

”There is a need for people who can provide a transition”

A case study of how educational activities empower actors to engage in a local transition of the waste system on Bornholm, Denmark

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Master Thesis Series in Environmental Studies and Sustainability Science,
No 2023:014

A thesis submitted in partial fulfillment of the requirements of Lund University
International Master’s Programme in Environmental Studies and Sustainability Science
(30hp/credits)



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Submitted May 9, 2023

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Abstract

Sustainable waste management is a complex task within environmental governance, and municipalities play a key role in governing a transition of the waste system towards prevention and re-use. This calls for an enhanced understanding of local capacities for change, and therefore this thesis adopts a socio-institutional perspective on the power of actors to influence local transitions. Through a qualitative case study of the waste sector of Bornholm, Denmark, I investigate the experience of actors in the cross-field of waste management and education. The results show how actors create synergies between organizations and sectors and thereby circumstances to further institutionalize new external facilities, teaching practices, and educator roles. Thus, the empowerment of actors is enabled through access to external resources, local autonomy, and experience of local and regional impact. This thesis emphasizes the challenges of achieving system changes within public organizations and reflects on practical implications for local stakeholders on Bornholm.

Keywords:

socio-institutional transitions; Denmark; power; education; municipal waste management; roles;

Word count: 11.930

Acknowledgments

First of all, I would like to thank my informants on Bornholm for welcoming me so warmly in the chilly months of February and March. You made this research possible by sharing your thoughts with me. In particular, I would like to thank my contacts at BOFA and the local schools for giving me insight into your work. I am already looking forward to coming back to the rocky island.

Next, I would like to thank my supervisor Darin and my thesis group for taking the time to listen and help me with your valuable feedback.

The last two years here in Lund have flown by and I would like to thank Batch 25. As I write this, I feel very lucky to have had so supportive and inspiring people around me during the time of this program.

It has meant the world to me to be able to spend the spring semester with such knowledgeable, amazing, and warm people. Therefore, a special thanks to Aude, Magdi, Julia, and Sorka for the sunny afternoons, bike rides through Lund, and encouragement.

Last but not least, I want to thank my friends back home and especially my sister, mom, dad, and grandmother for sending love and support from the other side of Øresund.

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List of abbreviations

BOFA: Municipal waste company of Bornholm

MaP: Multi-actor perspective

MLP: Multi-level perspective

OECD: Organisation for Economic Co-operation and Development

POINT: Power in Transition

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1 Introduction

Human activities, especially the economic and industrial development in the Global North, introduce polluting and toxic entities which transgress expert-estimated planetary boundaries and threaten the functions of vital natural ecosystems (Lade et al., 2020; Steffen et al., 2015). Meanwhile, production and consumption continue to increase, driving the amount of waste, which brings about environmental (pollution and resource scarcity), social (health risks), and economic challenges (treatment costs) (Karak et al., 2012; Kaza et al., 2018; King et al., 2006).

How authorities define waste determines how it is treated, for example through re-use, recycling, incineration, or landfilling (Pires et al., 2019). Especially the amounts of municipal solid waste, defined as household, commercial, and institutional waste, are problematized due to its complex composition of various materials and high costs of treatment for local governments (Alzamora & Barros, 2020; Karak et al., 2012). Thus, both treatment and source reduction or prevention are central parts of a transition in waste systems toward lower environmental impacts (Vergara & Tchobanoglous, 2012).

Local waste managers and governments are considered key actors in implementing changes in the system of household waste management (Ma & Hipel, 2016; Zacho & Mosgaard, 2016). However, this task requires local governments to involve various stakeholders to gain support for new policies, which makes it a complex task in environmental governance (Soltani et al., 2015; Vergara & Tchobanoglous, 2012). Hence, it follows the general challenge for local governments to facilitate citizen engagement around local sustainability plans in multi-actor arenas (Castán Broto et al., 2022; Hoff & Gausset, 2015), and adopt innovative governing instruments to support long-term sustainable development (Vedeld et al., 2021). However, more research is required on how actors' innovative capacity can be supported locally through roles and platforms which connect different sectors of society (Hofstad et al., 2022; Trischler et al., 2022). Specifically for a local transition in the waste sector towards more recycling, re-use, and prevention, there is a need for an enhanced understanding of how actors can work with waste prevention in a municipal context (Zacho & Mosgaard, 2016) and which competencies are needed from these actors (Moalem & Kerndrup, 2022).

One strategy in municipalities is education and information programs, which are regarded as essential policy instruments to enhance local support and social changes in favor of new waste systems

(Knickmeyer, 2020; Zacho & Mosgaard, 2016). Furthermore, education on sustainability is also an established political strategy globally (European Commission Joint Research Centre, 2020; OECD, 2022). However, previous studies on behavioral change for waste prevention and treatment have criticized how educational activities often lead to a superficial understanding of systemic issues of consumption (Gould et al., 2016; Izdebska & Knieling, 2021). Furthermore, policy instruments on waste have to be meaningful for the citizens (Finnveden et al., 2013), and therefore it matters how education is as part of governance for sustainability and public service management. Consequently, more research is needed to move beyond unidirectional and factual communication to motivate engagement (Goldman et al., 2021; Izdebska & Knieling, 2021), and from a transition perspective, how to integrate sustainability into the education system (Avelino, 2011).

1.1 Scope and research questions

Through this thesis, I analyze the power of local actors on Bornholm, Denmark to influence a local transition of the waste system. More specifically, I investigate how actors exercise power and experience empowerment through activities for citizens to learn about sustainable waste management (educational activities). To do this, this thesis focuses on the group of actors who develop educational activities, including educators from various schools and waste sector actors. Hence in the context of a local transition to sustainability in the waste sector on Bornholm, I answer the following research questions:

1. How is power exercised by the various actors in relation to educational activities?
2. How is power enabled through educational activities?

