Designing a just business model for citizen-owned energy cooperatives

A Master's Graduation Thesis

Chia-Yu Lin
September 2023

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Acknowledgment

I am deeply grateful for the opportunity to work on a research topic that is so close to my heart. This journey has allowed me to gain profound insights into the disparities within sustainable transitions, shedding light on how we arrived at this point and where our collective path should lead. Furthermore, this project has been a personal odyssey, helping me explore my role as a strategic designer within the broader context of a just transition.

I want to express my sincere gratitude to my exceptional supervisory team, including Abhigyan Singh (Chair), Sander Mulder (Mentor), and Hans Roeland Poolman (Company supervisor). Abhi's clear and kind guidance has been instrumental in helping me navigate the complexity of this research, and his continuous encouragement has kept me pushing forward. Sander's support, both in our philosophical discussions and as a genuine friend, has provided not only intellectual stimulation but also emotional grounding. Working through ideas with Hans significantly helped connect the dots of the concepts and reinforced the arguments of this research. I sincerely thank you all for your enlightenment and patience with my ambiguities.

The field research would not be possible without Joseph, Juan, and Emeka, who wholeheartedly welcomed me to the Quick Fix Bridge and showed me the perspectives I could never explore without them. Working with them felt like being part of a family. I extend my gratitude to my fellow research team members, including Dafne, Marilou, Kai, and Gijs, as well as the LIFE project team, including Esther, Avi, Luc, Tim, Wouter, and many others who generously supported this research project.

My parents have been an unwavering source of support throughout my two years of study (and indeed, throughout my thirty years of existence). They might not fully understand the intricacies of my work, but they have given me 100% of their support and love, for which I am immeasurably grateful.

I also want to express my appreciation to my friends, including Chia-Pei, Ping-Yu, Vicho, Laura, Ragini, Eneko, and more. They have been my companions on this two-year academic journey, always ready to provide essential mental supports and urgent research rescues.

It was not a project without challenges, but as Joseph wisely put it during one of our earliest conversations, "We are not defined by the challenge or circumstance but by our will and determination to push or pull through it." One thing Joseph forgot to mention is the immense support you need from people to assist you along the way. I'm deeply grateful for having them.

To the strategic designers out there wondering what could you do in facilitating a just energy transition, please read on. I hope you will find clarity through the insights as well as shared struggles in the following pages.

Sincerely,

Chia-Yu

Executive summary

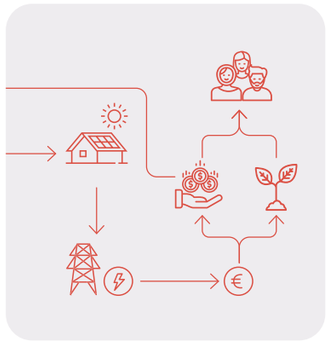
Could we achieve environmental and social sustainability simultaneously? The answer is a resounding "YES!" The transition to renewable energy offers us an opportunity to mitigate climate impact while simultaneously reshaping our energy system into one that is more democratic and decentralized, where citizens have greater control over their energy. However, this transition is not without its challenges. Currently, nearly half of Dutch households are unable to actively participate in the energy transition in the built environment on their own. Energy cooperatives have emerged as a crucial player in enabling the broader public to engage in the energy transition. Yet, they face the challanging tasks of understanding the needs of vulnerable groups, recognizing the energy injustices in their existing practices, and creating action plan for change. Hence, the central research question emerges: How might we build a just business model for energy cooperatives?

To address this question, this research leverages the interplay of three critical theories: energy justice, business model innovation, and cooperative design. It integrates the principles of energy justice and cooperative design with the method of business model innovation, facilitating the development of a just business model. A novel approach to conceptualizing energy cooperative business models is proposed to analyze potential injustices within these cooperatives. Concurrently, field research is conducted within the context of the Local Inclusive Future Energy (LIFE) project and the local communities in Amsterdam Zuidoost.

Following the field research and design phase, "a handbook of energy justice for energy cooperatives" is created. This handbook serves as an entry point for energy cooperatives to comprehend energy justice and its implications for their business models. It includes four exercises designed to facilitate business model innovation. Finally, by synthesizing findings from both the theoretical study and empirical insights, a proposed pathway for building a just business model for energy cooperatives is unveiled at the culmination of this research. It aims to provide energy cooperatives with a comprehensive overview of the intricate yet promising process of transforming their business models to be fairer and more inclusive.

Local energy cooperatives are poised to become instrumental vehicles for the decentralization and democratization of the energy system. By conducting research and design within the LIFE project in the Amsterdam Zuidoost region, this project aspires to offer a roadmap for establishing energy cooperatives that effectively address energy poverty in the Netherlands. Through the demonstration of a pathway to foster the creation of more equitable energy cooperatives, it underscores the potential for a just energy transition.

Key outcomes of the project



A new approach to conceptualize energy cooperative business model

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A handbook of energy justice for energy cooperatives

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A proposed pathway to build a just business model for energy cooperatives

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Chapter 1

INTRODUCTION: ENVISAGING A JUST ENERGY TRANSITION

Chapter summary

Chapter 1 provides an overview of the thesis project's general background, introduces the Local Inclusive Future Energy project, provides contextual information about the field research site, and outlines the project approach.

1.1

General background: envision a just energy transition

The pivotal 2019 Dutch Climate Agreement (Klimaatakkoord) has charted an ambitious trajectory, aiming for a 95% reduction on carbon emission by 2050 compared to 1990 levels (CE Delft, 2022). The urgency to steer our energy production towards renewable and low-carbon solutions cannot be overstated. However, the rewards of technological advancements seldom disperse evenly. This disparity has been evident in the uneven distribution of COVID-19 vaccinations and the disproportionate concentration of pollution in the regions of marginalized groups. The energy transition is susceptible to the same pattern unless we conscientiously steer technological advancements with considerations for social justice.

Presently, nearly half of Dutch households (48%) find themselves unable to partake in the energy transition by enhancing the energy efficiency of their residences. This limitation stems from their status as either tenants or homeowners with inadequate financial resources (Mulder et al., 2023). The dearth of avenues for involvement in the energy transition and susceptibility to energy poverty is particularly pronounced within the Bijlmer Centrum neighborhood of Amsterdam Zuidoost, which is the central focus of this study. Over the span of 2020 to 2022, the count of energy-poor households in this locale has undergone a rapid escalation. Current estimates indicate that a significant 13.8% of households grapple with energy poverty (TNO, 2022).

The question arises: How can we create avenues for a more inclusive participation in and access to the advantages of energy transition? The emergence of energy cooperatives offers a promising solution, capable of simultaneously addressing environmental and social sustainability. Operated and governed by citizens, energy cooperatives are designed to be open for local participation in jointly generating renewable energy to lower the energy price and collectively implementing energy efficiency measures. They have the potential to contribute to mitigating energy poverty if designed thoughtfully.

However, prior research has unveiled a pivotal challenge. Despite their capacity to facilitate a democratic energy transition, energy cooperatives are currently characterized by a dominance of social groups with elevated income and education levels (Hanke & Lowitzsch, 2020), a demographic that does not coincide with those experiencing energy poverty. This current state of energy cooperatives arguably embodies the epitome of an unevenly distributed energy transition.

"Almost half of all Dutch households (48 %) cannot participate in the energy transition in the built environment on their own."

-Mulder et al., 2023

1.2

Local Inclusive Future Energy project (LIFE)

The Local Inclusive Future Energy (LIFE) project is geared towards mitigating grid congestion and fostering an inclusive energy transition in Amsterdam Zuidoost. Supported by funding from the Netherlands Enterprise Agency (RVO), the project is a collaborative effort involving a consortium of twelve partners, with an expected completion date of 2025.

Against the backdrop of swift urban development, home electrification, and the increasing adoption of electric vehicles in Amsterdam Zuidoost, a notable surge in electricity demand is projected. This surge, if unaddressed, could lead to grid congestion. To address this challenge, the LIFE project is actively exploring the implementation of a local smart energy system. This system would harmonize the efforts of diverse stakeholders, aiming to alleviate or delay the need for expanding the local electricity infrastructure. In parallel, this initiative seeks to introduce novel services for stakeholders, ensuring equitable benefits and access across the local stakeholders.

An ongoing exploration within the LIFE project involves the establishment of a local energy cooperative. In this envisioned scenario, the LIFE social platform acts as a facilitator, linking resources from prominent asset owners with the aspirations of local residents.

The scope of this master's thesis centers on the business model of the LIFE energy cooperative, concentrating specifically on the timeframe spanning 2025 to 2030. This temporal range corresponds with the startup phase of the energy cooperative, during which significant inquiries related to cooperative design and its social role within the context of a just energy transition remain to be conclusively addressed.

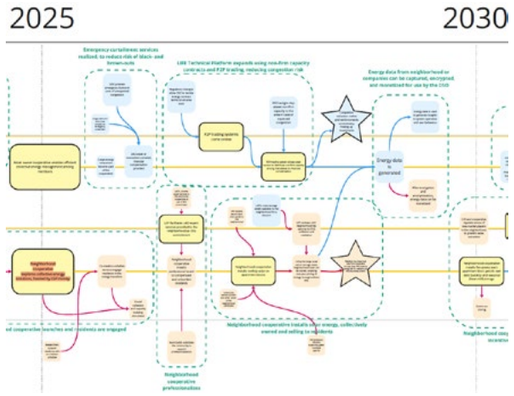


Figure 1. LIFE project roadmap

Figure 2. LIFE project partners

1.3

Project site: Bijlmer Centrum neighborhood

Located in Amsterdam Zuidoost, the Bijlmer Centrum neighborhood is a bustling multicultural district, housing a diverse population of over 130 nationalities. The majority of its residents have migration backgrounds from countries such as Suriname, Morocco, Turkey, the Antilles, and various other parts of the world. This region is experiencing rapid development and has a strong sense of community pride. In addition to its residential areas, De Bijlmer boasts a sizable office district and an entertainment and shopping hub known as Arena Boulevard, which includes the Johan Cruijff Arena, home to Ajax's football stadium.

Historical background

In 1966, Amsterdam expanded by annexing the Bijlmerpolder in the city's southeast. Plans were ambitious: to create a new district for 100,000 residents by 2000. The initial Bijlmer design featured tall apartment buildings with spacious, bright units. It was a vision of futuristic living for Dutch middle-class families, especially in the early 1960s.

However, issues emerged soon after the completion of the first building in 1968. People weren't moving in as expected. By the early 1970s, many buildings stood nearly empty, leading to lower rent prices. Consequently, the Bijlmer began to attract underprivileged residents, particularly immigrants from Suriname after its independence in 1975. These immigrants were placed in the now-affordable social housing of the Bijlmermeer. This led to social exclusion, as the area remained disconnected from the rest of Amsterdam for nearly a decade until a metro connection was established in 1977.

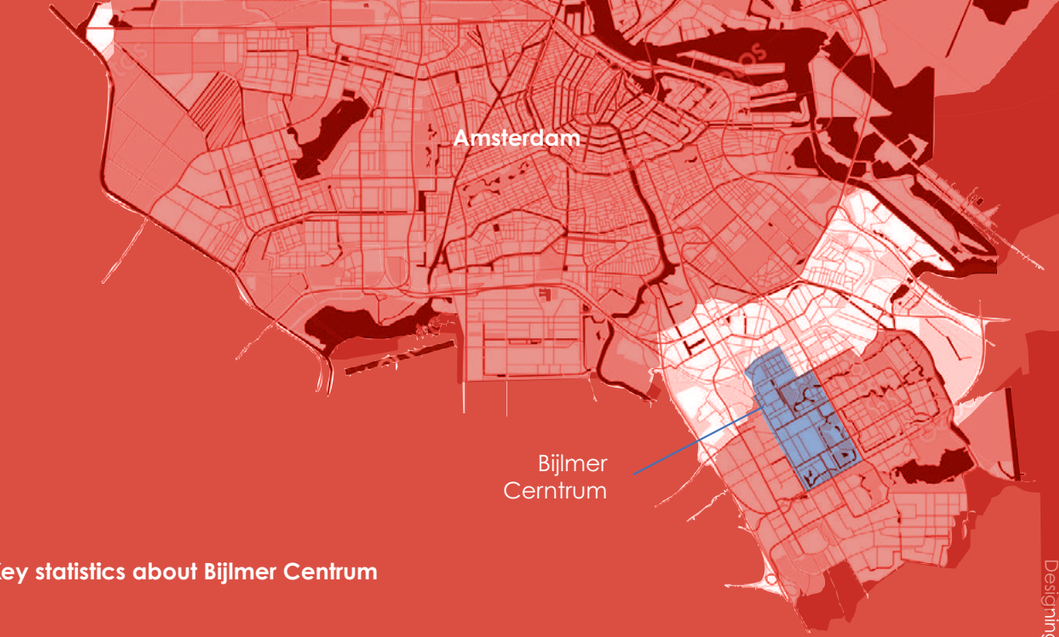
This poor transportation infrastructure, combined with its remote location, created barriers to employment, education, and social activities. The Bijlmer became isolated, experiencing high crime rates, drug problems, and unemployment. These conditions made poverty and social exclusion prevalent in this predominantly non-white neighborhood (Humanity in Action The Netherlands, n.d.).

Demographics: a Multicultural and youthful population

Bijlmer Centrum boasts a multicultural population, with 24,430 residents, over 66% of whom are under the age of 45. This demographic skews younger compared to the Dutch population as a whole. It's also a community marked by diverse migration backgrounds, with roughly 70% of its residents coming from non-Western backgrounds.

Energy poverty: lower Incomes and older buildings

The lower income levels and older building stock increase the vulnerability to energy poverty in this community. In the Bijlmer Centrum district, approximately 19% of households have incomes around or below the social minimum threshold. Furthermore, a significant portion of the buildings, around 74%, were built before the year 2000. Nearly half of these buildings fall within or below the energy label C category.



Key statistics about Bijlmer Centrum

70%
of residents have **non-western backgrounds**

19%
low-income households, compared to the national average of 7%

C
is the most common **energy label** of the house in this area

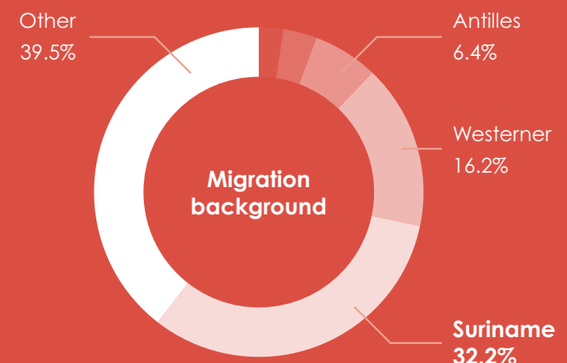


Figure 3.
Migration background of residnets in Bilmer Centrum

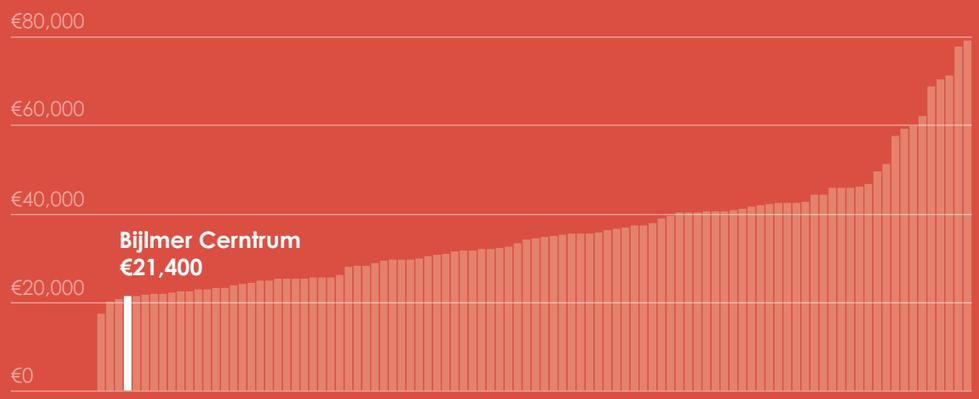


Figure 4. Average annual income for the neighborhoods in Amsterdam

1.4

Project approach

A choice to deviate from the conventional design research approach

Typical design frameworks kick off with the Discovery phase, where designers dive into understanding user problems and needs, all leading to a product or service solution by the process's end. However, the research project I embarked on didn't fit the typical mold in several key ways. Firstly, the project lacked clear starting and ending points. There was no predefined design brief or expected design outcome. Instead, I joined the project as a design graduate student with the liberty to propose both the project brief and its end result. This meant I had to weave my work into the ongoing LIFE project before proceeding.

Secondly, access to residents (our end users) was limited. Testing ideas with them presented significant challenges and could potentially confuse their perception of the LIFE project. Faced with this uncertainty and the project's specific conditions, I found it more practical and beneficial to chart an approach alongside the project's evolution. The approach I adopted wasn't predefined but evolved throughout the project's development, with me adjusting it according to the available resources.

Project approach

I initiated the research process with macro-context research conducted in parallel with field research to uncover common themes. The field research was conducted in an exploratory manner, with the primary objective being to comprehend the general living conditions of local residents and grasp the LIFE project's context. The context research and field research led to the reframing of the research question. Once I had a clearer sense of the question I aimed to address, I simultaneously delved into theoretical background research to identify relevant theories that could address these questions while remaining grounded in the field.

Continuing the field research was a purposeful choice, as it also facilitated the establishment of strong relationships with local champions. Upon the completion of the theoretical background research and field research phases, a rapid prototyping stage was introduced to synthesize the insights gained. This phase served as a bridge to the subsequent design phase.

Although it would have been advantageous to continue field research in tandem with the design phase, providing immediate insights for design iterations, practical constraints, particularly time and resource limitations, influenced my decision not to do so. A design proposal is created as the design development and evaluation phase concluded, recognizing that the design process did not necessarily culminate at this point. Further design and research initiatives could build upon this foundation, modifying and scrutinizing the design outcome.

To conclude the project, a reflection phase was incorporated to contemplate how the research and design addressed the initial research question. Additionally, this phase aimed to ref;ect on the roles of designers in the context of a just energy transition.

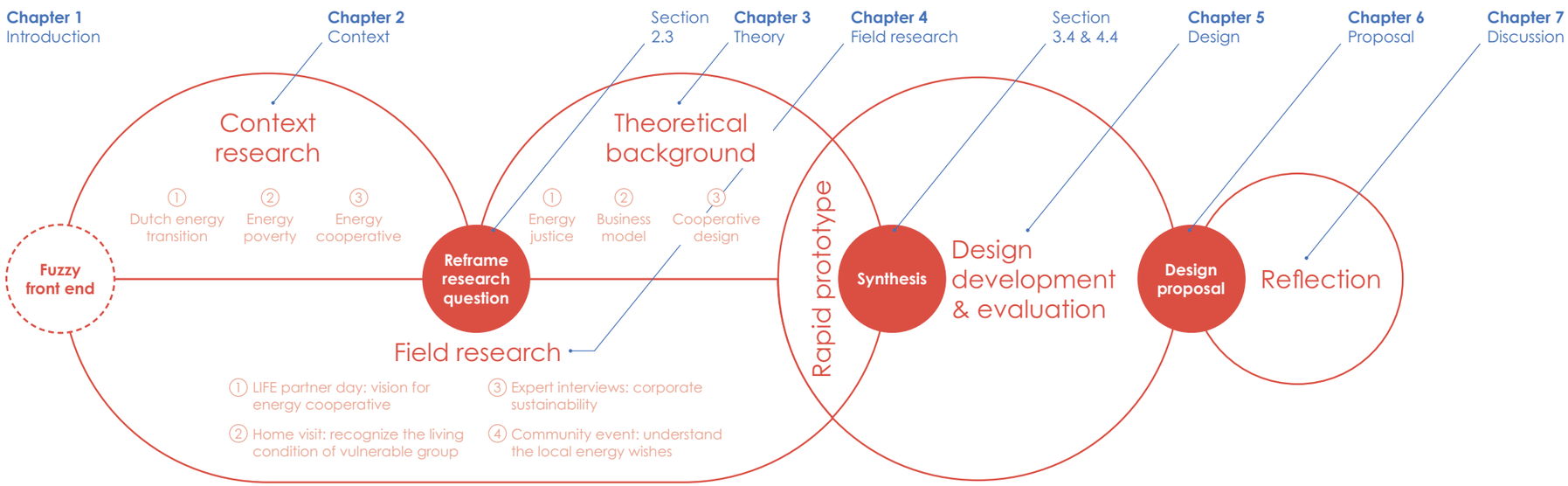


Figure 5.
Project structure and corresponding chapters in the report (orange texts indicate project structure; blue texts indicate corresponding chapters).

1.5

Chapter overview

The report's structure closely aligns with the project's implementation framework, providing readers with a coherent sequential understanding of the project's progression.

Chapter 1 sets the stage for this thesis project, providing a broad overview of its background. It introduces the Local Inclusive Future Energy project, offers context regarding the field research site, and outlines the project approach.

Chapter 2 delves into the historical context of the Dutch energy transition, its present status, and the challenges posed by urban energy poverty. It sheds light on the vital role played by energy cooperatives in promoting a just energy transition, culminating in a reframed research question.

Chapter 3 introduces the core theories underpinning the research: energy justice, business model innovation, and cooperative design. It also presents an innovative approach for scrutinizing energy cooperative business models, ultimately uncovering inherent injustices.

Chapter 4 provides a summary of insights derived from home visits and a local community event. It encapsulates the living conditions of vulnerable groups and the energy aspirations of local residents. These findings are synthesized within the frameworks of energy justice and cooperative design.

Chapter 5 encapsulates the design phase, marking the shift from problem space to solution space. It elucidates the journey of creating a rapid prototype and two design iterations. Ultimately, a handbook featuring four exercises is developed to guide energy cooperatives in reshaping their business models for greater justice.

Chapter 6 synthesizes insights from the theory study, field research, and design phase. It offers a comprehensive three-phase pathway to help energy cooperatives prepare for, conduct, and implement business model innovations that contribute to a just energy transition.

Chapter 7 reflects on the project's responses to the research question, emphasizing three significant outcomes, recognizing its limitations, and extending recommendations for future research. Additionally, it includes a personal reflection on the role of designers in promoting a just energy transition, ultimately concluding the entire project.

Chapter 2

CONTEXT: ENERGY TRANSITION, ENERGY POVERTY, AND ENERGY COOPERATIVE

Chapter summary

Chapter 2 begins by providing the reader with insights into the historical context and the current status of the Dutch energy transition, as well as the challenges of urban energy poverty. It then outlines the pivotal role that energy cooperatives play in facilitating a just energy transition. Finally, this contextual understanding informs a reframing of the research question.

2.1

Dutch context of energy transition and urban energy poverty

Energy transition: overcoming the legacy of gas transition in the Netherlands

The 2019 Dutch Climate Agreement (Klimaatakkoord) set ambitious targets to reduce climate emissions by 49% by 2030 and 95% by 2050 compared to 1990 levels (CE Delft, 2022). However, the energy mix in the Netherlands still heavily relies on fossil fuels, with natural gas and oil playing a significant role. In 2018, natural gas accounted for 42% of the total primary energy supply, followed by oil (37%), coal (11%), biofuels and waste (5%), and smaller contributions from nuclear, wind, solar, hydropower, and geothermal sources. In terms of electricity generation, gas and coal were the primary sources, with gas contributing 52% and coal contributing 27%. Despite being one of the largest gas producers in Europe, domestic gas supply and exports are declining due to the phased-out production from the Groningen field (International Energy Agency, 2020).

Today, 42% of the Dutch energy supply relies on gas

The historical legacy of the Dutch gas transition poses challenges for electrifying the energy system and expediting the energy transition. The discovery of the Groningen gas field in 1959, with its vast reserves, profoundly impacted the Dutch and North-West European energy systems. The establishment of a national gas transport grid by Gasunie, a public-private joint venture, facilitated a rapid transition from coal to gas in households and industries. Since the gas transition, the Netherlands has maintained a relatively constant share of natural gas in primary energy consumption, hovering around 40% over the past decade, significantly higher than the EU average of 23%. Several factors contribute to this high share, including large domestic production, a comprehensive distribution grid, the dominant use of gas for building heating (95%), and historically affordable gas prices for industrial and agricultural sectors (The Oxford Institute for Energy Studies, 2019). Affordability poses a significant challenge as the financial benefits of gas-free housing often do not outweigh the costs at present (CE Delft, 2022).

While renewable energy consumption as a percentage of total final energy consumption has grown modestly by around 7% between 1990 and 2019, there is room for improvement. Comparisons with countries like Denmark demonstrate different possibilities for the Netherlands. Further details will be discussed in the following section, 2.2.

Figure 6. Thousands of kilometers of gas pipelines are laid in the Dutch soil in about ten years (Photo: Spaarnestad Photo/HH)

Urban energy poverty in the Netherlands

Cause of energy poverty

Energy poverty, distinct from general poverty, is a condition wherein individuals face a confluence of factors, including low incomes, high energy costs, and inadequately insulated homes. This situation often results in adverse consequences, encompassing health problems, financial hardships, and social isolation (Boardman, 1991). Notably, research by Bouzarovski and Tirado Herrero (2017) reveals that some households, despite not being classified as poor, grapple with financial challenges primarily stemming from their energy expenses.

In recent years, the Netherlands, along with neighboring countries, has experienced a notable surge in energy prices, which has brought attention to the issue of energy poverty. The uncertain circumstances surrounding energy imports from Russia following the invasion of Ukraine have further added to the escalation of natural gas prices. Between 2020 and 2022, there has been a substantial increase in the average prices for gas and electricity supply, with gas prices rising by 526% and electricity prices by 540% (TNO, 2023). This sharp and significant increase significantly amplifies the risk of energy poverty for vulnerable households.

The exacerbating energy poverty in the urban area

Estimations indicate that the number of low-energy households has grown by approximately 90,000 between 2020 and 2022. In 2020, there were 512,000 energy-poor households, accounting for 6.4% of the total. By 2022, this number is projected to reach around 602,000 households, representing 7.4% of the total (Figure 8). The degree of urbanization also plays a role in energy poverty, following a U-shaped relationship. On average, energy poverty tends to be highest in heavily urbanized and non-urban municipalities, while moderately and lightly urbanized areas experience lower levels of energy poverty (Figure 9) (TNO, 2023).

Focusing on the Bijlmer Centrum neighborhood in Amsterdam Zuidoost, which is the subject of this research, the number of energy-poor households in the area has increased rapidly between 2020 and 2022. It is estimated that 13.8% of households in this neighborhood are currently affected by energy poverty (TNO, 2023). This situation underscores the U-shaped relationship between energy poverty and the degree of urbanization, highlighting the unique challenges posed by energy poverty in urban areas.

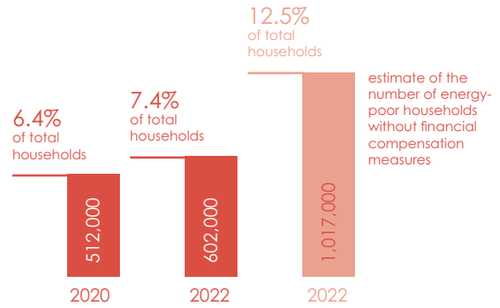


Figure 8. The number of energy-poor households in the Netherlands (TNO, 2023)

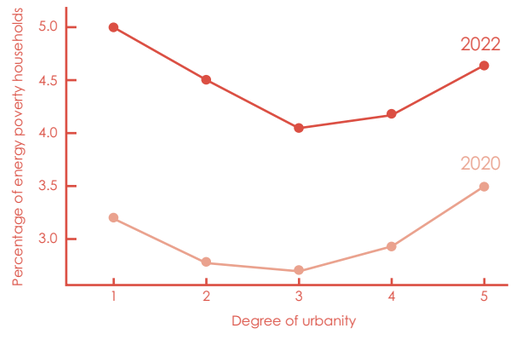


Figure 9. The relationship between the degree of urbanization of municipalities and the percentage of low-energy households in the worst housing (LIHE or LIZLEK) in 2020 and 2022. 1) very highly urban; 2) highly urban; 3) moderately urban, 4) little urban, 5) not urban) (TNO, 2023)

2.2

Energy cooperative

What is an energy cooperative?

An energy cooperative is an organizational format that allows for the co-ownership of energy generation units by citizens and other entities. It provides a framework for individuals, small and medium-sized enterprises (SMEs), municipalities, and other eligible members to collectively participate in renewable energy projects.

