Case study organisations were invited if they fulfilled the general selection criteria and at least two DRSC.

Table 5-1. Selection criteria for case study organisations

Case Study Selection Criteria	
<b>General Selection Criteria</b>	<ol style="list-style-type: none"> <li>1) Located and operating in Germany</li> <li>2) Legal form: cooperative (<i>in German e.G.</i>)</li> <li>3) Generating 100% renewable energy (preferably solar and/or wind power)</li> <li>4) First projects have already been implemented</li> <li>5) Ecovillages are deliberately excluded (as they sometimes tend to be religious, ideological and/or spiritual)</li> </ol>
<b>Degrowth Related Selection Criteria (DRSC)</b>	<ol style="list-style-type: none"> <li>6) First indication (at least in two areas) upon scanning their websites:                             <ul style="list-style-type: none"> <li>- Social and environmental core purpose</li> <li>- Inclusive democratic governance and collective ownership structures</li> <li>- Promoting demand-side energy sufficiency</li> <li>- Collaborative value creation and openness to share resources</li> <li>- Localised and embedded in the community context</li> <li>- Deviation from growth- and profit maximisation</li> </ul> </li> </ol>

Source: Own illustration inspired by the selection criteria of Kunze and Becker (2015), Tsagkari (2020)

To enable a diverse sample of RECs, this study aimed to include a similar number of small-scale (<300 members), medium-scale (300-1000 members), and large-scale (1000< members) RECs. Initially, 30 RECs were identified that fulfilled the selection criteria outlined in Table 5-1. These RECs were invited by email to participate in an online interview. Ultimately, 12 RECs positively responded and were included in the sample for this thesis project. Appendix B provides further background information about the case study organisation, their core activities, geographical location, and the participant's position. It should be acknowledged that due to the time constraints of this master thesis project, the selection of the case study organisations, which were ultimately included, depended on the availability of the participants. An exception to the selection criteria was made in the case of REC 4 (see Appendix B). Due to ambiguous information on its website, which did not allow a precise classification, REC 4 was included in the sample, although it was discovered during the interview that the main focus was not electricity generation by means of solar and/or wind but rather the development of a local renewable heating network with PV support.

### 5.2.2 Qualitative, semi-structured interviews

Qualitative, semi-structured interviews were conducted with 12 representatives of RECs in Germany in order to answer RQ2 and RQ3. The aim of the interviews was to capture nuanced perspectives and insights about RECs' current practices, in relation to the 14 degrowth elements of the degrowth framework for community energy (see Chapter 4). This was done to better understand whether, to what extent and how RECs are already implementing the pre-defined degrowth elements and thereby providing an indication of their degrowth compatibility. Qualitative interviews were identified as a suitable method of data collection for their ability to gather information and perspectives that go beyond publicly available material. This was particularly relevant for this study, as RECs in Germany may not (yet) explicitly refer to degrowth, given that it is still largely an academic and visionary concept. The format of semi-structured, qualitative interviews was chosen because it allowed data collection to be guided by

a questionnaire that was similar in each interview, thus ensuring comparability. At the same time, the semi-structured nature of the interviews also provided sufficient space for participants to elaborate on their perspectives (Creswell & Creswell, 2018). As explained by Creswell and Creswell (2018), qualitative interviews are subject to some limitations. First, qualitative interviews generate “indirect information filtered through the views of interviewees”, which may not necessarily be representative for a wider group of individuals (Creswell & Creswell, 2018, p. 264). Additionally, during qualitative interviews, the researchers’ presence may also influence the findings, as interviewees may adjust their answers to what they think the researcher would like to hear (Creswell & Creswell, 2018). To account for these limitations and to fill any data gaps remaining after the interviews, a supplementary document analysis was conducted (see Chapter 5.2.3) and the collected data was triangulated (Creswell & Creswell, 2018).

Finally, 12 semi-structured online interviews were conducted between 10. March 2023 and 12. April 2023. The interviews lasted between 45 and 70 minutes and were conducted using the online conferencing tool Zoom. The semi-structured interviews followed a pre-developed interview guide which was structured according to the seven dimensions and 14 degrowth elements of the conceptual framework (see Appendix C). The questions addressing RQ2 were designed to ask whether and in what form the pre-defined degrowth elements were already being implemented in RECs’ organisational practice. To answer RQ3, questions were asked about potential drivers and barriers influencing RECs’ ability to adopt the degrowth elements. The interview questions were mostly formulated in an open-ended manner to allow interviewees to elaborate on their perspectives.

### **5.2.3 Complementary document analysis**

A complementary document analysis was undertaken to supplement the qualitative interview findings and to contextualise the case study organisations (Bowen, 2009; Creswell & Creswell, 2018). Bowen (2009, p. 27) defines document analysis as a “procedure for reviewing or evaluating documents – both printed and electronic” and explains that it is common practice to combine document analyses with qualitative research methods such as interviews. This is because qualitative research benefits from the use of multiple sources and data collection methods from which findings can be compiled and triangulated, thereby increasing both the internal and construct validity of qualitative case study research (Bowen, 2009; Creswell & Creswell, 2018). This complementary document analysis was undertaken to obtain additional information on specific aspects that were not sufficiently covered by the interview evidence, in order to address the various dimensions and elements of the conceptual framework in the most comprehensive way possible. The document analysis also helped to gain a comprehensive understanding of the activities of the RECs, their business model logics and concrete projects implemented, as this information was often only briefly covered in the interviews due to time constraints. It is important to stress that the document analysis carried out in this study was not intended to be systematic, but rather complementary. A document analysis can draw on many different types of documents (Bowen, 2009), but the document analysis in this study was limited to REC websites, blog posts and open access reports. In order to limit the scope of the analysis, only documents published by the RECs themselves were used.

## **5.3 Methods for data analysis**

This subchapter outlines how the collected data was analysed. The first step in the data analysis process was to organise and prepare the collected material for analysis (Creswell & Creswell, 2018). The primary data collected during the interviews were transcribed using the online tool ‘Trint’. In the next step, the German interview transcripts were translated into English with the help of ‘DeepL’, an AI-powered translation tool. It is worth noting that this tool was also used for translation purposes at other points throughout the thesis. The transcripts and translations

were manually checked for mistakes. In addition, relevant secondary data collected during the complementary document review was sorted for further analysis (Creswell & Creswell, 2018).

Next, the collected material was uploaded into the free coding programme ‘NVIVO’, in which a thematic content analysis (TCA) was conducted. A TCA can be used “for identifying, analysing and reporting patterns (themes) within data” (Braun & Clarke, 2006, p. 79), and was therefore used to structure and interpret the participants’ perspectives and extract key themes from the qualitative data (Creswell & Creswell, 2018). The type of coding which was used in this study is called deductive-inductive coding (Braun & Clarke, 2006; Creswell & Creswell, 2018). Deductive codes are themes which are pre-defined by theoretical and conceptual considerations before the TCA begins, whereas inductive codes emerge from the data during the coding process (Braun & Clarke, 2006; Creswell & Creswell, 2018).

A deductive coding approach was used to analyse the data collected for RQ2, which asks whether, to what extent and in what form RECs are implementing the degrowth elements conceptualised in the framework. Consequently, the deductive codes emerged from the 14 degrowth elements of the conceptual framework (see Chapter 4.2). An important part of the analysis for RQ2 was to determine RECs’ degrowth compatibility with the pre-defined degrowth elements. It is therefore important to provide a brief clarification of what degrowth compatibility means and how it is assessed in the context of this study. In essence, this study understands degrowth compatibility in terms of the alignment of RECs with the respective degrowth element. As a qualitative study, this thesis does not attempt to quantify the degrowth compatibility of RECs, nor does it attempt to thoroughly assess the degrowth compatibility of each individual REC included in this study. Instead, it aims to provide an initial overview of the compatibility of the study’s sample with the respective elements of the framework and thus with the degrowth vision. In order to make an informed statement about the degrowth compatibility of the RECs included in this study, the following three categories have been developed and are used throughout the analysis (Chapter 6).

*Table 5-2. Categories for assessing the degrowth compatibility*

<b>Categories for Assessing the Degrowth Compatibility of RECs</b>	
-	<b>High degrowth compatibility</b> – In this category, the majority of the RECs demonstrate strong alignment with the respective degrowth element. RECs have implemented different strategies, or principles that promote its implementation. Only a few RECs have implemented limited strategies relating to this element.
-	<b>Partial degrowth compatibility</b> – In this category, the majority of RECs demonstrate partial alignment with the respective degrowth element by having implemented some strategies, or principles to promote its implementation. There are exceptions in both directions, highlighting the variety of the results.
-	<b>Limited degrowth compatibility</b> – In this category, the majority of RECs demonstrates limited or no alignment with the respective degrowth element. Only a few RECs have implemented some measures, but mainly without an overarching strategic implementation.

*Source: Own illustration*

While the deductive coding structure, based on the elements of the framework, was also used to analyse the data collected for RQ3, the data analysis revealed that the drivers and barriers sometimes apply to more than one degrowth element and therefore did not always fit into the framework structure. Therefore, inductive codes were derived for this specific purpose, forming the structure of Chapter 6.3. Finally, it is important to acknowledge that both deductive and inductive coding are strongly influenced by the researcher’s own choices, thereby introducing some degree of selection bias (Creswell & Creswell, 2018).

## 6 Results and analysis

This chapter presents and analyses the qualitative data collected to answer RQ2 and RQ3. This data includes the findings from the 12 qualitative, semi-structured interviews with representatives of German RECs and a complementary document analysis. This study presents and analyses the findings in an intertwined manner, as the presentation of the findings is closely guided by the conceptual framework, which makes it suitable for drawing direct analytical conclusions and identifying patterns and cross-connections between the different degrowth elements of the framework. Being qualitative in nature, this chapter deliberately captures and discusses important nuances, opinions, attitudes, and behaviours that have emerged from the research.

RQ2 aims to investigate whether, to what extent and in what form degrowth elements can be identified in the organisational practice of RECs in Germany. The corresponding results and analysis are structured according to the degrowth framework for community energy (see Chapter 4.2) and presented in Chapter 6.1. The presentation of the findings for each degrowth element and the analysis are structured in a similar way. First, a brief description of the degrowth element is provided, followed by the presentation and analysis of the findings specific to the degrowth element. This is followed by a summary of the key findings and a compatibility assessment for each degrowth element. The degrowth compatibility assessment is based on the categorisation presented in Chapter 4.3. RQ3 aims to identify key drivers and barriers that influence the ability of RECs in Germany to adopt degrowth elements. The findings for RQ3 are presented in Chapter 6.3. The drivers and barriers were often relevant to more than one degrowth element, so their connections to the corresponding degrowth elements are clearly illustrated. Throughout this chapter, the interviews are referenced according to the individual codes (e.g., REC 1) for each REC, as described in Appendix B.

### 6.1 Applying the degrowth framework for community energy

#### 6.1.1 Dimension: Purpose, Values & Visions

##### **a) Degrowth Element: Primary organisational purpose is to provide value for environment and society**

The first degrowth element relates to the core organisational purpose and objectives of the interviewed RECs and explores whether, and to what extent, RECs prioritise environmental and social over economic value creation (e.g., in the form of profits). The responses revealed that all of the interviewed RECs have made it their organisational core purpose to address social and environmental challenges (REC 1-12). Although economic considerations were also found to play a role in the organisational objectives of the interviewed RECs, they are often considered a means to an end in achieving environmental and social objectives (see Chapter 6.1.1b). This clearly shows that RECs are aware of their embeddedness in a wider socio-ecological context, which they seek to positively influence. In terms of environmental value creation, all of the interviewed RECs indicated that one of their core organisational purposes is to mitigate climate change by facilitating a decentralised energy transition to renewable energy, thus substituting fossil fuel-based energy production systems (REC 1-12), as illustrated by the following quote:

*“We want to protect the climate for a world worth living in, so we are acting here and now. Our goal is a shared and renewable energy future for all” (REC 11).*

In addition to the aspiration “to get away from fossil fuels as quickly as possible” (REC 3), another environmental objective of some RECs, especially at the time of their founding, was to contribute to the nuclear power phase-out by providing renewable energy alternatives (REC 11,

12). Notably, regionality was found to play a central role, as RECs clearly try to solve the global problem of climate change at the local level (see Chapter 6.1.5a). While environmental value creation stood out to be a central concern, RECs often understand social value creation as providing opportunities for the local community to participate and get involved (financially through providing capital, but also practically in terms of volunteering) (REC 1-12) (see Chapter 6.1.4a). With respect to social value creation, the work of REC 4 is worth highlighting, as it explicitly pursues two objectives. First, the generation of renewable energy in the form of heat, and second, the provision of a cultural venue and the promotion of community interaction through urban gardening or local cooking groups (KEGA, n.D.). Although environmental and social objectives were found to be at the core of the RECs' organisational purpose, it was observed that the associated environmental and social objectives are often not being operationalised through clear target setting (e.g., reduction of CO<sub>2</sub> emissions), underlining that they are perceived as a broader vision rather than informing RECs' day-to-day operations.

Table 6-1. Key findings and degrowth compatibility for degrowth element 6.1.1a

6.1.1 a): Primary organisational purpose is to provide value for environment and society	
Key Findings	<ul style="list-style-type: none"> <li>- The key purpose of the interviewed RECs includes environmental and social value creation objectives, with economic objectives largely being seen as a means rather than an end</li> <li>- Environmental value creation by substituting fossil fuels with renewable energy</li> <li>- Social value creation by facilitating citizens participation in the energy transition</li> <li>- Lack of operationalisation of environmental and social objectives</li> </ul>
Degrowth Compatibility	All of the RECs are strongly committed to delivering environmental and social value by promoting a decentralised, decarbonised energy transition and engaging citizens in this transition. They recognise their embeddedness in a wider socio-ecological context by solving global problems locally. RECs don't prioritise economic over social and environmental value creation, thus their degrowth compatibility for this element is considered to be high.

Source: Own illustration

**b) Degrowth Element: Deviation from economic growth and profit maximisation**

The second element of the framework examines RECs' orientation towards growth and profit maximisation. According to the framework, RECs following a degrowth path would take a critical stance towards organisational growth and deviate from profit maximisation efforts. First, the interviews revealed that almost all of the responding RECs follow a clear organisational growth motive in terms of installed capacity and number of cooperative members (REC 1, 3, 5, 7, 12). RECs with more diversified portfolios additionally aim to grow in terms of employees and customers (REC 2, 6, 8-11). Some of the RECs also indicated a tendency to grow in terms of the project size (REC 6-9). The following quote captures the growth motive of several of the interviewed RECs:

*“We want to grow in the sense that we want to hire people, we want to install more renewable energy, so we want to implement more PV systems, we want to implement more projects, we want to attract more members, we also want to attract more electricity customers and clients, ideally. But not for the sake of growth, but for the sake of climate protection” (REC 6).*

However, what has become evident throughout the interviews is that RECs in Germany are not “growing for the sake of growth” (REC 12), in order to maximise profits and pay out high dividends to their members (RECs 1-12). Although several of the RECs explicitly stated that it is essential for them also to let their members participate financially on the surpluses in form of dividends (REC 1, 5-12), they are by no means trying to purely maximise their profitability and “in this

sense, it is not monetary growth that [they] are targeting” (REC3). Organisational growth and the generation of profits are largely considered a means, not an end. Thus, the energy cooperatives interviewed are growing because, amongst other objectives, they want to 1) facilitate the energy transition (see Chapter 6.1.1a), 2) strengthen citizen participation (see Chapter 6.1.5a), 3) support regional value creation (see Chapter 6.1.4b), or 4) become independent of large, centralised, and profit-driven energy providers (see Chapter 6.1.1c). A key observation that was made is that some of the RECs have clearly operationalised their objectives and success factors in terms of quantified targets, e.g., increase in installed capacity (REC 5, 7, 8), which underpins the growth path most of the RECs are pursuing. Although some of the RECs emphasised that we “need a change in awareness that this growth is reaching its limits” (REC 11), thereby acknowledging that there are limits to growth, none of the interviewed RECs explicitly refer to degrowth as an organisational goal.

The only cooperative that was found to not actively be pursuing organisational growth is REC 4, where the participant said that “we don’t want to grow, we don’t want to open more and more [energy] bunkers, but we want to network and that’s what we’re doing”. Their reason for not growing seems closely related to the fact that REC 4 utilises existing infrastructure in an already densely populated and developed area in one of Hamburg’s central districts. However, it also underscores that other qualitative goals, in this case, networking with other sustainability initiatives, are being pursued to generate social-ecological impact (REC 4).

Table 6-2. Key findings and degrowth compatibility for degrowth element 6.1.1b

6.1.1 b): Deviation from economic growth and profit maximisation	
Key Findings	<ul style="list-style-type: none"> <li>- The great majority of the interviewed RECs aim to grow (e.g., in terms of installed capacity, members, employees, project size), sometimes with quantified targets</li> <li>- Profit maximisation motives, however, were not observed (profits are a means, not an end)</li> <li>- In some cases, awareness of limits to growth were found, but degrowth is not seen as an explicit organisational goal</li> </ul>
Degrowth Compatibility	The majority of RECs clearly pursue a growth motive to achieve their socio-ecological goal of promoting a decentralised transition to renewable energy, the substitution of fossil fuels and the participation of citizens. However, as RECs are growing, they are not absolutely reducing their own energy and resource throughput (see Chapter 6.1.2a). Profit maximisation is not their key objective; profits and organisational growth are considered a means, not an end. Therefore, RECs’ degrowth compatibility with respect to this element is only partially available.