Consequently, my aim is threefold. Firstly, to understand how the actors experience their opportunities to enact change in a municipal context. Secondly, to investigate the use of educational activities as both a collaborative effort and a policy instrument to enable more engagement. Thirdly, to identify circumstances related to educational activities that enable the power of actors. Hence, this thesis contributes with empirical insights on changing roles and power within the field of transition research (1.2). It is also my hope that the study can be useful for stakeholders by including a solution-oriented discussion of practical implications (6.3).

1.2 Contribution to sustainability science

The field of sustainability transitions addresses the societal consequences of sustainability challenges such as waste production and disposal (Markard et al., 2020), and has been influential for sustainability science (Clark & Harley, 2020). By focusing on a local transition, this thesis contributes to one of the core questions of sustainability science on how society can “most effectively guide or manage human-environmental systems toward a sustainability transition” (Kates, 2011, p. 19450). Thus, capacity building is an intrinsic part of sustainability science, and by adopting a *socio-institutional perspective* on sustainability transitions, this thesis specifically investigates how alternative pathways towards sustainability entail reconfigurations of societal roles, practices, and institutions (Loorbach et al., 2017). Hence, it is the aim to offer case-specific findings on how to strengthen the capacity of people to collaborate and engage. Building on local experiences and knowledge around both waste and education, this transdisciplinary study strives to be not only problem-driven but also solution-oriented by producing knowledge and insights which can be transferred and used by both academic and societal actors (Lang et al., 2012).

1.3 Thesis outline

After this introduction, I describe the context of a changing Danish waste sector and the specific case of Bornholm (Chapter 2). Thereafter, I present the theoretical frameworks as a part of the socio-institutional perspective on sustainability transitions (Chapter 3). Subsequently, I outline my methodological approach to a qualitative case study as well as the data collection and analysis (Chapter 4). Furthermore, I present the findings (Chapter 5) to proceed to answer the research questions and discuss their implications both for the local case and the literature (Chapter 6). Finally, the conclusions are presented and summarized.

2 Background

This chapter describes the context of the Danish waste sector (2.1), and which role municipalities have (2.2). Furthermore, I introduce the case of a local transition on Bornholm (2.3).

2.1 A paradigm shift in the Danish waste sector

In Denmark, the national waste plan works as a frame for the municipal management of commercial and household waste, and it is based on the normative principle of the waste hierarchy in the European Waste Framework Directive (Directive 2008/98/EC, 2018)(figure 1). Thereby, Danish municipalities are obliged to prioritize waste management after its environmental desirability: 1) Prevention (preventive measures before a material becomes waste), 2) Preparing for re-use (cleaning, checking, or repairing products to be used again), 3) Material recycling (reprocessing of waste materials to new products), 4) Other recovery (e.g., incineration for energy recovery), and 5) Disposal (landfilling) (Directive 2008/98/EC, 2018).

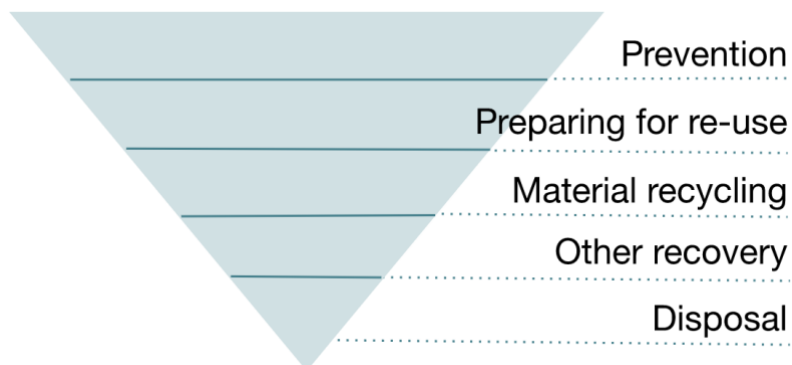


Figure 1: The Waste Hierarchy (Directive 2008/98/EC, 2018).

With the national plan for prevention and management of waste in 2021, the Danish government describes a ‘paradigm shift’ to fulfill their obligations to reach a 65 percent recycling target in 2035 as a member state of the European Union (Ministry of the Environment, 2021). This shifts the waste sector away from a linear “take-make-waste” model towards waste prevention and a circular model for resources through re-use and recycling, thus avoiding incineration as a treatment option for recyclable waste (Ministry of the Environment, 2021). Consequently, it is a shift away from the current path dependency on incineration of the Danish waste system, which is characterized by high waste generation, weak household recycling infrastructure, and excess waste incineration capacity in the

municipal-owned incineration plants (Hjelmar, 1996; OECD, 2019; Papineschi et al., 2019). The plan is operationalized through a restructuring of the Danish waste sector through marketization. In other words, municipalities are no longer allowed to invest in new treatment facilities of recyclable waste from households, since this task has to be offered to private actors, who already provide recycling options for commercial waste (Ministry of the Environment, 2021).

2.2 Towards new competencies and roles of municipalities

Danish municipalities are obliged through the Danish Statutory Order on Waste to implement local waste management plans for the collection, disposal, and preparation of household waste for reuse, recycling, incineration, and landfilling which meets the recycling targets on the national and European level (Hjelmar, 1996; Affaldsbekendtgørelsen, 2021; Zacho et al., 2018). Thus, with the shift from public ownership of waste treatment to a liberal market which began already in 2013, Danish municipalities have to adapt their operation and find new ways to utilize local resources to support change (Kørnøv et al., 2016).

A previous study highlights how municipalities in Denmark are key actors to push change in the waste system, due to their obliged role to implement local waste management plans and develop infrastructure and facilities for recycling (Zacho et al., 2018). But municipal waste companies are put under regulatory and normative pressure to navigate their future role within the continuous liberalization of waste management in the Danish waste sector (Kørnøv et al., 2016; Moalem & Kerndrup, 2022). On one hand, waste companies are challenged to initiate new entrepreneurial activities related to preparation for re-use, which require them to collaborate across professional and organizational boundaries and to acquire new knowledge and competencies (Moalem & Kerndrup, 2022). On the other hand, when experimenting with preparation for re-use, the waste companies, and partners experience that they have to navigate a legislative gray zone due to the growing marketization (Moalem et al., 2023).