The concept of energy cooperatives gained recognition and legal framework through the European Union's Renewable Energy Directive (RED II) and the Internal Electricity Market Directive (IEMD) as part of the Clean Energy Package (CEP). These directives define two types of energy communities: Renewable Energy Communities (RECs) and Citizen Energy Communities (CECs). Both RECs and CECs provide the privilege of sharing electricity, and in the case of RECs, other forms of energy, among community members, even when utilizing the public grid. The main differences are the restriction of participation and the governing model. RECs are restricted to natural persons, SMEs, and municipalities as members or shareholders. The governing model of RECs includes the principle that no single shareholder can own more than one-third of the shares, ensuring the autonomy of the community. On the other hand, CECs have a more flexible governance model and are open to all types of entities. There are no limitations on the shareholding of eligible individual members in CECs, making them particularly attractive when municipalities desire to retain control over energy projects. Figure 5 illustrates the differences between RECs and CECs:

Criteria	Renewable Energy Communities (RECs Pursuant to Arts. 2 (16), 22 RED II	Citizen Energy Communities (CECs) as Defined in Arts. 2 (11), 16 IEMD
Eligibility	• Natural persons, • Small and medium sized enterprises, • Local authorities, incl. municipalities;	In principle open to all types of entities;
Primary Purpose	"environmental, economic or social community benefits for its shareholders / members or for local areas where it operates, rather than financial profits";	
Membership	Voluntary participation open to all potential local members based on non-discriminatory criteria;	Voluntary participation open to all potential members based on non-discriminatory criteria;
Ownership and control	• Effectively controlled by shareholders or members that are located in the proximity of the RE project; • Is autonomous (no individual shareholder may own more than 33% of the stock).	• Effectively controlled by shareholders or members of the project; • Limitation for firms included in shareholders Controlling entity to those of small/micro size (not medium); • Shareholders engaged in large scale commercial activity and for which energy constitutes primary area of activity excluded from control.
Advantages to qualify as REC or CEC	• Preferential conditions defined in the "Enabling framework" to prowmote and facilitate the development of RECs; • Energy sharing within the REC.	• Level playing field; • Electricity sharing within the CEC.

Table 1. The new governance model for energy communities under Renewable Energy Directive (RED) II and Internal Electricity Market Directive (IEMD). Source: Lowitzsch, J., van Tulder F.J., & Hoicka, C.E., 2020.

Previous research recognizes common characteristics of energy cooperatives, including:

1. Involvement of the wider public: Energy cooperatives enable direct participation and ownership for members, allowing citizens and other stakeholders to actively engage in energy projects.

2. Pursuit of non-commercial benefits: Energy cooperatives prioritize community benefits over commercial gains. They foster a sense of community spirit and promote social, environmental, and economic well-being.

3. Acceleration of sustainable energy systems: Energy cooperatives are driven by the goal of transitioning to sustainable energy sources. They work towards phasing out nuclear power and regaining local ownership and control of energy provision.

Wierling et al., (2018) argue the role of energy cooperatives goes beyond the expansion of installed capacities. They play a vital role in building acceptance for necessary changes in energy systems, fostering public support for renewable energy, and implementing innovative solutions that benefit local communities. By engaging citizens and finding creative approaches, energy cooperatives contribute to the development of sustainable and resilient energy systems.

Shifting away from fossil fuels through energy cooperatives: the Danish and German cases

Denmark serves as an example of successfully transitioning away from fossil fuels through mainstream energy cooperatives. Prior to the 1970s oil crisis, Denmark heavily relied on imported petroleum for almost 80% of its energy needs. However, in response to the Arab oil embargo, Denmark recognized the significance of energy security and began shifting towards alternative sources. Anti-nuclear networks created a foundation for forming cooperatives (Mey & Diesendorf, 2018), which played a vital part in promoting renewable energy and reducing dependence on fossil fuels.

Denmark's energy transition was facilitated by its favorable wind resources, which played a pivotal role in the country's renewable energy development. Wind cooperatives emerged as key drivers in reducing the costs of wind turbines and promoting public acceptance of renewable energy. During the period between the 1980s and 2000s, there was a notable boom in energy cooperatives (Figure 10). By 2002, these cooperatives owned approximately 40% of the installed wind turbines in the country, indicating their significant contribution to Denmark's energy transition. (Wierling et al., 2018). However, in the same year, the newly elected Danish parliament made the decision to phase out feed-in tariffs for wind energy. Their

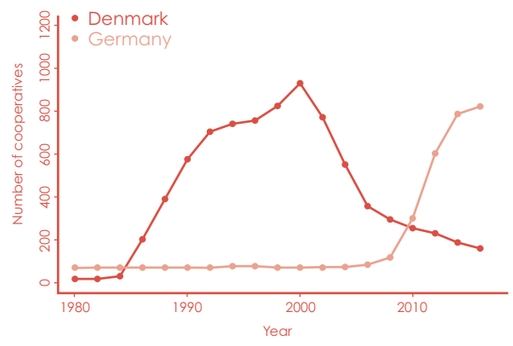


Figure 10. The number of energy cooperatives in the United Kingdom, Denmark, Germany, and Austria (Wierling et al., 2018)

rationale was that wind technology had matured sufficiently and no longer required government support. Instead, they aimed to promote market liberalization, fostering competition and reducing electricity costs for consumers. This policy shift had a considerable impact, leading to a notable decline in the number of wind energy cooperatives (Wierling et al., 2018).

It is worth noting that despite the decline in cooperatives, the market penetration of renewable energy had already been established. Denmark now boasts a renewable energy share of 37.5% of total energy consumption, in contrast to 8.5% in the Netherlands (Figure 11) (The Word Bank, 2022). Similar patterns can be observed in Germany. The Netherlands could learn from the experiences of other countries, such as Denmark and Germany, and explore the potential of leveraging energy cooperatives to transition away from fossil fuels.

Importance of energy cooperatives in energy transition

Energy cooperatives play a crucial role in accelerating the energy transition for several reasons. Firstly, they accelerate the installation and production of renewable energy by leveraging collective actions. By pooling resources and efforts, energy cooperatives can lower the costs of renewable energy technologies, making them more accessible and affordable. This has been observed in countries like the UK, Germany, and the USA, where energy cooperatives have acted as multipliers of renewable energy solutions (Brummer, 2018). For example, in Germany, energy cooperatives played a significant role in driving the electrification of rural areas in the early 20th century. The growth of energy cooperatives in Denmark between 1990 and 2000 coincided with a substantial increase in renewable energy consumption, demonstrating their effectiveness in promoting renewable energy and generating public acceptance, particularly in the wind sector.

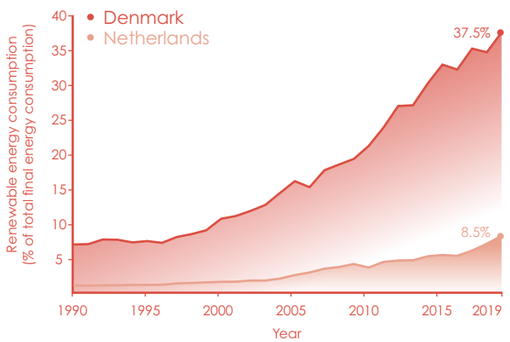


Figure 11. Renewable energy consumption in Denmark and the Netherlands (Remade with data from World Bank, 2022)

Secondly, energy cooperatives facilitate citizen participation in local energy policy. They provide a platform for individuals and communities to actively engage in decision-making processes related to energy production and distribution. In Germany, energy cooperatives provide an organizational form for citizen participation in local energy policy (Yildiz et al., 2015). The democratic and participatory nature of energy cooperatives allows for diverse perspectives and challenges the mainstream socio-political structures, offering alternative approaches to energy systems. Hoicka and MacArthur (2018) found that in countries like Canada and New Zealand, actors in energy cooperatives are often from marginalized groups (e.g., ethnic minorities). In Europe, pioneers of energy cooperatives countries often emerge from societal groups seeking to showcase alternative models to established socio-political structures (Wierling et al., 2018).

Thirdly, energy cooperatives have the potential to generate income for local residents. Success stories can be found in Danish islands like Samsø and Ærø, where energy cooperatives have not only contributed to sustainable energy development but have also provided economic benefits for the local communities (Wierling et al., 2018). By harnessing renewable energy resources and involving local residents as stakeholders, energy cooperatives can create opportunities for income generation and local economic growth.

Development in the Netherlands

The rising number of energy cooperatives in the Netherlands

As of the end of 2022, the momentum for energy cooperatives in the Netherlands is on the rise (Figure 12). Currently, there are 705 citizen energy collectives, including cooperatives and foundations. Cooperatives have been established in 86% of all municipalities across the country. The total number of active citizens participating in the energy transition through cooperative membership is estimated to be 120 thousand, which accounts for approximately 1.5% of all households in the Netherlands. This figure reflects an 8% increase in membership compared to 2021 (Hier & Energie Samen, n.d.).

Dutch regulation is still challenging for energy cooperatives

Energy cooperatives in the Netherlands continue to face challenges due to regulatory constraints. Regulatory uncertainty and decreasing financial support have been identified as significant obstacles that hinder the establishment of new energy cooperatives and hinder the ongoing success of existing ones (Wierling et al., 2018).

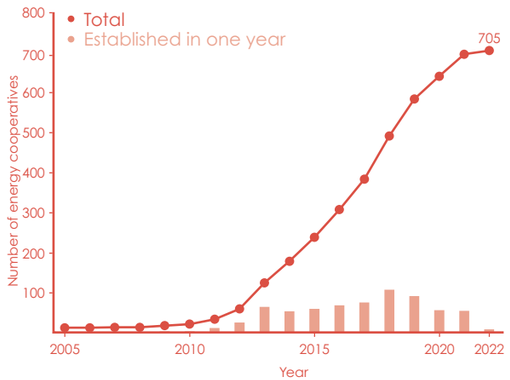


Figure 12. Number of energy cooperatives in the Netherlands (Hier & Energie Samen, 2022)

Current policies promote prosumership as a key element of the energy transition, but the benefits of these policies are limited to those who meet specific requirements and have ownership of renewable energy installations. This leaves vulnerable consumers at a disadvantage, as they not only miss out on the benefits of the policy framework but also bear the burden of increasing grid tariffs, levies, and energy costs (Hanke & Lowitzsch, 2020).

One specific policy scheme, the Subsidieregeling coöperatieve energieopwekking (SCE), is designed for energy cooperatives and homeowners' associations aiming to generate renewable energy (Government Information for Entrepreneurs, n.d.). However, the application process for subsidies under this scheme has proven to be challenging. More than half of applications, including those from tenant cooperatives (huurderscoöperaties), have been withdrawn or rejected in 2021. In 2022, there were 70% fewer applications in the number of applications due to insufficient rates under the SCE scheme (Hier & Energie Samen, n.d.). Although the rates for 2023 offer more flexibility, the complexities of accessing subsidies remain a barrier for energy cooperatives.

The market-oriented policy approach in the Netherlands tends to favor large corporate projects with high profitability, which often excludes small-scale citizen initiatives. The revenue models of citizen projects, which are typically modest, do not align with the current policy focus (Lowitzsch, 2019). Furthermore, changes in regulations have limited the ability of energy cooperatives to directly supply energy to households. Previously, energy cooperatives had the option to deliver energy locally, but new rules now require them to supply energy to the national electricity grid (author's personal conversation with Aukje van Bezeij from Energiecoöperatie Zuiderlicht). This restriction has necessitated the exploration of new ways to participate in the energy market, but it also highlights the need for updated legislation to accommodate the evolving landscape.

The localist trap: energy cooperatives' unfulfilled promise on mitigating energy poverty

'Localist trap' refers to the concept that RECs are perceived as energy-just and democratic merely because they act locally. This local embeddedness does not automatically translate to knowledge about vulnerable and energy-poor households' living experiences and socio-economic hardships, nor does it result in a diverse member structure reflecting the local community's social variety (Hanke et al., 2021).

Key barriers to initiating or joining energy communities

Vulnerable residents face significant barriers when it comes to initiating or joining energy communities. Economic constraints, such as high upfront investments, long payback periods, and a low price-performance ratio, are identified as key barriers by Boon and Dieperink (2014) and Attema-van Waas and Rijken (2013). These financial challenges make it difficult for local initiatives to secure the necessary capital for initial investments and ongoing maintenance of renewable energy projects. Additionally, a lack of knowledge and financial infrastructures, along with an unfavorable institutional context, further hinder the participation of vulnerable residents in energy communities (Mignon & Rüdinger, 2016). Furthermore, Lode et al. (2022) suggest that the development of energy cooperatives tends to occur in areas with higher social cohesion. In urban communities, the absence of existing social cohesion poses an additional challenge for the development of energy cooperatives.

Lack of inclusivity in energy cooperatives

The lack of inclusivity in energy cooperatives is a significant concern. At the EU level, there is a recognition of the importance of inclusivity in energy communities. Both the European Green Deal and RED II emphasize the inclusion of vulnerable consumers in Renewable Energy Communities (RECs) as a means of empowering consumers and addressing energy poverty.

> ***"Participation in renewable energy communities should be accessible to all consumers, including those in low-income or vulnerable households."***
>
> *- Article 22, RED II*

However, despite these intentions, exclusivity remains prevalent in energy communities. Hanke and Lowitzsch (2020) revealed that the typical prosumer within energy communities tends to be male, middle-aged, and with a higher income, while the participation of women and social groups vulnerable to fuel poverty is limited. Studies by Bauwens and Eyre (2017) and Yildiz et al. (2015) also highlight that most members of energy cooperatives exhibit high energy consumption patterns and belong to social groups with higher income and education levels. From a spatial perspective, research shows that energy cooperatives are unevenly distributed across different regions, indicating disparities in access and participation (Lode et al., 2022).

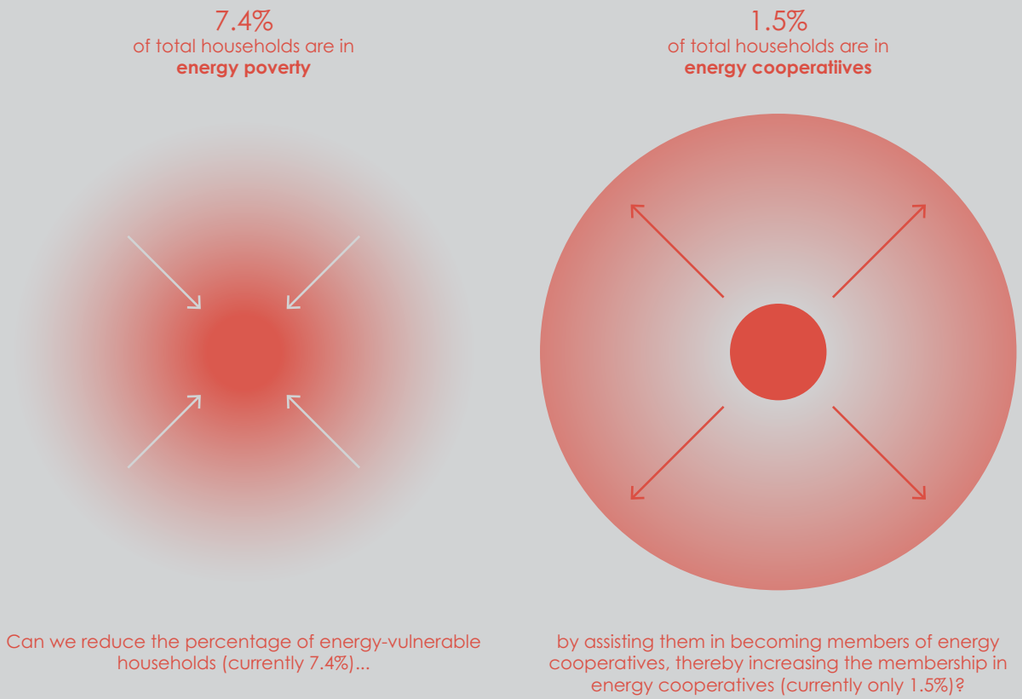
The exclusivity of energy cooperatives can reinforce existing social inequalities. It raises questions about who benefits from these cooperatives and who can access membership, potentially perpetuating inequities in the energy transition (Jenkins et al., 2016). In order to address these issues, it is crucial to actively work towards inclusivity and social equity within energy cooperatives. By addressing the problem of exclusivity, Energy cooperatives can become vehicles for procedural energy justice and contribute to a fair and equitable transition to renewable energy systems.

2.3

Reframing the research question

Chapter 2 discussed the multifaceted challenges linked to the energy transition, encompassing aspects such as the historical impact of Dutch gas transition, evolving regulatory frameworks, and the pressing concern of urban energy poverty. While energy cooperatives hold promise as facilitators of a citizen-led energy transition, their inherent exclusivity presents a hurdle in incorporating marginalized groups into this process. Furthermore, the potential reduction of government subsidies and supportive mechanisms for energy cooperatives, as witnessed in the Danish context, as renewable technologies mature, adds another layer of complexity. To foster a just energy transition through energy cooperatives, a fundamental rethink of the approach is imperative.

In light of this, the central research question is reframed: How might we build a just business model for energy cooperatives? This shift is underpinned by the recognition that a business model encapsulates not only the technical solutions within an energy cooperative but also the social and organizational mechanisms that contribute to either justice or injustice within its operations. Notably, the Netherlands presently faces a situation where 7.4% of households grapple with energy poverty, while a mere 1.5% participate in energy cooperatives (TNO, 2022; Hier & Energie Samen, n.d.). By overhauling the existing business model of energy cooperatives, the potential exists to dismantle barriers and transform a considerable portion of energy-poor individuals into self-sustaining energy cooperative members.



To explore this research question, I delved into three key research domains: energy justice framework, business model innovation, and cooperative design. The energy justice framework provided guidance in defining the concept of "just" in the research question. Research on business model innovation allowed for a deeper understanding of what constitutes a business model and how organizations can innovate within this framework. The study of cooperative design provided insights into the fundamental distinctions between cooperative enterprises and market-driven companies. Chapter 3 elaborates on these foundational theories, forming the theoretical framework that underpins this project.

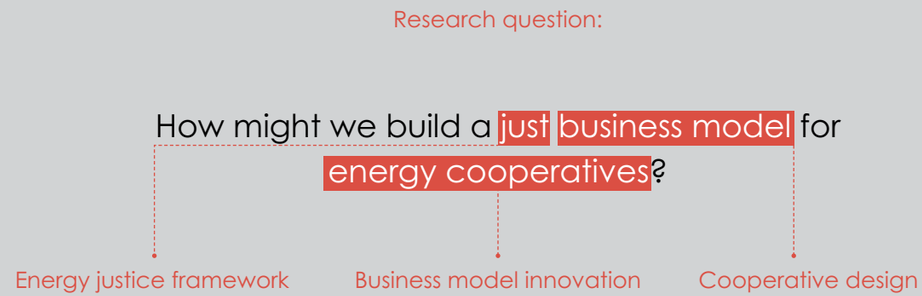


Figure 13. The research question and three theories that formulate theoretical framework of the project

Chapter 3

THEORY: ENERGY JUSTICE, BUSINESS MODEL, AND COOPERATIVE DESIGN

Chapter summary

Chapter 3 introduces three foundational theories that underpin the research: energy justice, business model innovation, and cooperative design. It presents a novel approach for analyzing energy cooperative business models. Towards the end of the chapter, the study uncovers injustices within typical energy cooperative business models.

3.1

Energy justice

Relevance of energy justice

The concept of energy justice plays a pivotal role in the overarching transition towards a low-carbon regenerative economy. This transition signifies a departure from the prevailing extractive economy that relies on the depletion of natural resources, which has perpetuated pervasive inequalities. Aligned with the movements for environmental justice and climate justice, energy justice strives to ensure equitable access to safe, affordable, and sustainable energy for all individuals, regardless of their geographical location (McCauley et al., 2013).

The question arises: Why is justice a central theme in the discourse surrounding energy transition? While energy transition is commonly viewed as a technocratic solution facilitated by advancements in technology to usher in a sustainable future, it does not inherently address pre-existing societal issues. Notably, renewable energy solutions like solar panels and wind turbines often necessitate a certain level of financial capability and expertise in the energy domain. Consequently, these prerequisites act as barriers that impede marginalized communities from reaping the benefits of the ongoing energy transition, all the while leaving them vulnerable to the detrimental impacts of climate change. In essence, energy justice offers a critical lens through which to evaluate whether the shift from an extractive economy to a low-carbon regenerative one is genuinely just, or if it inadvertently perpetuates injustices from the former system.

Furthermore, it is imperative to acknowledge that energy poverty is not solely an individual's circumstance; it is a consequence arising from the intricate socio-technical mechanisms inherent in the energy system. Addressing this predicament entails not only rectifying existing disparities but also dissecting the structural components that breed injustice, thereby necessitating a systemic redesign to prevent its recurrence. To holistically explore the multifaceted dimensions of energy injustice in my research, I draw upon the energy justice framework. This framework serves as a critical tool for "identifying and analyzing inequities within the energy system stemming from factors like socioeconomic class, race, ethnicity, age, gender, or spatial and economic disparities" (Hanke et al., 2021).

Energy justice offers a critical lens through which to evaluate whether the shift from an extractive economy to a low-carbon regenerative one is genuinely just, or if it inadvertently perpetuates injustices from the former system.

Three pillars of energy justice

Recognitional justice

Recognitional justice concerns the acknowledgment and respect for the inherent differences among individuals and social groups, without employing these differences as a basis for discrimination or ask the minorities to assimilate to mainstream standard.

A significant aspect of recognition-based justice is the failure to recognize the distinct needs and living conditions of those facing energy poverty. For instance, in the UK, the elderly and infirm often require higher room temperatures for their well-being. Regrettably, this requirement has not been adequately acknowledged, resulting in their energy usage behavior being unjustly deemed inefficient (Walker and Day, 2012).

Procedural justicead

Procedural justice seeks to establish fair decision-making processes that allow all stakeholders to participate without discrimination and ensure the equitable representation of different groups.

However, this principle faces challenges in practice. For instance, Hanke et al. (2021) discovered that in Germany, 83.3% of energy community boards are exclusively occupied by men, with an average of only 16.2% female members. Additionally, financial barriers often prevent vulnerable groups from participating in energy cooperatives, as these cooperatives rely on members' financial contributions to invest in energy assets. When vulnerable groups are excluded from the decision-making process, cooperatives may struggle to recognize their unique needs and come up with procedures to engage with them.

Nevertheless, there are successful approaches to overcoming these financial barriers and promoting diversity among cooperative members. For instance, on the Danish Island of Aero, an energy cooperative has partnered with a local bank to provide zero-interest loans to finance vulnerable households' membership.

> ***"Vulnerable households face a set of economic, social and individual participatory prerequisites. As a result, they are often excluded from participating or exclude themselves from participating."***
>
> *-Hanke et al., 2021*

Distributional justice

Distributional justice revolves around the impartial allocation of benefits and burdens across society, irrespective of factors such as social class, gender, ethnicity, and other differences. UNESCO (2009) encapsulates the essence of distributive justice: "Distributive justice in its true essence is centered on how a society should distribute its resources among individuals with competing needs, devoid of considering their merits. Basic needs must be provided to all, not as an act of charity, but as an entitlement based on justice." It is important to note that the concept of value encompassed here is not confined to mere monetary value. John Rawls (1999) proposed the principle that all societal values – encompassing liberties, opportunities, wealth, social foundations, and self-respect – ought to be distributed impartially.

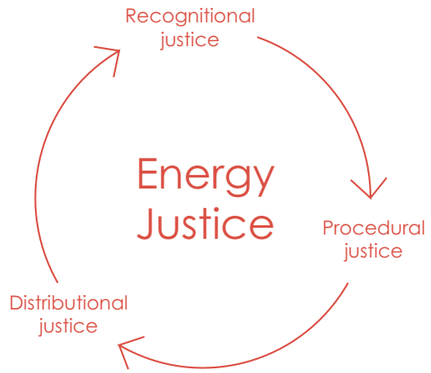


Figure 14. The three tenets of energy justice

Theoretical and insight of energy injustice in energy cooperatives

Characterized by co-ownership and citizen governance, energy cooperatives have the capacity to accelerate the adoption of renewable energy while instigating positive social change. However, the prerequisites, both social and economic, to become a member of these cooperatives often create barriers for vulnerable groups, causing them to be excluded or even to self-exclude from participation.

Hanke et al. (2021) identified prevalent injustices within energy communities through a comprehensive online survey encompassing 71 renewable energy communities (RECs) across the European Union. While energy cooperatives are just one form of energy community and not identical in structure, the insights from this research can offer illuminating perspectives on the energy cooperative scenario:

Recognitional: a lack of awareness and understanding of energy vulnerability

A disconcerting revelation from the survey was that 36% of RECs do not address energy poverty due to the topic never having been discussed within these organizations. Some respondents suggested that the absence of vulnerable groups in RECs was because these groups "do not want to participate" "lack interest in such topics" or that a "minimum share price of €500 is low enough to facilitate universal participation".

This highlights a fundamental recognitional issue: RECs often fail to grasp the motivations and needs of diverse social groups within their operational realms. This gap in recognizing diverse needs could be traced back to the formation of RECs, which often rely on the founder's social network, resulting in a membership that predominantly consists of middle-aged, educated, and higher-income individuals. This homogeneity limits their understanding and action toward addressing energy poverty through REC services. Consequently, Hanke et al. (2021) argue that establishing recognition-based justice is pivotal for creating equitable procedures and achieving just distribution within RECs.

Procedural justice: unequal representation and lack of social purpose

Procedural injustices are frequently borne from an organization's structure and purpose. The composition of membership can act as a barrier to create an equitable representation within RECs. For example, in Germany, 83.3% of REC boards are only occupied by men, and the median number of female members in RECs is just 16.2%. This gender imbalance can also be observed in the LIFE project working group.

Additionally, the primary purpose of the majority (85%) of RECs is the "promotion of renewable energies", often sidelining their social roles and goals. Due to limited financial and human resources, RECs are forced into a trade-off between business goals and social goals. Hanke et al. (2021) assert that the business model of RECs, coupled with the competitive energy market, drives organizations toward economic security and market competitiveness, diverting them from a just procedural path and disconnecting them from the essence of a cooperative model (more about such cooperative models can be found in section 3.3).

Distributional justice: benefit concentration and the overlooked non-financial benefits

While energy cooperatives typically equitably distribute financial benefits among their members, there are nuances to explore regarding 1) membership composition, 2) fair distribution of non-financial benefits (e.g., knowledge, participation), and 3) the sharing of benefits with non-members or even non-human entities, such as the environment.

Currently, although financial benefits are fairly distributed, most energy cooperatives consist of more financially well-off individuals. This hints at a broader concern: the distribution of benefits from energy transition remains concentrated within specific societal groups. As Jenkins et al. (2016) highlight, the exclusivity of energy cooperatives can exacerbate existing social inequalities. This raises questions about the beneficiaries of such cooperatives and who can access membership, possibly perpetuating energy transition disparities. Ensuring a more equitable distribution is not only vital within the energy justice framework but can also foster trust among underrepresented groups.

83% **boards are exclusively occupied by male members** in German energy communities

545€ is the average **minimum financial participation per member** in Germany

36% **of the energy communities don't address energy poverty** because "the topic has never been discussed"

Achieving justice through business model innovation

As elucidated earlier, the three foundational pillars of justice are interconnected and interdependent, requiring a holistic approach for effective resolution. In many instances, energy cooperatives have attempted to mitigate inequalities by offering supplementary provisions to marginalized groups. However, a more profound question arises: Can we reshape the very system itself, rendering it inherently just for all and thereby diminishing the necessity for compensatory measures within an unjust framework? In the forthcoming section, the author delves into the energy cooperative's business model through which injustices might manifest. The exploration is aimed at understanding how these injustices materialize within the existing business model and, more importantly, how we can incentivize transformative shifts in the business model to establish equity as the norm within energy cooperatives.

3.2

Business model

The dynamics of energy cooperatives (ECs) and their role in either perpetuating or mitigating injustices within the energy service ecosystem are multifaceted. This analysis focuses on dissecting the ECs' business models to uncover a portion of the larger puzzle. Osterwalder and Pigneur (2010) define a business model as the "rationale of how an organization creates, delivers, and captures value". Within academia, diverse vantage points exist for conceptualizing business models, encompassing technology-oriented, strategy-oriented, and organization-oriented approaches (Dilger et al., 2017). Nevertheless, the majority of business models underscore how corporations generate economic value through customer value creation, shareholder profit generation, and strategic resource allocation (Teece, 2010; Dilger et al., 2017).

To outline a comprehensive business model for energy cooperatives, a fusion of the Business Model Canvas framework and the Normative Business Model framework is chosen. In the subsequent section, the advantages and limitations of these two frameworks are discussed, accompanied by the introduction of an adapted business model analytical tool tailored for the examination of energy cooperative business models.