Source: Own illustration

### c) Degrowth Element: Striving for self-sufficiency and independence from the current energy system

This degrowth element focuses on RECs’ efforts to become self-sufficient and independent from the current energy system. The interview questions were designed to assess whether, to what extent and in what ways RECs are working towards energy autonomy and self-sufficiency of local communities in terms of their energy supply. First, it has been observed that there are several RECs explicitly striving for self-sufficiency and independence of the energy supply in their regional context (REC 1, 6, 7, 10, 11). A key objective is to become independent from existing and often centralised, profit-driven energy production and distribution systems, in line with the perspective of REC 3 that “public infrastructure should not be provided by private, profit-oriented [energy] companies.” For some of the interviewed RECs, empowering citizens to take energy production and distribution into their own hands is a key element for achieving regional self-sufficiency and independence (REC 1, 3, 10).



*“We want to become independent here, largely independent with our energy supply. So that we can produce what we need here in the region, in balance you have to say [...] and not through big companies, but wherever possible with the contribution and the commitment of the citizens who live here” (REC 10).*

In addition, REC 1 perceives it as necessary to become not only independent from the German energy system but also *“independent from foreign [energy] imports”* (REC 1). The aim of becoming less dependent on foreign, mostly fossil fuel-based, energy imports to strengthen energy security at the local level is not only of concern to the RECs themselves. REC 9 reported that their members are also increasingly aware of the importance of becoming independent, saying that *“I want to be more self-sufficient, I want to generate my own energy, generate my own electricity has suddenly become a big topic”* (REC 9).

Although not all RECs explicitly aim for self-sufficiency and independence, some implicitly implement measures that strengthen this objective. The interviewed RECs are trying to strengthen local energy independence and self-sufficiency. Tenant electricity and self-consumption models are common ways of supplying residents with their own electricity (REC 1, 2, 3, 5-8, 10). Another opportunity to strengthen independence is by either operating one's own local heating grid (REC 4, 8, 11) or by buying the local electricity grid from bigger suppliers, thus having control of the electricity flowing through the grid (REC 11). A relatively recent and up-and-coming way how RECs aim to increase household energy independence is by providing households with balcony PV modules that they can install to self-produce their own electricity for direct consumption. Several RECs offer consulting services or sell balcony PV modules to their members and other interested citizens (REC 3, 5, 6, 9, 11).

Table 6-3. Key findings and degrowth compatibility for degrowth element 6.1.1c

6.1.1 c): Striving for self-sufficiency and independence from the current energy system	
Key Findings	<ul style="list-style-type: none"> <li>- Several RECs are explicitly striving for self-sufficiency, independence, and autonomy from a) the current profit-driven energy system and b) foreign, fossil-fuel based energy imports</li> <li>- Other RECs are implicitly enabling the necessary conditions for energy self-sufficiency</li> <li>- Variety of strategies to achieve this, e.g., tenant electricity and self-consumption models, balcony PV modules, the purchase of electricity grids and operation of local heating grids</li> </ul>
Degrowth Compatibility	The majority of RECs strengthen energy independence and self-sufficiency of local communities, with the (explicit) objective of opposing the currently still largely profit-driven and fossil fuel-based energy production in Germany, as well as its imports from abroad. This is considered to be an important first step to self-empower local communities to take energy production back into their own hands and align in it with local community needs. Therefore, the degrowth compatibility of RECs for this element is considered to be high.

Source: Own illustration

**d) Degrowth Element: Politically motivated and normative action in networks**

This degrowth element examines RECs' politically motivated and normative action in networks to identify whether and how RECs actively engage with and shape local, regional, or national policy framework conditions that enable a smaller, decentralised, and democratic energy system based on degrowth values. By aiming for a decentralised renewable energy transition, the purpose of RECs in Germany is political and normative in nature (see Chapter 6.1.1a). All of the interviewed RECs were found to be politically engaged, although to different degrees, at various scales and policy levels, and with different objectives and strategies (REC 1-12). The RECs do not explicitly pursue degrowth objectives (see Chapter 6.1.1b), so they do not actively promote explicit degrowth policies. However, necessary conditions for a degrowth transition (e.g., community embeddedness (see Chapter 6.1.5a) or democratic decision-making (see

Chapter 6.1.4a)) are indirectly being promoted through the politically motivated engagement of RECs. Central to their political engagement is their collective ownership structure of being a cooperative, which allows them to “act together to the outside world, that [they] can make demands, and that [they] can create a social network, a social community, if [they] represent common values” (REC 6). Most of the interviewed RECs are primarily politically engaged at municipal and local policy levels to promote the idea of a decentralised renewable energy transition (REC 1-5, 8-12). RECs believe that they play an important role in raising awareness among local policymakers by “getting the idea of regionalising the energy production into their minds” (REC 9). Furthermore, political support is important to strengthen societal acceptance of the energy transition, as REC 12 reported that they regularly see themselves confronted by “professional [wind energy] opponents” in society. Besides raising political and societal awareness, several RECs also reported that their political engagement on the municipal level is often tied to a concrete project that should be realised in cooperation with the municipality (REC 2, 4, 5, 8, 12). When it comes to political engagement at the state or national level, the majority of the RECs become politically involved through membership in associations or umbrella organisations (e.g., Bündnis Bürgerenergie e.V.) that represent the interests of the RECs at the respective level (REC 2, 3, 5-11). Two things became apparent. Firstly, networks play a crucial role in enabling RECs to get politically and normatively involved. Secondly, especially smaller RECs working largely voluntarily, often don’t have the capacity to carry out their political work other than at the local level and often rely on the umbrella organisations and associations, which is illustrated by the following quote:

*“But we are also a member of the Bürgerwerke, which is a little bit of our [...] voice. So, we just have to be a little bit efficient, so to speak, we support that and unfortunately, we can’t do more, otherwise we wouldn’t be able to do our other tasks” (REC 2)*

REC 11, the largest REC included in this study, stood out for having sufficient resources to run its own political department, which exclusively focuses on political networking and lobbying (REC 11). Their political work is financed in a democratic way: all electricity and gas customers pay the so-called “sun cent” for every kWh consumed, which is used to subsidise, among other things, the political campaigns and work of REC 11 (EWS, 2022a).

Table 6-4. Key findings and degrowth compatibility for degrowth element 6.1.1d

6.1.1 d): Politically motivated and normative action in networks	
Key Findings	<ul style="list-style-type: none"> <li>- Facilitating a decentralised energy transition is political and normative in itself</li> <li>- RECs are politically engaged primarily at the local level to a) raise awareness and b) realise local projects</li> <li>- RECs are politically engaged at the state or national level, primarily through associations and umbrella organisations, due to a lack of resources</li> </ul>
Degrowth Compatibility	All RECs are politically engaged, although often only directly at the local level and in relation to projects that need to be implemented. When it comes to political work at state or national level, which would include working on the necessary changes in framework conditions, RECs direct engagement is more limited due to a lack of resources. As the RECs do not explicitly pursue degrowth objectives, they do not explicitly promote degrowth-oriented policies. Therefore, the degrowth compatibility of RECs with regard to this element is partially existent.

Source: Own illustration

## 6.1.2 Dimension: Environment and Resources

### a) Degrowth Element: Minimising environmental impacts within the own operations and supply chain

The following degrowth element examines whether, to what extent and in what form the interviewed RECs are actively assessing and minimising the environmental impacts resulting from a) their own operations (covering administrative and cooperative-related work, as well as tasks relating to the planning, installation, and operation of their respective energy systems), and b) their supply chains. Starting with some general observations, the interviews revealed that all RECs were aware of the potential environmental impacts caused by their own operations. However, it is noteworthy that the majority of the interviewed RECs are actively seeking to grow (see Chapter 6.1.1b), which in most cases results in the absence of any specific targets for the absolute reductions in material and energy throughput or internal sufficiency measurements, as illustrated by the following quote:

*“Of course, it always resonates that you are trying to reduce material and energy consumption. But there is no specific target where we say we want to achieve a certain reduction target because we are still growing” (REC 11).*

However, RECs are still implementing strategies to reduce the environmental impacts of their own operations, although the levels of ambition varied. Concerning the administrative and cooperative-related work, RECs' efforts to minimise environmental impacts were considered relatively small-scale and marginal. Several RECs, for example, reported that they prefer using electric cars or car-sharing when travelling to external events or meetings (REC 1, 5, 7, 8). In addition, some of the smaller RECs are saving resources and energy by not having their own office building (REC 1, 3, 4). For other RECs, printing marketing material on recycled paper (REC 5, 11), using renewable energy for their own operations (REC 4, 11), and providing sustainable mobility offers such as regional train tickets to their employees (REC 11) were mentioned as strategies for reducing the environmental impact. REC 11 had the most comprehensive sustainability strategy for its own operations, which can be explained by its large size and higher resource availability.

Regarding the planning of new installations, some interviewees referred to mandatory environmental impact assessments as a way of understanding and mitigating potential adverse impacts of their plants (REC 5, 9, 10). This is particularly the case for wind turbines or large-scale PV systems, which often require a significant intervention in natural ecosystems. While recognising potential adverse environmental impacts of renewable energy installations, REC 12 emphasised the importance of balancing the environmental impact with the benefits that, for example, a wind turbine delivers by providing clean and affordable energy.

For some RECs, concrete strategies for minimising the environmental impacts of PV system installation include setting up the systems themselves and doing it *“by hand, the stones, everything you need for that, mostly with as much manual labour and as little use of machines and technology as possible” (REC 1)*. In order to shorten supply and transportation chains, several RECs indicated that they try to reduce their environmental impact by purchasing technology from local suppliers and/or working together with local handymen to install the systems (REC 3, 5, 7, 8, 10, 11). An interesting perspective on how resource and space use can be optimised was raised by REC 3 and REC 4, which are deliberately utilising already existing infrastructure when installing their energy systems. REC 4 generates heat in a formerly abandoned bunker and REC 3 tries *“to install PV systems only on areas that are already sealed”*, such as rooftops. Concerning the operation of the respective energy systems, RECs have adopted several strategies to reduce environmental impacts and resource use, and to take biodiversity considerations into account. REC 11, for example, reported that they explicitly use waste wood from local wood-brush factories to operate their local heating networks, thus strengthening circular processes and reducing resource use in the region. REC 3 mentioned that *“if we would do a full life cycle assessment now, even if [the PV system is] running at 70%, it might still be interesting to just keep using it after 30 years instead of*

*taking it all down*” to extend the lifecycle, reduce resource use and environmental impact. Even though it was not considered the most central topic, the interviews also revealed some strategies that RECs have been undertaking to strengthen biodiversity around their plants (e.g., through species protection, insect hotels) (REC 6).

Moving from RECs’ own operations to their supply chains, it was found that although RECs are generally aware of the adverse environmental and social consequences arising from their supply chains, for example of PV modules, their ability to assess and mitigate their impacts is limited. This is because all of the interviewed RECs exclusively source their modules from external companies, primarily from the Asian market (specifically for PV modules), as REC 7 pointed out:

*“I remember the early days when we actually said, almost idealistically, that the material should come from Europe as much as possible, i.e., the solar modules, the inverters and so on. Today, of course, that is no longer possible. [...] Now everything is in China. Maybe it will come back now, there will be new initiatives, and then it will certainly be emphasized again. But this ideal has to be abandoned to some extent” (REC 7).*

This quote also illustrates that RECs consider sourcing materials produced in countries with high(er) environmental and social standards to be the most effective strategy for reducing their impacts in supply chains. While this appears to be difficult for PV modules, the accessibility of wind turbines from German manufacturers seems to be better, as REC 11 reported that they are working together with Enercon, a German wind turbine manufacturer.

Table 6-5. Key findings and degrowth compatibility for degrowth element 6.1.2a

6.1.2 a): Minimising environmental impacts within the operations and supply chain	
Key Findings	<ul style="list-style-type: none"> <li>- As RECs continue to grow, no absolute material and energy reduction is observable</li> <li>- Some efforts to reduce environmental impacts can be observed in RECs’ own operations, but often incrementally (e.g., use of recycled paper, EV-cars, shorten transportation chains)</li> <li>- Measures to reduce environmental and social impacts in the PV supply chain do not exist, but some RECs source their wind turbines from German companies</li> </ul>
Degrowth Compatibility	<p>Although individual measures to reduce the environmental impacts (mostly in their own operations) were identified, these are mostly isolated measures rather than comprehensive strategies. Furthermore, the growth path of most RECs does not allow for an absolute reduction of material and energy throughput or sufficiency-oriented behaviour in their own operation. Scaling up renewable energy is considered to be their main environmental contribution. Therefore, RECs’ degrowth compatibility for this specific element is considered to be low.</p>

Source: Own illustration

### 6.1.3 Dimension: Energy Consumers

#### a) Degrowth Element: Promoting demand-side energy sufficiency

This degrowth element aims to identify RECs’ ambition to promote demand-side energy sufficiency in their member/customer relationships. The aim was to analyse whether and how the interviewed RECs engage with their customers/members, advocate for behavioural changes that contribute to an absolute reduction in energy consumption, and address the critical question of how much energy is needed to ensure wellbeing and satisfaction of basic needs. Although the interviewed RECs seemed to be interested in the idea of promoting energy sufficiency, by saying that *“energy conservation potential is just as important [...] the less I have to generate, the better”* (REC 4), the majority of the interviewed RECs do not focus on it strategically. Most of them

mentioned the lack of resources as a limiting factor (REC 1, 3-5, 7, 8, 10, 12) and stressed that the planning, installation, and operation of renewable energy systems constitute their core business. However, there are still some concrete strategies that have been identified on how the RECs “try to motivate [their] members to think about energy conservation and take action” (REC 9).

A common strategy for RECs was to raise awareness, sensitise customers, and provide concrete suggestions on how energy consumption can be reduced through formats such as newsletters, social media, or their magazines (REC 9, 11). Other energy cooperatives mentioned that the issue of energy sufficiency and conservation plays a role whenever they are invited to public events, discussion rounds or presentations (REC 7, 8, 12). Two other RECs reported that they were involved in an ongoing research project of the research institute (IÖW, 2023), which explores the role of RECs in Germany in promoting sufficiency-oriented lifestyles (REC 7, 9). As part of the research project, both participating RECs organised a campaign week to engage with their members and other interested citizens on the topic of sufficiency. This week provided an interactive exchange and discussion on the topic, enabling the REC members to try sufficiency-oriented practices (Energiegenossenschaft Starkenburg eG, 2023). However, REC 6 mentioned that this was only feasible because the research institute provided necessary material and input. Sufficiency-promoting strategies were found to be more structurally embedded in the work of REC 11. The REC just recently ran an energy saving-campaign called “wirsparendas”, (which translates to “wesavethat”), where customers were provided with concrete suggestions on how to save energy and were asked to save electricity. For every kWh of electricity saved, a certain amount was donated to a project that provides low-income households with energy-saving advice to help them save money and reduce the risk of energy poverty (EWS, n.D.a). In addition, the company provides its customers with the opportunity to borrow electricity meters free of charge to monitor their own energy consumption, which is seen as an important pre-requisite for encouraging energy-sufficient behaviour. Additionally, the REC cooperates with a local energy agency to provide its customers with professional energy conservation advice (REC 11). All of these sufficiency-promoting measures are showing positive results, as REC 11 reports that “with an average electricity consumption of around 2,300 kWh, [their] customers use significantly less electricity than the average German household” (REC 11).

A central component that stood out is that promoting energy-sufficient lifestyles is considered to be most effective whenever customers, members, and other citizens become more involved in energy production. In the case of the solar balcony modules, for example, several RECs observed that people develop a different relationship with their energy consumption and are more likely to adjust because they take ownership and control over the production (REC 7, 9, 11). Interestingly, REC 1 reported that this awareness might already be there, as their members are most likely environmentally conscious and “they’ve already thought about using less electricity anyway, generating electricity and generating it regionally, that they’ve already thought about this system of efficiency and sufficiency and then joining the energy cooperative” (REC 1). According to REC 11, members play a central role as multipliers to create awareness within their social networks and normalise a more energy-sufficient lifestyle (REC 11).