2.3 Case: A local transition in the waste sector on Bornholm, Denmark

Bornholm is a Danish island in the Baltic Sea with around 39.500 inhabitants in 2022 (The Regional Municipality of Bornholm, 2022b). On Bornholm, there is one municipal waste company (BOFA), which is responsible for the incineration plant as well as treating waste from both households and companies, which is an exception from the Danish Statutory Order on Waste because of the small size of the island (D. Christensen et al., 2021). Waste management is a costly and logistically demanding task compared

to landlocked municipalities because recyclable materials mainly are shipped out for further processing in Denmark (Jakobsen et al., 2017).

In 2018, BOFA presents its vision, which describes how Bornholm can become the first region in Europe to terminate its use of landfills and waste incineration in 2032 when the local incineration plant will be closed: “In 2032, there is no longer any waste on the island. Everything that is thrown away is a resource that can be recycled for the benefit of the whole community” (BOFA, 2019, p. 4). This vision is a key part of the municipal waste plan, which BOFA and the Regional Municipality of Bornholm present in 2022 (The Regional Municipality of Bornholm, 2022a). Consequently, Bornholm strives for a local transition to a society with 100 % recycling and reuse rates in 2032, relying solely on prevention, preparation for reuse, and material recycling (The Regional Municipality of Bornholm, 2022a). In 2021, around 58% of the household waste on the island was recycled, and therefore BOFA describes a need to do things differently (The Regional Municipality of Bornholm, 2022a)



Figure 2: The Waste Tower at BOFA (own photo).

2.3.1 Educational activities for a local transition

BOFA describes how their visions of a local transition require different thinking, development of new ways to manage resources and re-use them locally, as well as changing how they as a waste company

work together across sectors with knowledge institutions, citizens, companies, and state partners (The Regional Municipality of Bornholm, 2022a). Therefore, BOFA has initiated different efforts counting networks, new physical facilities, recycling, and collection schemes, and finally educational efforts (The Regional Municipality of Bornholm, 2022a). BOFA states how education, learning, and experimentation are a cornerstone to support local innovation, push waste prevention, and foster a shared sense of responsibility and involvement, especially among citizens (D. Christensen et al., 2021; The Regional Municipality of Bornholm, 2022a). Three main educational activities are researched in this thesis:

1. *School partnerships*: Over the past 20 years, BOFA has offered a school education service, where local schools visit their facilities, The Waste Tower, to learn about waste prevention (D. Christensen et al., 2021) (figure 2, 3). BOFA describes how these activities contribute to a 'green civic responsibility' of future generations and lay a foundation "for the individual student to become far more conscious of its role in the greater circular system" (D. Christensen et al., 2021, p. 413). BOFA strives to reach more citizen groups and associations by creating an experience center, The Wastery, where the local community learns about the value of resources (D. Christensen et al., 2021).
2. *Green education*: The municipality's broader goal is to support long-term green education on nature, climate, and innovative solutions to current sustainability challenges. The green education agenda focuses on citizens up until the age of 18 to integrate sustainable principles in learning institutions and environments (Center for Schools, 2023). Furthermore, courses and competence networks are offered to educators at schools and kindergartens (The Regional Municipality of Bornholm, 2018).
3. *Experimental platforms*: Include various collaborative projects for teaching new competencies, which target both companies and community organizations (D. Christensen et al., 2021; The Regional Municipality of Bornholm, 2022a). One example is a local workshop space, where citizens learn how to repair and work with fabric. Another example is a competence network for local constructors and civil self-builders on local, circular waste streams of demolishing waste on Bornholm, hosted by BOFA and the municipal departments (The Regional Municipality of Bornholm, 2018). For BOFA, it also involves promoting the recycling station as a resource bank for local entrepreneurs.



Figure 3: Inside the Waste Tower at BOFA (own photo).

3 Theory

In the following, I present the two main frameworks from the socio-institutional perspective of sustainability transitions (3.1): The multi-actor perspective (MaP) (3.3) and the power in transitions framework (POINT) (3.4). Furthermore, I describe how education and learning are regarded as processes of enhancing actors' empowerment in sustainability transitions (3.5).

3.1 Sustainability transitions: State of the art

Sustainability transitions are fundamental changes in socio-technical systems to deal with complex problems of human-environmental interactions and can take place both on a global and a national-regional level (Frantzeskaki et al., 2012). Transition research is a normative systems approach to conceptualize societal change processes connected to sustainability (Loorbach, 2009; Loorbach et al., 2017; Markard et al., 2020).

To understand how innovations emerge and potentially lead to system changes, the multi-level perspective (MLP) has become a key contribution (Loorbach et al., 2017). The MLP describes how the existing socio-technical regime at the meso level is stabilized by deep structures such as institutions, that set the direction for practice of social groups (Geels, 2002, 2011). The wider context of the regime at the macro level is called the socio-technical landscape, which is constituted by broader political, social, and economic factors and trends (Geels, 2002). Niches work under the regimes on the micro-level as potential seeds for systemic change, if the ideas of niche actors can gain momentum and become more broadly accepted (Geels, 2011). Destabilization of the regime and hence the "window-of-opportunity" are the results of non-linear complex processes of multilevel interactions between slowly built-up pressure from the landscape on the regime and challenging positions of niches (Geels, 2011).