Business Model Canvas (BMC)

Business model canvas serves as a communication tool to create a shared understanding of what a company's business model actually is (Osterwalder & Pigneur, 2010). The canvas consists of nine building blocks, including key partners, key activities, key resources, value propositions, customer relationships, channels, customer segments, cost structure, and revenue streams. Reis et al. (2021) summarize the common business model of energy communities as below:

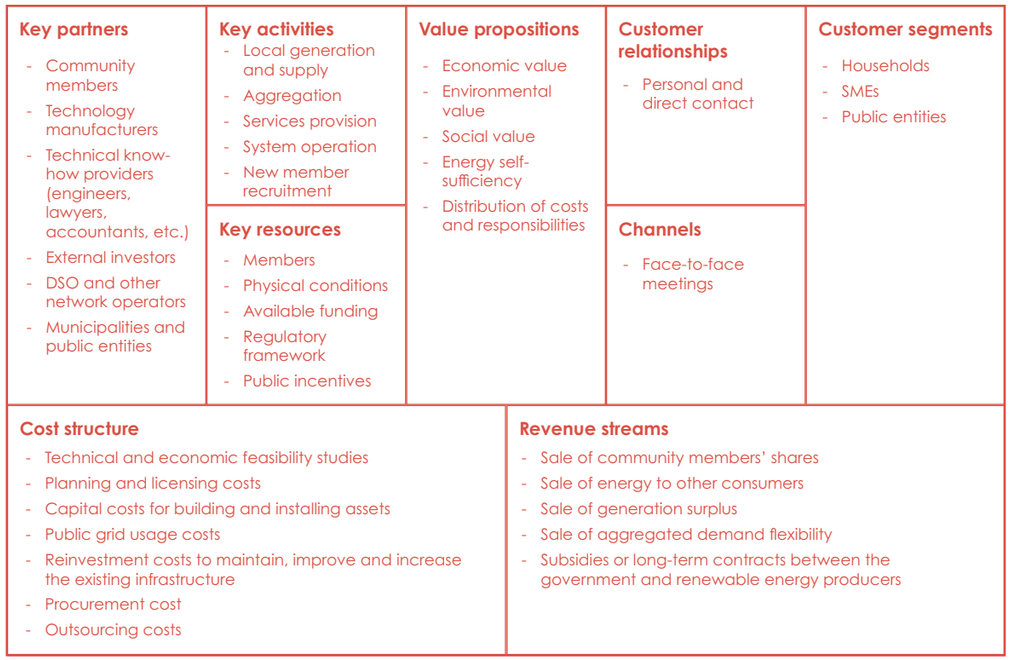


Figure 15.
Energy cooperative business model (Reis et al., 2021)

While BMC is widely referenced in business literature, it often falls short in explaining the intricate interplay between its constituent elements. Questions regarding how key resources correspond to key activities, the role of key partners within the value chain, and the creation and capture of values remain largely unanswered. Moreover, BMC primarily concentrates on elucidating "how a company intends to make money" (Osterwalder & Pigneur, 2010), frequently sidelining non-financial values and governance's impact. In the context of (energy) cooperative business models, both these factors hold significance. Consequently, relying solely on BMC isn't optimal for comprehensively analyzing where energy injustices may reside within a business model.

Normative Business Model (NBM)

The Normative Business Model (NBM), developed by Randles & Laasch (2015) as a response to the limitations of conventional business model literature, delves into the anchoring of values within organizational foundations. NBM endeavors to understand how values crystallize into an organization's core and the mechanisms that can modify inherited normative orientations. A central query addressed by NBM is, "How do values become 'normalised' into the essence of an organization?" (Randles & Laasch, 2015).

Two pivotal factors drive the selection of NBM for analyzing energy cooperative business models. Firstly, NBM is crafted to analyze diverse organizations, extending beyond profit-centric objectives to include organizations like education, charity, and social enterprise. As cooperatives are fundamentally geared towards serving members' needs and aspirations, NBM seamlessly fits the exploration of energy cooperatives, which place less emphasis on profit. Secondly, NBM investigates the 'social process' through which business model artifacts emerge and the interplay between the de-facto business model and its governance instruments. This complements BMC's limitations, unveiling the processes that can contribute to energy injustices within a business model.

NBM comprises four interconnected elements: 1)

Normativity, 2) institutionalisation/de-institutionalisation processes, 3) institutional entrepreneurialism and 4) economic and financial model governance (Figure 16).

The shortcoming of NBM framework is its lack of implementation in the business field. This might create an extra layer of difficulty to communicate the essence of a business model to the practitioners. Thus, a new business model analytical tool is proposed based on a fusion of BMC's practicality with NBM's insights.

Figure 16. Normative business model framework (Randles & Laasch, 2016)

3.3

Cooperative

Cooperative and its principles

An energy cooperative represents a specific form of cooperative organization. As defined by the International Co-operative Alliance, a cooperative is "an autonomous association of individuals united voluntarily to meet their common economic, social, and cultural needs and aspirations through a collectively-owned and democratically-controlled enterprise." While both cooperatives and for-profit businesses operate within the market, there are distinct differences between the two.

For-profit businesses are primarily established to generate positive returns for their investors, a goal typically achieved through profit maximization. In contrast, the primary objective of a cooperative usually centers around providing economic and social advantages to its members. This is often accomplished by enhancing member value through patronage and ensuring customer satisfaction (Mazzarol et al., 2018). Consequently, profit maximization and competitive advantage hold a lesser significance in cooperatives compared to market-driven businesses. Table x. Illustrate the seven principles of cooperative.

1 Voluntary and Open Membership

2 Democratic Member Control

3 Member Economic Participation

4 Autonomy and Independence

5 Education, Training, and Information

6 Cooperation among Cooperatives

7 Concern for Community

Figure Cooperative principles (International Cooperative Alliance)

Types of cooperatives

Fischer et al (2017) and Kindling Trust (2012) categorize cooperatives into four types based on their member composition:

1. Worker cooperatives: These cooperatives are comprised of and owned by individuals employed within the business. A notable example of this type is the Mondragon cooperative in the Basque region of Spain.

2. Producer cooperatives: In this model, groups of producers collaborate to collectively market and retail their products. A well-known illustration is the dairy cooperative Fonterra in New Zealand.

3. Consumer co-operatives: Customers unite to establish these entities, bolstering their collective influence when negotiating deals. Housing cooperatives and fair trade product cooperatives are typical examples.

4. Multi-stakeholder cooperatives: This cooperative format allows for the inclusion of diverse membership, often including consumers, service and goods providers, and occasionally workers and buyers.

Compared to the first three cooperative types, multi-stakeholder cooperatives face the challenge of orchestrating synergy among diverse stakeholders, often showcasing the interwoven interests of these various partners (Lund, 2011). With their membership heterogeneity, MSCs present a manifestation of the conventional market, establishing environments in which the dynamics of producer-consumer relations and expectations necessitate negotiation, consensus, and effective management (Ajates, 2017).

Why multi-stakeholder cooperatives (MSCs)?

Gray (2014) advocates the establishment of MSCs to address historical tensions within cooperatives: (1) participation and democracy versus efficiency and capitalism, (2) localism versus globalism, and (3) production versus consumption. MSCs can ease the tensions by offering an integrated organizational structure that internalizes externalized human and environmental costs (Gray, 2014). Moreover, the membership heterogeneity can foster long-term relationships between consumers and producers, rather than merely create punctual commercial transactions.

Ajates (2017) further highlights that MSCs transforms economics into politics and social relations, creating a more direct and personal approach compared to the indirect nature of 'supermarket transactions'. The interdependence of different stakeholders are materialized through cooperative governance, including mechanisms like weighted voting. Furthermore, MSCs eliminate the distant anonymity of shareholders by anchoring membership locally within the cooperatives (Ajates, 2017). This paradigm shift underscores how MSCs redefine the dynamics of economic relationships and multi-stakeholder decision-making.

MSCs hold particular relevance for the LIFE energy cooperative, which seeks to offer services to both prosumers and consumers, with a specific focus on the energy vulnerable group. By bridging the gap between prosumers and consumers in the energy sector, a local energy MSC can potentially harmonize the production and consumption of renewable energy, mitigating the challenges posed by energy intermittency. Additionally, the deployment of energy assets within the local community, managed by community members, fosters regular interactions between residents and energy providers, potentially enhancing mutual trust. Moreover, MSCs facilitate the engagement of diverse member networks, ranging from local residents and regional energy traders to national energy cooperative organizations. This multifaceted engagement has the potential to effectively disseminate knowledge, effectively "socializing the knowledge" concerning energy transition throughout the membership.

The diversion of energy cooperatives from traditional cooperative principles

While originating from the cooperative model, energy cooperatives are increasingly diverging from their traditional cooperative structure. In contemporary times, energy cooperatives predominantly adopt market-based business models, which veer away from the conventional cooperative ethos. This shift often prioritizes profit generation over the fundamental cooperative objectives of delivering social and economic benefits to members (Dilger et al., 2017).

In the context of the Netherlands, regulatory constraints prevent energy cooperatives from directly distributing the electricity they generate to all members. Instead, this electricity is channeled into the national grid, with compensation from energy traders or government subsidies. Consequently, energy cooperatives do not maintain their member relationships in the customary manner. The interaction is centered on monetary transactions, raising questions about the extent to which broader values such as advancing energy transition, alleviating local energy poverty, and fostering community cohesion can be effectively realized within the existing framework of energy cooperatives.

3.4

A new approach to conceptualize energy cooperative business model: Integrating BMC and NBM

Marrying the strengths of the Business Model Canvas (BMC) and the Normative Business Model (NBM), a novel business model visualization tool is conceived as an analytical instrument for this research. This tool incorporates BMC's key components while interlinking them through the framework of NBM. Distinct from conventional business model frameworks that often offer a static snapshot of business elements, this tool strives to capture the dynamic relationships among elements, providing a holistic depiction of how they collectively shape a business model.

The tool's advantages encompass:

1. Systemic Perspective: Illustrating the interactive influence of key business model elements, showcasing their interdependence.
2. Value Emphasis: Highlighting how values are captured and how they incentivize the sustaining of the business model.
3. Injustice Revelation: Unveiling mechanism through which injustices might manifest within a business model.

Three modifications from BMC are incorporated to tailor the tool for energy cooperative business models: "customer segment" transforms into "membership segment," "customer relationship" morphs into "member relationship," and "cost structure" evolves into "resource allocation." Additionally, "governance" is integrated, given its importance in the energy justice framework.

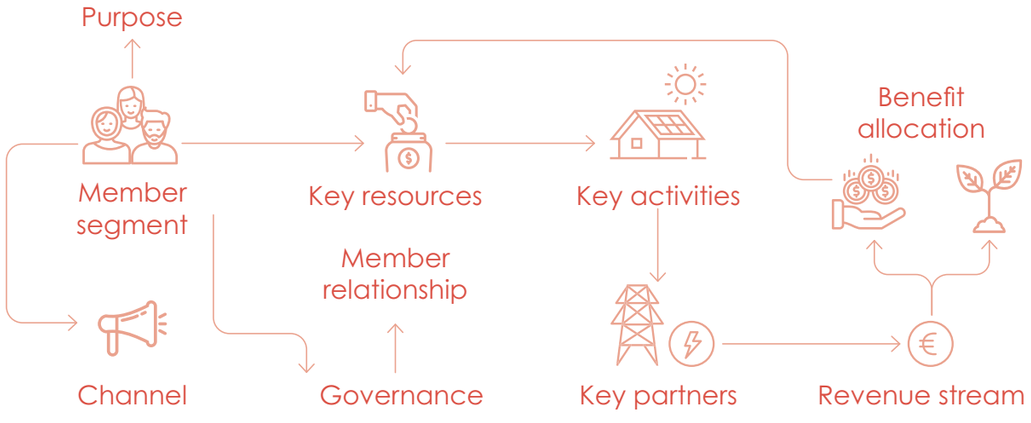


Figure 18. The proposed business model analyzing tool for energy cooperatives

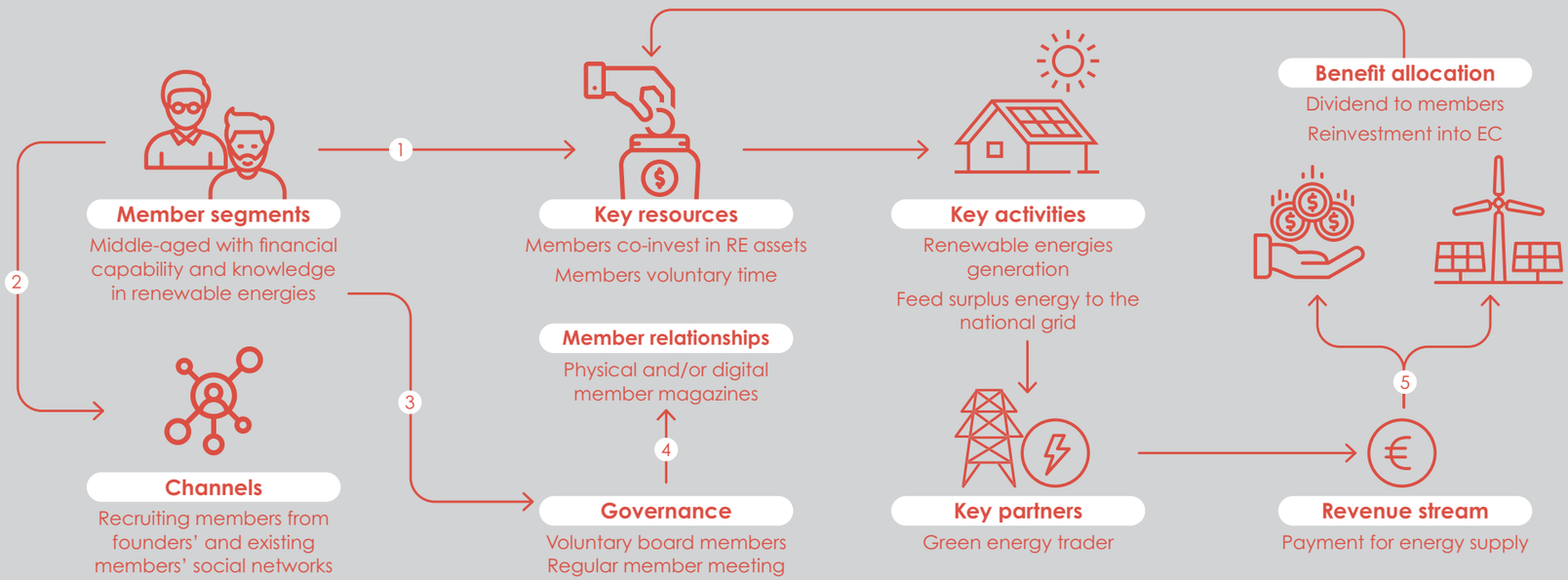
3.5

Synthesis: analyzing the injustices of mainstream energy cooperative business model

Chapter 3 introduces the foundational theories that establish the theoretical framework for this project. Section 3.1 provides an introduction to energy justice, outlining its three key pillars: recognitional, procedural, and distributional justice. In Section 3.2, the Business Model Canvas and Normative Business Model frameworks are presented as tools for conceptualizing business models. Here, a novel business model analysis tool is devised by integrating the strengths of both frameworks. Furthermore, Section 3.3 delves into the principles governing cooperative organizations and examines any deviations observed in energy cooperatives.

The outcome of these theoretical investigations lies in the scrutiny of the prevailing energy cooperative business model through the lenses of energy justice and cooperative principles. To facilitate this, the newly devised business model analysis tool is employed to pinpoint areas where injustices and misalignments may arise (refer to Figure x). A comprehensive summary of common injustices within energy cooperative business models is consolidated below:

Figure 19.
A typical business model of energy cooperatives and the injustices in the model



The injustices within typical energy cooperative business model

1 **Financial barriers constrain membership qualification**
Membership mandates a minimum financial investment (e.g., €545 per member in Germany). This prohibits vulnerable groups without financial means to participate as members.

2 **Homogeneous member composition**
The composition and ethos of energy cooperatives heavily rely on the initiator's social network, resulting in a homogeneous membership primarily consisting of middle-aged males with higher education and income.

3 **Time availability constrains participation in the decision making process**
Availability of time for volunteer commitments, particularly for board membership, becomes a barrier, potentially limiting participation from vulnerable groups due to time constraints.

4 **Lack of awareness and engagement activities for vulnerable groups**
Insufficient awareness of underrepresented groups and energy poverty often results in a lack of engagement initiatives targeted towards such groups.

5 **External communities and natural environment are left out of distribution**
Access to affordable energy and energy efficiency services is contingent upon membership, while external community and environmental considerations often disregarded in distribution.

6 The distribution of benefits within energy cooperatives tends to neglect social and community objectives.

7 The relationship between the cooperative and its members is driven by financial incentives (dividends), promoting a profit-centric model rather than prioritizing community and shared member objectives.

It is misaligned with...

1 Procedural justice; Cooperative principle
2 Procedural justice; Recognitional justice
3 Procedural justice; Recognitional justice
4 Procedural justice; Cooperative principle
5 Procedural justice; Distributional justice
6 Cooperative principle
7 Cooperative principle

Chapter 4

FIELD RESEARCH: THE LIVING CONDITIONS OF VULNERABLE GROUPS & THEIR ENERGY WISHES

Chapter summary

Chapter 4 summarizes the insights gained from home visits and a local community event, encompassing the living conditions of vulnerable groups and the energy aspirations of local residents. The synthesis section amalgamates these field research findings within the frameworks of energy justice and cooperative design.

4.1

Research approach

The goal of the field research in this project is to gain insights into the living conditions of vulnerable groups and understand the local perspective on energy services. It's important to note that the research isn't intended to generate generalized insights due to the small sample size. However, it plays a crucial role in helping me empathize with the people I'm designing for. I employed four approaches to conduct the field research:

LIFE project partner day

This event involved co-creation sessions with key partners of the LIFE project. The aim was to explore different future scenarios for establishing an energy cooperative in the Venserpolder neighborhood in Amsterdam Zuidoost. The outcome was a visionary roadmap outlining the development of the LIFE project and the energy cooperative from 2022 to 2035. I participated as a session facilitator and observer.

Expert interviews

I conducted three expert interviews to understand how social objectives are measured and implemented in corporate environments. We discussed various concepts, including reporting standards, the challenges of defining and measuring social goals, and the potential value proposition of the LIFE project. It's worth noting that, due to the reframing of the research question, the contents of these expert interviews are no longer significantly relevant and are not presented in the field research section of the report.

Home visits with energy coaches

I collaborated with the Quick Fix Brigade at Groene Hub. The Quick Fix Brigade regularly conducts home visits to provide energy efficiency services to residents in need. A typical home visit involves several steps:

1. **Pre-visit phone appointment**: A phone call is made before the visit to understand the general condition of the house.
2. **Material collection**: The energy coach collects the necessary materials for the visit.
3. **On-site visit**: On the scheduled day of the visit, two to three energy coaches are present to assist residents in installing energy-efficient products such as radiator foil and LED bulbs.
4. **Survey**: The home visit concludes with the resident filling out a survey designed by !Woon, the organization that funds the program.

An interactive session during community event

To engage with community members in a more informal setting, I put an interactive poster during a community event hosted by Groene Hub. This day-long event featured a variety of activities and drew a diverse crowd of people of different ages and ethnic backgrounds. During the event, I took on the role of a children's activity host and used this opportunity to have discussions with residents when they interacted with the design.

	Event	Date	Respondent	Language
1	Home visit 1	April 25, 2023	Arabic household	Dutch. The key points of the conversation are translated by to energy coach to me after the visit
2	Energy consultation at Groene Hub	April 25, 2023	Male, African, 60-70 years old	English
3	Home visit 2	May 4, 2023	Arabic household	Dutch. The key points of the conversation are translated by to energy coach to me after the visit
4	Home visit 3	May 11, 2023	Indian household	Dutch. The key points of the conversation are translated by to energy coach to me after the visit
5	Home visit 4	May 11, 2023	Moroccan household	English
6	LIFE project partner day	May 16, 2023	Key partners of LIFE project	English
7	Expert interview	May 31, 2023	ESG project manager of Johan Cruijff Arena	English
8	Expert interview	June 9, 2023	ESG reporting expert	English
9	Expert interview	June 15, 2023	Corporate sustainability expert	English
10	Afkoel Markt community event	July 28, 2023	Female, second generation of Suriname immigrant, 20-30 years old	English
			Couple, Western background, 60-70 years old	English
			Couple, Western background, 30-40 years old	English
			Male, non-western background, 40-50 years old	English
			Female, African, 12 years old	English
			Female, Western background, 40-50 years old	English

Table 2. Research activities

4.2

Understand the living condition of energy-vulnerable groups through home visits

Scholars have emphasized the pivotal role of recognizing the living conditions and requirements of energy vulnerable households in achieving energy justice. I am aware that my personal background and living circumstances might significantly differ from those of the potential users of the LIFE energy cooperative - the residents of Amsterdam Zuidoost. To bridge this gap, I participated in the Quick Fix Brigade at the Groene Hub, engaging in several home visits aimed at providing energy efficiency services to residents in need.

The Quick Fix Brigade routinely furnishes residents with energy-saving kits, encompassing LED bulbs, water-saving showerheads, radiator foil, and various insulation materials. This initiative received funding from the municipality of Amsterdam, allocated primarily within specific zip code areas in Amsterdam Zuidoost. However, due to positive word of mouth, residents beyond the designated areas also sought assistance, motivated by observing friends or relatives receiving the kits. Consequently, the Quick Fix team sought additional resources from !WOON to aid residents falling outside the municipality's funding scope. To respect residents' privacy, no recordings or photographs were taken during the visits. The following are the key insights into the living conditions of energy-vulnerable individuals gleaned from four home visits and one consultation conducted at Groene Hub.

Figure 20.
Energy coaches prepare energy efficiency materials (LED bulb, plug with switch) before home visit

Language and Cultural Diversity

Amsterdam Zuidoost is a diverse community comprising immigrants from various countries such as Suriname, Morocco, the Antilles, Africa, Turkey, and more. Although Dutch is the predominant language, some residents prefer to communicate in English or their native languages whenever possible, as they find it easier to express their thoughts this way. This linguistic choice can sometimes stem from a lack of confidence in using the language. For instance, an energy coach recounted an incident where a resident struggled to communicate clearly during an initial phone appointment. During a subsequent home visit, it was revealed that this resident, who actually speaks Dutch fluently, had initially sought a friend's assistance in translating Dutch to Arabic. The energy coach surmised that this might have been due to a cultural difference or a lack of language confidence that made her hesitant to manage the appointment independently.

The energy coaches themselves exemplify the language and cultural diversity within the local community. Their migrant backgrounds and adaptability to new environments have enabled them to speak multiple languages, including Spanish, French, and Italian. They also recognize the potential benefits of understanding Arabic to engage more effectively with a broader range of residents.

Female as initiators and communicators

During all of the home visits, it was consistently observed that female family members took the lead in communicating with the Quick Fix Brigade. This phenomenon highlights the prominent role of female members in terms of housing conditions and family budget management. However, it is noteworthy that within energy organizations, female members are often underrepresented. This underrepresentation could be attributed to the perception that energy-related topics are predominantly "technical" and fall outside the sphere of traditional female influence, which is often associated with societal and relational matters. This overlooks a significant opportunity to harness the influence of female household members in driving changes in energy consumption and home renovation.

An illustrative example of successful female-led initiatives can be found in the stitching class hosted at the Groene Hub. This class primarily attracts elderly women, and their participation is largely attributed to their personal rapport with the female instructor. This highlights a replicable model for promoting female participation through the lead of female project champions.

Challenges with digital tools and understanding technical terms

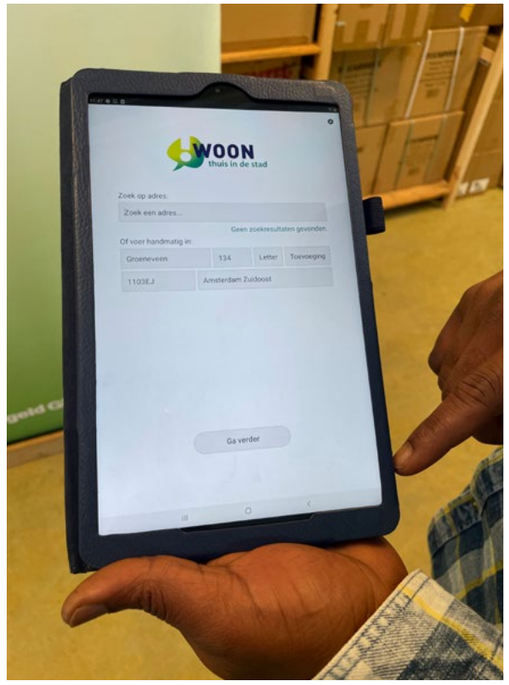


Figure 21. An energy coach shows the digital form the residents need to fill during the home visit

During the home visits, residents are asked to complete a questionnaire provided by !WOON to detail their house type and energy consumption. These questions are typically presented on a tablet and are often filled out with the assistance of the energy coach. This is largely due to the extensive nature of the questionnaire (nearly 10 pages of information), which can be difficult to read on a tablet. Moreover, many of the questions pertain to house conditions and appliance types that residents may not be fully aware of. Although the intention is for residents to complete the questionnaire independently, the involvement of energy coaches is frequently necessary.

Considering residents with physical disabilities

There is a subgroup of vulnerable households that is even more challenging to reach. For instance, socially isolated individuals living alone might not be aware of available social support systems. During a recent visit, Joseph, one of the energy

coaches, encountered a resident who was blind. When Joseph inquired about how the resident determined the correct temperature setting, he could not provide an answer. Fortunately, Joseph discovered an audio-enabled thermostat that provides the current temperature audibly. He plans to provide this resource to the resident. This encounter highlighted the diverse challenges individuals face in relation to energy management.

Variability in housing conditions- energy labels and

The condition of the houses varies significantly in terms of energy efficiency, construction year, and interior setup. The energy labels of these houses span from E to C, and their construction dates range from 1975 to 2002. The interiors also exhibit diversity, ranging from well-lit and comfortable households with ample sunlight to damp and poorly decorated households struggling to maintain warmth.

For example, one particular household resides on the ground floor and boasts a small garden. The house tends to be humid, possibly due to its position within the complex, lack of proper ventilation, and limited sunlight exposure. Additionally, the occupants dry their clothes indoors, further contributing to the humidity. Upon entering, the room temperature felt noticeably colder than in another house visited earlier that day (neither household had the heater turned on).

Several residents have already taken energy efficiency measures. In one case, a household had installed foil behind the radiators, but these were outdated and ineffective. Consequently, we removed the original foil and replaced it with new, more efficient versions. Although some LED bulbs were present in their homes, the residents were unaware of them. Generally, residents have done their best to optimize energy efficiency within their control. Yet, aspects like window frames, wall insulation, and wall cracks remain beyond their influence. Consequently, there may be limited room for improvement in energy efficiency from the residents' perspective.

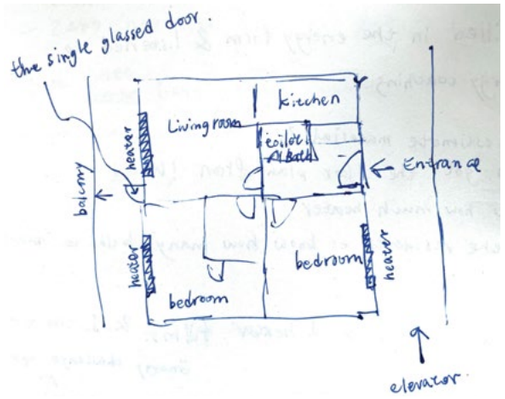


Figure 22. A drawing of a floor plan made by the author during home visit

This array of living conditions underscores the challenge of precisely identifying energy vulnerable households. While the list we received pertains to households within social housing complexes, this only accounts for one aspect of energy poverty, namely lower income. It excludes owner-occupied homes that also experience energy poverty.

Figure 23. Quotes from the residents during home visits

4.3

What are your energy wishes? Explore the community's perspective about local energy

Addressing the challenge of arranging formal interviews with local residents due to limited local social networks, I devised an alternative approach to gain insights into residents' perspectives on local energy concerns. This involved creating an interactive platform during the Afkoel Markt (Cool Market), a community event organized by Groene Hub that encourages participation from all residents interested in learning about energy efficiency measures, constructing rain collectors, and engaging in workshops centered around community sustainability.