Table 6-6. Key findings and degrowth compatibility for degrowth element 6.1.3a

6.1.3 a): Promoting demand-side energy sufficiency	
Key Findings	<ul style="list-style-type: none"> <li>- RECs were not structurally focused on promoting demand-side sufficiency due to lacking resources and a strong focus on the planning, installation, and operation of energy systems</li> <li>- Individual sufficiency-promoting measures were observed</li> <li>- Direct participation and ownership (e.g., balcony modules) could promote sufficiency-oriented behaviour, because of different relationship to own energy consumption</li> </ul>

Degrowth Compatibility	Individual strategies to promote demand-side energy sufficiency were identified for a very few RECs, but the structural focus of is lacking. The RECs simply do not prioritise (due to lack of resources) the promotion and normalisation of energy-sufficient lifestyles through communication and close engagement with their members and customers. The clear focus is on accelerating decentralised energy production and the deployment of renewable energy systems. As the necessary promotion of lifestyle changes is not observable, RECs' degrowth compatibility for this specific element is considered to be low.
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Source: Own illustration

### **b) Degrowth Element: Aligning energy production with local community needs**

This degrowth element aims to determine whether, to what extent and in what form RECs align their energy production with the energy needs of their local communities. RECs approaching degrowth aim to satisfy basic energy needs and ensure that the decentralised energy is consumed locally, as it would help them to limit their energy production capacity to the actual needs. The first observation that was made is that there is a general interest among all interviewed RECs to “generate [their] energy locally and then also consume it here to a large extent” (REC 6). However, RECs first need to identify and assess the current energy needs of their communities. In this regard, it is important to distinguish between self-consumption and feed-in energy systems. While some RECs develop their rooftop PV systems for self-consumption purposes (REC 1-3, 5-10), larger PV systems and wind turbines are often designed to produce electricity that is fed into the grid (REC 6-12). According to REC 3, the rooftop PV systems for self-consumption involve a thorough assessment of the respective consumer’s energy needs in order to design the system accordingly, as illustrated by the following quote:

*“So, because we work primarily with municipal partners, where we actually look first at what are the needs of the building, so this school, this day-care centre, this administrative building. How much electricity do they need? And then we install an adapted system there, or one that is more or less related to that” (REC 3)*

Interestingly, some RECs reported that precisely those rooftop PV systems designed for self-consumption are currently the most financially attractive PV systems to implement (REC 6, 7). However, it becomes more difficult to align the energy production with the local community energy needs when it comes to larger ground-mounted systems or wind turbines. That is because, unlike rooftop PV systems for self-consumption, these larger systems do not produce for a single entity, which in turn makes it more challenging to assess the actual energy demands of the community, as illustrated in the following quote from REC 6:

*“We don’t really know at the moment, what is needed, what is consumed? If you think about it in a larger sense in Weimar, in the Weimarer Land, how much energy is needed here and how much do we generate in order to somehow connect it. Also, simply because it would be too complex. First of all, you have to talk to the grid operator when you provide the data, which probably won’t happen. And there’s just no legal framework that makes sense for us to do that in any way” (REC 6).*

For this reason, the energy cooperatives often work together with ‘Bürgerwerke’, an umbrella cooperative that enables the distribution of decentrally produced green electricity to end customers (REC 3, 5-9). However, REC 7 noted that from a physical point of view, whether a PV system is designed for self-consumption or whether the electricity is fed into the grid makes no difference. The electricity is “still going to take the path of least resistance” (REC 7) and therefore usually consumed locally anyways. It is more a question of accounting, billing, and participation (REC 7).

The idea of energy sharing is an issue that came up frequently in the interviews and would strengthen the possibility of aligning local energy production with local needs. The idea of energy sharing is very much aligned with this degrowth element because it would enable the community to produce their own energy and satisfy their community energy needs through sharing. Although it is a widely discussed concept in Germany, it is not yet being implemented in practice as the policy framework is not in place yet. However, several RECs see it as a very promising avenue (REC 5, 6, 11). REC 11, for example, is currently running a model project in which the company created a virtual citizen power plant with 30 participants. The project was designed to experiment with energy sharing concepts, in the sense that 20 PV systems, various battery systems, electric cars and even a local heat and power plant were combined in a virtual citizen power plant. Through smart metering systems, the participants could produce, self-consume, and most importantly, share the energy with other participants (EWS, n.D.b).

Table 6-7. Key findings and degrowth compatibility for degrowth element 6.1.3b

6.1.3 b): Aligning energy production with local community needs	
Key Findings	<ul style="list-style-type: none"> <li>- Majority of RECs show general interest in aligning energy production with community energy needs</li> <li>- However, this is only feasible for smaller-scale, self-consuming PV systems, as larger systems feed most of the produced electricity into the grid without knowing actual community needs</li> <li>- Energy sharing has great potential, but is currently not used due to lacking policy framework</li> </ul>
Degrowth Compatibility	Aligning energy production with local community needs is an interest and current practice of the majority of the RECs. However, as almost all of the RECs are pursuing growth, there is a tendency that in order to increase the installed capacity, the project size increases, and more electricity is produced to be fed into the grid. This reduces the alignment of energy production with the local energy needs. Therefore, RECs degrowth compatibility for this element is considered to be partially existent.

Source: Own illustration

## 6.1.4 Dimension: Organisational Structure & Governance

### a) Degrowth Element: Inclusive and democratic governance and ownership structures

This element of the degrowth framework aims to assess whether and how the governance and ownership structures of the interviewed RECs are designed to be inclusive and democratic. From a degrowth perspective, it is considered important to involve as many people as possible in the decentralised energy production, to enable local control and ownership and thus promote the democratisation of the energy transition. The first finding is that cooperatives are considered to be an appropriate legal form for the operation of a REC because “*cooperatives provide a suitable structure for a larger number of people who want to advance a project [...] and that provides such a framework, a legal framework with a management board, supervisory board, audit cycles*” (REC 12). As the formal structure, roles and responsibilities within a cooperative are determined by the German cooperative law (REC 3), the general decision-making, governance and ownership structures were essentially the same for all of the interviewed RECs. However, significant differences were found in the additional measures the interviewed RECs took to further strengthen inclusiveness and participation beyond the legally prescribed structures.

Starting with the governance and decision-making structures defined by law, it was found that there are essentially three governance levels any REC in the form of a cooperative needs to

consider. At the first level, the board of directors is responsible for developing the strategic direction, managing the members, acquiring new projects and, depending on the size of the cooperative, also for the day-to-day operations (REC 1-12). As the size of a cooperative increases, the board's responsibilities become more diverse (REC 11). The next level is the advisory board, which oversees the board's work and appoints the board of directors (REC 1-12). Lastly, there is the Annual General Meeting (AGM), which is open to all cooperative members. At the AGM, the board and the advisory board report on the key development and achievements of the previous year, ideas are exchanged, and the members vote on various matters (e.g., dividend pay-out, new advisory board members) (REC 1-12). The legal structure of a cooperative can in itself be considered a democratic way of running a business, because *"everybody has one vote, no matter how many shares they have"* (REC 9). When it comes to the ownership structures of the interviewed RECs, in principle anyone can join and buy cooperative shares. To strengthen inclusiveness and *"to involve the general population and not just, let's say, a few financiers"* (REC 7), some of the cooperatives mentioned that they deliberately set the minimum number of shares that need to be bought to become a member relatively low in order to enable everyone to get involved. In addition, many of the RECs explicitly focus on recruiting members living close to the respective energy project to further strengthen direct participation, feelings of ownership, responsibility, and acceptance, as the following quote illustrates:

*"So, if a sports hall, a town hall, a fire station, or something like that is equipped, then [the citizens living nearby] simply have direct contact, direct identification, and that was also our model from the beginning. So already the third plant that we built, we organized a public event at the location and told the citizens who live there, that they could preferentially subscribe to the [cooperative] shares"* (REC 7).

However, besides these formal ways of ensuring participation and ownership, cooperatives are taking other concrete steps to further strengthen participatory, democratic, and inclusive structures, which will now be presented. One way in which RECs are further increasing participation is by involving interested members in day-to-day tasks such as assisting with the installation of PV systems (REC 1), sending out tax certificates (REC 7), monitoring and maintaining specific PV plants (REC 7, 8), PV consulting (REC 10), or sending members as representatives to events (REC 8). REC 11 reported that they actively involve their members in identifying new suitable areas for the implementation of PV systems, and other cooperatives have formed working groups on different topics (REC 4, 5), to enable direct member participation and share tasks. Providing information to members and increasing transparency were seen as key factors in encouraging active participation. In this respect, several RECs hold regular meetings, roundtables, or plenums to inform members, encourage them to discuss certain developments and gather feedback, thus providing a low threshold for participation (REC 1, 3, 4). Another typical way to keep members informed about current projects, important strategic decisions, cooperative events, or opportunities to participate is through regular newsletters (REC 6, 7, 9, 10). To ensure that *"every member of the cooperative always has the opportunity to follow most of the processes"*, REC 4 has set up an internal database where any minutes, documents and reports are uploaded so that anyone who would like to stay informed and participate has the opportunity to do so. Finally, REC 6 and 11 mentioned that their regional offices (REC 6 in Weimar and REC 11 in Freiburg) are places where their members, but also other interested citizens, can get information, provide feedback, and exchange ideas, which is seen as an important first step to getting involved.

However, despite the above-mentioned efforts to create participatory structures, two important findings emerged from the interviews. Firstly, some of the interviewed RECs mentioned that the number of people who are willing to voluntarily participate through formats other than the AGM or their financial investment is very limited compared to the total number of their members (REC 1, 2, 4, 7, 9). Secondly, while in some cases it has been possible to have (almost)



equal numbers of men and women on supervisory boards and boards of directors (REC 1, 3, 7) and to achieve a balance between locals and people who have moved to the region in these positions (REC 3), several of the interviewed RECs indicated that there is a clear lack of diversity, particularly in terms of gender and age (REC 1, 6, 7, 10, 12), but also in terms of marginalised and vulnerable groups (REC 1, 6), as the following quote illustrates:

*“I think that’s generally the problem with community energy cooperatives, that it’s often pensioners who do things, and it’s ultimately up to individual people. We also have a hard time acquiring younger people, so to speak. The same goes for female members. So, it’s often difficult. Last year we managed to get at least three women on the Supervisory Board. But the majority are older people and men” (REC 7).*

Table 6-8. Key findings and degrowth compatibility for degrowth element 6.1.4a

6.1.4 a): Inclusive and democratic governance and ownership structures	
Key Findings	<ul style="list-style-type: none"> <li>- The legal governance and ownership structures of cooperatives in itself are democratic (“one member, one vote”)</li> <li>- The majority of RECs make efforts to increase participation in the cooperative day-to-day work</li> <li>- However, it was found that a) participation beyond the general meeting and investment is rather low and b) there is a lack of diversity (age, gender, marginalised / vulnerable groups)</li> </ul>
Degrowth Compatibility	Although both the legally defined and the complementary governance and ownership structures practised by the majority of the RECs in principle allow for participation and inclusiveness, this is often only partially achieved in practice. Several RECs report low levels of active participation and a lack of diversity. For the degrowth movement, ensuring equal access and promoting diversity is considered central. Due to this discrepancy, RECs degrowth compatibility for this element is considered to be partially present.

Source: Own illustration

### **b) Degrowth Element: Focus on wellbeing of the employees and community members**

This degrowth element aims to investigate whether, to what extent and in what form RECs aim to improve the wellbeing of a) their employees by providing meaningful work and an atmosphere of trust and mutual support, and b) community members by providing added value to the local community in which the respective REC is embedded. Starting off with the RECs’ own employees, it should be noted that half of the RECs interviewed have no staff and carry out most of their work on a voluntary basis (REC 1, 3-5, 7, 12). The remaining RECs employ between one and 240 people (REC 2, 5, 6, 8-11). In general, the interviews revealed that both RECs working on a voluntary basis and RECs with employees provide meaningful tasks and jobs, as the people involved are actively working towards a socio-ecological and purposeful goal, namely the decentralised renewable energy transition.

The first section primarily focuses on the findings from the RECs that provide employment, as the degrowth element under discussion explicitly focuses on the wellbeing of employees. It was observed that several of the interviewed RECs are undergoing a process of professionalisation, with the aim of employing more people, offering jobs within the region, and of course, paying their employees a salary, which is an important condition for contributing to the employees’ wellbeing (REC 2, 6, 8-10). It should be noted, however, that of those RECs that already employ staff, only two (REC 2, 11) employ more than 10 people. They were found to be more explicit about the structural arrangements they have in place to ensure wellbeing of their staff. For example, REC 2 mentioned that as part of their efforts to professionalise and grow, they always try to let the structures of the organisation grow in a similar way in order not to overwhelm their

staff, to take them along on the journey and to ensure their wellbeing. REC 11, the most professional of the interviewed RECs, with the largest number of employees (240), described their internal structures as being highly democratic, characterised by low hierarchies and many opportunities for direct involvement. The interviewee from REC 11 considered these characteristics to be important in increasing staff wellbeing and motivation.

*“So, we have the greatest possible involvement of the employees to ensure a certain level of motivation. [...] And when they get involved, each with their own ideas, each with their own skills, I think something really good comes out. That’s why the strategy and vision development were done on a very broad basis. Anyone who wanted could get involved” (REC 11).*

When it comes to creating value for society to ensure community members’ wellbeing, the responses were mostly implicit. Although the *“satisfaction of [their] members is a big success factor”* (REC 10) for many of the interviewed RECs, the means of achieving this wellbeing or satisfaction vary. Some examples of how RECs aim to increase wellbeing within their communities include but are not limited to: offering opportunities to participate in the energy transition (REC 1-12), providing cheap electricity to the community (REC 2, 5, 7), offering free or low-cost PV consultations (REC 3, 5, 10), organising cultural events (REC 6), donating to people fleeing the war in Ukraine (REC 6), creating a local heating network in a flooded area to provide people with heat in winter (REC 8), or creating cultural spaces in the form of urban gardens or cooking groups that are open to everyone and strengthen the sense of community (REC 4). Another way in which RECs can promote the wellbeing of community members is by strengthening regional value creation and local economic cycles, as well as embedding organisational activities in the community context, with the aim of keeping money, jobs, taxes, and investment in the region for the benefit of the local community (REC 6, 8), which is further discussed in Chapter 6.1.5a.

Table 6-9. Key findings and degrowth compatibility for degrowth element 6.1.4b

6.1.4 b): Focus on employees’ and community members’ wellbeing	
Key Findings	<ul style="list-style-type: none"> <li>- Around half of the interviewed RECs employed staff and ensured their wellbeing (e.g., through low hierarchies, meaningful work, democratic internal structures)</li> <li>- There is a strong (often implicit) focus on communities’ wellbeing through a range of different practices (e.g., local value creation, cheap electricity provision, cultural events)</li> </ul>
Degrowth Compatibility	<p>Although not all of the interviewed RECs directly employ staff, a strong focus on ensuring the wellbeing of their employees and other active members through the provision of meaningful work and opportunities to participate in the decentralised energy transition was evident in the majority of RECs. In addition, the creation of wellbeing for the local community was (implicitly) present in most RECs in various ways. From a degrowth perspective, a strong focus on wellbeing is desirable as it promotes a qualitative perspective on prosperity and success. Therefore, RECs degrowth compatibility for this specific element is considered to be high.</p>

Source: Own illustration

## 6.1.5 Dimension: Community & Society

### a) Degrowth Element: Localised and strongly embedded in the community context

This degrowth element aims to assess whether, to what extent and in what form the interviewed RECs embed their activities in the local and regional community context. From a degrowth perspective, this element is key because it helps to retain value in the region, shorten supply chains, reduce dependencies, increase acceptance, and bring energy production closer to energy consumption. First of all, a strong motivation to *“localise renewable energy production, to bring it to a*

*regional level, and [...] to involve citizens*" (REC 9) became evident in all interviews (REC 1-12). RECs consider themselves to be *"regional innovators"* (REC 2) who want to create value for their local communities (REC 1-12). Regionality always referred to a geographical region, which was defined differently by each REC. While some RECs referred to a specific city (e.g., REC 1 operates in Krefeld), other RECs defined the region in which they operate more broadly (e.g., REC 8 operates in the Eifel region). The specific means by which RECs aim to locally embed their activities are presented according to the following aspects: 1) local economic embeddedness and 2) social and cultural embeddedness.

For the interviewed RECs, local economic embeddedness essentially revolves around concrete strategies that contribute to *"strengthening local economic cycles"* (REC 3) and *"keeping the value creation local and regional, because the money stays in the region"* (REC 7). In this context, REC 3 emphasised that *"a degrowth society is more than a society that does not emit CO<sub>2</sub>, but it is a society that is essentially based on decentralised economic and political structures"*. In order to strengthen decentralised economic value creation, several RECs mentioned that they deliberately work together with local companies to install and maintain their facilities (REC 3, 5-12), which creates jobs and keeps money in the region. By selling electricity locally (e.g., in the case of a self-consumption plant) or feeding it into the grid, RECs generate revenues and profits that are democratically distributed to their local members in the form of dividends (REC 1-12). In addition, by leasing the roofs or land on which the systems are installed from local authorities (REC 3, 5-12) and paying taxes (REC 1-12), RECs create economic value for the municipality and indirectly support the local community. By financing their projects either through local or regional banks (REC 8) or by raising loans from their members (REC 3, 8, 9), paid interest stays within the region. All of these examples demonstrate that RECs are seeking to strengthen local economic cycles and to keep money flowing in their region, which in turn promotes other degrowth elements discussed earlier (e.g., reducing environmental impacts through shorter supply chains (Chapter 6.1.2a) or improving community wellbeing through added value (Chapter 6.1.4b)). In addition, the interviews revealed a strong motivation for RECs to embed their activities in the social and cultural community context, as illustrated by the following quote:

*"From the very beginning, we wanted to involve the general population, and wherever we set up our facilities, we wanted to include the citizens. Then it becomes embedded in the community"* (REC 7).