The MLP has been criticized for not capturing the actors' agency and exercise of power (Smith et al., 2005), and thereby missing the urgency of integrating social and political aspects into sustainability transitions (J. P. Evans, 2011). Moreover, the MLP emphasizes bottom-up processes of change moving from the niche to the regime, which simplifies how existing institutions accommodate change (Berkhout et al., 2004). As a response to this critique, newer contributions within a socio-institutional perspective of transition research have focused their explanatory value on institutionalized cultures,

practices, and structures, hereunder agency and power (Avelino, 2017; Frantzeskaki et al., 2012; Loorbach et al., 2017). This perspective argues that sustainability transitions are not only socio-technical but involve political and social dimensions, with changing roles and relations between actors and institutions (Avelino & Wittmayer, 2016; de Haan & Rotmans, 2018; Loorbach et al., 2017). Furthermore, it emphasizes how transitions have to be based on the capabilities of specific places, which highlights the importance of context (J. P. Evans, 2011; Smith et al., 2005; Wittmayer et al., 2017). Finally, the socio-institutional perspective understands the agency of actors, hence their ability to enact change and direct a transition, as tied to their power and the power of other actors (Loorbach et al., 2017).

3.2 Multi-actor Perspective operationalizes actor roles

A more systematic categorization of actor roles in sustainability transitions is beneficial for understanding how the speed and direction of transitions can be governed (Avelino & Wittmayer, 2016; Loorbach et al., 2017; Wittmayer et al., 2017). Within this field, one contribution focuses on the interactive webs and inherent assumptions tied to roles (Wittmayer et al., 2017). Another contribution proposes categories where actors can have multiple and contrary roles through new social collaborations in sustainability transitions (de Haan & Rotmans, 2018). Building on these previous conceptualizations, Avelino and Wittmayer (2016) introduce the Multi-actor Perspective (MaP), which allows for a dynamic notion of power positions, which can change and overlap, and challenge the assumed power of for example state actors. The MaP structures four different sectors in society, wherein actors are understood as individuals or organizations (figure 4).

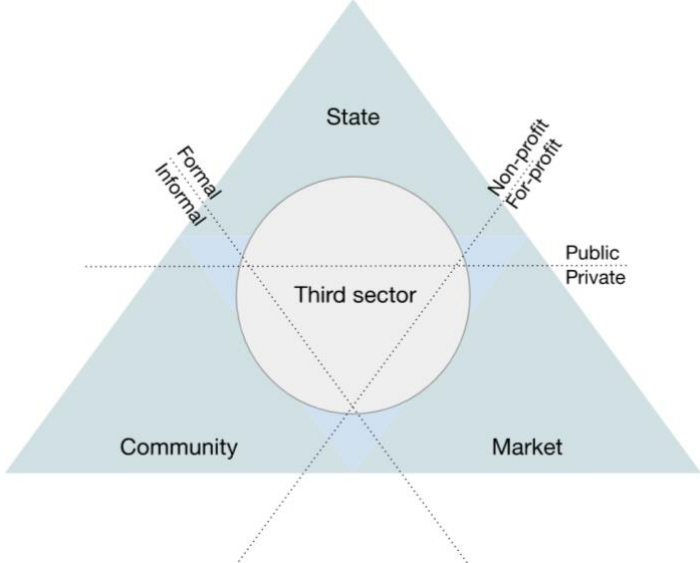


Figure 4 Multi-actor perspective with the four sectors (Avelino & Wittmayer, 2016).

The MaP categorizes actors according to four sectors defined by different logics: their degree of formality, public nature, and profit focus (figure 4, table 1). This framework includes the third sector, which operates as an intermediary between the three other sectors to avoid categorizing everything outside the market and the state as ‘civil society’ (Avelino & Wittmayer, 2016).

Table 1 Sectors in MaP (Avelino & Wittmayer, 2016).

Sector	Description	Examples
The state	Formal, public, and non-profit	Municipalities, official agencies, or government departments
The market	Formal, private, and for-profit	SMEs, social enterprises, multinational companies
The community	Informal, private, and non-profit	Community groups, families
The third sector	Intermediary but mainly formal, private, and non-profit	Associations, foundations, universities

Therefore, the MaP is useful for this study, since it is developed specifically to scrutinize the dynamic roles of sectors and actors in times of change, where new dynamics in governance structures reconfigure actors’ responsibilities (Avelino & Wittmayer, 2016). Hence, this framework allows an analysis of actor interactions in a dynamic way to explain how roles are constituted and reconfigured around the waste system on Bornholm.

3.3 Power in Transition operationalizes power

Previous scholars have worked on operationalizing a perspective on agency and power in transition research, which among others have involved a focus on power as determining the coordination and steering of actors and resources (Smith et al., 2005) and the power positions of change actors (de Haan & Rotmans, 2018). Whereas these perspectives include barriers to the agency in transitions such as low coordination and missing resources, they are limited in how they explain counteracting forces, which misses the opportunity to analyze boundary-spanning actors, who hold multiple, opposed roles (de Haan & Rotmans, 2018). Therefore, the power in transition framework (POINT) (Avelino, 2017) is chosen for this study to capture the actor dynamics and positions.

POINT takes an agent-centric power perspective on transition actors, where power is connected to agency and structures since power is always exercised by actors for both stability and change (Avelino, 2017). In this perspective, power is seen as the “capacity of actors to mobilize resources or institutions to achieve a goal” (Avelino, 2017, p. 508). POINT is developed as a response to a critique of an emphasis on vertical hierarchies of power in the MLP, but by doing that also privileging the power of the regime over niches (Avelino, 2017). To capture nuances of dynamic power relations, POINT thus centers its explanatory value around how actors can exercise *different types* of power across the levels of the MLP: reinforcive, innovative, and transformative power (Avelino, 2017) (table 2).

Table 2 Types of power (Avelino, 2017).

Type of power	Definition
Reinforcive power	“Reinforcive power is the capacity of actors to reinforce and reproduce existing structures and institutions” (Avelino, 2017, p. 508). The collective exercise of this type of power is the space of the regime.
Innovative power	“Innovative power is the capacity of actors to create new resources” (Avelino, 2017, p. 509). Resources can be mental, monetary, artifactual, human, or natural (includes space and time). These resources must be public and visible. The collective exercise of this type of power is the space of niches.
Transformative power	“Transformative power is the capacity of actors to develop new structures and institutions” (Avelino, 2017, p. 509). Hence, existing institutions and structures are challenged, reconfigured, and renewed. The collective exercise of this type of power is the space of niche-regimes.