In this context, I designed a poster featuring a probing question: "Wat zijn jouw energiewensen?" (What are your energy wishes?). Visitors were presented with eleven predefined energy-related wishes from which they could choose. These wishes were formulated based on the potential services energy cooperatives could offer, aligned with the principles of energy justice. Additionally, attendees had the freedom to add their own wishes if their specific concerns were not represented in the provided options. The design ensured that the interaction was self-guided, requiring no facilitation. Nonetheless, I did engage in follow-up conversations with a few residents to delve deeper into their reasons for selecting particular wishes. Table x lists the eleven predefined energy-related wishes:

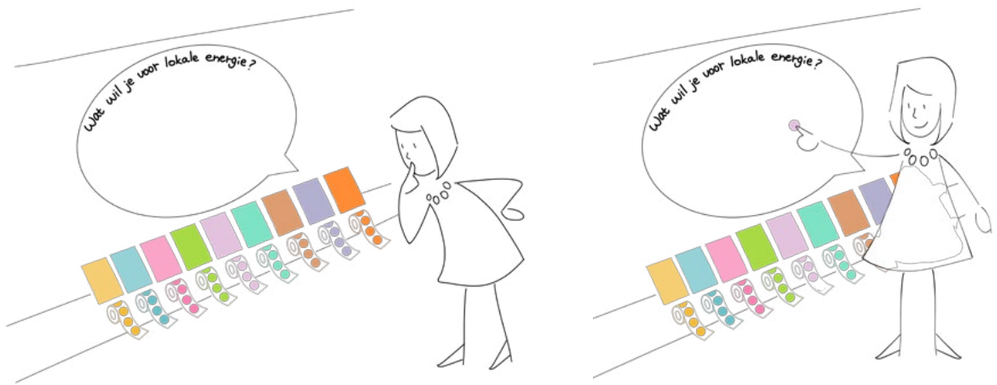


Figure 24. Sketch of the space and interaction design

	Energy wishes in Dutch	Energy wishes in English
1	Lokale energie voor een lagere prijs	Get local energy at a lower price
2	Leer mijn energierekening begrijpen	Learn to understand my energy bill
3	Training ontvangen voor energiebanen	Receive training for energy jobs
4	Geld verdienen door gedrag te veranderen (bijv. de was doen tijdens daluren)	Earn money rewards from behavior changes (i.e. laundry during off-peak hours)
5	Buren helpen die moeite hebben met het betalen van energierekeningen	Help neighbors who have difficulties paying energy bills
6	Houd regelmatig gemeenschapsbijeenkomsten om te beslissen over energieonderwerpen	Have community meetings regularly to decide on energy topics
7	Financiering voor het herstel van lokale natuurlijke omgevingen	Funding for restoring local natural environments
8	Gratis energie voor openbare gebouwen (bijv. scholen, ziekenhuizen)	Free energy for public buildings (i.e. schools, hospitals)
9	Ontvang een huisrenovatie om het energieniveau van je huis te verbeteren	Receive home renovation to improve house energy level
10	Transparante informatie hebben over collectief opgewekte energie	Have transparent information about collectively generated energy
11	Zonnepanelen op gemeenschapsdaken installeren om energie op te wekken	Install solar panels on community rooftops to generate energy

Table 3. Energy wishes in Dutch and English

Figure 25. Energy wishes stickers

So, what were the energy wishes expressed by the residents? Here are some key insights regarding community's perspective of local energy that emerged from the event:

Perception of equity: disparity between "us" and "them"

The perception of inequality often arises when a disparity between "us" and "them" is felt. This dichotomy was highlighted in the event, revealing two types of disparities. The first involves the distinction between "the rich" and "the poor". One resident questioned the fairness of urging the economically disadvantaged community to curtail energy usage while the affluent sector's energy consumption remains unregulated.

"Sometimes I feel (the energy saving) is double-standard. The poor people and general public are asked to save when we already have less resources, while our little saving doesn't make difference if the rich still enjoy the lifestyle they have."

- A participant of Afkoel Markt

When energy becomes a commodity purchasable by money, those who are affluent can merely buy their way out of challenges. The scarcity of resources coupled with the use of financial means to allocate access to these resources intensifies the perception of inequality. Therefore, the allocation of resources and the dissolution of a sense of disparity become questions for the LIFE energy cooperative.

The second type of disparity relates to the distinction between "the local" and "the immigrant". Most event attendees have non-Western origins, having emigrated from countries such as Nigeria and Suriname. Even after living in the Netherlands for years, discussions about a sense of belonging still arose during the event. Attendees mentioned ethnicity as a factor in differential treatment, expressing a desire to reconnect with their original communities in their birth countries. The immigrant background also influences energy behaviors. A resident shared that living a low-energy consumption lifestyle was not difficult for her due to her upbringing in Suriname:

"In the first 9-10 years of my life, my family lived in Suriname and our home didn't have electricity, so I grew up knowing how to live without high energy use."

- A participant of Afkoel Markt

While bridging disparities between diverse cultural communities might be a formidable challenge within the LIFE project, recognizing residents' origins and past experiences is crucial when designing engagement strategies. Creating opportunities to learn from residents' insights about culture, community, and their strategies for managing energy consumption should also be designed into LIFE energy cooperative.

Communal benefits over personal financial gains

Within the eleven energy wishes, the most prominent choice was "Funding for restoring local natural environments," whereas "Get local energy at a lower price" received no votes as the top priority. This outcome diverged significantly from the common assumption held by the LIFE project team, where it was anticipated that financial incentives would be the primary motivator for most residents. The residents' rationale for selecting the restoration of the local natural environment as their priority is rooted in its potential to foster unity. They expressed a preference for collective harmony over individual advancement. This preference, I believe, also stems from the presence of a community garden initiative managed by Groene Hub. This existing project serves as a reference point, enabling residents to envision the potential impacts and outcomes of similar endeavors. This finding underscores the importance for the LIFE project to recognize and leverage the ongoing local initiatives as a foundation for capturing residents' interest.

Create ease to participate and matching the local resources

Another criterion frequently highlighted among the energy wishes is the facilitation of ease in participation. This aspect aligns with the principle of procedural justice, which aims to extend membership and engagement opportunities to a diverse range of groups. For instance, residents are attracted to the energy wish of "Earning monetary rewards from behavioral changes (e.g., doing laundry during off-peak hours)" as it involves actions they are already taking. Given that ownership of energy assets is currently uncommon among local residents, it is important to design participation schemes that allow energy consumers to take part in the cooperative. This can foster greater community participation in the early stages of the LIFE energy cooperative.

Furthermore, existing local resources offer potential avenues for exploration, reducing the necessity of seeking external resources. As one resident aptly put it:

"When people talk about Zuidoost, they all think people here need to be helped. But there are actually many successful entrepreneurs here."

- A participant of Afkoel Markt

"I am in the position to help others. I bought a house with solar panels and I understand my energy bill. I would like to share my energy with neighbors in need but the current infrastructure doesn't allow it."

- A participant of Afkoel Markt

This sentiment underscores the opportunities to generate local financial resources without over-reliance on private investors. The fundamental question here is: How can we identify and connect existing local resources to residents in need? While LIFE currently envisions injecting financial resources into the community to support the local energy cooperative and community initiatives, a careful blend of top-down and bottom-up approaches is essential. Engaging local resources can potentially be pivotal in ensuring long-term financial and organizational sustainability.

Figure 26.
The result of the day: a poster with residents' opinions on their energy wishes

4.4

Synthesis: aligning field research insights with energy justice and cooperative principles

In an effort to contextualize the field research findings within the realms of energy justice and energy cooperatives, I have organized the gleaned insights and considerations into four distinct themes: recognitional justice, procedural justice, distributional justice, and cooperative design (Table x.). This systematic approach aims to harmonize the practical insights garnered from the field research with the foundational knowledge from the theoretical background. Through this amalgamation, a cohesive set of design considerations and potential solutions will emerge, poised to guide the subsequent design phase effectively.

Table 4.
Considerations for energy justice in Amsterdam Zuidoost

Topic	no.	Insights and suggestions
Recognitional justice	1	Collaborate with !Woon to access data on housing conditions and energy consumption patterns among vulnerable households.
	2	Consider a more inclusive communication artifacts, as the digital tools may not be user-friendly for all residents.
	3	Address language diversity, accounting for common languages such as Dutch, Arabic, Spanish, and English.
	4	Tailor assistance for specific subgroups, such as elderly individuals living alone with disabilities.
	5	Acknowledge past experiences of injustice related to ethnicity that might impact residents' perceptions.
	6	Collaborate with ongoing local initiatives (e.g., De Tuinen van Brasa by Groene Hub) to enhance awareness about the LIFE project.
	7	Develop refined criteria for identifying households in need, considering both listed postcode area residents and those who proactively seek assistance.
	8	Leverage local champions, like the energy coaches, who possess neighborhood knowledge and shared languages to bridge cultural gaps and build trust.
Procedural justice	9	Given that the majority of residents are currently energy consumers and prosumership is not widespread, it's advisable to establish simple and accessible ways for energy consumers to participate, thereby encouraging a more extensive membership base within the local community.
	10	Provide channels or spaces that enable residents to share insights from their cultural backgrounds, community experiences, and energy consumption practices.
	11	Promote female participation by nurturing local female champions and creating an environment conducive to their engagement within the cooperative.
Distributional justice	12	Acknowledge the difference of diverse social groups and implement equitable distribution strategies to address a sense of disparities.
	13	Incorporate the significance of local environmental initiatives into distribution planning.
	14	Community initiatives are valued and need to be considered in the distribution
Cooperative design	15	Address the challenge of balancing interests between consumer and prosumer members in the initial stages, and develop pathways for consumers to transition into prosumer roles gradually.

Chapter 5

DESIGN: A TOOL TO REDESIGN THE BUSINESS MODEL TO ACHIEVE ENERGY JUSTICE

Chapter summary

Chapter 5 encapsulates the design phase, marking the transition from the problem space to the solution space. It outlines the process of developing a rapid prototype and two design iterations. Ultimately, a handbook design featuring four exercises is crafted, offering guidance to energy co-operatives on the journey to revamp their business models to be more just.

5.1

Design brief

Design goal

To assist energy cooperative initiators and members in understanding how their current business model contributes to energy (in)justice and how to modify the model to achieve their social goals in the energy transition.

Why

Energy cooperatives often struggle to incorporate energy justice in the organization to achieve their social impact goals in the energy transition. This is primarily due to:

1. Business model is financial oriented: Energy cooperatives that initially focus on business goals find it challenging to realign with social goals and redistribute resources for such activities.

2. Lack of awareness: Energy poverty and energy justice are not commonly discussed within energy cooperatives.

3. Information & recourses constraints: These cooperatives often lack the necessary human resources, financial means, recognition for vulnerable groups, and effective communication channels.

For whom

Individuals interested in starting an energy cooperative or modifying an existing one to contribute to a just energy transition. This includes initiators and members of energy cooperatives, designers and consultants facilitating just energy transition, and general publics who are interested in a fairer future energy.

What is the design

A tool that facilitates the design of a just business model for energy cooperatives by:

1. Initiating conversations about energy justice within the organization.

2. Offering clear guidance on creating a business model aligned with energy justice principles.

3. Providing participants with a holistic understanding of where injustices may arise in their business model.

When to use

1. Initiating a new energy cooperative.

2. Evaluating and reinventing an existing energy cooperative.

Design process

The design process involved three rounds of design iterations, with each round followed by an evaluation session to inform the subsequent iteration. This iterative process ultimately culminated in the design proposal for a handbook. Figure X provides a visual representation of the design process.

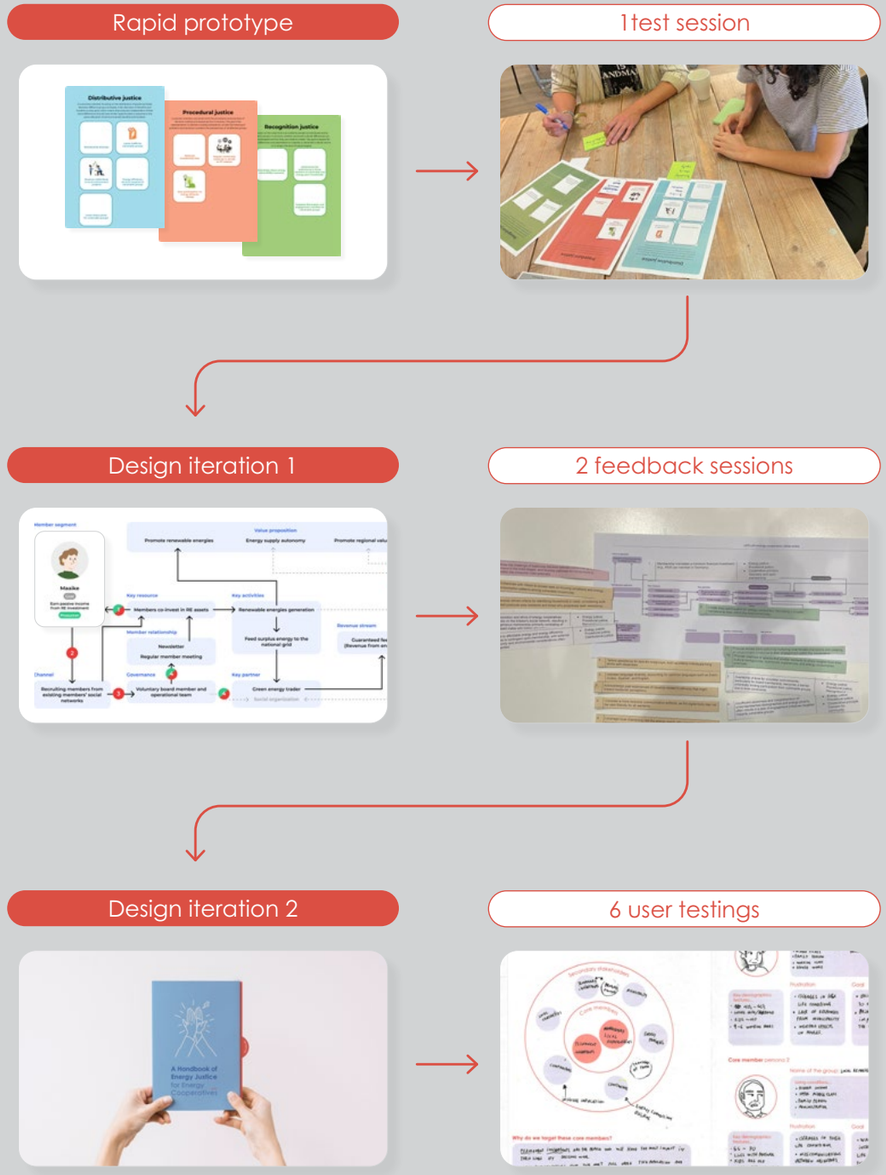


Figure 27. Overview of the design process

5.2

Rapid prototype: a tool to start conversations about energy justice

The tool design

The tool is designed to facilitate discussions about energy justice within the context of energy cooperatives. Its low-fidelity design is provide to guide participants focus on the content instead of graphical aesthetic.

Type: Group exercise (4-8 participants)
Time: 60 minutes
Facilitation: required

Step 1: Introducing the three pillars of energy justice

At the outset of the session, the facilitator introduces the three pillars of energy justice, providing definitions and illustrating how these pillars manifest within energy cooperatives. Participants review this material individually before engaging in a group discussion guided by the facilitator. The aim is to clarify the meanings of these pillars and encourage participants to brainstorm additional examples of their manifestation within their specific energy cooperatives. Participants are provided with color-coded blank cards corresponding to each pillar to write down additional examples.

Step 2: Prioritizing critical issues

In the second step, participants collaboratively assess the significance of each energy justice issue within their energy cooperative. They engage in discussions to determine the relative importance of these issues, categorizing example cards into three tiers: "Not important," "Important," and "Very important." To provide a practical context, the prototype uses the LIFE project as the focal energy cooperative of interest.

Step 3: Establish evaluation metrics

After determining the most crucial energy justice issues, the facilitator guides the participants to delve deeper by posing the question: "What do we mean by...?" For instance, let's consider the issue of "Lower tariffs for vulnerable groups," which the participants have chosen. During this step, participants are tasked with formulating specific metrics that will be used to gauge the successful achievement of this goal. These metrics could include items such as "Providing electricity at a price 10% lower than the market rate to 100 households." This step serves two main purposes: it clarifies the criteria for achieving success in addressing each issue and transforms vague goals into actionable tasks.

Step 4: Prioritizing tasks to make action plan

Building upon the metrics and actionable tasks developed in step 3, the facilitator proceeds to guide participants in placing these tasks on a feasibility-importance scale. Participants are tasked with collectively determining where each metric fits on this scale. The objective is to pinpoint metrics that are both important and feasible for attention, while setting aside those that currently fall outside the scope of possible action. By the end of this exercise, participants will have a well-defined action plan designed to enhance their energy cooperative's performance in the realm of energy justice.

Step 1 Introducing the three pillars of energy justice

Figure 28.
The test result of step 1

Step 2 Prioritizing critical issues

Figure 29.
The test reult of step 2

Step 3 Establish evaluation metrics

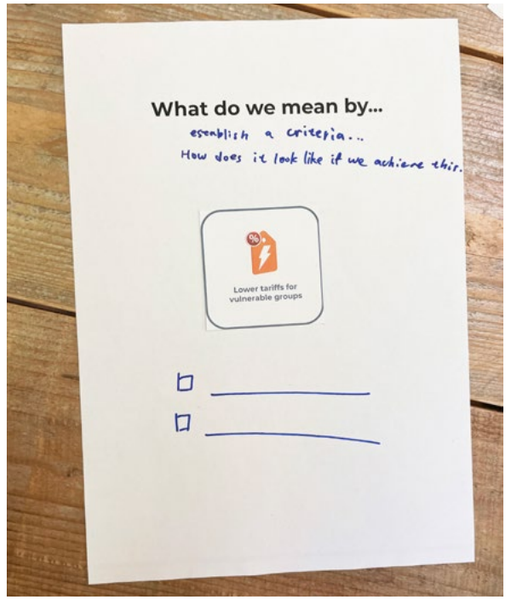
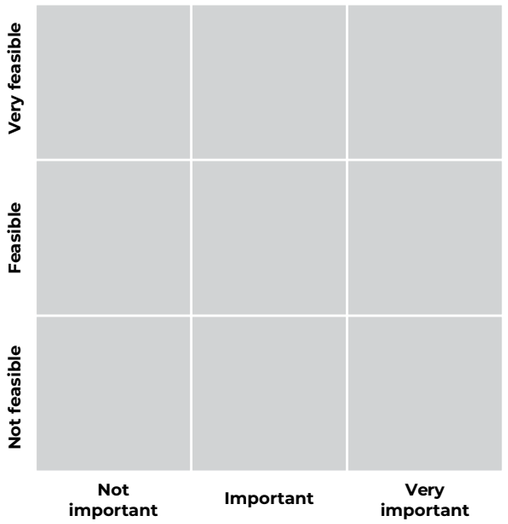


Figure 30.
A modified version of step 3 suggested by the participants

Step 4 Prioritizing tasks to make action plan



Evaluation

The tool underwent testing with two fellow researchers from the LIFE project, covering steps 1 to 3. Step 4, unfortunately, remained unfinished due to time constraints. Nevertheless, general feedback was collected for all the steps.

Session	Date	Respondent	Duration
1	Aug 1, 2023	Two reseachers from LIEF project	1 hour

Feedbacks

Suggestions

1. **Setting clear session goals**: consider beginning the session by specifying its goals, including its intended audience, expected outcomes, and a session time plan outline.

2. **Thorough explanation of the pillars**: offer a more comprehensive explanation of the three pillars of justice, possibly through storytelling, and provide time for participants to read the cards themselves for better comprehension.

3. **Customized cards**: prepare additional cards that are more tailored to the specific context of the energy cooperative under discussion.

4. **Managing discussion**: To prevent lengthy discussions about the cards, allocate time for both discussion and adding and revising cards, but conclude with a dot voting process for decision-making.

Discussions

1. **What to do when "important" cards tend to concentrate on certain pillars?** In the test session, the important cards are more about distributional justice and less about procedure justice. Participants suggested this disparity might be due to different developmental phases of energy cooperatives. However, it's essential to emphasize that procedural justice should be considered from the outset. Extra steps might be necessary to have a even consideration about all three pillars.

2. **What are the better criteria to prioritize the actions in step 4?** Participant suggest that the "feasibility" axis could inadvertently filter out important yet seemingly unattainable ideas. An alternative approach could involve assessing metrics based on time horizon or complexity rather than feasibility alone.

Decisions on iteration

1. Increasing the duration of the session to allow ample time for the facilitator to explain the session, introduce the concept of energy justice, and for participants to engage in comprehensive discussions.

2. Extend the exercise to illustrate how energy justice interplays with the energy cooperative business model, providing participants with a more holistic understanding of the concept's implications.

5.3

Design iteration 1: a workshop for addressing energy injustices in energy cooperatives

The workshop design

The workshop is designed to guide energy cooperatives in understanding if their mission aligns with their members' goals and if there are injustices within their business model.

Type: Group exercise (4-8 participants)
Time: 120 minutes
Facilitation: required

Step 1: Defining target member

The workshop begins by prompting participants to identify the specific types of members they aim to serve within their energy cooperative. Four personas are introduced, representing various community members, including consumers, prosumers, wealthier investors, and energy-vulnerable elders. These personas provide detailed profiles, outlining the goals and living conditions of each group. Participants can also add new personas if needed. During this step, participants engage in discussions about these personas and collectively select their primary target members.

Step 2: Understanding the business model

Following the selection of the primary member group, participants are guided through mapping out their cooperative's business model. This process starts with putting the chosen member persona in the "member segments" and then extends to the remaining nine elements of the business model: value proposition, key partners, key activities, key resources, member relationships, channels, benefit allocations, revenue streams, and governance. Arrows are used to illustrate the relationships and interactions between these elements. For example, an arrow between "key resource" (such as members' co-investment in renewable energy assets) and "member segment" signifies that this key resource originates from the member segment.

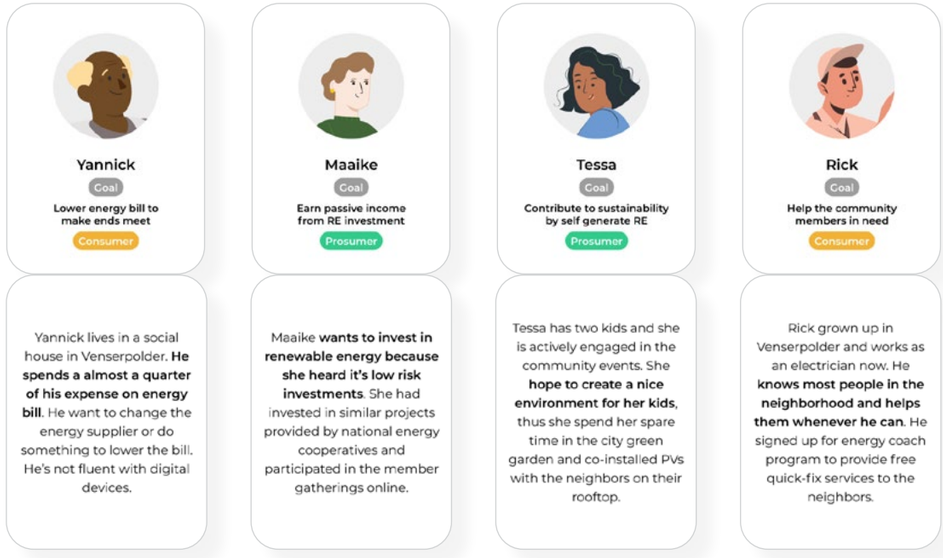
Step 3: Identifying potential injustices

In this step, participants are tasked with evaluating each element and interaction within the business model using the three pillars of energy justice and the seven principles of cooperatives. They are encouraged to pinpoint where injustices may occur and document them on cards. Each card should contain a concise description of the injustice and specify which energy justice pillar or cooperative principle it violates. These cards, along with the business model diagram, are then displayed on the wall for all participants to review collectively.

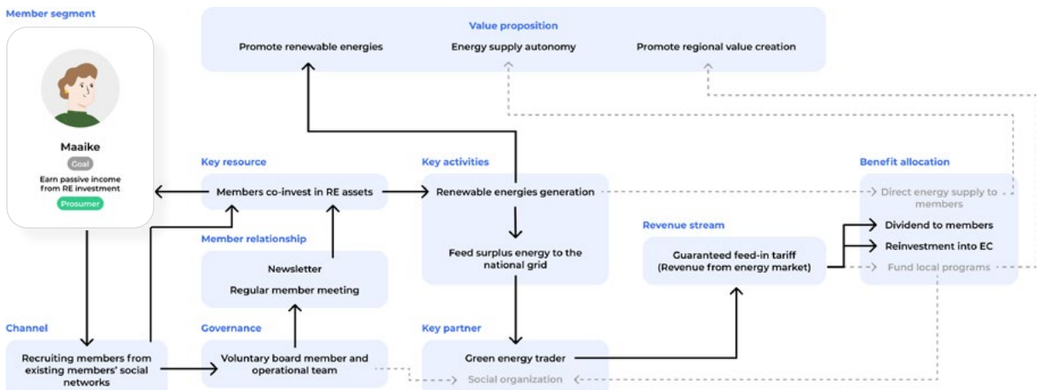
Step 4: Generating just solutions

After identifying injustices, the facilitator guides participants in transforming these problem cards into thought-provoking statements aimed at re-evaluating the essence of the issue and defining what they want to address. For instance, an issue like "Restrictions on minimum financial investment to become a member" can be rephrased as a question like "How can we open up membership to everyone?" Once all problem cards have been transformed into these provocative questions, participants engage in a brainstorming session to generate potential interventions. During the process, the facilitator can provide examples of solutions that other energy cooperatives have used to address similar injustices. By the end of the workshop, participants will have a visual map showing where injustices exist within their business model and a set of potential interventions to rectify them.

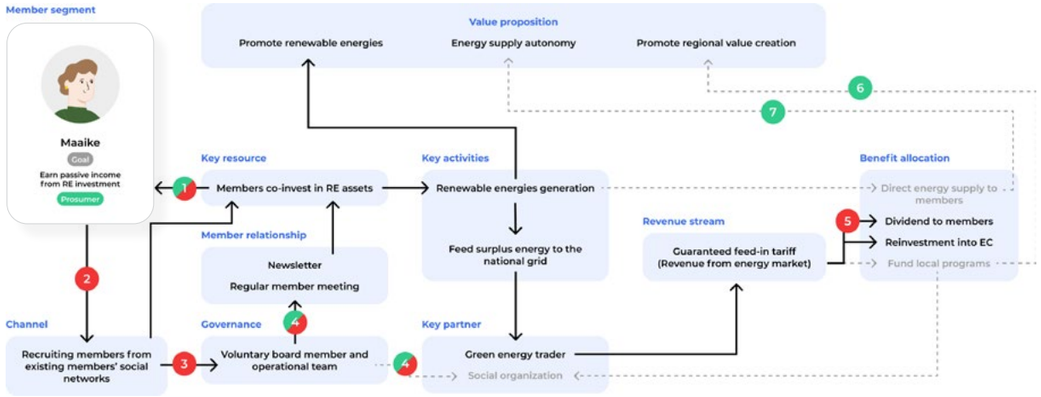
Step 1 Defining target member

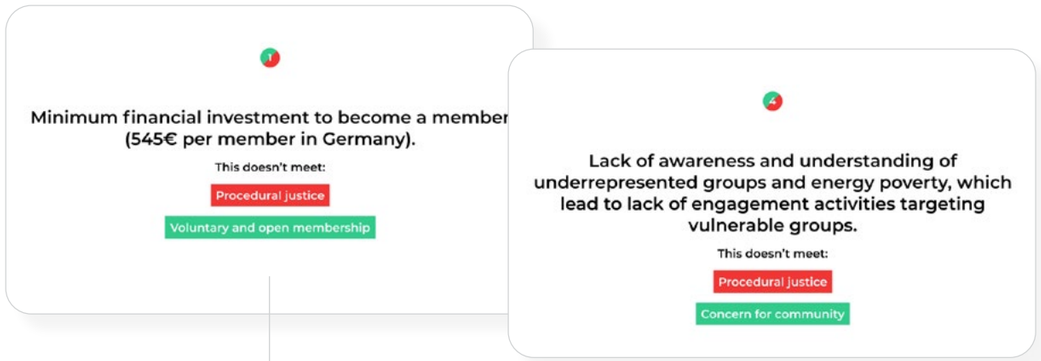


Step 2 Understanding the business model

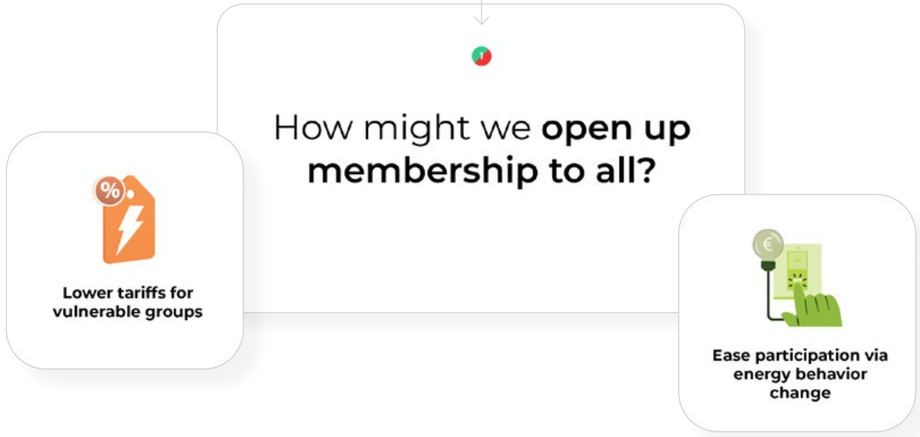


Step 3 Identifying potential injustices





Step 3 Generating just solutions



Evaluation

The evaluation process involves two group discussion sessions with the social team of the LIFE project and the thesis supervisory team. During these sessions, I guide the respondents through the workshop process and engage in discussions about the workshop's design.