RECs reported that embedding their activities in the social and cultural community context and involving local citizens significantly increased the acceptance of the energy transition by the local population (REC 3, 7, 9, 12). Involving citizens makes them *"aware that it's not something that's happening somewhere else, it's happening here"* (REC 3). Creating this awareness and acceptance is particularly important for wind projects, where there is strong opposition in various parts of the country (REC 7, 12). The opportunity of giving local citizens the *"feeling of self-empowerment, of being able to take things back into your own hands"* (REC 10) was also identified as a key driver for RECs to embed their activities in the community context. However, how RECs embed their activities in the social and cultural context and involve the local community varied across the interviews. First, the RECs actively acquire their members within the local community context (REC 1-10, 12). The social embeddedness of the cooperatives in the community context is particularly evident in the planning phases of projects, in which the RECs first try to understand *"what suits the community, what suits the village, what suits the town"* (REC 11). This is often done by organising an event to inform local citizens about the project, gather feedback and provide an opportunity for them to get involved (REC 7-12).

Some RECs mentioned that they prioritise the people closest to the plant when financing the plant to further strengthen the regional link (REC 7, 9). In addition, RECs also aim to involve members and citizens in the installation of the plant, for example, REC 9 mentioned that they

built a rooftop PV system with students from the local school to raise awareness and empower people to participate directly in the decentralised energy transition. A previously mentioned way of directly involving and embedding the work of RECs in the local context is to provide citizens with balcony PV modules and empower them to produce their own electricity (REC 3, 5, 6, 9, 11). The ambition of REC 4 to use its “[energy] bunker both as a cultural meeting place and as a cultural offering” provides a fitting example of how RECs can create spaces for social and cultural exchange and togetherness by embedding their activities in the social and cultural community context. Finally, an interesting observation was made that as projects become larger, the RECs are no longer able to implement them independently in terms of capacity and financial resources, and therefore tend to cooperate with other energy cooperatives, even outside their local community context. For example, REC 6 referred to a ground-mounted PV system that was being implemented together with another REC in a different state. As a result, there is a risk that regional embeddedness, both economically and socially, could diminish as project size increases.

Table 6-10. Key findings and degrowth compatibility for degrowth element 6.1.5a

<b>6.1.5 a): Localised and strongly embedded in the community context</b>	
Key Findings	<ul style="list-style-type: none"> <li>- RECs are strongly embedded in the local economy (e.g., working with local companies for installation and maintenance, paying lease/taxes/dividends in the region)</li> <li>- RECs are strongly embedded in the social and cultural community context (e.g., acquiring members from the region, understanding community context, organising cultural events)</li> <li>- As projects get bigger, there is a risk that they will be planned elsewhere, thereby losing their economic and social embeddedness</li> </ul>
Degrowth Compatibility	The majority of RECs clearly embed their activities in the community’s local economic, social, and cultural context. Different strategies were identified for how RECs are achieving this. From a degrowth perspective, this is an important attribute as it keeps value in the region, increases local wellbeing, aligns production with consumption and empowers citizens to get involved. Although there is a risk that RECs may lose this local embeddedness, to date it is strongly established. Therefore, RECs degrowth compatibility for this element is considered to be high.

Source: Own illustration

**b) Degrowth Element: Collaborative value creation and openness to share resources**

The following degrowth element explores RECs’ ambitions to collaborate with other actors and openly share resources, knowledge, and technology. From a degrowth perspective, this is important because the focus is no longer on accumulating resources to strengthen the individual competitive advantage but on collaborative value creation and enhancing community wellbeing. Firstly, it should be noted that the vast majority of interviewed RECs work together with different actors in the energy sector and beyond to collectively create value. In most cases, this involves project-based cooperation with other RECs in the regional context, especially when it comes to larger and more complex projects in the form of wind turbines, large-scale PV systems or local heating networks (REC 2, 6, 7, 9-12). A central motivation for cooperating with other RECs is the exchange of experiences, knowledge, and ideas (REC 2, 7, 9, 12). RECs 9 and 12 mentioned that energy communities often have different levels of expertise across various areas, so working together is “actually ideal, to build a real symbiosis and bridges” (REC 12). In addition, the total investment volume and the associated financial risks of large-scale projects are often considered to be too high for a single REC, so they cooperate with other RECs (REC 7, 11, 12). As mentioned before, REC 11 is the largest and most professional REC included in this study, which is why they are actively cooperating with smaller RECs to implement projects, as the following quote illustrates:

*“Then there are other cooperatives that are also developing wind power or PV, where we provide capital, but where there is also an exchange of know-how, and I think it is very, very important to support each other” (REC 11).*

While the above-mentioned cooperation efforts are often project-based, REC 7, together with four other RECs and the local utility company, founded the ‘Energiekooperativ’ initiative, which is a permanent initiative of energy cooperatives aiming to bundle skills, resources, and knowledge to drive the energy transition in the region (EENA, n.D.). Another example of this inter-cooperative exchange of knowledge and experience is the effort of REC 8, which actively invites other RECs to learn from their experiences on how they have managed to professionalise in recent years (REC 8). In addition to direct cooperation between RECs themselves, REC 3 emphasised that *“it is important for such a societal transformation that infrastructure tasks are actually carried out in commons-public-partnerships”*. In this form, the municipality and the local community (represented by the REC) jointly provide the common good (in this case energy), from which everyone in the local community can openly benefit. While the previous examples are mostly project- and energy-related, interestingly some of the RECs are broadening their horizons and actively collaborating and networking with other initiatives to improve wellbeing in society and drive socio-ecological transformation. For example, REC 4 mentioned that they are working with the solidarity agriculture movement in Hamburg, providing them with a distribution point, or with a micro forest initiative in the neighbourhood. Furthermore, REC 5 reported that they cooperate closely with a number of climate protection alliances, such as “Waiblingen Klimaneutral” or “Weinstädter Klimabündnis”, to work together on local climate actions. As discussed in Chapter 6.1.1d, involvement in umbrella organisations and associations at different levels is an important way for RECs to exchange ideas, but also to engage politically.

Table 6-11. Key findings and degrowth compatibility for degrowth element 6.1.5b

<b>6.1.5 b): Collaborative value creation and openness to share resources</b>	
Key Findings	<ul style="list-style-type: none"> <li>- RECs collaborate openly with other RECs, often to share knowledge, experiences, risks, or (financial) resources as part of a joint project (specifically larger and more complex projects)</li> <li>- Commons-Public-Partnerships form an interesting cooperation model between RECs and municipalities</li> <li>- Collaborations with other non-energy related projects (e.g., solidarity agriculture movement, climate protection alliances) were occasionally identified</li> </ul>
Degrowth Compatibility	The majority of RECs were found to openly share knowledge, experience, and resources with other RECs to create community wellbeing and accelerate the decentralised renewable energy transition. While the project-based cooperation stood out, several RECs were found to also cooperate with other civil society organisations to steer a wider socio-ecological transformation in the local context. The degrowth movement considers those bottom-up initiatives as a central imitator for change. RECs degrowth compatibility for this element is therefore high.

Source: Own illustration

### **c) Degrowth Element: Enabling energy justice**

The following degrowth element deals with RECs’ ability to enable energy justice and equity in their communities. In particular, it assesses whether and to what extent RECs recognise and demonstrate awareness of energy vulnerable groups in society (recognitional justice), ensure equal access to their services and benefits (distributional justice), and strengthen the participation of energy vulnerable groups in the energy transition (procedural justice). Firstly, regarding recognitional justice, it was observed that some of the interviewed RECs were aware that there are energy vulnerable and marginalised groups in society that may face barriers to

participating in the energy transition. While only some of the RECs explicitly mentioned this in the interview (REC 1, 6) or on their website (EWS, 2022b), the awareness was implicitly observed through some of the activities mentioned to ensure distributional and procedural justice (REC 3, 7, 9, 11). In general, however, it has to be acknowledged that while awareness of injustices was evident in some cases, ensuring energy justice through the provision of structures and mechanisms for the inclusion and participation of marginalised and energy vulnerable groups was certainly not the focus of the majority of the interviewed RECs.

To ensure distributional justice, RECs should provide equal access to their services and benefits, particularly for those who are energy vulnerable. The interviews revealed that although RECs often provide certain benefits (e.g., dividend payments) exclusively to their members, there provide some services and benefits to all community members. In principle, RECs offer all community members access to their decentralised energy at a lower price than the average electricity tariff (REC 2, 5, 7). Some RECs also provide PV advice (e.g., on balcony PV modules) free of charge or for a small fee to members and other interested citizens (REC 3, 5, 9, 10). However, none of these services directly targeted energy vulnerable and marginalised community members. In contrast, REC 3 launched a crowdfunding campaign that provided low-cost PV balcony modules specifically to citizens with low income, thereby actively contributing to distributional justice as shown by the following quote:

*“The idea is that we want to give balcony PV modules to initiatives and people who don’t have much money themselves but want to contribute to the energy transition. So, we want to give 100 balcony modules at a low cost of about 100 € to these people who otherwise could not afford it” (REC 3).*

Also noteworthy are REC 11’s efforts to ensure distributional justice by actively funding energy justice projects around the world, such as the creation of PV training centres in Burkina Faso (EWS, n.D.c), or REC 9’s provision of low-cost micro-loans to PV installers in Manila (Starkenburg, n.D.). What is striking, however, is that these were rather project-based and individual measures to ensure distributional justice and were not found to play a major role in providing their core activities and services. Finally, in terms of procedural justice and the question of whether and how RECs put in place processes to enable vulnerable and marginalised groups in society to openly join and be active in the cooperative, very little evidence has been found in the interviews. For example, REC 7 mentioned that they set the minimum number of shares required to become a member relatively low to enable people with lower incomes to join. Chapter 6.1.4a describes other measures aimed to lower participation barriers, but these measures were not deliberately targeted at marginalised and vulnerable groups. The lack of concrete measures to address procedural justice was also evident in statements about the lack of diversity in RECs’ membership structure (see Chapter 6.1.4a), as shown by the following quote:

*“We have not succeeded yet. I think we suffer from the same problem as the other cooperatives, that it is predominantly men. In our case it’s the older men, the average age is still okay, it’s still in the 40s [...] But also other marginalised groups are not included in our cooperatives. We don’t consciously exclude them. But we haven’t addressed them either” (REC 6).*

Table 6-12. Key findings and degrowth compatibility for degrowth element 6.1.5c

<b>6.1.5 c): Enabling energy justice</b>	
Key Findings	<ul style="list-style-type: none"> <li>- Recognitional justice: Limited and rather implicit awareness of energy vulnerable and marginalised groups in the local community</li> <li>- Distributional justice: Some services/benefits are also available to non-members, however, they only rarely directly target energy vulnerable and marginalised community members</li> </ul>

	<p>- Procedural justice: Participation processes do not explicitly aim to include energy vulnerable and marginalised community members, which is also represented by the low diversity in the membership base of many interviewed RECs</p>
<p>Degrowth Compatibility</p>	<p>Although there is some awareness of the problem, that injustices exist and that marginalised and energy vulnerable groups in society do not have the same opportunities to participate in and benefit from the energy transition, this awareness is often implicit. The majority of RECs have made little or no effort to actively facilitate access to benefits and services or participation of energy vulnerable and marginalised groups. Therefore, RECs degrowth compatibility for this element is considered to be limited.</p>

Source: Own illustration

## 6.1.6 Dimension: Technology

### a) Degrowth Element: *Appropriate, convivial, and democratic use of technology*

This degrowth element aims to explore the role of technology and determines whether, to what extent and in what form the interviewed RECs deploy renewable energy technology in an appropriate, convivial, and democratic manner. The primary purpose for which RECs deploy renewable energy technology is to produce decentralised renewable energy (see Chapter 6.1.1a), with the added intention of involving the local community (see Chapter 6.1.5a). In many cases, technology was perceived to “*be more like functional*” (REC 4) to achieve the previously mentioned objectives. However, in terms of the appropriate use of the technology (local embeddedness of the technology and possibility of local repair and maintenance), and the democratic use of the technology, some interesting findings emerged. However, it is important to distinguish between different renewable energy systems (e.g., rooftop PV, larger PV systems, wind systems) and their varying levels of complexity.

*“The technology itself is very simple, whether it is photovoltaic or local heating. It’s a very simple technology, it’s easy to understand. [...] Today, any electrician and even some roof builders can install a PV system. [...] It is different when we think about wind energy. Of course, no local electrician can climb into the nacelle of a wind turbine to make the necessary repairs. We are dependent on the manufacturer or trained personnel”* (REC 8).

Renewable technologies with lower complexity (e.g., small-scale PV systems, biogas-plants, small-scale local heating systems) were strongly embedded in the local context in that sense that they were often a) directly connected to the energy needs of the local community (e.g., rooftop PV system producing electricity for the tenants of a house) and b) could be installed, repaired and maintained by RECs themselves or by local handymen (REC 1, 3, 7-9, 12). It was also this smaller-scale, low-complexity technology that enabled the RECs to democratise their technology. REC 3, for example, described their plans to directly engage citizens in a PV project and gain experience with a “*PV do-it-yourself project*” in order to “*understand and learn more about the technology that we’re using*” (REC 3). REC 9 runs a biogas project directly involving farmers to maintain the plants, as the technology is small-scale and relatively simple. Also, concerning the balcony PV modules, REC 3 talked about the possibility to “*empower people to deal with it, even though it can only be repaired to a certain extent*” (REC3). When it comes to larger projects, especially wind energy, several interviewees mentioned that the complexity of planning and maintenance significantly increases, which in turn leads to a stronger dependence on specialised, expert knowledge (REC 3, 4, 7-9, 12). This leads to a situation in which the convivial, appropriate, and democratic use of technology is not guaranteed. This is particularly interesting in the context of the observation that there is a tendency for some RECs in Germany to grow, also in terms of project size (see Chapter 6.1.1b).

Table 6-13. Key findings and degrowth compatibility for degrowth element 6.1.6a

6.1.6 a): Appropriate, convivial, and democratic use of technology	
Key Findings	<ul style="list-style-type: none"> <li>- In general, a functional purpose of technology was observed – employed to produce renewable, decentralised energy (and involve local citizens, provide local value &amp; wellbeing)</li> <li>- More evidence for the convivial, appropriate, and democratic use of technology was found in small-scale &amp; less complex projects (than in larger scale &amp; more complex projects)</li> </ul>
Degrowth Compatibility	The majority of RECs were found to show mixed alignment with the degrowth elements. While there are several examples of smaller, less complex energy projects in practice that show aspects of conviviality, appropriateness, and democratic use of technology. Several of the RECs grow in size and, with it, the technology deployed, which would work against the community embedded and adjusted, small-scale, low complex technology imaginary of degrowth. The degrowth compatibility for this element reduces and is thus considered partially existent in the study sample.

Source: Own illustration

## 6.1.7 Dimension: Finance

### a) Degrowth Element: Purposeful capital acquisition and democratic allocation of profits

The final element of the degrowth framework for community energy investigates whether and how RECs acquire capital in a meaningful way and democratically allocate financial surpluses and profits. RECs aligned with the degrowth vision prioritise collective ownership structures and aim for financial self-sufficiency, to avoid potential growth and profit maximisation dependencies that could arise when acquiring debt and/or equity with the obligation to pay back interests or dividends. The first observation is that all RECs depend on external capital acquisition (either in the form of equity or debt). This is because almost all of the interviewed RECs are pursuing growth, which requires capital that can be invested in the construction of new renewable energy facilities (see Chapter 6.1.1b). All of the RECs finance their activities (partly) through cooperative shares, which is possible because they are organised in the legal form of a cooperative (REC 1-12). However, the forms of (additional) capital acquisition varied between the RECs included in this study. Several RECs finance their activities exclusively through the above-mentioned cooperative shares of their members (equity) (REC 1, 3, 5, 7, 10). Others take loans from their members (debt) (REC 8, 9). Some RECs reported that they need to borrow capital in the form of bank loans (debt), especially for larger projects (REC 2, 4, 9, 12). Finally, REC 4 also finances its project through public funds from the city or state, although this is uncommon for RECs. Although all RECs are largely dependent on external capital and therefore not financially self-sufficient, they are doing this a) in order to fulfil their environmental and social purpose of facilitating a decentralised renewable energy transition b) by collectively acquiring capital from local citizens to strengthen involvement and feeling of ownership. Therefore, clear attempts to acquire capital in a purposeful way were observed. There are several RECs that cap how many shares can maximally be bought (REC 5, 7-10), in order “to involve the general population and not just, let’s say, a few investors” (REC 7). In addition, some RECs mentioned that they deliberately work together with a sustainable financial institution (REC 4) or financial institutions located in the community (REC 8) to raise capital in the form of loans.

The cooperative law regulates how RECs should decide on the distribution of financial surpluses and profits (REC 3, 7). At the AGM, the board of directors proposes the distribution of financial surpluses and profits (in the form of dividends and/or reinvestments) and the participating members democratically have the choice to agree, disagree or make another



proposal on how the profits should be distributed (REC 1-12). The unique characteristic of cooperatives is that every member has one vote, regardless of how many shares they have previously acquired, which makes the whole allocation process democratic. In addition to dividend payments, the reinvestment of financial surpluses plays a key role for many RECs in order to plan new renewable energy facilities (REC 7, 5, 8, 10), but also as a financial buffer (REC 12). Interestingly, REC 2 reported that they pay out their own profits and dividends not in terms of monetary values, but in the form of local value creation and the social innovation they bring to the region by providing renewable energy, e-car sharing or shared bicycles. REC 4s business purpose lies in both energy generation and the organisation of cultural activities, with profits from the energy being used to cross-finance the cultural part. Generally, it was observed that although RECs generate profits and pay out dividends, they “*don't focus on the return on investment*” (REC 12) (see Chapter 6.1.1b).