By developing the MLP, the purpose of POINT is to provide a heuristic that analytically differentiates between the spaces of the niches, niche-regimes, and regimes based on the type of power actors exercise (table 2). In these different analytical spaces, power is exercised both vertically between niches and regimes and horizontally between moderate niches (following dominant trends) and radical niches (following countertrends) (Avelino, 2017)(figure 5). When introducing qualitatively different types of power, the framework describes the multiple roles of single actors and allows for different types of power to interact, which may create enabling or restricting circumstances for other actors to exercise power (Avelino, 2017). For example, actors mobilize a new resource through innovative power, but they rely on the exercise of reinforcive or transformative power to establish the necessary structures for the long-term distribution of this resource. In the thesis, I utilize POINT to operationalize

the concept of power and explore how the actors exercise different types of power (RQ1) which may create enabling circumstances for other actors' exercise of power (RQ2).

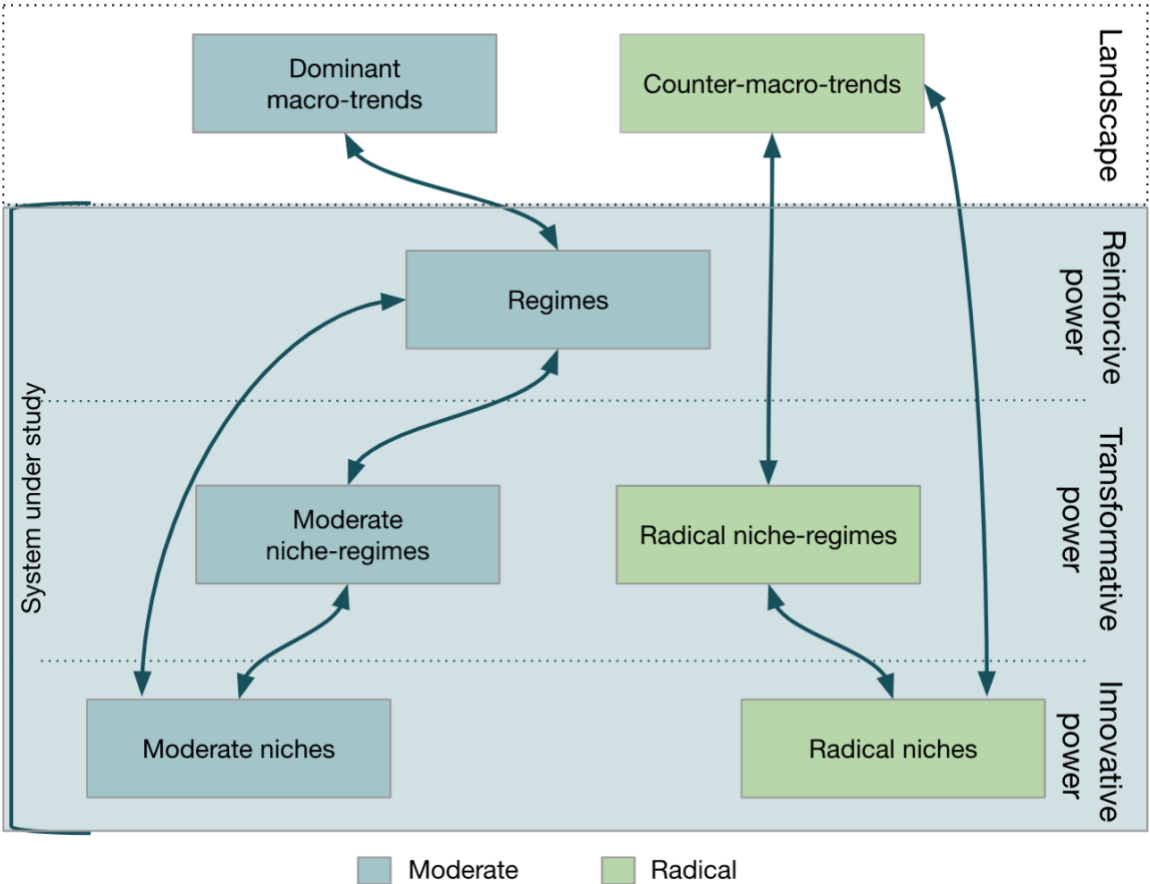


Figure 5 Power in transition framework visualizes the different spaces of power and how moderate and radical trends are connected (arrows) through the different levels from niche to landscape (Avelino, 2017).

3.4 Empowerment through learning and education

This thesis investigates learning and educational activities as part of a local strategy and political instrument for building capacity for change. Hence, a focus on educational activities for building capacity follows the broader consensus in transition studies and sustainability science on learning and knowledge-building as vital processes for decision-making and governance of sustainability transitions (Apetrei et al., 2021; Pahl-Wostl, 2009; Schöpke et al., 2017). Here, learning and education are often connected to the experimental and innovative activities of niches (Frantzeskaki & Rok, 2018; Geels, 2011). Especially how actors build capacity through social innovation is an influential perspective on the innovative and experimental niche-related activities of actors in sustainability transitions (Frantzeskaki & Rok, 2018; Loorbach et al., 2017). Following the socio-institutional perspective, social

innovations are defined as changes in social relations between actors, which involves new ways of knowing, acting, and organizing (Avelino et al., 2019, 2020; Loorbach et al., 2017).

Nevertheless, when strategic actors seek changes in society and enable other actors to become engaged, it is not enough to create enabling circumstances – actors also need the capacity to act on these enabling circumstances (Avelino, 2017; Avelino et al., 2020). Therefore, it becomes a question of empowerment, which is conceptualized as “the process through which actors gain the capacity to mobilize resources and institutions to achieve a goal” (Avelino, 2017, p. 512), which covers 1) resources and institutions and the access to them, 2) the strategies to mobilize them and 3) the willingness to do so (Avelino, 2017) (table 3). Because it included the process of empowerment, POINT is used to analyze how actors are capable of making use of the enabling circumstances (the synergies with other actors’ exercise of power) and thereby themselves exercise power to contribute to a sustainability transition. Hence in this thesis, educational activities are studied as aspects of this empowerment process (RQ2).