Session	Date	Respondent	Duration
1	Aug 22, 2023	Two members from LIFE social team	1 hour
2	Aug 22, 2023	Thesis supervisory team	2 hours

Feedbacks

What they like about the design

1. **Initiating energy justice discussions**: the workshop provides a platform to initiate conversations and awareness about this crucial issue in the neighborhood.

2. **Putting member in the center**: the workshop's emphasis on understanding the members is seen as a valuable step. It allows cooperatives to clearly define the focus of their organization based on their target member group.

3. **Providing intervention examples**: It makes it easier for participants to transition from identifying problems to exploring potential solutions, thereby facilitating actionable outcomes.

What they don't like about the design

1. **Complexity of business model mapping**: Some participants find the process of mapping out the business model less intuitive and suggest that it could benefit from additional guidance. For instance, participants might find it helpful to first work on the business model of an existing company that everyone understands before delving into their energy cooperative's business model.

2. **Limited persona**: the provided personas may not cover the diversity of people in the community. To address this, it is suggested to offer blank persona templates for participants to fill in. Additionally, participants may need guidance on how to gather information about community members to complete these personas effectively.

Decisions on iteration

1. Providing blank persona templates along with guidance on how to create and use them effectively.

2. More intermediate steps will be added to explain the key elements of business models and how to map them out.

3. Recognizing that a two-hour workshop may be insufficient to sensitize participants to energy justice and effectively engage in business model innovation, alternative formats for delivering the exercises will be explored.

5.4

Design iteration 2: a handbook of energy justice for energy cooperatives

Why design a handbook?

In previous design iterations, I explored various formats, ranging from a toolset to a workshop, in an effort to find the most suitable means of conveying the design concept. Ultimately, I decided to employ a handbook as the chosen format. Several key factors have driven the decision:

1. **Sensitization about the topics**: The testing sessions revealed the necessity of sensitizing participants about the concept of energy justice before engaging in workshops or discussions. Therefore, a handbook, with its capacity to provide in-depth information, serves as a valuable resource for better preparing participants for these discussions.

2. **A familiar format for the target audience**: Considering that the primary target audience comprises initiators or members of energy cooperatives, a handbook aligns well with the format used by existing energy cooperatives to communicate with their members. These cooperatives often employ physical magazines or digital newsletters, making a handbook a familiar and accessible medium for spreading information.

3. **A more engaging learning experience**: The physical print format of a handbook allows for a more interactive experience by incorporating detachable case cards and templates for the exercises, enabling readers to directly participate in the learning process.

The handbook design

The handbook serves as a self-guiding tool for readers to delve into the topics of just energy transition, energy justice, and gain practical experience in business model innovation for energy cooperatives. It comprises six distinct sections: introduction, context, exercises, case cards, resources, and exercise templates.

Type: Individual or group
Time: Self pacing
Facilitation: Not required

Who are the handbook for

1. Initiators and boards of energy cooperatives
2. Designers and consultants facilitating just energy transition
3. General publics who are interested in a fairer future energy

When to use the handbook

1. Initiating a new energy cooperative
2. Evaluating and reinventing the existing energy cooperative

What is the expected outcome

Gaining a better grasp of how your energy cooperative's business model impacts energy (in)justice and to discover ways to adjust the model in order to achieve your social objectives in a just energy transition.

How to use the handbook

While this handbook is designed for individuals to read on their own, the exercises work great for group discussions too. Here's the ideal way to use it:

1. **Individual reading**: Start by reading the introduction and context sections individually. This gives everyone a basic understanding of what's to come.

2. **Preparation**: After that, do some additional research to gather information about the cooperative's business model and members' living conditions.

3. **Group exercises**: Get together with the team for the Exercises part. Plan for about two and a half hours to finish them. It can be helpful to appoint a facilitator to guide the discussion and decision-making process.

Tone and volume of the handbook

This handbook is intended for a wide readership, ranging from the general public to members of energy cooperatives. It covers three diverse domains: energy justice, business model innovation, and design thinking. Considering that readers may not be familiar with all of these topics, the language and terminology used throughout the handbook are deliberately kept simple and easily understandable. This approach aims to make the content accessible and comprehensible to a broad audience while introducing unfamiliar subjects. The handbook is intentionally designed to be concise, encouraging readers to delve into the challenge of grasping complex topics.

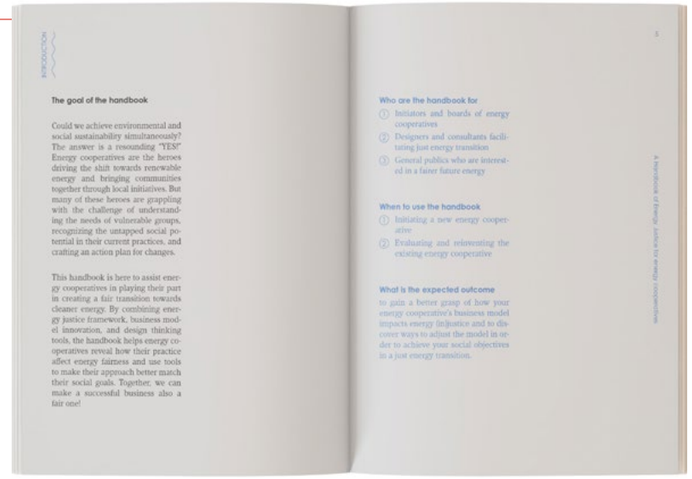
The six parts of the handbook

The following section introduces the six parts of the handbook and provides insights into the design considerations that shaped the content:

Part1

Introduction

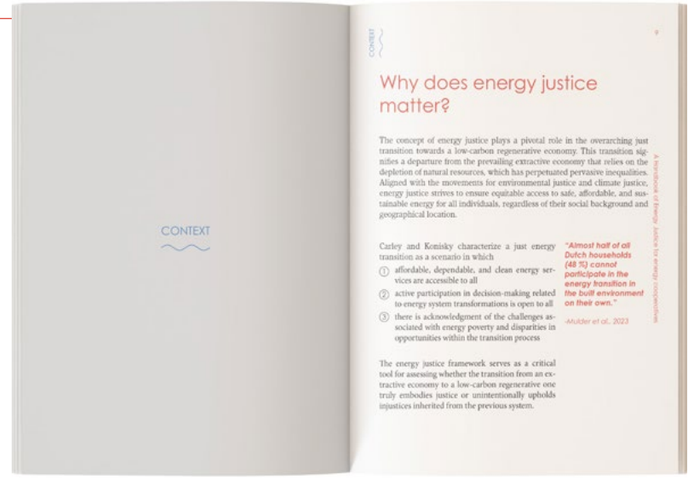
The initial section of this handbook outlines its purpose, intended audience, and the anticipated benefits of reading it. Following this, the reader's guide provides an overview of the handbook's four main sections: context, exercises, resources, and case cards.

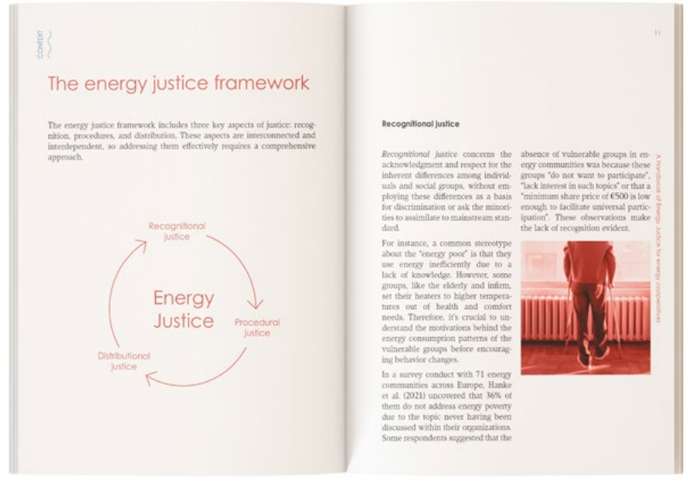


Part 2

Context

Considering that energy justice may be an unfamiliar concept for many energy cooperatives, the context section elucidates its significance in facilitating a fair energy transition. It introduces the three core principles of energy justice, supported by relevant examples. Additionally, this section outlines the role that energy cooperatives fulfill in the broader energy transition and highlights prevalent injustices within typical energy cooperatives.





Exercises

The Exercise section consists of four activities to help the readers understand their members and business model, uncovering potential injustices within the energy cooperative. The following pages explain each exercise in details.

Design consideration

The exercise structure is visually presented to help readers grasp the steps easily and enhance their memory of the process.

Design consideration

The arrows visually emphasize that readers have the flexibility to choose their exercise starting point rather than completing all of them.

Design consideration

For-profit enterprises are primarily created with the aim of generating profits for their investors, often prioritizing profit maximization. Conversely, cooperatives are primarily focused on delivering economic and social benefits to their members. To align with the fundamental cooperative principle, this exercise commences by placing members at the center.

Design consideration

As emphasized by Hanke et al. (2021), recognizing the distinct living conditions represents the initial stride towards attaining energy justice. In light of this, I invite readers to delve into their comprehension of their members, considering four distinct aspects. This exercise is designed to cultivate empathy among readers for those they serve as an energy cooperative, ensuring that the cooperative's purpose aligns with the needs of its members.

Design consideration

Step-by-step guidance is provided to assist readers who may not be familiar with the business model in mapping it out using the information they have.

EXERCISE

Second, map out our cooperative's business model

A business model is the blueprint of how an organization creates, delivers, and captures value. It encompasses both the technological applications and the socio-economic dynamics that govern its operations. In this step, we will map out the key elements of your energy cooperative's business model and understand how they work together.

Exercise 2 **What is our business model?**

① Map out the key elements and the connections

There are ten fundamental elements of an energy cooperative's business model. To start, outline the parts that you're already certain about. For example, if one of the key activities of your energy cooperative is "generating renewable energy from rooftop solar panels," you can then expand to identify the key resources needed for this, as well as the revenue streams stemming from these activities. Keep going until you've mapped out all ten elements and how they connect.

Design consideration

A brief explanation of each element of the business model is provided to assist readers fill in the information.

① **Purpose**
the value why a cooperative exist

② **Member segment**
the different groups of people a cooperative aims to serve

③ **Channel**
how a cooperative reach out to and communicate with potential members

④ **Member relationship**
how a cooperative maintain the relationship with existing members

⑤ **Governance**
how a cooperative make decisions with what kind of body

⑥ **Key activities**
the activities a cooperative carry out to serve its members and fulfill its purpose

⑦ **Key resources**
the important things required to conduct the key activities

⑧ **Key partners**
the supplier, trader, or other entities that ensure the business model works

⑨ **Revenue stream**
the revenue the cooperative generate from the key activities

⑩ **Benefit allocation**
the way the cooperative redistributes its revenue and non-financial benefits to the stakeholders

In the end, you will have a business model map like the image below. Want a detailed example? Check out the case card of exercise 3.

Design consideration

Visually illustrating the expected outcome of the exercise can help readers consider the interaction of each element, rather than just listing them out.

EXERCISE

Third, take a closer look for any injustices

Great job! Now that we have a clear blueprint of our business model, it's time to examine it closely and check if there are any aspects that might not align with the three principles of energy justice.

Exercise 3 **Where do the injustices reside?**

① Identify the (in)justices in the business model

Using the business model from exercise 2 as a foundation, let's explore if any injustices exist. For example, in the "governance" aspect, we may hold regular online member meetings on weekday mornings. However, this schedule might exclude elderly members unfamiliar with digital tools and those who work during those hours, potentially leading to procedural injustice. Conversely, we could allocate some earnings to support local environmental projects, promoting more equitable benefits distribution, including environmental benefits, and addressing distributional justice.

If you're unsure about other examples of (in)justices, you can refer to a list of energy justice indicators developed by Hanke et al. (2021). Each indicator is relevant to different aspects of the business model. For instance, you can assess the "member diversity" indicator by examining the composition of the "member segment" within the business model.

Recognitional justice	Procedural justice	Distributional justice
Level of knowledge about energy poverty — Governance	Overcoming barriers for participation by:	Member diversity — Member segment
Level of knowledge about preferences, needs and living situation of energy poor households — Governance	Reduced membership fees — Member segment, Key resources	Energy efficiency services targeted at vulnerable groups — Key activities, Benefit allocation
Engagement with energy poor households — Channel, Member relationship	Targeted information & engagement activities — Channel	Lower energy tariffs for vulnerable groups — Benefit allocation
Addressing energy poverty in the organizational statutes — Purpose	Lower share prices for vulnerable groups — Benefit allocation	

Energy (in)justices can be context-specific and may differ from one cooperative to another. It's crucial to put yourself in the shoes of your members and stakeholders and gain an understanding of what they perceive as (in)justices.

Want an example? Check out the case card!

Design consideration

Examples of energy justice indicators from the literature are provided, offering parameters for readers to evaluate if there are injustices in their business model.

Design consideration

The "question note" encourages readers to think more deeply by posing questions and providing additional points for consideration.

EXERCISE

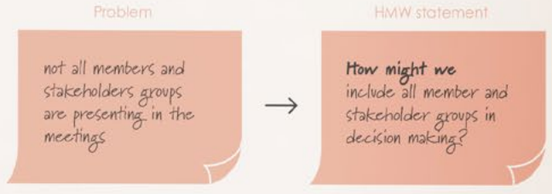
Ready? Let's brainstorm what we can do differently

Realizing there are injustices in your energy cooperative's business model might feel a bit discouraging at first, but it's actually a crucial starting point for unlocking its full social potential! Now, let's not dwell on these as mere "problems." Instead, we'll reframe them as potential "opportunities" and brainstorm ideas to change the key elements of your business model.

Exercise 4 **How do we make our business more just?**

① How might we...?

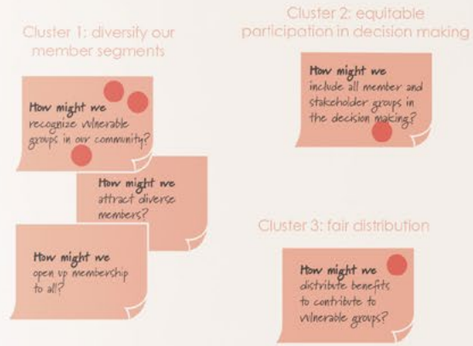
Review the injustices you've found in exercise 3, and let's reframe them into "How might we" statements. For instance, if you've identified a procedural injustice in the "governance" aspect, like "not all members and stakeholders groups are presenting in the meetings," let's turn it into an opportunity with a statement like "How might we include all member and stakeholder groups in decision-making?"



Take five minutes to individually write down at least three "How might we" (HMW) statements. Then, post them on the wall for everyone in the group to see. Feel free to build upon each other's ideas to create your HMW statements.

② Clustering & dot-voting HMW statements

If there are a lot of HMW statements, we'll begin by clustering them and consolidating overlapping ones to make the process more manageable. Afterward, each participant will be given dots to vote on the HMW statements they believe are the most important. In the end, there will be 1-3 chosen HMW statements.



③ Crazy 8's: idea generation

Now, we use Crazy 8's the generate ideas for the chosen HMW statements. Crazy 8's is a rapid sketching method that each person draws eight different ideas in eight minutes. The focus is on quantity, not perfection, so wild and imaginative ideas are encouraged. Remember, there's no need for the ideas to be perfect or practical – sometimes the wildest ideas can lead to unexpected innovations.

Fold an A4 paper into 8 sections

Set timer for 8 minutes

Draw an idea in one section until time's up

Design consideration

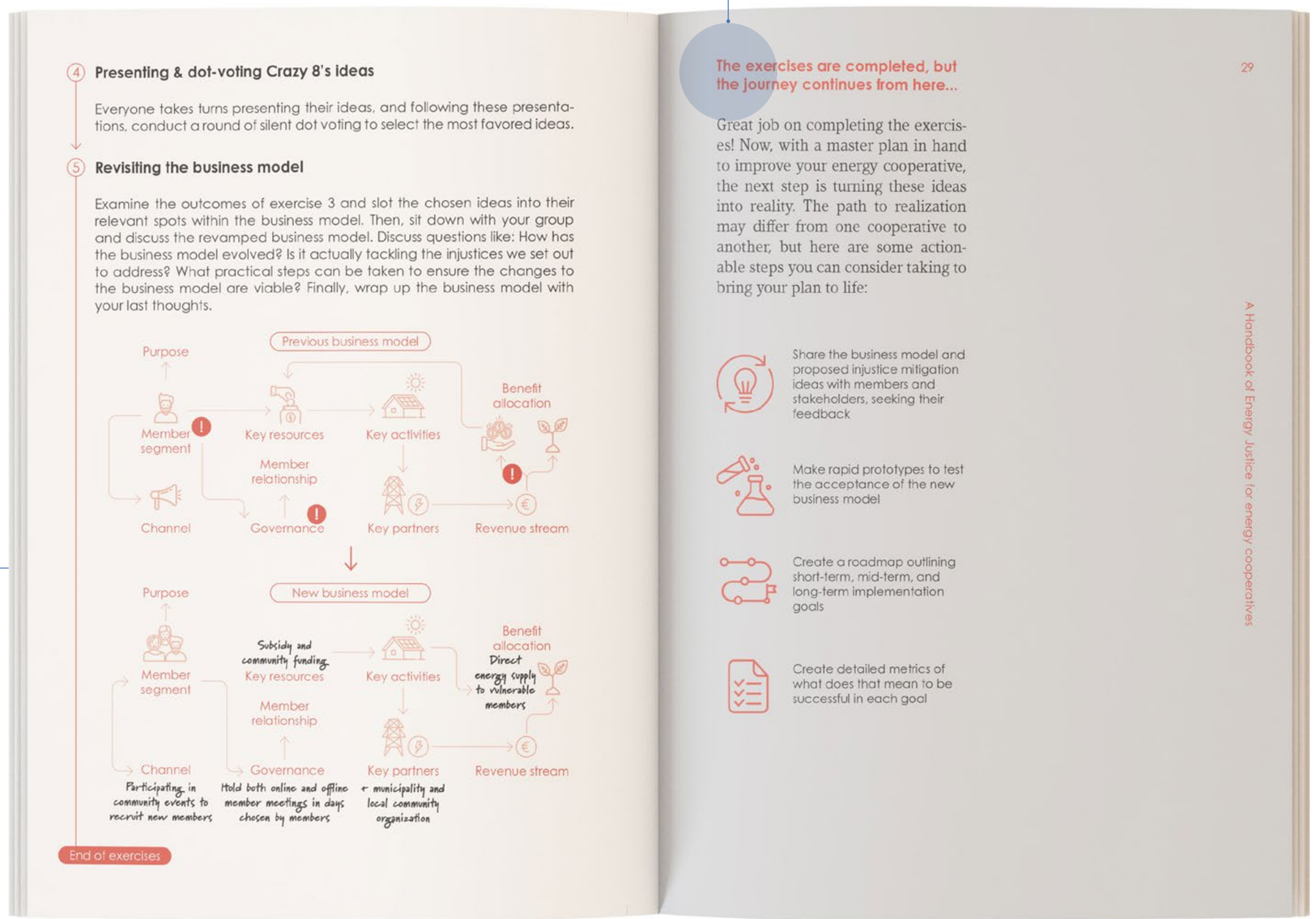
The "How Might We" method is applied here to encourage readers to think beyond the problems they encounter and explore the opportunities for change within these problems.

Design consideration

The discussion about injustice can often be challenging and detailed, sometimes ending without reaching possible solutions. The Crazy 8's method, commonly used in product design brainstorming to generate novel ideas quickly, is employed here to help readers purge obvious ideas and shift their mind to the solution space quickly. Multiple rounds of Crazy 8's can be conducted to elicit a wider range of diverse and innovative solutions.

Design consideration

An example of a modified business model is provided to illustrate how the actions to improve energy justice can be incorporated into the business model.

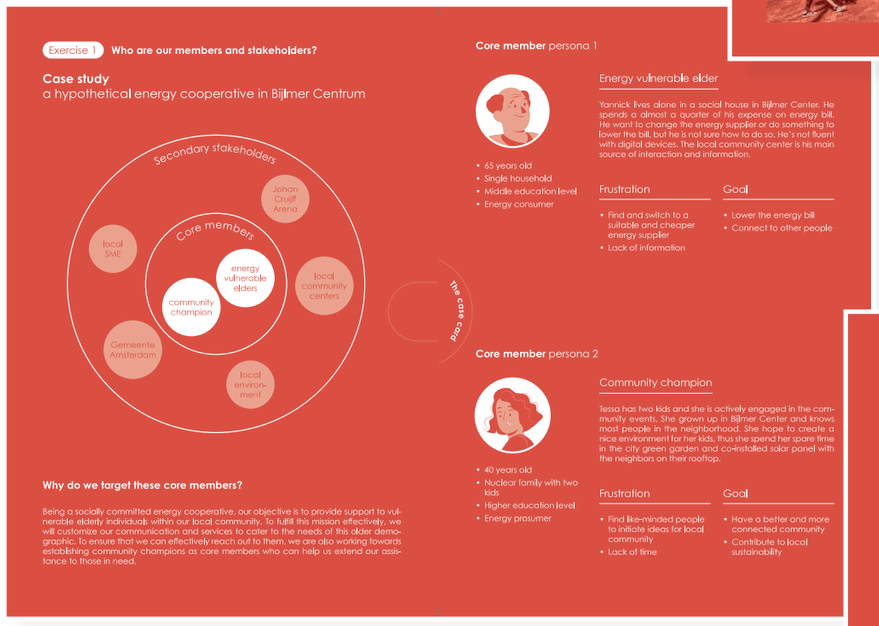


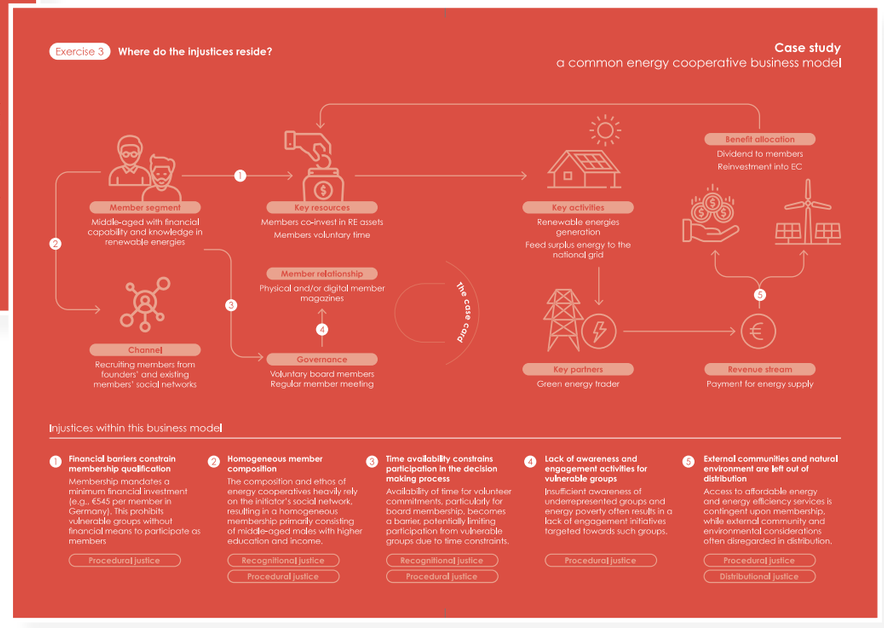
Design consideration

The end note emphasizes that completing the exercises is not the end of the process. To bring about change, there are further steps required to implement the new business model within the cooperatives. Common steps are listed here to assist readers in considering the actions they need to take from this point forward.

The case card

Three case cards are included to help readers better understand the presented concepts. The first case card illustrates how the three pillars of energy justice manifest in the context of the Bijlmer Centrum neighborhood. The second case card provides an example of how to create members' personas. The third case card uses a typical energy cooperative as an example to illustrate what a business model is and how to identify injustices within the model. These case cards are detachable so that readers can place them alongside the exercise templates while they are completing the exercises.





Part 5

Resources

The methods chosen in this handbook are not the only ones available to investigate energy justice, understand your members, and develop your business model. In the resources section, I have provided other existing tools that can help the readers gather more information and explore alternative approaches.


Tool to understand (potential) members

Home visiting

Visiting people in their homes can offer valuable, often unspoken insights into their living conditions. For instance, even homes with the same energy label may have varying levels of comfort due to factors like humidity and inadequate ventilation, which residents might not be aware of themselves.

However, gaining access to people's homes, especially for vulnerable groups, can be challenging. To overcome this hurdle, you can collaborate with local community organizations. For instance, the Quick Fix Brigade program at Groene Hub in Amsterdam Zuidoost conducts home visits to provide energy efficiency services. Energy cooperatives can reach out to these organizations to request permission to join these home visits, gaining a more real-world understanding of the needs of vulnerable groups.

Learn more about field research:

Community event

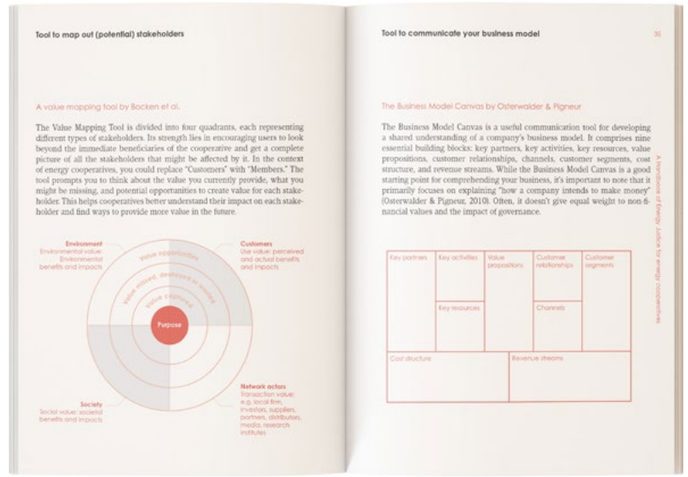
To connect with a diverse group of local residents, it's crucial not to rely solely on existing member networks or digital platforms, as they may exclude some community members. Attending local events can provide valuable insights into the neighborhood's makeup, residents' interests, and communication preferences.

Your level of involvement at these events should align with your agreement with the event organizer. You can choose to participate as an observer to understand the community dynamics. If the organizer allows you to promote your cooperative, consider preparing materials that can kick-start conversations. These materials can help you engage with residents and gain insights into their thoughts and concerns about energy. Rather than directly asking what they expect from your energy cooperative, focus on building connections and having meaningful discussions since their needs might not be immediately clear.

Survey

Conducting regular surveys can be a valuable tool to gather quantitative insights and stay in tune with your members' preferences. To ensure inclusivity, use both online and offline formats for the survey, as this helps overcome potential barriers related to digital literacy. When creating the survey, steer clear of jargon to make it accessible to everyone, and aim for a completion time of under 10 minutes.

If possible, consider including demographic questions on the survey, covering aspects like gender, age, migration background, income level, and more. This data can provide a better understanding of member diversity within your cooperative and aid in assessing your progress towards procedural justice.


Tool to map out (potential) stakeholders

A value mapping tool by Bocken et al.

The Value Mapping Tool is divided into four quadrants, each representing different types of stakeholders. Its strength lies in encouraging users to look beyond the immediate beneficiaries of the cooperative and get a complete picture of all the stakeholders that might be affected by it. In the context of energy cooperatives, you could replace "Customers" with "Members." The tool prompts you to think about the value you currently provide, what you might be missing, and potential opportunities to create value for each stakeholder. This helps cooperatives better understand their impact on each stakeholder and find ways to provide more value in the future.