Table 6-14. Key findings and degrowth compatibility for degrowth element 6.1.7a

<b>6.1.7 a): Purposeful capital acquisition and democratic allocation of profits</b>	
Key Findings	<ul style="list-style-type: none"> <li>- All of the RECs were financially dependent on external capital (either debt/equity), as they pursue a clear growth motive to reach their goals</li> <li>- Different forms of capital acquisition (e.g., cooperative shares, member loans, bank loans) with the aim of enabling as many citizens as possible to financially participate (no focus on large investors)</li> <li>- Strongly democratic profit allocation processes (one member, one vote) in form of dividend payments to the members and reinvestment to plan new projects – no profit maximisation</li> </ul>
Degrowth Compatibility	All the interviewed RECs were dependent on raising external capital to fulfil their core organisational purpose. This carries the risk of getting trapped in a growth/profit spiral. However, different strategies were found for RECs to raise their capital in a purposeful and collective way, financially involving as many citizens as possible. Democratic distribution of profits as a way to prevent this external capital induced growth path, while distributing profits locally within the region. The degrowth compatibility for this element is partially existent.

Source: Own illustration

## 6.2 The degrowth compatibility of RECs in Germany

The previous section explored whether, to what extent and in what form RECs already incorporate the elements of the degrowth framework for community energy to shed light on their compatibility with the degrowth vision. Firstly, it is noteworthy that the interviewed RECs were not homogeneous but varied considerably in size, main activities, priorities, and strategies to achieve their key objectives. This diversity was also reflected in their responses and strategies to achieve the different degrowth elements in practice. Nevertheless, several patterns, common practices and perspectives emerged that are interesting to analyse from a degrowth perspective. The following chapter provides a preliminary synthesis of the key findings and the resulting degrowth compatibility of the interviewed RECs, as a starting point for further discussion in Chapter 7. Firstly, it was found that the RECs themselves don't explicitly see degrowth as a core organisational objective (see Chapter 6.1.1a). However, several patterns or strategies were identified for each REC that were in line with the degrowth vision and the pre-defined elements. This implies that there was not a single REC that did not fulfil at least some of the degrowth elements, although it must be acknowledged that none of the RECs adopted all of the elements. Interestingly, it was found that REC 11, as the largest REC included in this study, adopted more degrowth elements in some areas than other RECs, likely due to its large size, sufficient resources, and financial capacity, which enabled certain issues to be addressed in more detail (e.g., political engagement or strategic environmental management).

Scrutinising the findings that emerged for the framework's seven dimensions and 14 degrowth elements, mixed results were found in terms of the compatibility of RECs with the degrowth elements. Some elements were clearly evident in the practice of the majority of RECs, with various strategies for achieving this, underlining their degrowth compatibility in this area. This included that all RECs based their activities on a strong environmental and social purpose of facilitating a decentralised transition to renewable energy and democratically involving local community members (see Chapters 6.1.1a and 6.1.4a). Furthermore, most RECs were found to be strongly embedded in their respective local community contexts (see Chapter 6.1.5a), collaborating openly, sharing experiences and resources with other actors to jointly create regional economic value and social well-being (see Chapters 6.1.5a and 6.1.5b), and striving for independence from the current energy system (see Chapter 6.1.1c). Next, there were degrowth elements for which the majority of RECs showed partial compatibility, in the sense that only some strategies were found to promote their implementation. These include, for example, the appropriate, convivial, and democratic use of technology, which was only evident for small-scale and low-complexity energy systems (see Chapter 6.1.7a), or the politically motivated and normative action in networks, which was largely project-based and anchored in the local context (see Chapter 6.1.1d). Finally, there were also degrowth elements for which the majority of RECs showed limited or no alignment by implementing only a narrow set of enabling strategies. This was particularly evident with regard to the lack of overarching strategies and priorities for promoting energy sufficiency, the growth motive of the majority of RECs (see Chapter 6.1.1b), which results in a lack of absolute reduction in material and energy throughput (see Chapter 6.1.2a), or the absence of strategies to ensure energy justice (see Chapter 6.1.5c). These overall mixed results underline the partial compatibility of RECs with the degrowth vision, which this study explains in terms of 1) the existence of key drivers and barriers affecting the ability of RECs to adopt certain degrowth elements (see Chapter 6.3) and 2) complementary and conflicting relationships between some of the framework elements, which might influence each other (see Chapter 7.1.1).

## 6.3 Main drivers and barriers

In order to answer RQ3, the following chapter describes and analyses the main **drivers and barriers** which were identified in the data collected. The drivers positively and the barriers negatively affect RECs' ability to adopt the above-mentioned degrowth elements. It should be noted that while more drivers and barriers were identified than those presented below, a conscious choice was made to focus on the main drivers and barriers that appeared in order to ensure representability. A distinction has been made between **internal** (organisational factors, e.g., resources) and **external** (external factors, e.g., regulatory factors) drivers and barriers.

### 6.3.1 Internal drivers and barriers

#### **Drivers**

*Intrinsically motivated members* – Cooperative members typically participate in RECs for idealistic and intrinsically motivated reasons. Members often do not invest their money in cooperative shares or provide loans (see Chapter 6.1.7a) with the expectation of achieving the highest possible return on investment. Instead, their main motivation is to promote a decentralised, community-based, local, and democratic energy transition (REC 1-12). This intrinsic motivation has a direct and positive impact on the ability of RECs to adopt certain degrowth elements. First, it allows RECs to strongly pursue environmental and social objectives and place them at the core of the organisation's purpose (see Chapter 6.1.1a). It also positively impacts RECs' ability to deviate from profit maximisation, as financial expectations are not the main priority for the members (see Chapter 6.1.1b).

*Financial capacity* – Several RECs reported that raising capital from their members works quite well. The demand for cooperative shares and loans is often higher than the actual need, as members have trust in the work of their RECs (REC 5, 7, 8, 10). This enables RECs to fulfil their primary purpose of promoting the decentralised energy transition and involving as many people as possible (see Chapters 6.1.1a and 6.1.4a). However, there are exceptions, as REC 3 mentioned that wealth is unequally distributed in Germany, which leads, for example, to a lower financial capacity of citizens in eastern parts of Germany than in other parts of the country.

*Legal structure of a cooperative* – The democratic participation and collective ownership structures were identified as key characteristics of renewable energy cooperatives (REC 1-12). They act as a driver that positively influences the potential of RECs to adopt degrowth-oriented practices. The principle of one member, one vote, no matter how many shares are bought, is a strong driver for direct participation in the general assembly (see Chapter 6.1.4a), and for democratic profit allocation (see Chapter 6.1.7a).

## **Barriers**

*Dependence on debt and equity* – All of the RECs were found to be strongly dependent on external sources of finance, either in the form of equity through cooperative shares or loans from members or banks (see Chapter 6.1.7a). The acquisition of capital is a necessary factor for investing in new renewable energy plants and thus for accelerating decentralised energy production. However, acquiring external capital can create a growth and profit-seeking spiral to pay interest (debt) or dividends (equity). Although the financial expectations of members are rather low, the dependence on external sources of finance can be seen as a key barrier for RECs to deviate from growth and profit maximisation (see Chapter 6.1.1b).

*Volunteering and lack of resources* – Several RECs face the internal barrier of limited capacity and resources, often in terms of human resources. Many RECs operate almost entirely on a voluntary basis (REC 1, 3-5, 7, 8, 10, 12). This was found to negatively impact the ability of RECs to adopt certain degrowth elements. First, political engagement, specifically at the state or national level, was considered unmanageable with the limited resources and capacity available (see Chapter 6.1.1d). In addition, it was found that demand-side sufficiency was often not deliberately promoted, as this requires extensive communication and direct engagement with energy consumers, for which the RECs indicated that they did not have the necessary resources (see Chapter 6.1.3a).

*Increasing project size* – As almost all of the RECs (REC 1-3, 5-12) are pursuing growth, the size of the projects being planned and implemented increase as well (see Chapter 6.1.1b). This increase in project size directly influences the ability of RECs to adopt a number of degrowth elements. Firstly, it has been observed that as project size increases (e.g., larger ground-mounted PV systems or wind turbines), they are no longer designed for self-consumption but mainly to feed electricity into the grid. This implies that RECs are unable to match and limit their energy production with local community needs, which is considered a key component in reducing overall energy production (see Chapter 6.1.3b). Furthermore, as these larger projects are, in some cases, no longer implemented directly in the community (e.g., REC 6 mentioned that it implements projects with RECs located in other states), the embeddedness of the projects in the local economic, but also social/cultural context is at risk (see Chapter 6.1.5a). The increased project size can also result in a higher dependence on external capital, as the investment volume increases (see Chapter 6.1.7a). The idea of using community-embedded, convivial, and democratic technology may also be negatively affected, as the size of the technology increases, more expert knowledge is required, and dependencies may arise (see Chapter 6.1.6a).

*Financial obligations* – While several RECs deliberately set a minimum number of shares at a relatively low level (e.g., REC 7), in the end, it is necessary to invest a certain amount of money (often 500-1,000€) in order to join a REC (REC 1-12). This financial obligation excludes members of society that don't have the financial capacity to invest capital for participating in the decentralised energy transition, which negatively impacts the inclusiveness of RECs (see Chapter 6.1.4a) and on their efforts to promote distributional and procedural justice (see Chapter 6.1.5c).

*Communication* – The way in which RECs present themselves to the outside world attracts a specific clientele, as evidenced by the rather limited diversity of the membership base of several of the interviewed RECs (often older, more male, and very few vulnerable or marginalised groups) (see Chapter 6.1.4a and 6.1.5c). Some RECs described a strong association with technology and energy as something that does not appeal to all parts of society (REC 5, 7). Other RECs noted that the image of energy cooperatives as an investment opportunity does not appeal to people with low incomes or limited investment opportunities (REC 6, 10, 12). Ultimately, the way in which RECs communicate and represent themselves, without directly addressing energy vulnerable and marginalised groups in society (REC 6), certainly impacts RECs' efforts to achieve diversity and energy justice (see Chapter 6.1.4a and 6.1.5c)

*Low participation* – The final internal barrier observed is the relatively low participation of members in the day-to-day work of the cooperatives (e.g., REC 1, 2, 4, 7, 9). Although several RECs offer opportunities for participation apart from the general assembly (see Chapter 6.1.4a), these are not widely used. There may be differences between RECs, but in general the board is responsible for the core decision-making and most of the day-to-day work in close cooperation with the advisory board. Therefore, inclusive & democratic organisational governance structures (see Chapter 6.1.4a) are theoretically in place but are mostly incorporated at the general assembly rather than in the day-to-day work of the cooperative.

## 6.3.2 External drivers and barriers

### **Drivers**

*Strong REC network* – In general, RECs are well connected and networked with each other (especially in a regional context), which can be considered an important external driver for two degrowth elements. Firstly, networks at regional and national level enable RECs to engage politically (see Chapter 6.1.1d), especially those that would not be able to do so due to their size and lack of available resources. Secondly, the strong network of energy cooperatives in Germany enables RECs to collaboratively create value, implement projects together and share resources and knowledge (see Chapter 6.1.5b) instead of competing against each other and driving profitability and growth (see Chapter 6.1.1b)

*Financial incentives* – It has been observed that the financial incentives in form of the feed-in tariffs that RECs receive for feeding the additionally produced and not consumed electricity of a rooftop PV system into the grid have been relatively low in recent years. This has encouraged RECs to install rooftop PV systems with a high self-consumption rate, where the electricity is consumed directly in the building (REC 7, 8). The incentive, even though often not seen as a driver by the RECs themselves, can be considered a strong driver from a degrowth perspective to align energy production with the needs of the owner or user of the property, thus helping to right-size PV systems (see Chapter 6.1.3a).

*PV balcony module development* – The emergence of PV balcony modules has been identified as a strong driver for RECs, strengthening their ability to incorporate several degrowth elements. First of all, providing citizens with PV balcony modules strengthens their self-sufficiency and

independence by enabling them to self-produce parts of their electricity (see Chapter 6.1.1c). In addition, RECs providing citizens with PV Balcony Modules strengthen direct participation in energy production. According to some RECs, this is an important step in rethinking one's own energy consumption, which could promote energy-sufficient behaviour (see Chapter 6.1.3a). Lastly, the use of PV balcony module technology could be a way for RECs to promote small-scale, appropriate, and convivial energy technology, given that the technology is not complex, can often be self-repaired and can be used to satisfy the direct local energy needs of the user (see Chapter 6.1.6a).

*External events* – Although geopolitical events such as Russia's war on Ukraine and the resulting energy crisis in Germany, or nuclear accidents such as the one in Fukushima, are absolutely horrific events, they were repeatedly cited as drivers for society to think about energy self-sufficiency and independence from the current energy system (REC 1, 9-11) and can therefore help RECs to advance this autonomy (see Chapter 6.1.1c).

## **Barriers**

*German tendering regime* – A strong external barrier is formed by amendments to Germany's Renewable Energy Sources Act (EEG) in the past years, which often favoured large-scale, profit-oriented renewable energy providers (REC 3). Even though the current policy landscape is slowly changing, several RECs identified the EEG tendering system introduced in 2017, which was relevant for wind or larger PV systems, as a key external barrier and example illustrating this policy focus (REC 6, 7, 10). RECs had to apply for a tender and compete with larger, and profit-oriented energy providers in order to receive public remuneration for their planned projects. The lower the costs associated with a project, the better the chances of getting the subsidy. As a result, RECs were under increasing pressure to design their projects at lower prices and, in turn, to operate more profitably and cost-effectively in order to compete. This negatively impacts the ability of RECs to deviate from growth and profit maximisation motives (see Chapter 6.1.1b).

*Electricity Market Design* – Another barrier identified is the lack of a policy framework that would enable energy sharing in Germany (REC 3, 5, 6, 7, 9, 10, 12). Currently, RECs in Germany are highly dependent on the existing design of the electricity market, which does not allow for energy sharing between different users. For example, while a rooftop PV system can be designed for (partial) self-consumption, the excess electricity cannot simply be shared with someone in the community having energy needs but has to be fed into the grid. In this sense, fully aligning renewable energy production with the needs of the local community in the form of energy sharing is not yet feasible (see Chapter 6.1.3b).

*Increased Complexity and Bureaucracy* – Several RECs identified high levels of complexity and bureaucracy in the processes of planning, approving, and installing local energy projects as a key barrier (REC 6, 10, 11). For those working primarily on a voluntary basis with limited resources, these processes absorb resources that could be spent in other areas to strengthen their degrowth potential instead. A commonly mentioned example was the growing complexity of environmental impact assessments (see Chapter 6.1.2a).

*Dependency in Technology Supply Chain* – It became clear that RECs and their local suppliers are highly dependent on the Asian market for the procurement of PV modules (REC 1-3, 5-7, 10, 12). This negatively impacts RECs' ability to control and mitigate the social and environmental impacts of the products they procure (see Chapter 6.1.2a) and can trigger supply shortages if global supply chains are disrupted (like during COVID-19) (REC 1, 2). For wind turbines and inverters, RECs can rely more on German producers because some manufacturers are still based in Germany (see Chapter 6.1.2a).

Table 6-15. Overview key drivers and barriers

<b>Drivers</b>	Internal Drivers	<ul style="list-style-type: none"> <li>- Intrinsically motivated members</li> <li>- Financial capacity</li> <li>- Legal structure of a cooperative</li> </ul>
	External Barriers	<ul style="list-style-type: none"> <li>- Strong REC network</li> <li>- Financial incentives</li> <li>- PV balcony module development</li> <li>- External events</li> </ul>
<b>Barriers</b>	Internal Barriers	<ul style="list-style-type: none"> <li>- Dependency on debt and equity</li> <li>- Volunteering and lack of resources</li> <li>- Increasing project size</li> <li>- Financial obligations</li> <li>- Communication</li> <li>- Low participation</li> </ul>
	External Barriers	<ul style="list-style-type: none"> <li>- German tendering regime</li> <li>- Electricity market design</li> <li>- Increased complexity and bureaucracy</li> <li>- Dependency in technology supply chain</li> </ul>

## 7 Discussion

Prompted by the need to better comprehend the relationship between degrowth and RECs, this study investigated whether, to what extent and in what form RECs in Germany, as a specific form of business, are already compatible with the degrowth vision and which factors might influence their degrowth compatibility. In doing so, the thesis addressed the urgent need to identify organisational forms that could already be aligned with the degrowth vision to learn from best practice examples and better understand what energy production and consumption could potentially look like from a degrowth perspective. To achieve this aim, the following three RQs were answered:

- *RQ1 – How can degrowth be conceptualised for RECs?*
- *RQ2 – Which degrowth elements can be identified in the organisational practice of RECs, to what extent and in what form?*
- *RQ3 – What are main drivers and barriers for RECs to adopt degrowth elements?*

This chapter critically discusses, interprets, and reflects upon the key findings and their significance in relation to the existing body of academic literature. The aim is to highlight the academic and practical contributions of this work and to identify its limitations. The discussion of the key findings in relation to the existing literature is structured according to the three RQs (Chapter 7.1). Finally, some critical reflections on the methodological choices, the legitimacy of the research and its generalisability are provided in Chapter 7.2.