Table 3 Dimensions of empowerment (Avelino, 2017; Avelino et al., 2020).

Dimension	Description
Access	Actors’ access to resources and institutions
Strategy	Strategies used by actors to mobilize resources and institutions, e.g., lobbying or debating
Willingness	Intrinsic motivation of the individual actor to exercise power, which can be related to dimensions of experiencing relatedness, autonomy, competence, impact, meaning or resilience.

By developing POINT, Avelino (2017) argues for a better understanding of sustainable power constellations between sectors and social groups to reach sustainability visions. The MaP also contributes to this goal by providing a typology for actor roles and sectoral developments (Avelino & Wittmayer, 2016). Hence, by recognizing that education is a policy instrument and thereby connected to the development of policies of decision-makers (Markard et al., 2020), this thesis follows a focus of previous studies on the reinforcing activities of incumbent institutions in the regime and how they influence the direction and dynamic of sustainability transitions (Loorbach et al., 2017; Pel et al., 2020). Hence, the research questions and aims for this thesis of investigating educational activities for political visions align with the mission behind POINT, which is to examine the functionalistic worldview often seen in environmental policy on how to make people behave more sustainably (Avelino, 2017).

4 Methodology

This chapter presents the chosen research philosophy (4.1), the design of a qualitative case study (4.2, 4.3), and how the data analysis is conducted (4.4).

4.1 Research philosophy

My research design is guided by a constructivist ontology and interpretivist epistemology, which is typical for qualitative case studies (Stewart, 2014). Thereby reality is seen as constructed through individual experiences, which are accessed and interpreted through interviews and observations (Stewart, 2014). Priority is given to subjective experiences, and how individuals assign meaning to their experiences and relations (Stewart, 2014), in this case, their experiences of exercising power in a local transition. Additionally, this also highlights the importance of transparency on how the multiple meanings are reduced to themes in the analysis (Alvesson & Sköldbberg, 2009).

The theoretical frameworks for this study are both heuristics, making them flexible explanatory tools to unpack complexities (Avelino, 2017; Avelino & Wittmayer, 2016). They thereby leave room for interpretation of the empirical data, which requires reflexivity on where system boundaries are set (Avelino, 2017). Consequently, I set the boundaries of the system in this thesis at the micro-level collaborations around educational activities for citizens about sustainable waste management on the Danish island of Bornholm, which are analyzed in the context of political goals on the macro-level.

4.2 Case study research design

This study follows a case study research design since it is appropriate for researching contemporary, complex social phenomena, where the real-life context matters (Yin, 2003). The chosen theoretical POINT and MaP frameworks direct the study to include several levels or subunits of analysis, ranging from sectors to networks, down to individual perspectives (Avelino, 2017; Avelino & Wittmayer, 2016). Therefore, I choose an embedded case study design (Yin, 2003) with three units of analysis corresponding to the main educational activities (Chapter 2) (figure 6).

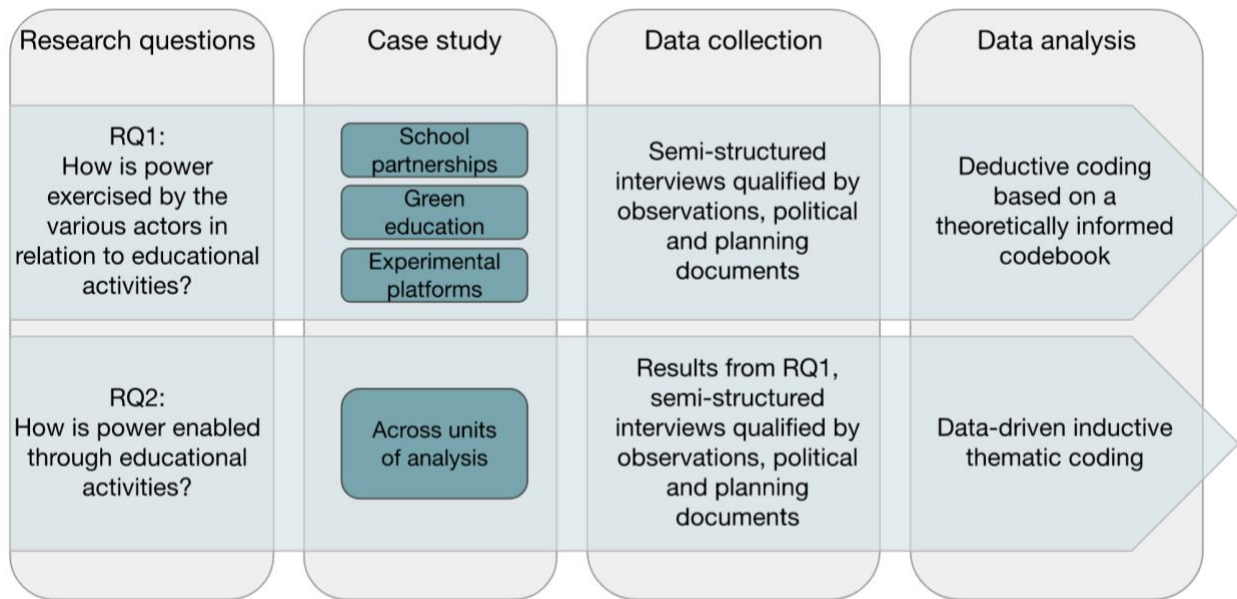


Figure 6 Research design outlining the connection between RQs, units of analysis, data collection and analysis.

4.3 Data source triangulation

This case study relies on multiple sources of evidence and deploys data source triangulation, which ensures in-depth and nuanced data as well as validity (Stewart, 2014; Yin, 2003). I combine document analysis, observations, and semi-structured interviews, and the results are therefore based on the convergence of the data sources. Additionally, the two research questions are connected, since the analysis of the power of actors in the local transition (RQ1) contributes to an understanding of how enabling circumstances are created (RQ2) (figure 6).