Environment
Environmental value: Environmental benefits and impacts

Customers
Use value: perceived and actual benefits and impacts

Purpose

Society
Social value: societal benefits and impacts

Network actors
Transaction value: e.g. local firm, investors, suppliers, partners, distributors, media, research institutes

Tool to communicate your business model

The Business Model Canvas by Osterwalder & Pigneur

The Business Model Canvas is a useful communication tool for developing a shared understanding of a company's business model. It comprises nine essential building blocks: key partners, key activities, key resources, value propositions, customer relationships, channels, customer segments, cost structure, and revenue streams. While the Business Model Canvas is a good starting point for comprehending your business, it's important to note that it primarily focuses on explaining "how a company intends to make money" (Osterwalder & Pigneur, 2010). Often, it doesn't give equal weight to non-financial values and the impact of governance.

Key partners | Key activities | Value propositions | Customer relationships | Customer segments
Key resources | Channels
Cost structure | Revenue streams

Part 6

Template for exercises 1 & 3

To encourage the readers to quickly try out the exercises, I've provided blank templates for Exercise 1 and 3. These templates can be torn out from the handbook, making it easier for the readers to work with them.

Template: Exercise 1 **Who are our members and stakeholders?**

Secondary stakeholders

Core members

Why do we target these core members?

Core member persona 1

Name of the group:

Living conditions...

Key demographics features...

Frustration

Goal

Core member persona 2

Name of the group:

Living conditions...

Key demographics features...

Frustration

Goal

Template: Exercise 3 **Where do the injustices reside?**

Use → to illustrate the interaction of each element

Use ☺ to highlight where we've achieved justice

Use ! to pinpoint where injustices occur

Purpose | Governance | Key resources | Key activities | Benefit allocation

Member segment | Channel | Member relationship | Key partners | Revenue stream

Injustices within this business model

Where in the business model do these injustices occur? What type of injustice do they represent: recognitional, procedural, or distributional?

5.5

Evaluation of design iteration 2

Method

The evaluation process involves providing the handbook to respondents for them to read and test at their own pace. The respondents were chosen to represent two distinct audience groups for the handbook: designers and consultants interested in facilitating a just energy transition, and the general public interested in a fairer future energy. Notably, users from energy cooperatives were not included in the evaluation, primarily due to limited access to this specific group. A list of respondents is outlined in Table x. The evaluation process consisted of the following steps:

1. **Pre-reading survey**: Prior to reading the handbook, respondents were asked to complete a survey that assessed their familiarity with the topics covered in the handbook (energy cooperatives, energy justice, business model innovation) and provided demographic information such as migration background and age.

2. **During reading**: While reading the handbook, respondents were encouraged to jot down any questions, thoughts, or suggestions on sticky notes. They were also prompted to use the provided templates to try out the exercises individually or in a group setting.

3. **Post-reading survey**: After completing the handbook, respondents filled out a survey that gauged the usability, desirability, and viability of the handbook. This included questions to assess whether the handbook helped them understand the key topics, their willingness to try the exercises, and their confidence in using the exercises to effect change in business models. The questions are answered using 5-point Likert scale. Respondents were also asked for feedback on the content design (clarity, readability, structure) and graphical design (the design of removable case cards and exercise templates, colors, layout, etc). Additionally, respondents had the opportunity to suggest additional resources for inclusion in the handbook and share personal experiences related to energy (in)justice.

	Domain of expertise	Pre-existing familiarity with the topics			Background	Age
1	Strategic design	EC	EJ	BM	Non-western	20-29
2	Strategic design	EC	EJ	BM	Western	20-29
3	Strategic design	EC	EJ	BM	Non-western	20-29
4	Industrial design	EC	EJ	BM	Non-western	20-29
5	Biomedical engineering	EC	EJ	BM	Non-western	30-39
6	Mechanical engineering	EC	EJ	BM	Non-western	40-49
	Average	EC=2.33	EJ=1	BM=3.83		

EC= energy cooperative, EJ= energy justice framework, BM= business model innovation

= Very unfamiliar, = Unfamiliar, = Neutral, = Familiar, = Very familiar

Table 5. A list of respondents participated in the evaluation

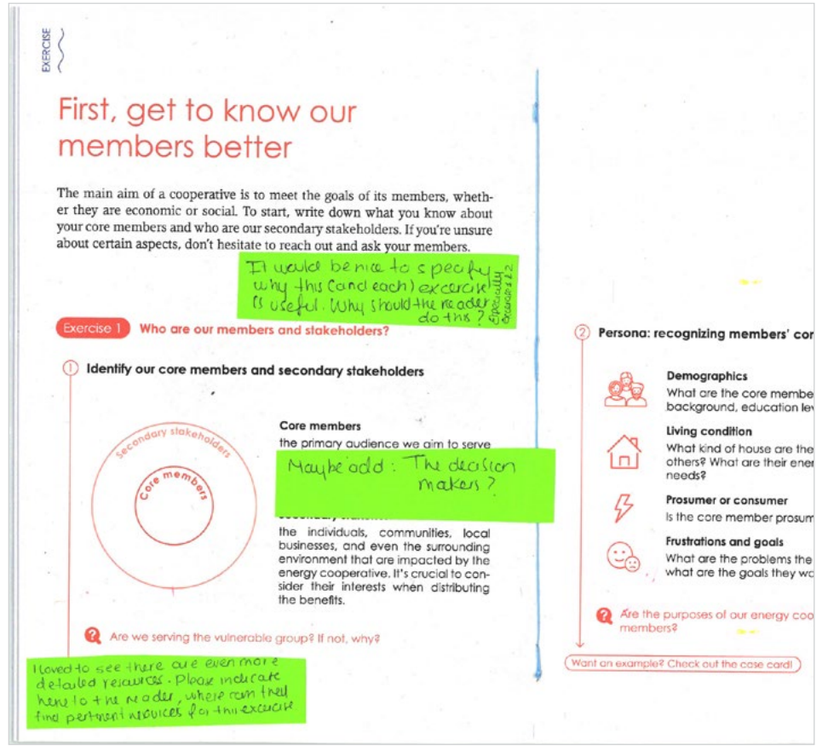


Figure 31. A respondents provided feedback in the handbook using sticky notes

Results

Understanding of the topics

Energy justice: Prior to the test, respondents had an average familiarity level of 1 (very unfamiliar) with the concept of energy justice. However, after engaging with the handbook, respondents reported a significantly improved understanding of the topic. The average response to the survey question "The handbook helps me understand the energy justice framework" was 4.5, indicating that respondents agreed or strongly agreed that the handbook aided their comprehension of the energy justice framework.

Energy cooperatives: Before the test, respondents generally had limited familiarity with the topic of energy cooperatives, with and average point of 2.33 (between unfamiliar to neutral). After reading the book, the average response to the survey question "The handbook helps me understand energy cooperatives" was 4.33. This indicates that the book effectively explained the topic in an understandable manner.

Business model innovation: Among the respondents, three individuals from the strategic design domain already had a high level of understanding of business model innovation prior to the test. Their responses varied, with one strongly agreeing, one agreeing, and one disagreeing that the handbook helped them understand the concept of business model innovation. For respondents who were less familiar with business model innovation, their feedback ranged from neutral to agreement, suggesting that the handbook aided their understanding of the concept.

Willingness to use the exercises

The average response to the survey question "I am willing to try out the exercises from the handbook" was 4.5, indicating a favorable attitude toward using the exercises. Respondents highlighted that the exercises were clear explained and the exercises are accessible and interactive. They also appreciated that the exercises included practical examples they could relate to.

" They are very well explained and made accessible by offering tools that are easy to understand."

- A feedback by respondent

Confident in making business model innovation

In response to the survey question, "I am confident in making changes to the business model using the exercises in the handbook," the average score was 4, indicating agreement with this statement. Respondents expressed appreciation for the step-by-step guidelines provided for mapping the business model and identifying opportunities for improvement. They found the exercises valuable in shedding light on various community complexities, fostering a deeper understanding of the situation.

However, it's important to note that confidence in effecting systematic change was not universally high. Respondents acknowledged that implementing significant changes can be challenging, often contingent on the organization's specific circumstances. Nevertheless, the overall sentiment expressed was positive, suggesting that the exercises in the handbook have the potential to inspire a proactive attitude toward business model innovation.

" I'm ready to start a change! But not exactly sure on how to implement it..."

- A feedback by respondent

Content and language usage

Overall, respondents found the book to be easy to read and comprehend. They appreciated the inclusion of examples and explanations throughout, which enhanced their understanding. Despite the comprehensive content, the book didn't feel overly long, and it effectively conveyed a substantial amount of information. Importantly, even respondents not familiar with the subject matter noted that the content allowed them to quickly empathize with energy-related topics.

" I was quite unaware of energy as a sector and fell much more empathetic towards the context quite quickly after reading the handbook"

- A feedback by respondent

For those less acquainted with the subject matter, suggestions were made to include a brief glossary explaining key terms used in the book. This would expedite their comprehension. Additionally, respondents recommended providing an example illustrating how a company could apply all the exercises to enhance their business model. Such an example would offer readers a clearer understanding of the entire process. Lastly, respondents expressed interest in having extra resources for guidance on the next steps following the exercises.

Exercise design

In general, respondents suggested several improvements for exercise design. These include indicating the estimated time required for each exercise and providing explanations of their purpose. Some specific concepts may benefit from examples, such as illustrating what could be the "rapid prototypes" for testing a new business model.

Regarding Exercise 1, respondents found it easy to understand, but there was a suggestion to include the identification of "decision makers" alone side with members and stakeholders. For Exercise 2, respondents recommended providing more support for readers when mapping their business models. Concerning Exercise 4, some respondents were unsure if they could complete the exercises individually or if they need to work in group. The set up of the exercise could be explain more explicitly to facilitate the implementation.

Book design

Overall, respondents praised the visual design of the handbook. They found it to be aesthetically pleasing and functional. The use of color was noted for giving the book a formal yet approachable appearance. The practicality of the design was highlighted, particularly due to the inclusion of case cards and tearable templates, which served as valuable guides throughout the process. Respondents appreciated that the case cards provided actionable insights and compelling examples that prompted critical thinking. The tearable templates were particularly beneficial as they allowed readers to easily engage in the exercises without the need for printing or assembling materials themselves.

" I loved that the case cards were detachable, so that I could keep the example at hand while doing the excercise"

- A feedback by respondent

Figure 32.
A respondent tried out the templates for exercise 1 (left) and exercise 3 (right).

5.6

Reflection on the handbook and recommendations for future design

In summary, the handbook effectively met the three key design criteria outlined in the design brief: 1) Initiating conversations about energy justice within the organization, 2) Offering clear guidance on creating a business model aligned with energy justice principles, and 3) Providing participants with a holistic understanding of where injustices may arise in their business model.

Successfully raising the awareness on energy justice

The handbook effectively fulfills its purpose of raising awareness about energy justice among its readers. Prior to reading, all respondents were unaware of the energy justice framework. They reported that the handbook significantly contributed to their understanding of the topic, enabling them to relate to it. This was primarily facilitated by the context section of the handbook and the case card detailing Bijlmer Centrum. To enhance future design, it is recommended to employ similar methods to introduce the topic and provide real-world examples to readers.

Before reading, some respondents intuitively associated energy justice issues primarily with impoverished communities and failed to establish a personal connection with the topic. Given that almost half of all Dutch households (48%) cannot independently participate in the energy transition within the built environment (Mulder et al., 2023), this issue should not feel distant. For future design, it is advisable to offer examples and implications of energy justice for various reader groups, making it easier for them to contextualize its relevance. Additionally, creating a platform for individuals to share their personal experiences with energy (in) justice could further raise awareness of the issue.

Create willingness and readiness to change

The evaluation results indicate that respondents are not only willing to engage with the exercises but also confident in their ability to implement business model innovations with the assistance of the handbook. This positive response can be attributed to the handbook's self-guided content structure and accessible language tone, making it suitable for a broad audience without the need for a facilitator. Its compact size serves as an initial catalyst for change, motivating readers to seek further resources on related topics.

However, it's essential to acknowledge that a single tool may not suffice to drive all the necessary changes. For future design considerations, it could be beneficial to expand the handbook into three separate volumes:

1. **Context and community preparation handbook**: This volume would delve into the context of energy justice, energy poverty, and the energy cooperative landscape. It would also guide organizations and communities on how to prepare for creating a just energy cooperative.

2. **Business model redesign handbook (Current Handbook)**: This volume focuses on the exercises and tools for redesigning the business model to achieve energy justice.

3. **Implementation handbook**: The third volume would provide guidance, real-world case studies, and practical steps on how to implement the proposed business model changes effectively.

By offering these three distinct resources, organizations and individuals can access the specific guidance they need at each stage of their journey

Business model innovation remains a challenging concept and exercise

Even with their higher pre-existing familiarity with business model innovation compared to energy justice and energy cooperatives, the respondents reported that mapping out the business model proved to be a formidable task, despite the guidance provided by the handbook.

This challenge can be attributed to the varied definitions and approaches to business model innovation within academia and practice. In practice, professionals often employ diverse methods for business model innovation, making it unclear whether a single approach could cater to the diverse situations of different energy cooperatives.

It's worth noting that having a facilitator to guide the business model innovation process was perceived as beneficial. For future design considerations, exercises 2 to 4 could be designed in a guided format, such as a workshop or video tutorial, to assist novice audiences in navigating the intricacies of business model innovation.

Expand the justice framework to other domains

While the energy justice framework primarily focuses on the context of energy services and policy-making, its three pillars (recognitional justice, procedural justice, and distributional justice) originate from the just transition theory, which encompasses a broader range of environmental and societal topics. These three pillars have the potential to be applied in areas beyond the energy sector where significant transitions are envisioned.

> ***" I can think of multiple scenarios to develop this model, not only in professional environments."***
>
> *- A feedback by respondent*

Respondents also recognized the versatility of the energy justice framework, noting its applicability in various scenarios, even beyond professional environments. This suggests opportunities to present the issue in a more personal context, resonating with a broader audience. For future design considerations, it is recommended to explore different application areas for the (energy) justice framework. Collaborating with practitioners and researchers in specific fields can provide valuable insights and facilitate the cross-pollination of knowledge.

Chapter 6

PROPOSAL: A PATHWAY TO BUILD A JUST BUSINESS MODEL FOR ENERGY COOPERATIVES

Chapter summary

Chapter 6 synthesizes the insights gleaned from the theory study, field research, and design phase. It offers a comprehensive three-phase pathway designed to assist energy cooperatives in preparing for, conducting, and implementing business model innovations that contribute to a just energy transition.

6.1

So how might we build a just business model for energy cooperatives?

Let's look at it as a journey...

Reflecting on my journey throughout this project, it's become clear that developing a fair business model for energy cooperatives is a multifaceted, long-term process. To convey the idea, let's look at it as a journey. Before we even begin making changes, we need to lay the groundwork and build the necessary momentum. After we've generated ideas for a new business model, there's a series of steps to navigate as we work toward bringing that model to life. The most exciting thing is that this journey isn't one you would undertake alone; you'll bring people along with you to build the future together.

Based on my experiences conducting research and design in this project, I'd like to offer some personal recommendations for designing a just energy cooperative business model:

Phase 1. Prepare the ground

Raise awareness of energy justice and energy poverty

Energy justice is still a relatively new concept that isn't on everyone's radar. This fact was reinforced by the survey conducted by Hanke et al. (2021), which found that 36% of the energy community doesn't address energy poverty simply because it's not discussed within their organizations. My own empirical insights from field research and design evaluation support this finding.

To get started, look for appropriate opportunities, channels, or media to introduce the topics of energy justice and energy poverty to your organization's members. Initiate discussions on what these concepts mean within the context of your energy cooperative. Seek to understand and adapt the energy justice framework to suit your cooperative's unique circumstances.

Recognize and empathize with the diverse groups of people

Recognizing and empathizing with the diverse groups of people in your community is essential for understanding what energy justice means to these various segments and how your energy cooperative can contribute to justice according to their unique needs. It's especially critical to proactively engage with vulnerable groups, as they often experience social isolation from the mainstream community.

To gather insights about these diverse groups, consider conducting street interviews, home visits, participating in community events, or using surveys. During this phase, gradually develop personas for different community groups and share your findings within the energy cooperative. Alternatively, involve cooperative members in the research process to help them empathize with these community members.

Demonstrate respect and embrace the existing circumstances of these groups. Avoid imposing changes that would force them to conform to the mainstream community. Instead, work collaboratively to find solutions that align with their specific situations.

Engaging with community and local champions

Connecting with the local community and local

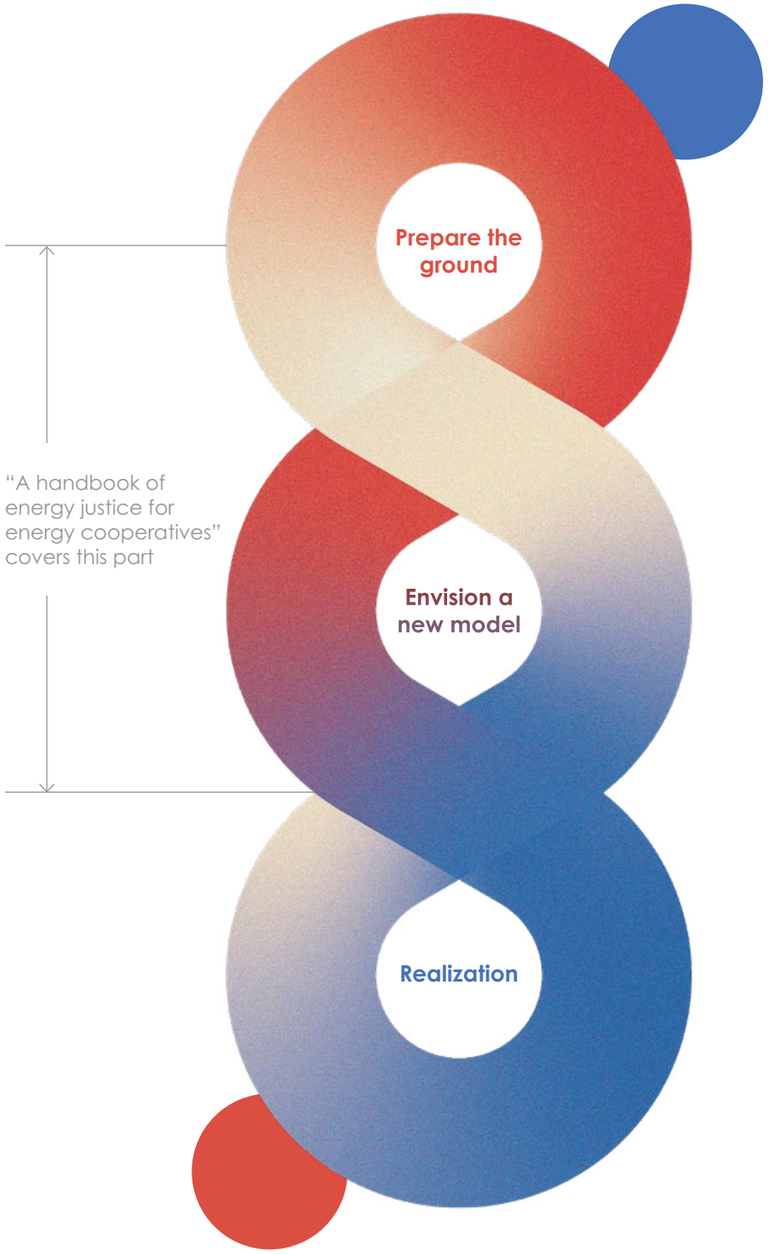


Figure 33. A proposed pathway to build a just business model for energy cooperatives

champions is crucial for the effectiveness of your social impact efforts. These existing communities and champions serve as a bridge to reach a broader audience that your energy cooperative may not yet be serving. Local champions are particularly valuable as they can guide you in connecting with vulnerable groups, understanding the local language and culture, and providing insights based on their years of experience in the community.

Once you've established rapport, engage in discussions with these local champions to gain a deeper understanding of how energy issues impact the local community. Brainstorm together to identify possible interventions that are suitable for the local context. Take this information back to your energy cooperative and initiate discussions on what the cooperative can do to benefit the community. This collaborative approach ensures that your initiatives are well-informed and aligned with the needs and realities of the local population. Early engagement with the local community will also facilitate the smoother implementation of new initiatives.

Cultivate motivation for change

It's important to understand the available resources and limitations of your energy cooperative. As mentioned in the literature review, some energy communities may not address vulnerable groups due to it not aligning with the cooperative's primary purpose or due to resource constraints. Engage in discussions with members about why energy poverty and energy justice haven't been addressed. Explore how the cooperative can strive for a more just energy transition by making positive impact locally. Plant the seed for change within the cooperative by envisioning a better and fairer future together.

Phase 2. Envision a new model

Understand the business model of your energy cooperative

After laying the foundation, it is time to bring the discussion about changing your business model to the meeting table. Sensitize your members by sharing the information you've gathered from previous phases. This includes your cooperative's perspective on energy poverty and energy justice, community member personas, local energy issues, and potential interventions suggested by locals. You can use exercises 1 and 2 from the handbook to facilitate this discussion.

Identify injustices within the business model

Examine the business model through the lens of the three pillars of energy justice and insights gathered from community field research. Document areas where the cooperative excels and where improvements are needed. Utilize exercise 3 from the handbook to identify injustices. Additionally, consider referencing resources like "The Energy Justice Workbook" and "Justice in 100 Scorecard" by the Initiative for Energy Justice. These resources primarily focus on governance and policy-making aspects of energy cooperatives, but they may need adaptation to suit the European context and your cooperative's specific circumstances.

Redesign the business model

With a clear understanding of where injustices exist within your business model, the next step is to brainstorm ideas to eliminate these issues. During this phase, members might feel overwhelmed by the problems they're facing. To keep the discussion productive, focus on potential solutions rather than getting bogged down in the complexity of the problems. Encourage members to build on each other's ideas to reach a consensus.

Exercise 4 from the handbook can be used to facilitate this discussion. Expect multiple rounds of discussion and iterations of the business model. Keep a record of the outcomes of each round, display them prominently in your workspace, and solicit feedback from members who weren't part of the discussions. By the end of this process, you should have a tentative vision of the new business model to aim for.

Phase 3. Realization

The path to realization may differ from one cooperative to another, but here are some actionable steps you can consider taking to bring your plan to life:

Create rapid prototypes

To test the acceptance of the new business model, consider creating rapid prototypes or pilot programs. These can be scaled-down versions of your proposed changes that allow you to assess their effectiveness and gather real-world feedback. This step is particularly valuable before implementing large-scale changes.

Develop a roadmap

Create a roadmap that outlines your implementation plan. Divide your plan into short-term, mid-term, and long-term goals. This roadmap will serve as a guide, helping you stay on track and measure progress along the way.

Define metrics for success

Establish clear and measurable metrics for success for each of your implementation goals. What specific outcomes do you want to achieve, and how will you measure them? Having well-defined metrics will help you track your progress and evaluate the impact of your changes.

Engage stakeholders

Keep your cooperative's members, local community, and other stakeholders engaged throughout the implementation process. Effective communication and collaboration are key to the effective implementation of the new business model.

Monitor and adapt

The result from the second phase is a tentative vision of the new business model, which has to be shaped by feedback and real-world implementation circumstances. Continuously monitor the progress of your implementation efforts and be prepared to adapt your plan as needed. Not everything will go according to plan, so being flexible and responsive to challenges is crucial.

Evaluate and share the experience

After implementing your changes, it's crucial to regularly evaluate their impact on energy justice and the well-being of the local community. Learn from both successes and failures to continuously refine your approach over time.

Sharing the knowledge gained throughout this process is of paramount importance, benefiting not only your local energy cooperative but also the wider academic and cooperative community. This path is rarely taken, and your journey toward a more just energy transition can serve as inspiration and guidance for others in their endeavors.

Chapter 7

DISCUSSION: REFLECTING ON RESEARCH OUTCOMES, LIMITATIONS, AND FUTURE RESEARCH

Chapter summary

Chapter 7 reflects on the project's answers to the research question, highlights three significant outcomes, acknowledges its limitations, and offers recommendations for future research. It also includes a personal reflection on the role of designers in fostering a just energy transition, ultimately concluding the entire project.

7.1

How each phase contributes to investigating the research question

Given that the project's approach evolved alongside the project's development, it is essential to assess how each phase contributes to addressing the research question and identify potential improvements at the project's conclusion.

Context research

Contextualize the research project and reframe the research question.

The objective of the context research phase is to gain a deep understanding of the context in which I am designing and formulate an appropriate research question for subsequent investigation. The concept of the energy cooperative was introduced through the LIFE project, but initially, it remained unclear how an energy cooperative could create social impact and contribute to a just energy transition. To address this uncertainty, I delved into the historical and current developments of the Dutch energy transition, exploring the potential roles energy cooperatives could play in this transformation. Following the context research phase, it became evident that the Netherlands lagged behind in transitioning to renewable energy, while energy cooperatives could be instrumental in fostering public acceptance of renewables and democratizing the energy sector, as exemplified by Denmark and Germany.. The context research serve as a crucial step to contextualize the research problem and ultimately it helped me to reframe the research question to "How might we build a just business model for energy cooperatives?"

Field research

Understand what energy justice means in the local context and the business model of LIFE energy cooperative.

Parallel to the context research phase, I initiated field research to gain insights into both the LIFE project and the local communities in Amsterdam Zuidoost. In this context, the LIFE project represents the potential managing body of the energy cooperative, while the residents and communities symbolize potential members. The field research served multiple objectives: 1) understanding the current development of the LIFE energy cooperative and its business model, 2) establishing rapport with local champions to obtain real-world insights from residents. As the theoretical phase approached, the field research's objective evolved to contextualize the energy justice theory within the local community setting.

In essence, the field research within the local community facilitated my comprehension of the residents' perspectives and allowed me to localize the energy justice framework. Looking back, I would consider engaging with individuals from existing energy cooperatives to cross-validate findings from the literature review and gather their insights on energy justice, which could provide a more comprehensive perspective.

Theory study

Making connections between energy justice and business model innovation

The theoretical phase commenced following the reframing of the research question. Initially, the research question revolved around the inclusivity of the energy cooperative business model, a topic with limited available literature. There was a lack of clarity regarding the definition of inclusivity or fairness within the context of energy cooperatives. Eventually, I discovered the energy justice framework and literature addressing how energy cooperatives address energy poverty, which formed the foundation for developing arguments about what constitutes a just business model. While I focused on the energy justice framework, my supervisory team also highlighted the weak connection between energy justice and business model innovation at that point. Merging these two fields became the most challenging yet exciting aspect of my research.

Identifying suitable theories to answer the research question proved to be a time-consuming task. In the end, I had to expedite the theory study with a rapid prototype to synthesize insights from both field research and theory research. This left limited room for in-depth exploration of each theory. For instance, the business model innovation aspect of the theory remained underdeveloped, which impacted the effectiveness of the design. Given the project's time constraints and inherent uncertainties, improvements in planning might be somewhat constrained.

Design phase

Testing and answering the "How" aspect of building a just business model for energy cooperatives

In the design phase, I transitioned from problem exploration to problem-solving, aiming to provide a tangible solution to help energy cooperatives create just business models. This phase aims to address the "How" aspect of the research question.

Throughout this process, I encountered several challenges. Unlike traditional product design, designing a just business model is highly conceptual, making it difficult to pinpoint a specific problem to address through design. This challenge may stem from my conventional design education, which often focuses on solving user problems, identifying market opportunities, or applying new technologies. Designing a just business model proved to be a complex task that necessitates deep involvements from various teams within the energy cooperative. The set up of the research project made it hard to have ample time with different teams from LIFE project to co-create the business model.

As the project evolved, I realized that it might be more effective to design a tool or framework for building just business models rather than crafting one exclusively for the LIFE project. This shift in perspective allowed me to anchor my design work in a space where I could make a more significant contribution as a strategic designer.

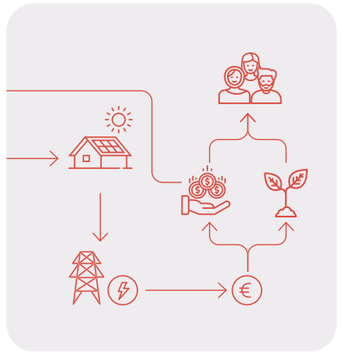
In hindsight, I believe that intermediate steps between the research and design phases could have helped define the design brief more clearly. Additionally, taking a teamwork approach involving multiple stakeholders from the energy cooperative could be more beneficial when addressing the challenges of redesigning the business model, rather than conducting it in an individual research setting.

7.2
Key outcomes of the project and their contributions

Outcome 1

A new approach to conceptualize energy cooperative business model

Diverging from traditional business model frameworks that typically provide a static portrayal of business components, this tool aims to depict the interconnections among various business model elements. Its purpose is to reveal the mechanisms through which injustices can potentially emerge within a business model.