### 7.1 Discussing the results in the light of previous research

#### 7.1.1 Discussion of RQ1 – Conceptualising degrowth for RECs

To answer RQ1, a comprehensive, qualitative literature-based degrowth framework for community energy was developed, which conceptualises what degrowth means in concrete terms for RECs (see Chapter 4). This framework makes an academic contribution as no existing conceptual framework for community energy could be identified that comprehensively translates the broad degrowth vision and principles into operationalised elements tailored to RECs as a specific type of business in the energy sector. However, according to Nesterova (2020), it is important to understand and conceptualise degrowth for businesses in a comprehensive way to account for its multidimensionality. Therefore, the framework developed in this study builds on different streams of existing research exploring 1) the link between degrowth and community energy (Alarcón Ferrari & Chartier, 2018; Gunderson et al., 2018; Kunze & Becker, 2015; Rommel et al., 2018), and 2) degrowth for businesses (e.g., Froese et al., 2023; Hankammer et al., 2021; Hinton, 2021; Khmara & Kronenberg, 2018; Nesterova, 2020). Key observations from the development and application of the framework will now critically be discussed.

#### ***Complementary and conflicting relationship between degrowth elements***

In developing and applying the framework, complementary and conflicting relationships were observed between some degrowth elements. Similar to the studies by Hankammer et al. (2021) and Hinton (2021), the strongest tensions were identified between the organisations' growth and profit maximisation motive (see Chapter 6.1.1b) and other degrowth elements of the respective frameworks. While Hinton (2021) considered the organisations' relationship to profit as the main influencing force, this study predominantly identified the RECs' growth objective as being in some cases complementary to, but more often in conflict with other elements. Most of the interviewed RECs pursued a growth motive (see Chapter 6.1.1b), which they considered necessary to fulfil their core organisational purpose of accelerating a decentralised renewable energy transition, and which was one key element of the conceptual framework (see Chapter

6.1.1a). However, this growth pathway conflicted with several other framework elements, for example, in relation to the alignment of energy production with local community needs (larger plants tend to generate electricity exclusively to be fed into the grid; see Chapter 6.1.3b), environmental and resource use (growth often implies an increase in resource and material use; see Chapter 6.1.2a), and financial independence (growth requires external capital acquisition, with the risk of getting trapped into a growth/profit spiral; see Chapter 6.1.7a). Complementary relationships were also identified, such as the convivial, appropriate, and democratic use of technology (see Chapter 6.1.6a), which provided a necessary condition for energy production to be aligned with local community energy needs (see Chapter 6.1.3b). Although it was beyond the scope of this study to identify every single complementary or conflicting relationship between the degrowth elements, it was considered necessary to transparently report on these relationships as they a) may influence the overall ability of RECs to adopt degrowth and b) should thus be considered when applying the framework in the future.

### ***Unpacking the framework elements – what they should and should not be***

The framework's 14 degrowth elements (see Chapter 4) provide a preliminary indication of what degrowth might look like for RECs in a practical and applicable sense. It should be noted that the framework and its degrowth elements are by no means exhaustive and do not represent the final or optimal state of what a degrowth-oriented REC should look like. Future research could further develop the degrowth elements, perhaps adding new ones or refining others. In line with Nesterova (2020) and Hinton (2021), the framework elements should not be considered as a quantifiable checklist but rather as part of a holistic picture for assessing the degrowth compatibility of RECs. This was addressed by deliberately adopting a qualitative approach rather than a quantitative one.

The framework was designed for breadth rather than for depth, as great emphasis was placed on selecting and including all those elements that are considered to be most central from a degrowth (energy) perspective. However, similar to what Hankammer et al. (2021) found when developing their framework, some of the elements (e.g., reducing environmental impacts in and around the supply chain) are not necessarily unique characteristics of a degrowth business organisation and could very well be identified in sustainable business models as well. Therefore, a logical next step for future research could be to rank the degrowth elements and clearly identify those that have the greatest impact on achieving degrowth alignment, for which the study of Hinton (2021) made a first attempt. Finally, the implementation of degrowth elements in the practice of RECs should, of course, not be understood as automatically facilitating a society-wide transition towards degrowth. Consistent with Khmara and Kronenberg (2020) and Nesterova (2020), organisations and businesses such as RECs should only be seen as one piece of a larger puzzle that needs to change (e.g., policies, institutions, individuals) in order to facilitate a degrowth transition. Future research could thus analyse how (degrowth-aligned) RECs can initiate and support a degrowth transition in the energy sector.

## **7.1.2 Discussion of RQ2 – Identifying the degrowth elements**

To answer RQ2, the self-developed framework was applied by conducting twelve in-depth qualitative interviews and a complementary document analysis. In line with the findings of Kunze and Becker (2015), Rommel et al. (2018) and Tsagkari et al. (2021), this study found the degrowth compatibility of the RECs to be mixed. Although RECs did not explicitly refer to degrowth as their core organisational objective, certain degrowth elements were strongly observable, while others were only observable to partial or limited degrees. This leads to the conclusion that the RECs in this study sample are only partially degrowth compatible. This sub-chapter will now further unpack the findings and discuss them against the existing literature, focusing on key lessons that can be drawn from the results.



### ***The ambiguous role of growth – to grow or not to grow?***

The study found that almost all RECs in the sample, regardless of their location, size, and core business activities, pursue an organisational growth motive (e.g., increasing installed capacity, project size, number of members and employees). This finding is consistent with the contribution of Klagge and Meister (2017), who identified RECs with a diversified portfolio (that engage in activities other than power generation) as being particularly predisposed to pursuing a growth path. While from this perspective, it could be argued that RECs are not necessarily suitable examples of degrowth-aligned organisations in practice, the question of whether or not selective organisational growth can be compatible with the degrowth vision requires a more nuanced discussion than it might appear at first glance. First of all, RECs were found to not necessarily grow in order to maximise profitability but rather to pursue growth to achieve their core organisational objectives of facilitating a decentralised energy transition and providing opportunities for citizen participation (see Chapter 6.1.1b). These findings are in line with the work of Klagge and Meister (2017), Kunze and Becker (2015) and Rommel et al. (2018). However, while accelerating decentralised renewable energy is necessary for decarbonising the energy sector and enabling societal acceptance for this transition (Bauwens et al., 2022), RECs' organisational growth comes at a cost. As Chapter 7.1.1 illustrated, this study identified several conflicting relationships between organisational growth and the ability of RECs to adopt other degrowth elements of the framework (e.g., aligning energy production with local needs, an absolute reduction of resource and material throughput), which are necessary conditions for a degrowth-oriented energy system. The ambiguity of whether or not degrowth-oriented RECs should be able to pursue organisational growth became apparent throughout the development and application of the framework and can also be observed in the general academic discourse on the topic (Hankammer et al., 2021; Khmara & Kronenberg, 2018; Raith, 2021). According to Hankammer et al. (2021), whether individual organisational growth is compatible with the degrowth vision cannot be fully answered at the micro level, as it implies an important macroeconomic differentiation. According to degrowth researchers, it is important to understand degrowth as the selective downsizing of production and consumption in those sectors that are “ecologically destructive and socially less necessary” (Hickel, 2021, p. 1108). Decentralised renewable energy production arguably does not fall into this category, as it a) aims to involve the wider society in the transition, and b) produces energy that is important for human wellbeing in a way that is arguably less environmentally destructive than the fossil-fuel-based production, leading Buch-Hansen and Nesterova (2023) to argue that clean and renewable forms of energy need to grow. Along the same lines, Kunze and Becker (2015) argue that the growth of RECs can be aligned with the degrowth vision because, similar to the findings of this study, they found that RECs seek to displace environmentally destructive, fossil-fuel-based and centralised forms of energy production (see Chapter 6.1.1c). RECs can therefore be seen as an illustrative example of the ambiguous role of growth in the conceptualisation of degrowth for businesses. Future research could further explore this relationship by reflecting on whether and how the framework element ‘deviation from economic growth and profit maximisation’ can be sharpened in the context of this discussion.

### ***The relevance of the local community context***

The study found the interviewed RECs to be particularly committed to and aligned with those degrowth elements that relate to the local community context (e.g., ‘localised & strongly embedded’, Chapter 6.1.4a; ‘collaborative value creation’, Chapter 6.1.5b; ‘wellbeing of community’, Chapter 6.1.4b), which the participants defined as a local physical place that they operate in. This finding aligns closely with existing degrowth and community energy research, in which the principle of localisation plays a central role in socio-ecological transitions, as many bottom-up and grassroots initiatives associated with the degrowth movement (e.g., community gardens, producer-consumer networks) are situated in a small-scale and local community

context (Kallis et al., 2015; Trainer, 2020). An important notion in the degrowth research community is that a locally embedded and decentralised organised economy provides a means “to reduce throughput and manage a stable adaptation to a smaller economy” (Kallis, 2011, p. 876). Similarly, in the community energy and cooperative research domain, embeddedness in a local and regional physical place is considered a key characteristic of RECs (Bauwens et al., 2022; Klagge & Meister, 2018). This highlights an essential synergy between the degrowth vision and the local nature of RECs and explains why RECs align with many of the abovementioned degrowth elements. In line with these general observations, this study found RECs to be strongly embedded in the local community context, both economically and socially/culturally. Consistent with the findings of Brummer (2018) and Rommel et al. (2018), RECs’ activities were found to strengthen local economic and financial cycles by employing local companies to install and maintain the facilities, providing jobs, paying leases and taxes, and keeping value creation in the region, thereby strengthening community wellbeing. Rommel et al. (2018) added that localising energy production and strengthening local economic cycles can increase local communities’ autonomy, self-reliance, and resilience, which was identified to be a strong motivation for the interviewed RECs (see Chapter 6.1.1c). Another interesting observation was that RECs openly collaborate and share knowledge with other local actors (such as RECs or local policymakers) to implement community projects that reinforce the abovementioned value creation within the community (see Chapter 6.1.5b).

Moreover, this study found RECs to be actively involved in the social and cultural community contexts by organising local events, providing opportunities for citizen participation, and creating a sense of community, although to varying degrees (see Chapter 6.1.5a). One argument that is put forward in the literature and was also observed in this study is that social embeddedness and citizen participation can positively impact community acceptance of renewable energy projects (Bauwens et al., 2016; Brummer, 2018; Schumacher et al., 2019). As the degrowth (energy) transition requires far-reaching socio-economic and behavioural changes (e.g., reduced energy consumption), increasing acceptance of the energy transition in the local community context can be seen as an important prerequisite for further engagement with community members on other issues such as energy-sufficiency (Frick et al., 2022). However, as policy changes in recent years have favoured larger projects (e.g., through tendering), and the size of projects in general has been observed to increase (see Chapter 6.3), the strong local embeddedness may be at risk in the future, as also observed by Rommel et al. (2018).

### ***The quest for energy self-sufficiency and autonomy***

One promising way to absolutely reduce material and energy throughput is by focusing on small-scale, self-sufficient energy production and consumption systems (Rommel et al., 2018; Trainer, 2012; Tsagkari et al., 2021). This study identified a clear motivation of RECs to strengthen local self-sufficiency and autonomy from a) the current largely centralised and fossil fuel-based energy system and b) foreign energy imports and the currently associated market volatility (see Chapter 6.1.1c). Several other studies also identified the pursuit of greater self-sufficiency and autonomy as a key motivating factor for RECs (McKenna, 2018; Radtke & Ohlhorst, 2021; Tsagkari et al., 2021). According to Juntunen and Martiskainen (2021, p. 9), energy autonomy requires a “self-sufficient power balance between demand and supply”, highlighting the importance of closely aligning decentralised energy production with local community needs and engaging citizens (consumers) in the production of decentralised energy (‘prosumption’). In this study, the alignment of energy production with consumption was observed mostly in the case of small-scale PV rooftop systems or balcony modules, which allow (partial) self-consumption of energy in the respective building, thus aligning energy production with consumption and strengthening autonomy (see Chapter 6.1.3b). Similar to the findings of Rommel et al. (2018), this study also found that the extent to which RECs can achieve energy autonomy and self-sufficiency strongly depends on structural factors such as the electricity market design (e.g., feed-in tariffs).

According to McKenna (2018), energy storage and demand-side energy management also play a central role in achieving energy self-sufficiency, although they are often not applicable on a large scale today. This study found the type and size of the renewable energy project deployed to play a key role, with larger PV systems and wind turbines primarily producing energy to feed into the grid rather than aligning energy production with local community needs (see Chapter 6.3). Despite the lack of a legal policy framework in Germany, the potential of energy sharing to strengthen community energy self-sufficiency and align energy production with local energy needs was noted in several interviews (see Chapter 6.1.1c) and could be an interesting direction for future research on degrowth and community-based energy projects.

### ***Energy sufficiency – changing social norms?***

It is argued that to achieve the 1.5°C goal, the current technology-driven pathway, which relies on energy efficiency measures and a large-scale transition to renewables, needs to be complemented by a socio-economic sufficiency pathway that focuses on absolute reductions in energy and material consumption (Grubler et al., 2018; Keyßer & Lenzen, 2021; Nieto et al., 2020). This requires a change in values, behaviours, and social norms, which this study captured from two perspectives: 1) RECs' attitudes to absolutely reducing material and energy consumption in their own operations (see Chapter 6.1.2a), and b) the attempt to promote demand-side energy sufficiency in their relationships with customers and members (see Chapter 6.1.3a). While this study did not attempt to quantify the material and energy throughput reductions achieved by the RECs in terms of sufficiency in their own operations, RECs consistently reported that they were aiming for growth (see Chapter 6.1.1b), which according to several interviewees, made absolute reductions in material and energy throughput unattainable. The interviewed RECs prioritise the planning, installation, and operation of renewable energy systems over sufficiency considerations, and it can therefore be argued that they follow more of a technology-driven path. Although RECs' efforts to replace fossil fuel-based energy production systems contribute to reducing society's overall energy and material throughput, according to degrowth scholars, this is consistent with the green growth motive and vulnerable to potential rebound effects that may substitute the achieved energy and material savings with higher consumption in other areas (Parrique et al., 2019). Turning to the demand side, energy sufficiency was not found to be a key priority, as only a few RECs implement individual measures that promote energy sufficiency among their members. These findings align with those of Frick et al. (2022) and underscore RECs' currently limited compatibility with this specific degrowth element. While limited internal resources were cited as the main reason for not promoting energy sufficiency (see Chapter 6.3), the individual values and worldviews of those involved in RECs may also explain why this issue is not prioritised (Nesterova, 2021), particularly given that RECs do not consciously pursue degrowth as an organisational goal. However, Frick et al. (2022) identify RECs as promising and authentic actors for promoting energy-sufficient lifestyles and behaviours, as the concept, in principle, connects to their current business model. This is because RECs in Germany are committed to climate protection, have democratic and participatory organisational structures, and are inherently close to their members, which are often environmentally aware and open to such topics (Frick et al., 2022).

### ***RECs as enablers of a participatory, inclusive, and just energy transition?***

Research on degrowth and energy has emphasised the concept of energy democracy and the importance of creating inclusive and democratic participation, decision-making and ownership structures in order to actively engage wider parts of society in the decentralised energy transition and strengthen the sense of responsibility and ownership (Gunderson et al., 2018; Kunze & Becker, 2015; Rommel et al., 2018; Tsagkari et al., 2021). This study found the legal structure of cooperatives to imply strongly democratic governance structures. As each member has one vote regardless of the number of shares purchased, the REC body (e.g., advisory board) is elected at the AGM, and there is a general emphasis on financially involving as many local citizens as

possible to strengthen collective ownership. However, it was noted that there is a significant discrepancy between the formal means of participation (voting at the AGM, financial participation through the purchase of cooperative shares) and the actual participation of members. Although RECs were observed to provide various opportunities for participation, the level of participation was reported to be comparatively low and limited to those people taking responsibility (see Chapter 6.1.4a). This suggests that members have different motivations for participating in RECs (e.g., normative, financial), which several studies confirm (Bauwens et al., 2016; Fischer et al., 2021; Holstenkamp & Kahla, 2016). This study further confirms the findings of previous research (Radtke & Ohlhorst, 2021; Rommel et al., 2018), which shows that REC membership is often homogeneous and lacks diversity in demographics (e.g., gender, age, income), indicating that despite their democratic nature, RECs often fail to engage members from all different groups in society. The study identified two main reasons for this: a) communication and external representation attract a particular type of member, and b) the financial burden of joining a cooperative (see Chapter 6.3).

The justice perspective is inextricably linked to the degrowth debate (Mastini et al., 2021) and, therefore, should form an important component of an energy system based on the degrowth vision. This implies that the costs and benefits of energy production, distribution, and consumption are equitably shared across society, and particularly vulnerable groups should be included in a just and participatory way (Hanke et al., 2021; Sovacool et al., 2017). However, this study found that energy justice and therefore the awareness for, active participation, and equal distribution of benefits among vulnerable groups of society, was only addressed to a very limited extent in the operational practice of the interviewed RECs, in line with the overall findings of the study by Hanke et al. (2021). While different attempts to strengthen distributional justice were identified among the interviewed RECs (see Chapter 6.1.5c), the aforementioned homogeneity of the membership base clearly affected the ability of RECs to promote distributional and procedural energy justice. Although there was some (implicit) awareness of injustices in the energy system among the RECs, most of them did not make a conscious effort to engage vulnerable or marginalised groups. To enable a degrowth transition in the energy sector that ensures wellbeing among all parts of society, RECs would benefit from strengthening diversity by including different perspectives and actively engaging those who are unable to participate in the energy transition under current circumstances (Hanke et al., 2021; Rommel et al., 2018).