4.3.1 Document analysis

Document analyses help provide background information on the sociocultural, economic, and political context of a case (Bowen, 2009). The document analysis in this study provides insights into the broader political context of Bornholm around education and sustainability for a contextual understanding (Chapter 2). Additionally, documents are used as empirical data and were coded together with the interviews for both research questions (table 4), to understand the institutionalized educational activities on Bornholm. Documents are included based on the explicit mention of citizens learning about sustainable waste systems on Bornholm.

Table 4 List of documents.

#	Title	Document type	Date	Reference
Background and context				
1	Bright Green Island – Bornholmermålene frem mod 2035	Political strategy	2018	(The Regional Municipality of Bornholm, 2018)
1	Vi viser vejen – Bornholm uden affald 2032	Political strategy	2019	(BOFA, 2019)
2	Affaldsplan for Bornholms Regionskommune for 2022 – 2034	Political strategy	2022	(The Regional Municipality of Bornholm, 2022a)
Analysis of regime-niche interactions				
3	10 veje til god skoleudvikling 2023-2026	Political strategy	2023	(Center for Schools, 2023)
4	Affaldsbogen – Skidt og kanel. Guld og grønne skove	Education material	2017	(Johansen, 2017)
5	Affaldsbogen for de mindste – Mysteriet om jordkompasset	Education material	2018	(Johansen, 2018)
6	Hasle-forsøget rapport	Evaluation report	2017	(BOFA & Aalborg University, 2017)

4.3.2 Observations

Observations of situations can be useful before interviews to ensure relevant questions about specific activities (Mills & Birks, 2014). During the fieldwork on Bornholm, three different educational activities are observed (table 5). These observations are used to qualify the questions in the following interviews with educators to specifically ask about the observed activities, and therefore they are not coded with the other data material. These three situations are selected based on the given opportunities, accessibility, and permission from the participants. Notes are taken during the activities and the anonymity of all participants is ensured in the data.

Table 5 Observations conducted.

#	Sector	Organization	Description of educational activity	Duration
1	State	Educational facilities at the Municipal waste management company	Education activities for a visiting school class (age 13-15) on resources and mining	2h 30m
2	State	Educational facilities at the Municipal waste management company	Education activities for a visiting group of kids (age 3-7) and their parents on recycling and reuse	2h 30m
3	Market/ community	Local workshop and repair café	Open workshop for citizens with access to sewing machines and materials	2h

4.3.3 Semi-structured interviews

In January 2023, two scoping telephone interviews are held with employees from BOFA. These interviews inform the design of the interview guides and the fieldwork, which lasts 24 days from mid-February to mid-March 2023. During the fieldwork, additional 18 semi-structured interviews of 30-60 minutes are held in Danish with local actors (table 6). Through interviews, it is possible to examine how large-scale social change processes are experienced by individuals but also shaped by the responses of them as strategic social actors (May, 2002). Semi-structured interviews are typical for interpretative research and follow an interview guide, however with room for a change of order of the questions in the guide through active listening and follow-up questions (Magnusson & Marecek, 2015). The interview guides are carefully designed around the research questions with four general themes: 1) Background information, 2) Purpose and visions, 3) Education and learning, and 4) Understanding of role and agency (appendix 1, 2).

Additionally, each interview guide is adapted to the specific sector and role of the actors, which were identified based on the MaP framework (Avelino & Wittmayer, 2016) (appendix 3), to support the informants to answer using their references (Magnusson & Marecek, 2015). Each informant is asked to give consent to their participation, recording of the interview and to be referred to by their primary role in their organization. Interview recordings are transcribed verbatim and analyzed in Danish, and thereafter translated to English for the in-text quotations.

Table 6 Overview of conducted interviews (appendix 3).

MaP sector	Interviews (#)	Primary roles of informants
State	15	<ul style="list-style-type: none"> • School service educator at BOFA • Specialist at BOFA • Project leader at BOFA • Teachers and pedagogues (referred to as educators) from both public and private schools on Bornholm • Project worker at the Youth School • Coordinator at municipal school service • Project leader at municipal planning department
Market	2	<ul style="list-style-type: none"> • Educator at local workshop • CEO of business incubator
Third sector	1	<ul style="list-style-type: none"> • Coordinator for research and universities
Community	2	<ul style="list-style-type: none"> • Board member from resident association • Board member from citizen association

The informants are selected for interviews based on their active engagement in educational activities for sustainability on Bornholm through their role in their organization, and they are mapped according to the sectors presented in the MaP (Avelino & Wittmayer, 2016) (appendix 3). Some informants are identified using snowball sampling in interviews, where I ask about other actors. This strategy has been useful because many key actors already collaborate in networks, thus informants have the role of important gatekeepers. However, this approach also poses a challenge to navigate because snowball sampling can contribute to a heterogeneous group of informants (O'Reilly, 2012). I therefore also use purposive sampling to identify additional informants through other channels such as municipal documents, media, association registers, and personal encounters.

4.4 Data analysis

I enter the documents and interview transcripts in the qualitative data analysis computer software QSR Nvivo and analyze through a combination of inductive and deductive coding in a thematic analysis described by Fereday & Muir-Cochrane (2006). Thematic analysis is an analytical approach that identifies regularities, patterns, and themes expressed either implicitly or explicitly in the data through careful reading and interpretation (Guest et al., 2012). A combination of deductive and inductive coding for qualitative data allows for answers to research questions that require both theoretical

grounding (RQ1) and open exploration of emerging themes that are not found in an existing framework (RQ2) (Fereday & Muir-Cochrane, 2006).

Firstly, a deductive approach is used to analyze the actors' exercise of power (RQ1). A theoretically informed codebook is applied with codes referring to key concepts from the MaP and the POINT frameworks: actor role, empowerment, power type, power dynamic, resources, and transition dynamics (appendix 4). I corroborate the codes in a separate document to identify how actors exercise different types of power in each of the three units of analysis, which also structures the presented results in the first section of the analysis (5.1).