Outcome 2

A handbook of energy justice for energy cooperatives

The handbook acts as a self-guided tool for readers to explore just energy transition, energy justice, and gain hands-on experience in business model innovation for energy cooperatives. The intended result is a deeper understanding of how the energy cooperative's business model influences energy (in)justice and how to redesign the model to contribute to a just energy transition.

Outcome 3

A proposed pathway to build a just business model for energy cooperatives

A conceptual pathway delineates the three phases of preparing, conducting, and implementing business model innovation within energy cooperatives. It accentuates the significance of actively involving cooperative members and engaging with local communities to seamlessly facilitate the transition towards a more equitable and just business model.

7.3
Limitations

Time and resource constrains

This project faced time and resource limitations. The master's thesis project spanned a relatively short timeframe of six months, and it was conducted by a single researcher. Additionally, my personal constraint of not being fluent in Dutch restricted my ability to interact effectively with certain resident groups. Furthermore, not residing locally prolonged the process of building rapport within the community.

It is essential to emphasize the importance of adequately preparing for such a project. In hindsight, I would recommend allocating an additional two months to initiate community involvement before commencing the research.

Limited generalization

It's important to note that the findings and recommendations of this project should be considered illustrative rather than universally applicable, primarily due to the small sample size and contextual specificity.

In terms of context, the project's insights and recommendations are rooted in the Dutch energy cooperative landscape. These findings may not be readily transferable to other regions or countries characterized by different energy systems, governance structures, and socioeconomic contexts. Regarding the design aspect, the evaluation involved a relatively small group of respondents. Conducting more extensive testing with a broader and more diverse audience could yield more robust feedback and further enhance the project's applicability.

Scope of the research

This research primarily aims to address the question of how to build a just business model for energy cooperatives. However, it acknowledges that to facilitate business model innovation, certain preparatory steps are necessary before the redesign phase, and implementation strategies are essential after the redesign.

This study predominantly focuses on the intermediate phase, which involves the actual redesign of the business model. It does not provide an exhaustive exploration of how to prepare the organization for innovation or how to effectively implement the new business model.

7.4

Recommendations for future research

A deeper intergration of justice framework and business model innovation

Presently, business model innovation and communication tools are predominantly focused on economic objectives, exemplified by the Business Model Canvas by Osterwalder & Pigneur (2010), or on social and environmental goals, as demonstrated by tools like the Value Mapping Tool by Bocken et al. (2013) and the Triple Layered Business Model Canvas by Joyce & Paquin (2016). However, discussions around business model innovation rarely incorporate the dimension of justice. While businesses may achieve economic, social, and environmental success, the extent to which they contribute to a just transition remains unclear. Given the global momentum towards creating more equitable social and economic systems, businesses may find themselves lacking adequate tools to reinvent their models and prepare for these transformative changes.

In my research, I explore the potential for energy cooperatives to achieve energy justice by redesigning elements of their business models. Currently, the tools provide initial insights into conceptualizing the interplay between energy justice and business model innovation. However, there is ample room for further research to explore pathways and frameworks that facilitate a more robust integration of these two fields for a broader types of business and organization.

Furthermore, the empirical insights from the study reveal that the process of modifying a business model remains a challenging endeavor, even for strategic designers well-versed in the concept. While business model innovation is a well-studied field, it is evident that more research and experimentation are required to propose a tool that is accessible to novice users, particularly those from energy cooperatives.

Understand individual users v.s. Understand people & communities

During my field research in Beijlmer Centrum, I found that applying traditional user research methods to study the community's people was counter-intuitive. In the end, I didn't employ methods like interviews or focus groups, and upon reflection, I identified several reasons for this.

First, traditional user research methods often aim to extract specific user needs and desires within a particular context. For example, they might focus on a user's needs during their daily commute. These insights are then used to create product or service specifications. However, this approach tends to overlook broader aspects of the user's identity. Because energy cooperatives are deeply embedded in existing communities, it's crucial to comprehend a person as a whole and understand their community. These communities come together not because of the products or the market segment their are in, but due to shared cultural backgrounds, social goals, and often similar difficult life experiences. Hence, in the initial stages of this project, my goal was to understand not what people need but who they are as individuals and how they relate to their communities.

Second, the traditional user research process can sometimes feel extractive. It's designed to efficiently gather insights, leaving little room to build rapport before the inquiry or maintain relationships afterward. This is particularly problematic in Beijlmer Centrum, where residents have experienced repeated research efforts by various institutes from outside the community. Researchers often come and go, and trust is challenging to establish. Previous research fellows reported difficulties engaging with residents, and the partner institutes of the LIFE project faced similar challenges.

In my research, I adopted a more observational approach. Initially, instead of conducting user research to uncover unmet needs, I start with searching for better approaches and communication methods for conducting user research. I established a connection with a local contact, the energy coach, to initiate this approach. A similar approach was used by another fellow master student researching another community. In hindsight, we recognized that our gender and age – being female and younger than community members – played a positive role in our engagement with the community. We were perceived as less threatening and more empathetic.

This led us to question whether our somewhat successful engagement experiences with the community could be generalized into a tool to assist designers working in this field. Further research is needed to reshape traditional user research methods to enable designers to design for both individuals and communities effectively.

Expanding pathways for participation in energy transition: The open source energy cooperative approach

While this research primarily focused on enhancing the inclusivity of energy cooperatives to embrace vulnerable groups and promote energy transition, there are alternative avenues to democratize participation in this transition. Beyond the proposed changes to business models based on energy justice principles, there's the possibility of exploring an "open source" approach to establishing energy cooperatives. This approach would empower individuals and communities to "DIY" and initiate their own local energy cooperatives more easily, thus democratizing access to energy transition initiatives.

In the current landscape, the process of setting up an energy cooperative can be complex and opaque, requiring substantial time and commitment from those interested in establishing one. This complexity adds an extra layer of challenge on top of the financial considerations. While subsidies are theoretically available in the Netherlands to support energy cooperatives, navigating the application process can prove to be a daunting task.

Future research could delve into the concept of "open sourcing" the knowledge and resources required for initiating energy cooperatives. This might involve making information about securing subsidies or alternative financial resources, technical and legal aspects of cooperative establishment, and community engagement strategies more accessible. By simplifying these processes and providing tools to guide initiators, a more inclusive and just approach to energy transition could be fostered, empowering a wider range of communities to participate in the energy transition movement.

DISCUSSION

7.5

Reflecting on the role of (strategic) designers in a just energy transition

Raising awareness of energy justice through design

Previous research has shown that one major reason energy poverty or the needs of vulnerable groups are not addressed within energy cooperatives is that these topics are often not even discussed within the organization. The surprising lack of awareness explains the slow progress in fulfilling the social role of energy cooperatives. As organizations increasingly seek contributions from designers, whether in designing a better user experience or crafting innovative strategies, designers can play a crucial role in creating awareness about energy justice issues through their work and establish a new paradigm by incorporating justice into their practice.

Champion the recognitional justice through user-centric mindset

Designers are trained to place people at the center of their work. We often ask questions like "How might we meet users' needs?" rather than focusing solely on profit. This fundamental designer's mindset positions us well to understand and research recognitional justice. Designers can adapt user research approaches to help organizations gain a deeper understanding of the living conditions of vulnerable groups. Effective communication tools like personas and storyboards can be employed to help teams empathize with the living conditions of these individuals.

Foster procedural justice through participatory design

An essential aspect of procedural justice revolves around engaging all stakeholders in an equitable decision-making process. Designers possess the means to address this challenge. Over the years, participatory design has evolved, enabling organizations to open up their design and decision-making processes to a wider array of stakeholders. Currently, energy cooperatives often engage their members in decision-making through online or off-line gatherings to vote on important issues. However, there may be more opportunities and occasions to involve members beyond voting. Strategic designers can introduce and experiment with participatory design tools to help energy cooperatives engage their members more effectively, thereby enhancing procedural justice.

Bridging the gap between insight and impact

In the energy sector, a wealth of data and insights are generated daily. Data analysts can reveal consumption patterns, grid operators can predict electric grid congestion, and energy cooperatives can gather information about their members. However, the critical question remains: what do we do with these insights? Designers, with their unique skill set, are experts at translating insights into concrete actions. They are adept at turning data into meaningful solutions. In the context of the energy transition, this ability to visualize possibilities and offer actionable scenarios is invaluable. Designers can take the lead in synthesizing insights and transforming them into practical initiatives that empower individuals and communities to act in the direction of a just energy transition.

DISCUSSION

7.6

Conclusion

In the Netherlands, approximately half of the population is unable to actively participate in the ongoing energy transition currently. Citizen-owned energy cooperatives presents the opportunities to create the pathway for inclusive participation in the energy transition. However, it's evident that participation in these energy cooperatives is currently limited to social groups with greater financial resources, leading to a fundamental research question: How might we build a just business model for energy cooperatives?

This project bridges the realms of theory and empirical research in the domains of energy justice, business model innovation, and cooperative design. It unveils the inherent injustices reside within traditional energy cooperative business models through the utilization of a novel business model analysis tool. Furthermore, it integrates the principles of energy justice with the methodologies of business model innovation to facilitate the development of a just business model. To enable practical action, it provides a comprehensive handbook tailored for energy cooperatives, serving as a versatile guide for igniting transformative changes. In the end, it proposes a conceptual pathway that serves as a guide for embarking on the journey of business model redesign.

Amidst the ongoing shift toward a decentralized and democratized energy landscape, with local energy cooperatives will play a critical role, this project provides insights into inclusive participation through innovative and just business models.

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Designing a just business model for citizen-owned energy cooperatives

APPENDIX

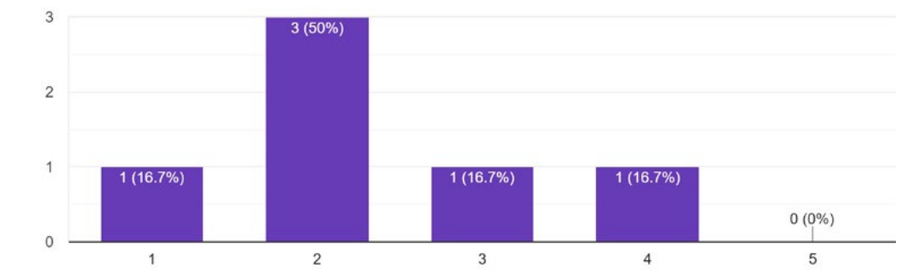
A Master's Graduation Thesis

Chia-Yu Lin
September 2023

Feedbacks on design iteration 2: results of pre-testing survey

I am familiar with energy cooperative

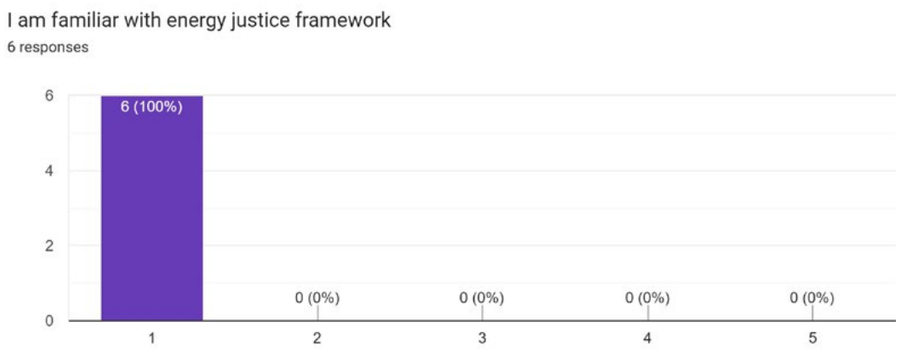
6 responses



1 = Very unfamiliar
2 = Unfamiliar
3 = Neutral
4 = Familiar
5 = Very familiar

I am familiar with energy justice framework

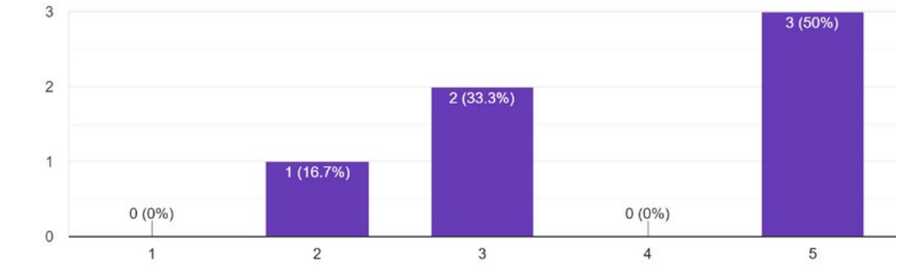
6 responses



1 = Very unfamiliar
2 = Unfamiliar
3 = Neutral
4 = Familiar
5 = Very familiar

I am familiar with business model innovation

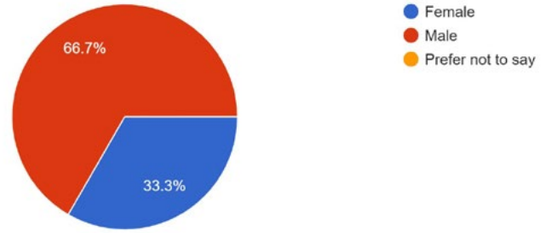
6 responses



1 = Very unfamiliar
2 = Unfamiliar
3 = Neutral
4 = Familiar
5 = Very familiar

Gender

6 responses



Nationality

6 responses

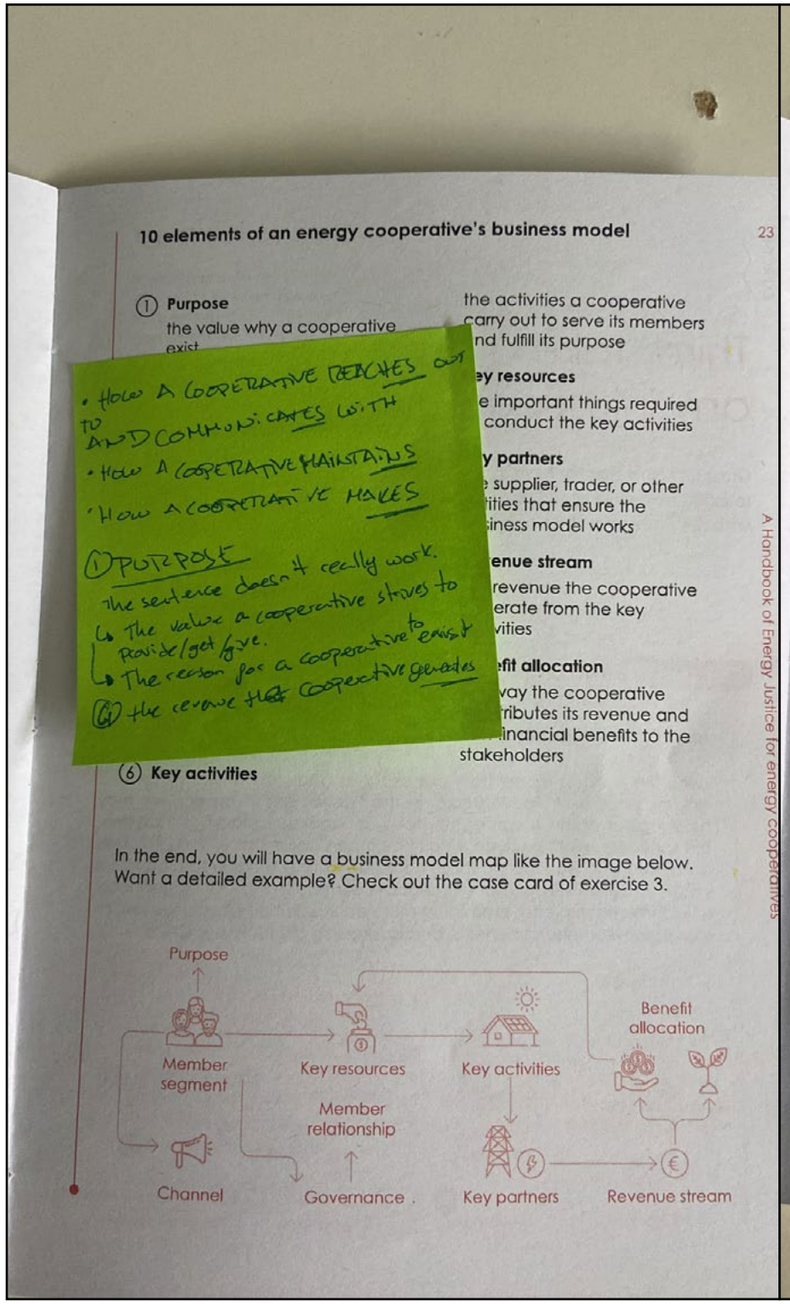
- Colombian
- Spanish
- Chilean
- Indian
- Taiwan
- Netherlands

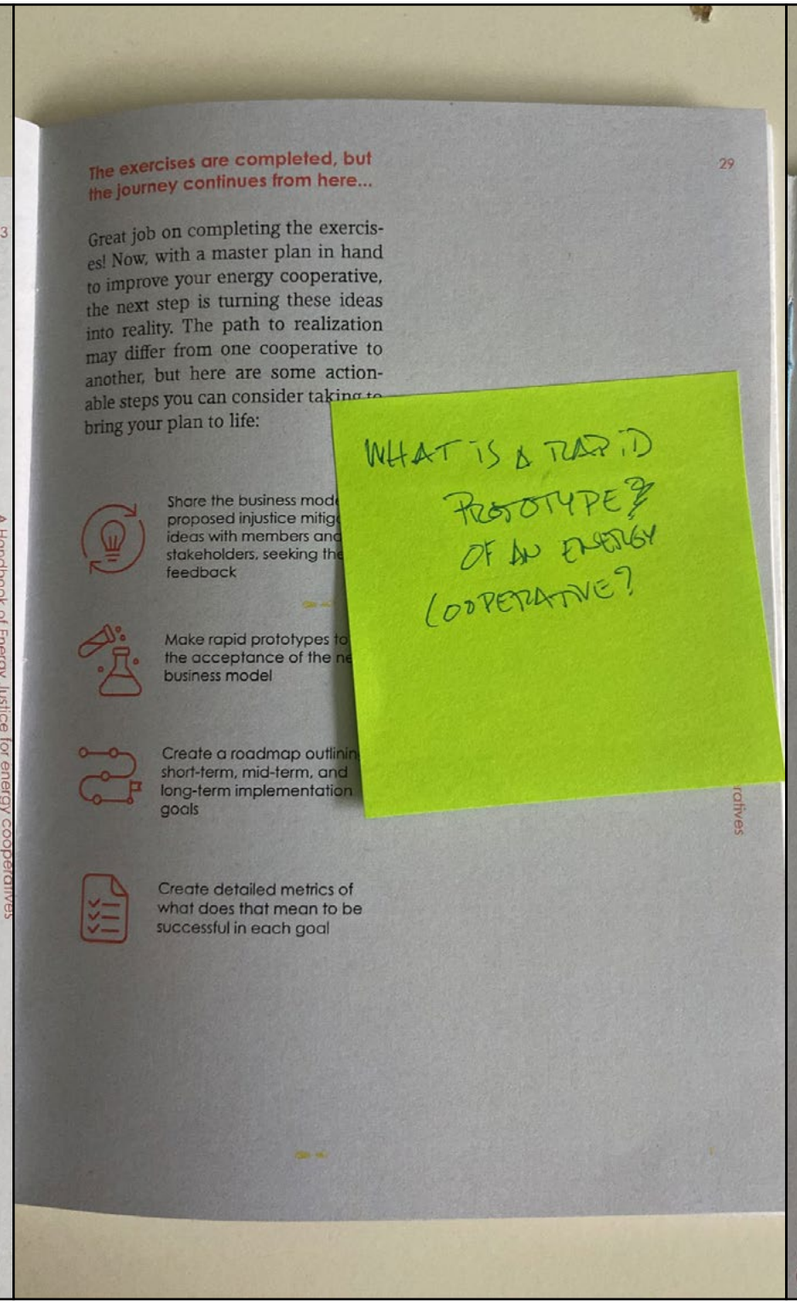
Migration background

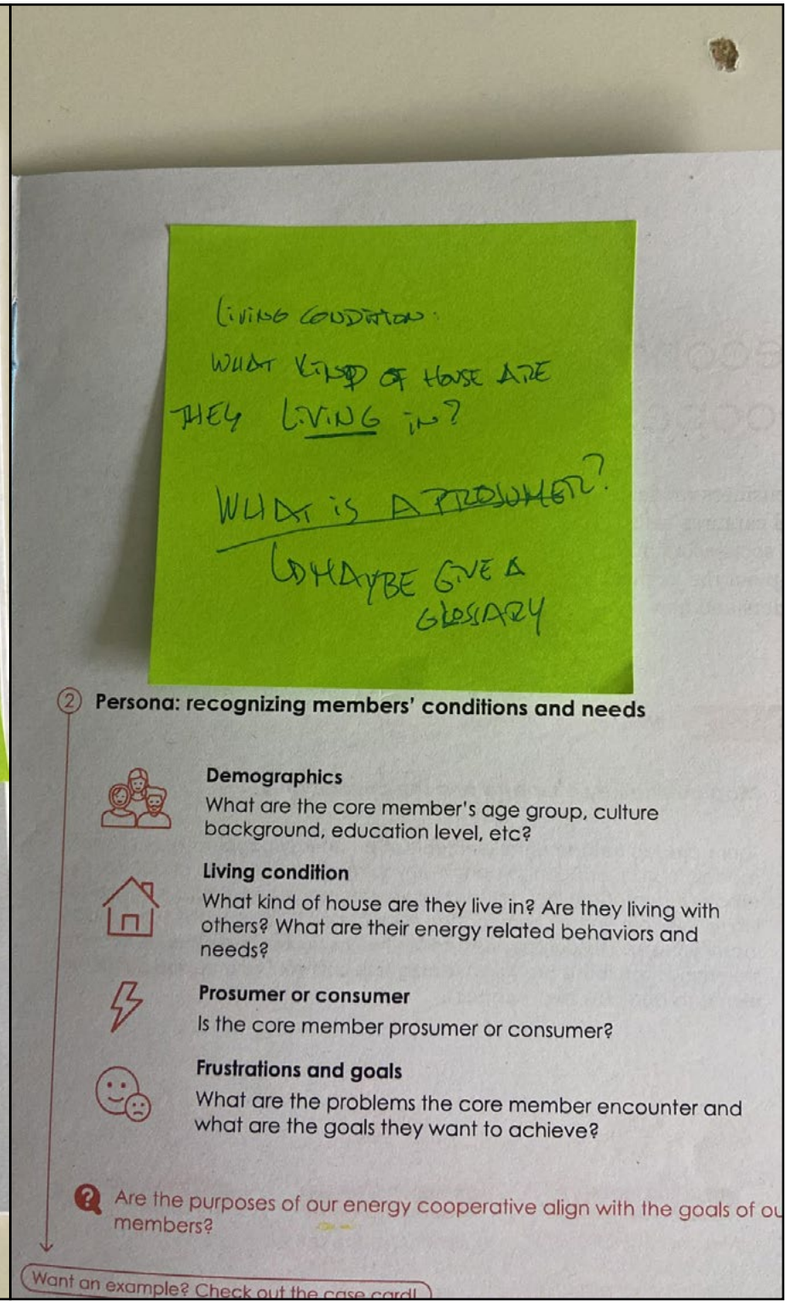
4 responses

- Colombia
- Spain
- Chile
- Hong Kong

Feedbacks on design iteration 2: respondents' works on the hand book







The goal of the handbook

Could we achieve environmental and social sustainability simultaneously? The answer is a resounding "YES!" Energy cooperatives are the heroes driving the shift towards renewable energy and bringing communities together through local initiatives. But many of these heroes are grappling with the challenge of understanding the needs of vulnerable groups, recognizing the untapped social potential in their current practices, and crafting an action plan for changes.

'grappling' is a bit of a high level word. Try. 'facing the challenge'

This handbook is here to assist energy cooperatives in playing their part in creating a fair transition towards cleaner energy. By combining energy justice framework, business model innovation, and design thinking tools, the handbook helps energy cooperatives reveal how their practice affect energy fairness and use tools to make their approach better match their social goals. Together, we can make a successful business also a fair one!

→ 'A' energy justice framework / 'The' energy justice framework / energy justice framework 's' } which?

'affects' | I love this introduction, it is super clear!

Who are the handbook for

1. Initiators and boards of energy cooperatives
2. Designers and consultants facilitating just energy transition
3. General publics who are interested in a fairer future energy

When to use the handbook

1. Initiating a new energy cooperative
2. Evaluating and reinventing the existing energy cooperative

What is the expected outcome

to gain a better grasp of how your energy cooperative's business model impacts energy (in)justice and to discover ways to adjust the model in order to achieve your social objectives in a just energy transition.

CONTEXT

Why does energy justice matter?

The concept of energy justice plays a pivotal role in the overarching just transition towards a low-carbon regenerative economy. This transition signifies a departure from the prevailing extractive economy that relies on the depletion of natural resources, which has perpetuated pervasive inequalities. Aligned with the movements for environmental justice and climate justice, energy justice strives to ensure equitable access to safe, affordable, and sustainable energy for all individuals, regardless of their social background and geographical location.

Carley and Konisky characterize a just energy transition as a scenario in which

1. affordable, dependable, and clean energy services are accessible to all
2. active participation in decision-making related to energy system transformations is open to all
3. there is acknowledgment of the challenges associated with energy poverty and disparities in opportunities within the transition process

"Almost half of all Dutch households (48 %) cannot participate in the energy transition in the built environment on their own."

-Mulder et al., 2023

The energy justice framework serves as a critical tool for assessing whether the transition from an extractive economy to a low-carbon regenerative one truly embodies justice or unintentionally upholds injustices inherited from the previous system.

I love this context! Super clear & short!

Reading guide

Add bold to section names so that it's cleaner

The handbook is divided into three sections: context, exercise, and resources. In the context section, you'll find an explanation of the relevance of energy justice and its three important pillars. The exercises section introduces four hands-on activities to help you assess your energy cooperative and brainstorm ways to make it fairer. The resources section provides extra tools to support the exercises. The Case Cards showcase examples to illustrate the concepts in action. By blending theory with practical cases, the handbook encourages you to roll up your sleeves and start reshaping your energy cooperative!

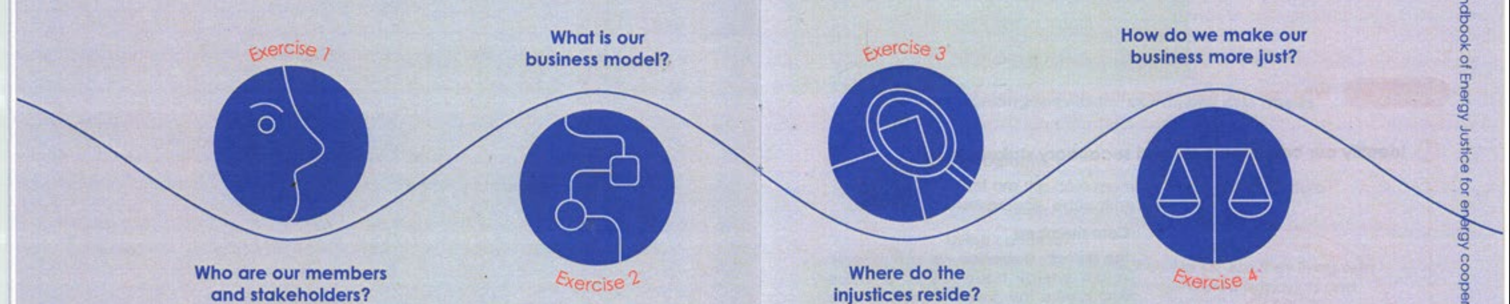
→ Needs a bit of connection: 'Additionally the ~~case cards~~ handbook includes three case card...'

Catching typo! 'Resources' I think we miss a case card

Exercise guide

Maybe 'overview'

The Exercise section comprises four activities designed to assist you in gaining a comprehensive understanding of your members and business model, thereby addressing potential injustices within the energy cooperative. Each cooperative is unique in its development stage, so you can choose the exercise that best suits your current situation. For instance, if you already have a good grasp of your members, stakeholders, and business model, you can jump directly to Exercise 3, which focuses on identifying injustices. Take a look at the key questions for each exercise below and start with the unanswered questions that you aim to tackle.



KEY QUESTIONS

Exercise 1
- Who are our core members and secondary stakeholders?
- What are the living condition of our members?
- What are the frustrations and goals of our members?

Exercise 2
- How does our energy cooperative work?
- What are the key elements of our business model?
- How do the elements effect each other?

→ **Start with exercise 2** if you already have understandings of your members & stakeholders

Exercise 3
- What do we do well in energy justice currently?
- Which part of our business model may contribute to injustices?
- What are the indicators of injustice?