### **7.1.3 Discussion of RQ3 – Identifying key drivers and barriers**

Finally, RQ3 identified key external and internal drivers and barriers that influence the ability of RECs to adopt certain degrowth elements. Multiple external barriers were found to be related to structural forces that are deeply embedded within the current growth-based energy and economic system. Similar to the findings of Rommel et al. (2018), the renewable energy policies codified in the German EEG were found to often favour growth- and profit-oriented forms of renewable energy production in the past decades. A good example is the tendering regime, in which RECs needed to compete with larger, often profit-oriented organisations, placing decentralised energy production under cost pressure. Another factor influencing the ability of RECs to pursue degrowth was their reliance on equity/debt, as it structurally forces RECs to pay back dividends/interest, which requires them to grow and generate profits. Although RECs have been put forward as potential actors to put into practice the degrowth vision (Kunze & Becker, 2015; Tsagkari et al., 2021), it needs to be acknowledged that RECs “operate in a larger economic and societal context” (Hinton, 2021, p. 11), which in a system that is still predominantly growth and profit-driven, makes full degrowth compatibility unattainable.

Furthermore, it was observed that addressing many of the degrowth elements (e.g., political engagement) requires significant resources. Similar to the studies by Brummer (2018) and

Rommel et al. (2018), this study showed that RECs often deal with limited resources and are highly reliant on volunteers, which is a limiting factor for not engaging more with other degrowth elements (see Chapter 6.3). In contrast, the largest and most professional REC in this study was found to meet considerably more degrowth elements of the framework than the smaller RECs. This further highlights the paradox that, on the one hand, engaging with certain degrowth elements requires resources and a considerable organisational size (e.g., getting politically involved, promoting sufficiency), while on the other hand, degrowth stands for small-scale, community-based, and self-sufficient forms of energy.

Reflecting on the interviews, the underlying set of values and worldviews of the management, advisory board, and members of RECs certainly can impact the ability of RECs to adopt degrowth practices and elements (Nesterova, 2021). This became evident with regard to the priority that RECs place on supply-side, technology-driven renewable energy deployment rather than on engaging with their members and changing societal norms, which is considered essential from a degrowth perspective (Tsagkari et al., 2021). While this study demonstrated that RECs are already compatible with the degrowth vision in some areas, there are some areas where they are still distant from the degrowth narrative. This raises the question of whether RECs need to explicitly strive for degrowth, which would imply a fundamental change in current values (Kunze & Becker, 2015; Tsagkari et al., 2021). While this study cannot provide a definitive answer to this question, it remains an important perspective that, alongside the structural and practical barriers and drivers identified in this study, the underlying values of stakeholders may be important to consider when exploring the degrowth compatibility of an organisation (Nesterova, 2021).

Finally, the legal nature of being a cooperative and the core characteristics associated with it was found to enable RECs to implement certain degrowth elements. This underlines synergies and links between the degrowth vision and the legal form of a cooperative, explaining why several authors propose cooperatives as a suitable legal form for running an organisation in a degrowth society (Cunico et al., 2022; Johanisova et al., 2015). In particular, their highly democratic organisational structure compared to other organisational forms, their purpose- and less profit-driven orientation, and their regional embeddedness (Klagge & Meister, 2018) are inherently close to the ideals of degrowth. However, as this discussion has shown, the legal form of a cooperative in itself does not automatically lead to degrowth compatibility but can be an important precondition for it.

## 7.2 Reflections and Limitations

### 7.2.1 Methodological, conceptual, and analytical choices

The development of the degrowth framework for community energy was a central part of the thesis and strongly influenced the data collection and analysis process. Although great care was taken to select those degrowth elements that the literature review showed to be most important when conceptualising degrowth for community energy, the final choice of the elements was to some extent subjective. It must therefore be acknowledged that conducting a systematic literature review to identify degrowth elements suitable for RECs could potentially have led to the identification of other, more nuanced elements. However, given the time constraints of this thesis project and the aim of gathering empirical evidence, developing the framework based on a systematic literature review was not feasible. Next, the framework should not be seen as a final state and could be further developed and refined in the future. During the framework development, it was recognised that many of the degrowth elements link to other broad concepts (e.g., energy democracy, energy justice), which have already been researched in the context of German renewable energy cooperatives (e.g., Hanke et al., 2021; Yildiz et al., 2015). However, this thesis applied those concepts primarily from a degrowth perspective, thus adding

to the academic discussion of each framework element. The aim and strength of this thesis was not to provide a detailed analysis of the findings in relation to each degrowth element and associated theoretical concept, but rather to provide a holistic overview of the degrowth compatibility of RECs in Germany. However, it must be acknowledged that the breadth of the framework and the subsequent analysis has come at the expense of depth. While great care was taken to ensure a comprehensive presentation and application of degrowth and related concepts, this was not always possible.

A qualitative multiple case study research design with semi-structured interviews was chosen, as research investigating the relationship between degrowth and RECs was limited (Creswell & Creswell, 2018; Yin, 2014). Particularly in the German context, empirical studies were rare, so a qualitative approach was most appropriate for exploring this relatively new field and gaining a deeper understanding of important relationships, perspectives, and meanings. This allowed for a thick description of the different strategies and approaches that RECs are pursuing in relation to degrowth elements (Creswell & Creswell, 2018), which provided interesting insights and can help RECs and other organisations to gain inspiration on how they can become more degrowth-compatible in the future. In hindsight, conducting qualitative case study research only captures a very small picture, and it would arguably have been interesting to quantify degrowth compatibility and conduct a mixed methods study, as was done by Klagge and Meister (2017), for example. However, as explained in Chapter 7.1.1, several researchers who have previously developed degrowth frameworks for business have emphasised the importance of understanding an organisation's compatibility with the degrowth concept holistically, rather than purely quantifying its degrowth compatibility (Hinton, 2021; Nesterova, 2020).

Finally, to strengthen construct validity, which can be understood as “the accuracy with which a case study's measures reflect the concepts being studied” (Yin, 2014, p. 238), data was collected from two different sources (qualitative interviews and complementary document analysis) and then the findings were triangulated. As the qualitative interview results were already very thorough, as confirmed by the saturation that was reached in the interviews, a complementary, not systematic, document analysis was considered sufficient to a) complement the participants' perspectives, b) fill gaps from the interviews, and c) provide a deeper understanding of the projects and initiatives. A more comprehensive document analysis might have revealed further nuances in the findings.

## **7.2.2 Legitimacy and relevance of research questions**

Arguably, identifying degrowth-compatible forms of business in a capitalist economic system could be an unsolvable problem. However, given that a) cooperatives as a specific organisational form are often discussed as a suitable vehicle for implementing the degrowth vision (Cunico et al., 2022; Johanisova et al., 2015), and b) research on RECs and degrowth identified some common ground, but remains limited (Gunderson et al., 2018; Kunze & Becker, 2015; Rommel et al., 2018; Tsagkari et al., 2021), it was considered legitimate to further explore this relationship. Without expecting that RECs in Germany are already fully compatible with the degrowth vision, it was considered valuable to identify those practices that might already be degrowth compatible, to foster learning and show where potential for improvement remains. It was deemed legitimate to develop a new conceptual framework because a) current degrowth business frameworks are not adapted to the specific energy context and b) existing studies on RECs and degrowth often focus on specific elements instead of a comprehensive assessment. Furthermore, with respect to RQ2, it was considered legitimate to collect empirical evidence on RECs degrowth compatibility, as there is very limited and rather mixed empirical evidence on the relationship between degrowth and energy cooperatives in Germany (Klagge & Meister, 2017; Kunze & Becker, 2015; Rommel et al., 2018). Finally, with regard to RQ3, no academic study could be identified that deals with concrete drivers and barriers that influence the ability of RECs to

adopt a degrowth approach. While RQ1 and RQ2 were sufficiently answered, RQ3 was sometimes difficult to capture, as RECs did not explicitly approach degrowth and therefore did not explicitly talk about potential drivers and barriers that influence their degrowth ability.

### **7.2.3 Generalisability and limitations**

Due to time constraints of this project and the limited availability of REC representatives, this study was based on a sample size of  $n=12$ , which is rather small. Although saturation was reached during the interviews, the small sample size limits the generalisability of the empirical data and findings of this study. Another factor influencing the generalisability of the study's empirical findings was the study's scope, which exclusively focused on energy communities in the legal form of a cooperative. While this was done to ensure comparability between the case study organisations, the analysis showed that some of the degrowth elements observed were related to the specific nature and characteristics of a cooperative. This means that generalising the findings and applying them to RECs that are not organised as cooperatives should be done with caution. Furthermore, generalising the empirical findings beyond the German context may be difficult as, similar to Hankammer et al. (2021), this study showed that many of the identified drivers and barriers were context-specific and often related to the German context. While developing the degrowth framework for community energy, great emphasis was placed on defining the degrowth elements in a generalisable way, which should enable its application in different country contexts and to other legal forms of RECs.

A few other limitations were identified. First of all, limited attention was paid to the regional differences and size of the RECs, which potentially influenced the results. Kahla et al. (2017) found significant differences between RECs located in different parts of the country, which were also partially observed in the present study (e.g., the financial capacity of members was lower in the north/east than in the south/west of Germany). While the analysis showed that the largest REC included was able to address degrowth more comprehensively, it provides a first indication that the size of the REC plays a role when exploring the compatibility of RECs with the degrowth vision. However, this study did not sufficiently consider this dimension in its analysis. Furthermore, a certain degree of generalisation was observed when assessing the degrowth compatibility of the RECs. While some evidence was found for almost every degrowth element, the 12 different perspectives were to some extent aggregated into one of the three categories (high, partial, limited degrowth compatibility), which may have overgeneralised some of the participants' perspectives. Next, there was a degree of selection bias, as this study focused primarily on representatives of RECs in management and advisory board positions, without interviewing other stakeholders of RECs in this study. In addition, the interviews were conducted and transcribed in German, but translated and coded in English, with the risk that some nuances might be lost in translation. To account for this, the study made extra efforts to check the translated transcription to ensure that the meaning was retained. Finally, the researcher's own set of values potentially influenced the collection and analysis of data in this study (see Chapter 5.1), which may have led to some form of bias in the selection of representatives, coding of interviews and presentation of the results.

## 8 Conclusion

The concept of degrowth, which refers to the democratic downscaling of production and consumption while enhancing wellbeing (Schneider et al., 2010), presents itself as a normative response to some of the most pressing socio-ecological challenges of our time. To date, the academic degrowth debate has focused mainly on regulatory and institutional policies necessary for a degrowth transition, while the implications for and the role of business organisations have received much less conceptual and empirical attention. The energy sector is central to the degrowth debate. However, research on how energy production and consumption might look like in a degrowth society and particularly which actors might be compatible with the degrowth vision, is limited. While existing literature has identified RECs as a central actor in facilitating a decentralised energy transition, much less conceptual and empirical research has been conducted on whether RECs in the legal form of cooperatives could be compatible with the degrowth vision and could thus be considered a potential actor that can ensure renewable energy production in a degrowth society. Therefore, this study addressed these gaps. Specifically, this study aimed to better comprehend the relationship between degrowth and RECs (RQ1), to investigate whether and to what extent RECs in Germany, as a specific form of business, might already be compatible with the degrowth vision (RQ2), and to explore potential drivers and barriers they face in doing so (RQ3). This chapter summarises the main conclusions of this study, re-emphasises its academic and practical implications, and presents potential avenues for future research.

### 8.1 Conclusion and answer to the research questions

*RQ1 – How can degrowth be conceptualised for RECs?*

In order to better comprehend the relationship between degrowth and RECs, this thesis developed its own literature-based, qualitative degrowth framework for community energy (see Chapter 4), thus making a theoretical and conceptual contribution to the emerging research field. The framework translates the broad degrowth vision into operationalisable strategies, business principles and elements that help to a) analyse the compatibility of RECs with the degrowth vision and b) indicate how RECs can contribute to achieving degrowth in practice. This study revealed that the multitude of degrowth elements provides various entry points to engage with degrowth. At the same time, however, aligning with this framework could have far-reaching implications for RECs' current business model. In conceptualising degrowth for community energy, the study identified some common ground between the two fields of research, as several degrowth elements of the framework are closely related to key concepts discussed in the community energy context (e.g., energy justice and energy democracy). However, this study also revealed some contradictory and complementary relationships between different degrowth elements, whereby the role of organisational growth was identified as a central tension. While the organisational growth of RECs is necessary to achieve their core purpose of facilitating a decentralised energy transition and decarbonising the energy sector as quickly as possible, it also negatively impacts the degrowth compatibility of other elements, underpinning the complex and, in some cases, ambiguous relationship between degrowth and business. For the purpose of this study, the framework has been formulated as a benchmark for comparison with current REC practices. However, the framework should not be understood as a final state: degrowth is a complex, multi-faceted concept, therefore, future research is encouraged to further develop, sharpen, and refine the framework and its degrowth elements.

*RQ2 – Which degrowth elements can be identified in the organisational practice of RECs, to what extent and in what form?*

The degrowth framework for community energy was applied to 12 REC case study organisations across Germany, with the aim of investigating their degrowth compatibility.



Reflecting upon the interview findings and the complementary document analysis, mixed results were found that indicate that RECs are partially degrowth compatible with the predefined degrowth elements. Although, the interviewed RECs did not explicitly refer to degrowth as one of their core objectives, many of them were pursuing objectives that are important components of degrowth economy. RECs are therefore important actors in illustrating how several of the academically discussed degrowth premises can be put into practice. However, the extent to which the pre-defined degrowth elements and associated strategies for implementing them could be observed varied considerably across the RECs. Each REC fulfilled at least some of the degrowth elements, but no REC was fully compatible with the degrowth vision. Some degrowth elements were found to be clearly evident in the practices of many RECs, highlighting their degrowth compatibility. In this respect, RECs were found to be strongly embedded in their respective local community contexts, collaborating openly with other actors to create regional economic value, social/cultural wellbeing and some level of independence and self-sufficiency from the current energy system. However, other key elements of degrowth, such as the promotion of demand-side energy sufficiency, the absolute reduction of material and energy throughput, and attempts to achieve energy justice, were not, or only to a very limited extent, evident in the practice of the case study organisations. Although the degrowth literature suggests cooperatives and RECs as potential precursors of businesses putting degrowth into practice, the results of this study suggest that this is only observable to a certain extent. This study explains RECs partial degrowth compatibility as a result of 1) complementary and contradictory relationships between some framework elements, and 2) key drivers and barriers affecting the ability of RECs to adopt degrowth elements. Nevertheless, it should be emphasised that RECs in Germany make an important contribution to the socio-ecological transformation of the energy sector, which should not be undermined by the findings.

### *RQ3 – What are the main drivers and barriers for RECs to adopt degrowth elements?*

Linking closely to the degrowth compatibility of RECs, several key external and internal drivers and barriers were identified that either positively or negatively influence the ability of RECs to adopt degrowth elements. It was observed that the key drivers and barriers were often not tied to a single degrowth element. The study found several of the external barriers to be systemic in nature and linked to a growth mindset which is deeply embedded in the current energy and economic system (e.g., German tendering system), underlining that institutional and regulatory decisions shape the reality on the ground. This implies that RECs, which are embedded in the system, need to play according to the rules that this system stipulates, highlighting the importance of macro-level institutional and regulatory changes supporting degrowth action on the ground. The study further revealed that adopting several of the framework's degrowth elements (e.g., political engagement, promoting energy-sufficiency) requires a certain number of resources and a certain organisational size, which many RECs do not have due to high levels of volunteerism. Although not explicitly mentioned in the interviews, the underlying values are assumed to form a key barrier to the adoption of those degrowth elements that require a clear mindset shift from the status quo (e.g., promoting energy sufficiency, producing less, absolutely reducing material and energy use). Finally, the legal structure and nature of the cooperative was found to be a key enabler for the implementation of many of the elements which were already observed in practice (e.g., local embeddedness, formal democratic decision making).

## **8.2 Practical implications and avenues for future research**

The findings have several implications for practitioners, policymakers, and the research community. First, the conceptual framework (RQ1) can help policymakers at different policy levels and in different geographical contexts to gain a first understanding of what degrowth, as a multifaceted and abstract concept, concretely means for the energy sector and in particular for decentralised forms of energy production. Given that degrowth is currently attracting more

attention from policymakers, as exemplified by the currently ongoing 'Beyond Growth Conference' at the EU level, this study makes a timely contribution to the discourse and has the potential to strengthen the general understanding of those who want to implement degrowth-oriented policies in the energy system. As this thesis identified common ground between community-based forms of energy and degrowth, it could be interesting for policymakers to exploit these synergies and further develop policies that simultaneously strengthen both decentralised and participatory forms of energy and degrowth practices. The identified drivers and barriers (RQ3) form a good starting point for policymakers to understand what factors currently prevent RECs from adopting degrowth practices and give some indication of what factors can stimulate RECs to pursue degrowth. These factors could inform policy design at the EU, national, state, and municipal level to reduce barriers and strengthen drivers for RECs to increase their degrowth alignment. Although this study identified RECs to only be partially degrowth compatible, it has revealed several dimensions in which RECs are already compatible with the degrowth vision today, making them a potential agent of change towards a degrowth economy, from which policymakers can learn. The empirical data collected for RQ2 is particularly relevant for German policymakers, given the specificity of the context.

Secondly, the findings of RQ2 have the potential to inspire other RECs in Germany and from different geographical contexts on how they can put the degrowth vision into practice – even RECs that might not have a clear degrowth ambition. A key finding of this study was that while the interviewed RECs were not consciously pursuing degrowth, many of them were pursuing objectives that are important components of degrowth, such as energy democracy and energy self-sufficiency and autonomy. This implies that many of the study findings might be of interest in themselves, by promoting shared learning on key issues that RECs are dealing with (e.g., how to increase participation, how to get more politically involved). In addition, the framework dimensions and elements can provide guidance and inspiration to all types of businesses interested in degrowth-oriented and strongly sustainable business models. Although the framework is tailored to the energy sector, several of the elements are arguably transferable to other industries and contexts.

Finally, the academic community could benefit from this study as it conceptually and empirically contributes to the discussion on degrowth and business organisations, but also on degrowth and energy. By developing a framework that conceptualises degrowth for community energy and collecting empirical evidence by applying it to the German context, this study makes a novel academic contribution. Building on this study, several avenues for future research were identified. First of all, future research could expand the sample size and country scope beyond the German context and compare the results with the findings of this study. Particularly in light of the EU's RED II legislative framework, which aims to strengthen the role of community energy in Europe, it would be interesting to investigate whether RECs in different EU Member States perceive similar barriers and drivers when working on specific degrowth elements. Another research avenue could be to explore the interrelationship between RECs and other stakeholders that are necessary for a degrowth transition (e.g., policymakers, NGOs, civil society, RECs umbrella organisations), to better understand which role (degrowth-aligned) RECs might play in a transition towards degrowth. Furthermore, the tensions, conflicting and complementary relationships between the different degrowth elements of the framework, could be further explored with a particular focus on which elements can be considered most central for initiating a degrowth transition in the energy sector. Lastly, research that develops concrete energy policies to strengthen both the role of decentralised forms of energy production and degrowth practices could be a particularly valuable avenue forward. The drivers and barriers identified in this paper provide a first starting point for such a highly policy-relevant discussion.

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## Appendix

### Appendix A - Interview consent form



#### Einverständniserklärung und Informationsblatt für Teilnehmer:innen

Das Formular „Einverständniserklärung und Informationsblatt für Teilnehmer:innen“ dient dazu, Sie mit dem Forschungsprojekt meiner Masterarbeit vertraut zu machen. Es soll sichergestellt werden, dass Sie alle notwendigen **Informationen über das Forschungsprojekt** und die **Datenverarbeitung** erhalten haben und freiwillig an der Studie teilnehmen können. Sollten Sie Rückfragen zum Forschungsprojekt haben, kontaktieren Sie mich gerne unter den folgenden Kontaktdaten.

**Name:** Leon Bartling, Student M.Sc. Environmental Management and Policy, Lund University, Schweden  
**Kontakt:** [leon.bartling@posteo.de](mailto:leon.bartling@posteo.de) oder +4915779605701  
**Institution:** International Institute for Industrial Environmental Economics (IIIEE), Lund University, PO-Box 196, 22100 Lund, Schweden  
**Titel des Forschungsprojekts:** Energieerzeugung in einer Postwachstumsgesellschaft – Die Rolle und das Potenzial von Bürgerenergiegenossenschaften in Deutschland

#### Was ist der Hintergrund des Forschungsprojektes?

Derzeit schreibe ich meine Masterarbeit zur Erreichung des „Master of Science in Environmental Management and Policy“ an der Universität in Lund, Schweden. Im Rahmen meines Forschungsprojekts analysiere ich das Potenzial von Bürgerenergiegenossenschaften aus einer Postwachstums-Perspektive. Dazu möchte ich einerseits das **Geschäftsmodell von Bürgerenergiegenossenschaften** in Deutschland besser verstehen und herausarbeiten, ob und wenn ja, welche konkreten Elemente einer Postwachstumsgesellschaft (z.B. demokratische Entscheidungs- und Beteiligungsstrukturen, Förderung lokaler Wirtschaftsstrukturen, Suffizienzmaßnahmen) sich bereits heutzutage in der Praxis von Bürgerenergiegenossenschaften wiederfinden lassen. Andererseits soll im Rahmen des Forschungsvorhabens analysiert werden, welche **Rolle die dezentrale Form der Energieerzeugung** durch Bürgerenergiegenossenschaften haben könnte, um das derzeit weitgehend zentrale, gewinn- und wachstumsorientierte Energiesystem in Deutschland zu ergänzen/abzulösen.

#### Warum ist Ihre Perspektive wichtig?

Sie sind herzlich dazu eingeladen, an dem Forschungsprojekt teilzunehmen und ihre wertvollen Erfahrungen und **Perspektiven aus der Praxis** einzubringen. Dies ist besonders wichtig, da diese Masterarbeit nicht ausschließlich eine theoretisch-akademische Auseinandersetzung mit dem Thema darstellen, sondern explizit auch Erfahrungen und Berichte aus der gelebten Praxis von Bürgerenergiegenossenschaften einbeziehen soll. Das Interview wird **maximal eine Stunde** dauern und online über **Zoom oder Microsoft-Teams** stattfinden.

#### Was passiert mit Ihren Daten?

Die gesammelten **Daten werden ausschließlich zur Erstellung meiner Masterarbeit** an der Universität in Lund verwendet. Das Ergebnis wird eine **wissenschaftliche Publikation** sein, welche öffentlich zugänglich sein wird. Alle im Rahmen dieses Forschungsprojekts erhobenen Daten werden in Übereinstimmung mit der **Datenschutzverordnung 2016/679 der Europäischen Union** erhoben, gespeichert und verarbeitet.

Zu Beginn des Interviews werden Sie gefragt, ob Sie mit einer **Aufzeichnung des Gesprächs** einverstanden sind. Die Videoaufzeichnung wird ausschließlich für die Transkription des Interviews verwendet und danach unverzüglich gelöscht. Die Transkription des Interviews wird für die Auswertung der Ergebnisse verwendet und mit einer **anonymisierten Identifikationsnummer** versehen. Damit wird sichergestellt, dass alle persönlichen Informationen, die Rückschlüsse auf Ihre Identität zulassen würden, gelöscht werden. Es besteht jedoch die Möglichkeit, dass Sie durch die Organisation, der Sie angehören, und/oder durch Ihre Position in der Organisation, identifiziert werden können. Sie können bis zum **25. April ohne Angabe von Gründen von der Teilnahme an der Studie zurückzutreten**.

Das Forschungsmaterial, einschließlich Ihrer **anonymisierten Daten**, wird **bis zum 30.06.2023** in einem passwortgeschützten Ordner an der Universität Lund gespeichert. Auf diesen Ordner haben nur die an der Arbeit beteiligten Personen (Leon Bartling) Zugang. In jeder Phase des Forschungsprojekts, haben Sie als



Teilnehmer:in der Studie das Recht, **Zugang zu Ihren eigenen personenbezogenen Daten zu erhalten**, sowie die Berichtigung, Einschränkung oder Löschung dieser Daten zu verlangen. Weitere Informationen über die Umsetzung der Europäischen Datenschutzverordnung an der Universität Lund (in englischer Sprache) finden Sie unter: <https://www.lunduniversity.lu.se/about-university/contact-us/processing-personal-data-lund-university>

**Einverständniserklärung**

Mit Ihrer Teilnahme an dem Forschungsprojekt bestätigen Sie, dass Sie die Informationen und Hinweise gelesen und verstanden haben. **Bitte füllen Sie die folgende Einverständniserklärung aus, um zu bestätigen, dass Sie mit der Teilnahme an der Studie und der anschließenden Verwendung der Interviewergebnisse wie oben beschrieben einverstanden sind.** Sie können mir jederzeit während des Interviews oder im Anschluss unter den angegebenen Kontaktdaten Fragen stellen.

<input type="checkbox"/>	Ich bin mit dem Forschungsprojekt vertraut gemacht worden und hatte die Möglichkeit, fachliche und prozessuale Fragen zu stellen.
<input type="checkbox"/>	Ich bin über mein Recht aufgeklärt worden, meine Teilnahme jederzeit (bis spätestens jedoch 25.04.2023) zu widerrufen.
<input type="checkbox"/>	Ich bin damit einverstanden, dass das Interview in Audio- oder Videoformat aufgezeichnet, transkribiert und ausgewertet wird.
<input type="checkbox"/>	Ich bin damit einverstanden durch den Namen meiner Institution / Genossenschaft identifiziert zu werden.
<input type="checkbox"/>	Ich bin darüber aufgeklärt worden, dass die Ergebnisse des Forschungsprojektes so dargestellt werden, dass keine Rückschlüsse auf meine Person möglich sind.
<input type="checkbox"/>	Ich bin darüber aufgeklärt worden, dass die Videoaufzeichnung des Interviews nur verwendet wird um eine Transkription zu erstellen und diese im Anschluss gelöscht wird.

**Hinweis:** Ihre Teilnahme ist **freiwillig**. Als Teilnehmer:in dieses Forschungsprojektes müssen Sie nicht alle Fragen beantworten, die Ihnen gestellt werden. Sie behalten sich das Recht vor, die Teilnahme an der Befragung abzulehnen oder zu beenden. Sie haben zudem das Recht, dass bestimmtes Interviewmaterial / Teile des Interviews vertraulich behandelt werden sollen. Bitte bestätigen Sie ihr Einverständnis mit Ihrer Unterschrift:

	Teilnehmer:in	Wissenschaftler:in
<b>Name</b>		Leon Bartling
<b>Unterschrift</b>		
<b>Ort / Datum</b>		

## Appendix B – Overview of case study RECs included in this research<sup>14</sup>

#	Case Study Name	Participant's position	Location	Size (# Members)	Type of Energy	Core Activities
REC 1	Energiegenossenschaft Krefeld eG	Member Advisory Board	Krefeld, Germany	70	PV	<b>Electricity Generation:</b> Realisation, financing, and operation of three rooftop PV systems. One system leased for residual feed-in and self-consumption and two systems with full feed-in to the public grid.
REC 2	Inselwerke eG	Board Member	Eberswalde, Germany	80	PV	<b>Diversified Portfolio:</b> Realisation, financing, operation, and sale of rooftop PV systems. In addition, operation of 22 electric vehicle charging stations and operation of shared rental services for electric vehicles, pedelecs and e-bikes.
REC 3	Bürgerenergie Oder-Spree eG	Member Advisory Board	Heinersdorf, Germany	100	PV	<b>Electricity Generation:</b> Realisation, financing and operation of rooftop PV systems with a focus on public rooftops. A system leased to a school/day-care centre for (partial) self-consumption with residual feed-in. One PV system installed on a municipal roof. Sales of PV balcony modules. Sale of electricity via Bürgerwerke.
REC 4	Kultur Energie Genossenschaft Altona eG	Assigned Member	Hamburg, Germany	130	PV & local heating	<b>Local heating network:</b> Construction of a local heating network, which is currently being planned. In an old bunker, 2 heat pumps and a wood gas cogeneration plant will be installed to supply the immediate neighbourhood with renewable heat. Solar PV systems for own consumption are also planned.
REC 5	Bürgerenergie Schwaikheim eG	Board Member	Schwaikheim, Germany	280	PV & Wind	<b>Electricity generation:</b> Realisation, financing, and operation of 15 rooftop PV systems, both leased systems for self-consumption with residual feed-in and full feed-in systems. Financial participation in a wind farm project. Launched sales of PV balcony modules. Sale of electricity and through Bürgerwerke.
REC 6	Energiegenossenschaft Ilmtal eG	Board Member	Weimar, Germany	300	PV & Wind	<b>Electricity generation:</b> Realisation, financing, and operation of 8 rooftop PV systems, both leased systems for self-consumption with residual feed-in and full feed-in systems. In addition, 2 ground-mounted PV systems and a wind farm project together with other RECs. Sale of PV balcony modules together with other RECs in the region and heat contracting. Sale of electricity through Bürgerwerke.
REC 7	EneuerbareEnergien Necker-Alb eG	Board Member	Reutlingen, Germany	950	PV & Wind	<b>Electricity generation:</b> Realisation, financing, and operation of 23 rooftop PV systems, both leased systems for self-consumption with residual feed-in and full feed-in systems. Financial participation in two wind farm projects.

<sup>14</sup> Data based on information available online on each REC's website. Some information obtained from interviews.

REC 8	Eifel Energiegenossenschaft eG	Board Member	Wiesbaum, Germany	1000	PV, Wind & local heating	<b>Diversified Portfolio:</b> Realisation, financing, and operation of 14 rooftop PV systems, both leased systems for self-consumption with residual feed-in and full feed-in systems. Financial participation in four wind farm projects and one ground-mounted PV project, as well as one self-operated wind turbine. Built and operates a district heating network.
REC 9	Energiegenossenschaft Starkenburg eG	Board Member	Heppenheim, Germany	1200	PV & Wind	<b>Diversified Portfolio:</b> Realisation, financing, and operation of 35 rooftop PV systems, both leased systems for self-consumption with residual feed-in and full feed-in systems. This REC has also built and operates seven wind turbines, one biogas plant, one wood pellet plant and seven electric vehicle charging stations.
REC 10	Bürger Energie Kassel & Söhre eG	Board Member	Kassel, Germany	1400	PV & Wind	<b>Diversified Portfolio:</b> Realisation, financing, and operation of several (unspecified) rooftop PV systems with focus on public buildings. Focus on financial participation in several large wind farm projects. PV consultancy for private individuals and 30 systems already implemented.
REC 11	EWS Elektrizitätswerke Schönau eG	Assistant of Board Member	Schönau, Germany	10500	PV, Wind, Hydro, Gas & Local heating	<b>Diversified Portfolio:</b> Largest REC in the sample with the most diversified and professional business model and activities. Realisation, financing, and operation of several renewable energy projects (PV ground-mounted system, hydropower, wind parks, on-roof PV systems), operation of electricity and local heating grids, nationwide sales as one of the largest suppliers of green electricity and gas. Provision of sustainable mobility services (e.g., charging stations for electric vehicles together with other cooperatives in Germany).
REC 12	Bürgerwindrad Blauen Erneuerbare Energien eG <sup>15</sup>	Board Member	Hasel, Germany	190	PV & Wind	<b>Electricity generation:</b> Established to initiate a wind farm, which is still in the planning and implementation phase. Realised, financed, and operates 3 ground-mounted PV full feed-in systems in close cooperation with other RECs in the region.

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<sup>15</sup> The placement of this REC may be misleading as it is not the largest REC. Placed here due to relatively late positive response to participation in this study.



## **Appendix C – Interview guide for RECs**

*As this study used semi-structured qualitative interviews, some of the following questions were explored in more depth than others. Sometimes the order of questions was adjusted as the interview progressed, or questions were skipped if they had been covered by previous answers. The interview guide is structured around the seven dimensions and 14 degrowth elements of the degrowth framework for community energy. Questions to identify drivers and barriers were integrated into this structure. The interviews were conducted in German, so the interview guide is translated into English in this appendix.*

### **Introduction**

- 1) Could you briefly introduce yourself, the renewable energy cooperative you represent and your position within it?

### **Purpose, values, and visions**

- 1) How would you describe your organisation's business model and core activities?
- 2) What are the main goals and visions of your organisation?
  - a. Have your organisation's goals changed? What factors influence them?
  - b. How do you measure the success of your organisation?
- 3) What is your organisation's attitude to organisational growth and profit?
  - a. What drives your organisation to grow/strive for profits?
- 4) How important is it for your organisation to be independent of the energy system?
  - a. What enables or hinders you to achieve this independence?
- 5) What are your organisation's key policy objectives and are you actively working towards them?
  - a. What enables or hinders you to work normatively and politically?

### **Environment & Resources**

- 1) How does your organisation minimise its impact on the environment, both in its own operations and in its supply chain?
- 2) How does your organisation try to control and reduce its own material and energy consumption?
  - a. What factors are influencing you to reduce your material and energy consumption?

### **Customers**

- 1) How does your organisation aim to ensure that the electricity produced is consumed in the local community?
  - a. What enables or hinders you to do this?
- 2) Does your organisation encourage its customers/members to reduce their absolute energy consumption? If so, how?

### **Organisational Structure and Governance**

- 1) How are the decision-making and participation processes organised in your organisation?
- 2) Does your organisation aim to ensure that those processes and structures are inclusive?
  - a. What factors are influencing you to do this?
- 3) Does your organisation create paid employment opportunities? If so, can you briefly describe them?

### **Community & Society**

- 1) How do you embed your activities in the local context and promote value creation in the region?
- 2) What value does your organisation create for the local community?
- 3) Does your organisation work in networks and openly collaborate with other energy cooperatives and/or other actors? If so, can you give an example?
  - a. What hinders you or enables you to do this?
- 4) How does your organisation try to involve the local population/society and ensure equal access and fair participation (especially marginalised and vulnerable groups)?
  - a. What hinders you or enables you to do this?

### **Technology**

- 1) Which technology does your organisation primarily use to generate energy and what role does this technology play in your business model?
- 2) Could you briefly comment on whether the technology your organisation uses is a) easy to understand, use and replicate, b) locally produced and repairable, c) openly available to other users?

### **Finance**

- 1) How does your organisation primarily finance its activities?
- 2) How does your organisation use profits and financial surpluses?