→ **Start with exercise 3** if you already have business model of the cooperative

Exercise 4
- What ideas do we have to remove the injustices in our energy cooperative?
- How does incorporating the ideas reflect on our business model?

→ **Start with exercise 4** if you already identify injustices in the business model of the cooperative

First, get to know our members better

The main aim of a cooperative is to meet the goals of its members, whether they are economic or social. To start, write down what you know about your core members and who are our secondary stakeholders. If you're unsure about certain aspects, don't hesitate to reach out and ask your members.

It would be nice to specify why this (and each) excercise is useful. Why should the reader do this? Especially excercise 1 & 2

Exercise 1 Who are our members and stakeholders?

① Identify our core members and secondary stakeholders

Core members
the primary audience we aim to serve

Maybe add: The decision makers?

Secondary stakeholders
the individuals, communities, local businesses, and even the surrounding environment that are impacted by the energy cooperative. It's crucial to consider their interests when distributing the benefits.

Are we serving the vulnerable group? If not, why?

I loved to see there are even more detailed resources. Please indicate here to the reader, where can they find pertinent resources for this excercise

② Persona: recognizing members' conditions and needs

Demographics
What are the core member's age group, culture background, education level, etc?

Living condition
What kind of house are they live in? Are they living with others? What are their energy related behaviors and needs?

Prosumer or consumer
Is the core member prosumer or consumer?

Frustrations and goals
What are the problems the core member encounter and what are the goals they want to achieve?

Are the purposes of our energy cooperative align with the goals of our members?

Want an example? Check out the case card!

Ready? Let's brainstorm what we can do differently

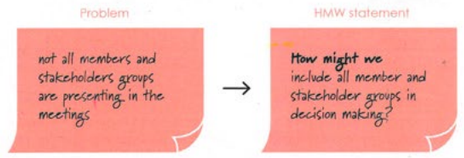
Realizing there are injustices in your energy cooperative's business model might feel a bit discouraging at first, but it's actually a crucial starting point for unlocking its full social potential! Now, let's not dwell on these as mere "problems." Instead, we'll reframe them as potential "opportunities" and brainstorm ideas to change the key elements of your business model.

Exercise 4 How do we make our business more just?

This is really clear. I like it a lot.

① How might we...?

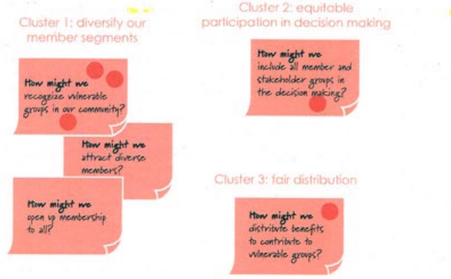
Review the injustices [illegible] into "How might we" statements. For instance, if you've identified a procedural injustice in the "governance" aspect, like "not all members and stakeholders groups are presenting in the meetings," let's turn it into an opportunity with a statement like "How might we include all member and stakeholder groups in decision-making?"



Take five minutes to individually write down at least three "How might we" (HMW) statements. Then, post them on the wall for everyone in the group to see. Feel free to build upon each other's ideas to create your HMW statements.

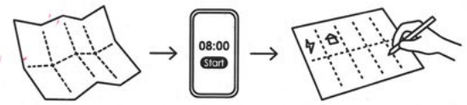
② Clustering & dot-voting HMW statements

If there are a lot of HMW statements, we'll begin by clustering them and consolidating overlapping ones to make the process more manageable. Afterward, each participant will be given dots to vote on the HMW statements they believe are the most important. In the end, there will be 1-3 chosen HMW statements.



③ Crazy 8's: idea generation

Now, we use Crazy 8's the generate ideas for the chosen HMW statements. Crazy 8's is a rapid sketching method that each person draws eight different ideas in eight minutes. The focus is on quantity, not perfection, so wild and imaginative ideas are encouraged. Remember, there's no need for the ideas to be perfect or practical – sometimes the wildest ideas can lead to unexpected innovations.



Fold an A4 paper into 8 sections

Set timer for 8 minutes

Draw an idea in one section until time's up

Third, take a closer look for any injustices

Great job! Now that we have a clear blueprint of our business model, it's time to examine it closely and check if there are any aspects that might not align with the three principles of energy justice.

Exercise 3 Where do the injustices reside?

① Identify the (in)justices in the business model

Using the business model from exercise 2 as a foundation, let's explore if any injustices exist. For example, in the "governance" aspect, we may hold regular online member meetings on weekday mornings. However, this schedule might exclude elderly members unfamiliar with digital tools and those who work during those hours, potentially leading to procedural injustice. Conversely, we could allocate some earnings to support local environmental projects, promoting more equitable benefits distribution, including environmental benefits, and addressing distributional justice.

Indicators for energy justices

If you're unsure about other examples of (in)justices, you can refer to a list of energy justice indicators developed by Hanke et al. (2021). Each indicator is relevant to different aspects of the business model. For instance, you can assess the "member diversity" indicator by examining the composition of the "member segment" within the business model.

Recognitional justice	Procedural justice	Distributional justice
Level of knowledge about energy poverty — Governance	barriers ion by:	Member diversity — Member segment
Level of knowledge about preferences, needs and living situation of energy poor households — Governance	d fees	Energy efficiency services targeted at vulnerable groups — Key activities — Benefit allocation
Engagement with energy poor households — Channel — Member relationship	mation ment	Lower energy tariffs for vulnerable groups — Benefit allocation
Addressing energy poverty in the organizational statutes — Purpose	prices groups	

This is written from a solution perspective. Consider rephrasing? Otherwise it's overlapping with exercise 4

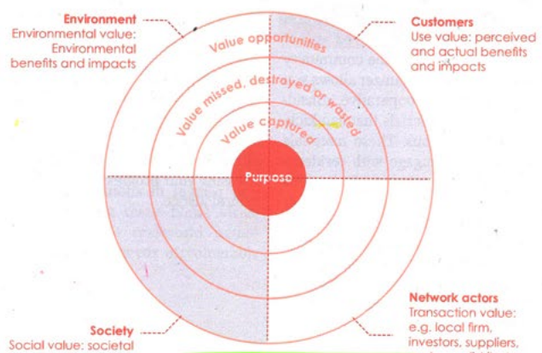
Energy (in)justices can be context-specific and may differ from one cooperative to another. It's crucial to put yourself in the shoes of your members and stakeholders and gain an understanding of what they perceive as (in)justices.

Want an example? Check out the case card!

Tool to map out (potential) stakeholders

A value mapping tool by Bocken et al.

The Value Mapping Tool is divided into four quadrants, each representing different types of stakeholders. Its strength lies in encouraging users to look beyond the immediate beneficiaries of the cooperative and get a complete picture of all the stakeholders that might be affected by it. In the context of energy cooperatives, you could replace "Customers" with "Members." The tool prompts you to think about the value you currently provide, what you might be missing, and potential opportunities to create value for each stakeholder. This helps cooperatives better understand their impact on each stakeholder and find ways to provide more value in the future.

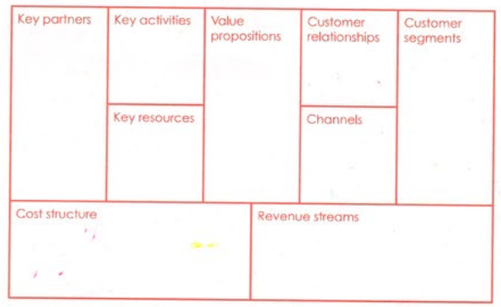


I would need an example at this, it is not too clear for me how to apply it in the excercise.

Tool to communicate your business model

The Business Model Canvas by Osterwalder & Pigneur

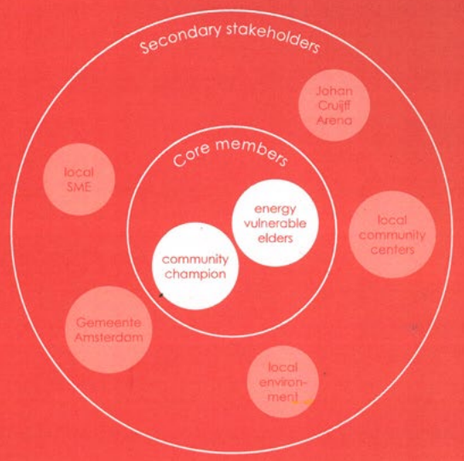
The Business Model Canvas is a useful communication tool for developing a shared understanding of a company's business model. It comprises nine essential building blocks: key partners, key activities, key resources, value propositions, customer relationships, channels, customer segments, cost structure, and revenue streams. While the Business Model Canvas is a good starting point for comprehending your business, it's important to note that it primarily focuses on explaining "how a company intends to make money" (Osterwalder & Pigneur, 2010). Often, it doesn't give equal weight to non-financial values and the impact of governance.



Exercise 1 **Who are our members and stakeholders?**

I like this!

Case study
a hypothetical



the case club

Why do we target these core members?

Being a socially committed energy cooperative, our objective is to provide support to vulnerable elderly individuals within our local community. To fulfill this mission effectively, we will customize our communication and services to cater to the needs of this older demographic. To ensure that we can effectively reach out to them, we are also working towards establishing community champions as core members who can help us extend our assistance to those in need.

Core member persona 1

Energy vulnerable elder

Yannick lives alone in a social house in Bijlmer Center. He spends a almost a quarter of his expense on energy bill. He want to change the energy supplier or do something to lower the bill, but he is not sure how to do so. He's not fluent with digital devices. The local community center is his main source of interaction and information.

- 65 years old
- Single household
- Middle education level
- Energy consumer

Frustration

- Find and switch to a suitable and cheaper energy supplier
- Lack of information

Goal

- Lower the energy bill
- Connect to other people

Core member persona 2

Community champion

Tessa has two kids and she is actively engaged in the community events. She grown up in Bijlmer Center and knows most people in the neighborhood. She hope to create a nice environment for her kids, thus she spend her spare time in the city green garden and co-installed solar panel with the neighbors on their rooftop.

- 40 years old
- Nuclear family with two kids
- Higher education level
- Energy prosumer

Frustration

- Find like-minded people to initiate ideas for local community
- Lack of time

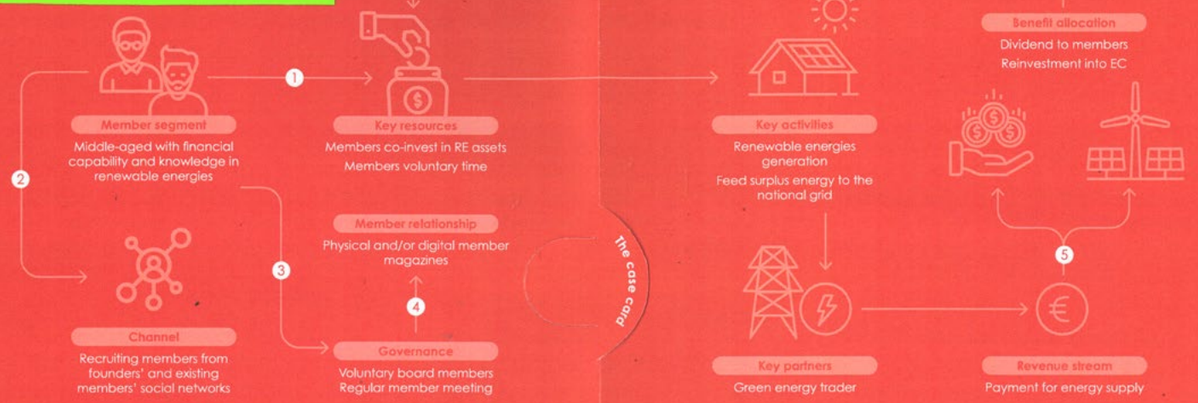
Goal

- Have a better and more connected community
- Contribute to local sustainability

Exercise 3 **Where do the injustices reside?**

Super clear! ♡

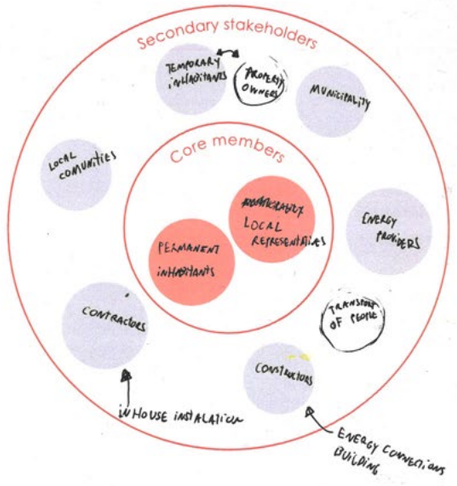
Case study
a common energy cooperative business model



Injustices within this business model

1. **Financial barriers constrain membership qualification**
   Membership mandates a minimum financial investment (e.g., €545 per member in Germany). This prohibits vulnerable groups without financial means to participate as members
   Procedural justice
2. **Homogeneous member composition**
   The composition and ethos of energy cooperatives heavily rely on the initiator's social network, resulting in a homogeneous membership primarily consisting of middle-aged males with higher education and income.
   Recognitional justice
   Procedural justice
3. **Time availability constrains participation in the decision making process**
   Availability of time for volunteer commitments, particularly for board membership, becomes a barrier, potentially limiting participation from vulnerable groups due to time constraints.
   Recognitional justice
   Procedural justice
4. **Lack of awareness and engagement activities for vulnerable groups**
   Insufficient awareness of underrepresented groups and energy poverty often results in a lack of engagement initiatives targeted towards such groups.
   Procedural justice
5. **External communities and natural environment are left out of distribution**
   Access to affordable energy and energy efficiency services is contingent upon membership, while external community and environmental considerations often disregarded in distribution.
   Procedural justice
   Distributional justice

Template: Exercise 1 **Who are our members and stakeholders?**



Why do we target these core members?

PERMANENT INHABITANTS ARE THE PEOPLE WHO WILL HAVE THE MOST IMPACT IN THEIR LIVES BY DECISIONS MADE.
LOCAL REPRESENTATIVES HAVE THE MOST FULL OVER THE POPULATION AND KNOWLEDGE OF THE CONTEXT.

Core member persona 1

Name of the group: PERMANENT INHABITANTS

Living conditions...
- MINIMUM WAGE - ISH.
- MIDDLE CLASS
- FAMILY PERSON
- WORKING CLASS
- HOUSE WORK
- PROBLEMS RELATED TO HOUSING IN COLD WEATHER

Key demographics features...
- 30? 40s - 60s
- HOUSE WIFE/HUSBAND
- KIDS ~OLD
- 9-6 WORKING HOURS

Frustration
- CHANGES IN HER LIFE CONDITIONS
- LACK OF RESPONSES FROM MUNICIPALITY
- WEATHER EFFECTS ON HOUSES.

Goal
- BRINGING PEOPLE TO HER COMMUNITY
- BRINGING ENERGY IN MOVEMENT TO THE COMMUNITY.

Core member persona 2

Name of the group: LOCAL REPRESENTATIVES.

Living conditions...
- HIGHER INCOME
- UPPER MIDDLE CLASS
- FAMILY PERSON
- ADMINISTRATOR

Key demographics features...
- 55 - 70
- LIVES WITH PARTNER
- KIDS ARE OLD
- WORKS THE WHOLE WEEK

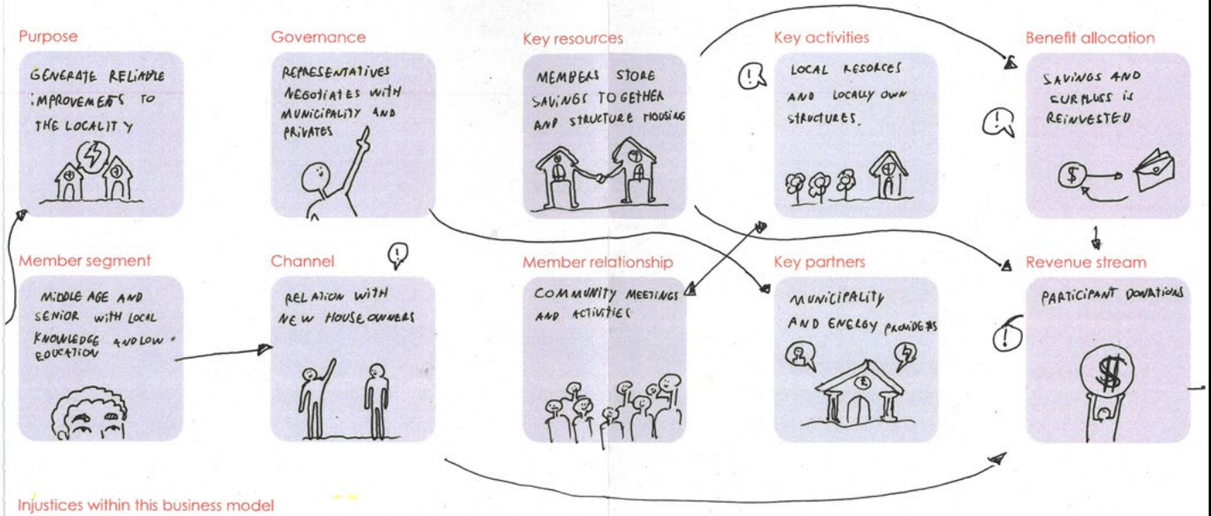
Frustration
- CHANGES IN THEIR LIFE CONDITIONS
- MISSCOMMUNICATIONS BETWEEN NEIGHBORS.
- NEW PEOPLE AND TURISTS.

Goal
- WANTS TO INCREASE THE LIFE QUALITY OF THE LOCALITY

* THE OLDER CONFUSED ME

Template: Exercise 3 **Where do the injustices reside?**

Use → to illustrate the interaction of each element
Use ☺ to highlight where we've achieved justice
Use ! to pinpoint where injustices occur

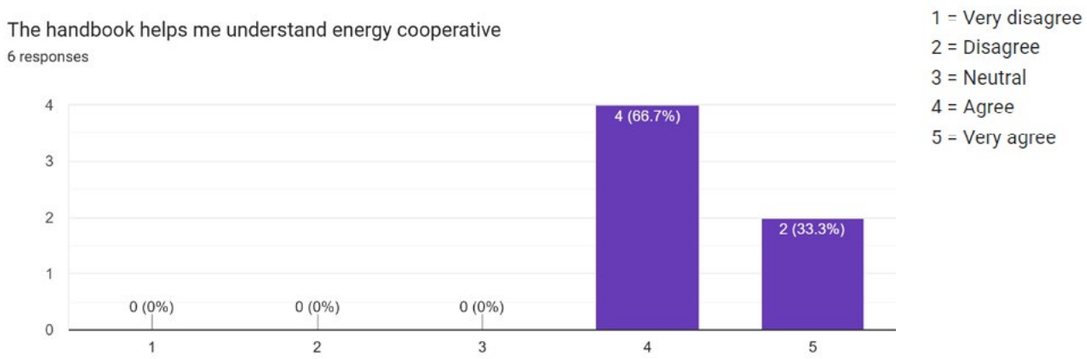


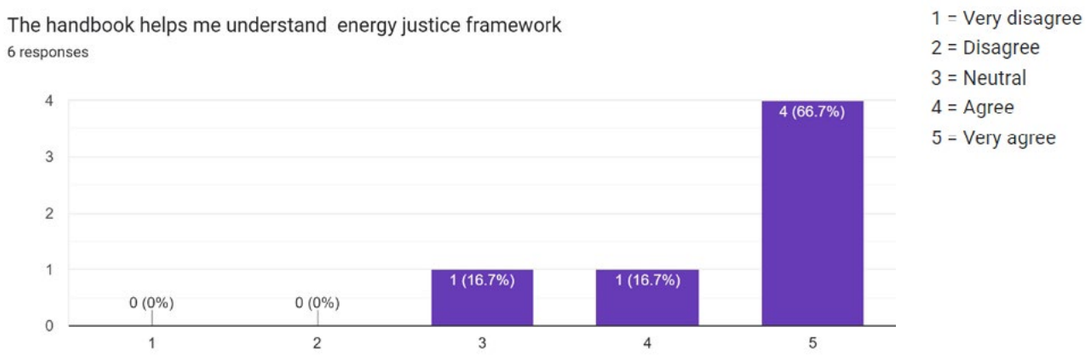
Injustices within this business model

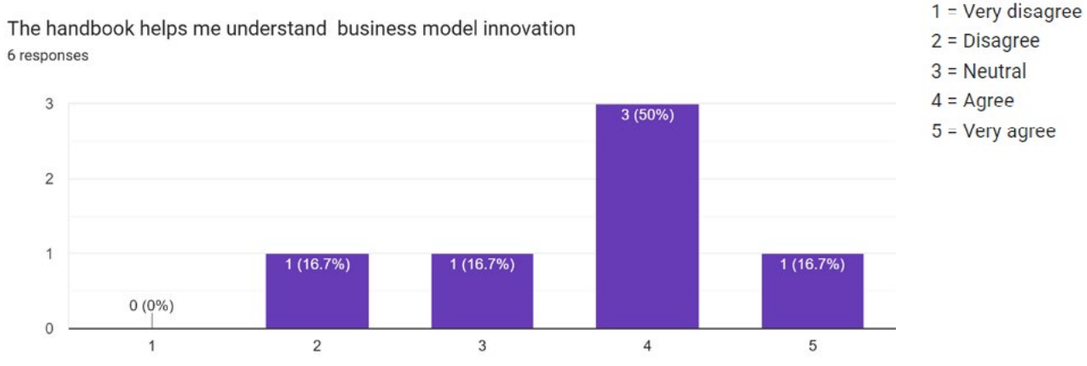
Where in the business model do these injustices occur? What type of injustice do they represent: recognitional, procedural, or distributional?

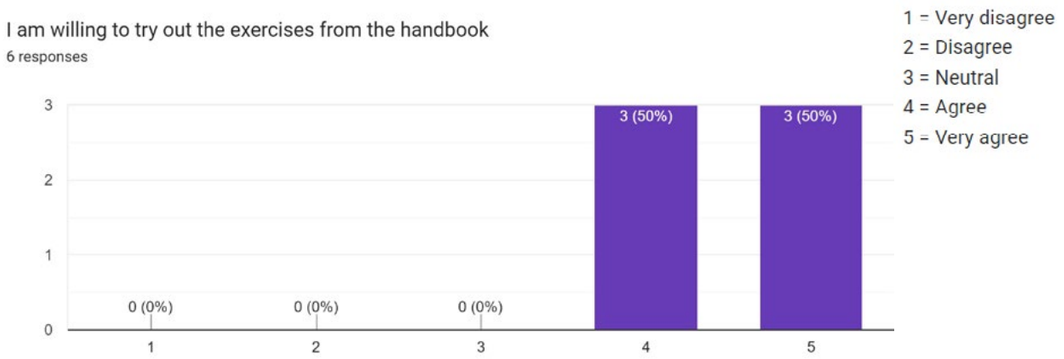
1. MUNICIPALITY COMMUNICATION IS ONE WAY
   - PROCEDURAL JUSTICE
2. MEMBERS RECIVE EQUAL BENEFITS BUT ~~RECIVE~~ DONATE DEPENDING ON ~~INCOME~~ INCOME
   - DISTRIBUTIONAL JUSTICE
3. SELF - BENEFIT MENTALITY.
   - PROCEDURAL JUSTICE
4. DISCREPANCY BETWEEN OBJECTIVES AND RELATIONSHIP WITH NEW PARTICIPANTS.
   - MEMBER DIVERSITY

Feedbacks on design iteration 2: results of survey after testing









Following previous question, please explain your choice:

6 responses

1. They are very well explained and made accessible by offering tools that are easy to understand. The case cards also give actionable insights and good examples that make you think.

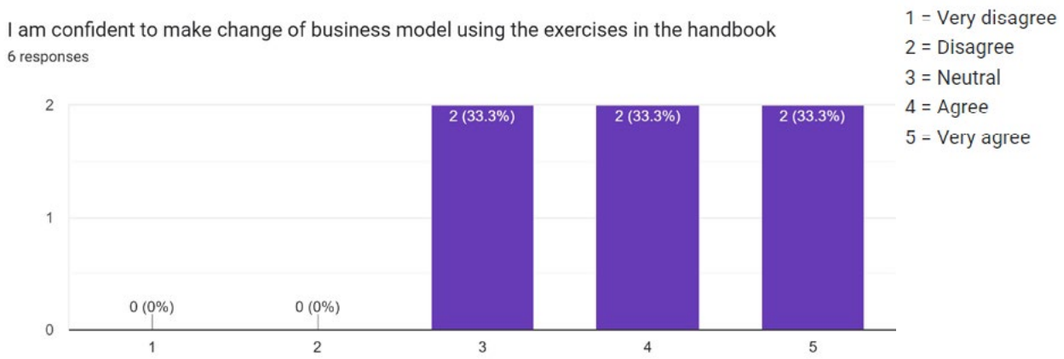
2. I thinks it's fun! It feels like an interesting activity. It was really insightful and interactive. Also I can think of multiple scenarios to develop this model, not only in professional environments.

3. I think participants might need a bit more of support in exercise 2, for mapping the business model

4. While reading the exercises I didn't know that the guidebook had templates in the end. I was happy to see this when I reached the end. If I was promoted to check the template when reading the exercise I would have filled it out parallely to reading. I was also unaware the amount of time each exercise could potentially take so I didn't know if I could do it while reading each chapter or if I should finish reading and then do the exercises.

5. It's a fun framework to examine if there is anything missed in the business model, so I think it's worth to try.

6. The exercises are actual pratical examples that I relate to.



Following previous question, please explain your choice:

5 responses

1. I think it was very useful to highlight the different complications of the community and develop a better understanding of the situation, but I'm a bit skeptical on weather or not will be enough to promote structural change.

2. I'm ready to start a change! But not exactly sure on how to implement it. However I think that's fine

3. I think the way you have presented - step by step guidelines on how to map the business model and identify opportunities for improvement is great! If I had a question come up in my mind, it was immediately answered in the next section. The case cards provided through the book are extremely helpful!

4. Making changes is always difficult, but if it makes senses, I think most people would agree to change.

5. It really depends on the exact business model and if the changes works for my model in a healthy positive return of investment percentage.

What do you think about the content of the book?

6 responses

1. The content of the book is clear, easy to follow and well organized. It makes a lot of sense and the way you've included examples and explanations throughout made it even easier.

2. It's very easy to read. The language is clear and not too complex. It doesn't feel too long and yet it packs a lot of information. I got a but confused on the application of the overall content but the cases help a lot.

3. Yes! For changes see notes

4. Yes I really like the balance between formal reporting of the information, yet it is in a language that is easy to understand, follow and create empathy. I was quite unaware of energy as a sector and fell much more empathetic towards the context quite quickly after reading the guide.

   I do feel the references may not be necessary to include in the text and can have a list of someone's interested as I was slipping through the names of authors quite often and was a little bit more formal too read.

   I'm the beginning if I could have been given a QR for websites of some existing energy co-operatives where I can read in their own words about the mission and intent, could be nice!

   I wasn't sure if I can do the exercises alone or did I need to do it with someone (Excersise - 4). Lastly some resources for the suggestions regarding the next steps would be great too! For example what are some rapid prototypes for testing a new business model canvas

5. I think it is clear, one thing can be improved is that maybe you could provide an example showing how a company follows all the exercises to improve their business model. So, the readers can have an even better idea about how the entire process works.

6. It was not easy for me, because its totally not my field. The structure is clear. It does provide a lot of information. A short "dictionary" about the key words that used in this book, would clarify faster for me to understand it.

What do you think about the design of the book?

6 responses

1. Love the colors and visuals. The color gives it a formal look while keeping it casual. The visual style and layout keeps it the same way while not looking childish at all.

2. The design is very pretty and organized. Makes a friendly approach to the situation. I would say the exercises and the guidelines do not march very clearly so it makes it weird to read, and last page of content was hard to follow.

3. Beautiful. I loved that the case cards were detachable, so that I could keep the example at hand while doing the excercise

4. Extremely clear! The only thing I would like is just to be prompted to use the templates when the exercise is introduced. Visually the book is captivating and clear! The case cards as well as the tearable templates are extremely practical!

5. This is beyond me.

6. The design is beautiful and practical. Keep it like this.

What do you think about the design of the book?

4 responses

1. The increase in price is daunting sometimes and makes the use of energy more conscious

2. It's an interesting topic. But my brain guides the idea directly to local poor communities or organisations that have issues accessing to energy, more than the ones presented in the example. I guess closer to how to bring sustainable energy to people without energy more than changing current energy for sustainable one.

3. Being from a different country I lack the knowledge about the general patterns of energy consumption and differentiation between good practices and bad practices for household energy management.

4. Refreshing, helps me to understand the subject more.