Secondly, I reread the coded data on the exercise of power in a data-driven inductive thematic coding. Across the units of analysis, I investigate how enabling circumstances for the actors are related to the three dimensions of empowerment from POINT: access, strategy, and motivation (RQ2). Thereby, existing codes on empowerment and power dynamics are scrutinized to create new codes for when actors describe enabling circumstances for them to exercise power (e.g., "external learning offers"). The results from these themes appear in the second section of the analysis (5.2).

References to transcripts are made according to the informant number indicated in the table in Appendix 3. Whenever I use a direct quotation, the individual informant is referred to as "Informant #".

5 Analysis and results

The first section of the analysis (5.1) shows how actors exercise the different types of power in the three units of analysis. Building on these results (5.2), I present findings of enabling circumstances for empowerment.

5.1 How actors exercise power

In the case of Bornholm, transformative power is mainly exercised through a reconfiguration of existing structures of public organizations (schools and BOFA) through networks and partnerships (figure 7b).

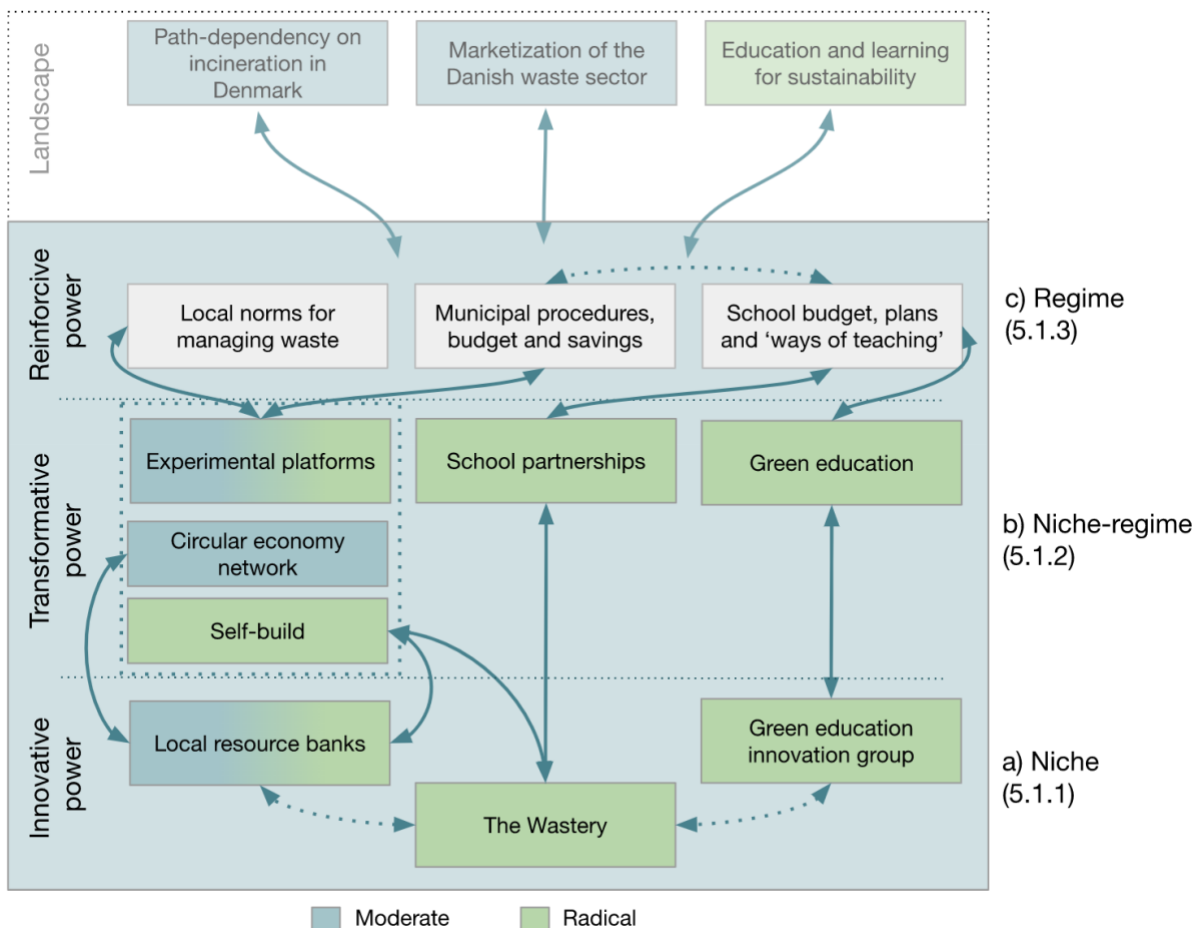


Figure 7 Overview of the dynamics between the niche, niche-regimes, and regime (arrows) This figure is elaborated in the following sections of the analysis, a) 5.1.1, b) 5.1.2, c) 5.1.3.

These niche-regimes are supported through a local mobilization of educators and market or civil partners and mental resources (new ways of teaching), as well as resource banks, education material, and facilities. External funding options constitute a bottleneck for the innovation of educational facilities to transcend the niche and enter the niche-regime space (figure 7a). Actors experience their efforts as slowly developing local capacity for change through the synergies between the schools and waste actors. This slow process is associated with the actors' reliance on policymaking and the limited facilities and resources in the schools (figure 7c). In this thesis, innovations that follow the trend of restructuring and marketization of the waste sector are categorized as moderate, and innovations that explore new synergies between waste management and education through the community/third sector are categorized as relatively radical (figure 7). The following sections elaborate on these dynamics and present the main findings, which are stated in bold as subheadings for the paragraphs.

5.1.1 Innovative power in the space of the niches

In the niche space, the actors mobilize new resources. Firstly, school partnerships inspire new educational activities and facilities. Furthermore, green education develops new ideas of what can be taught, and finally, experimental platforms foster new local competencies across sectors (figure 8).

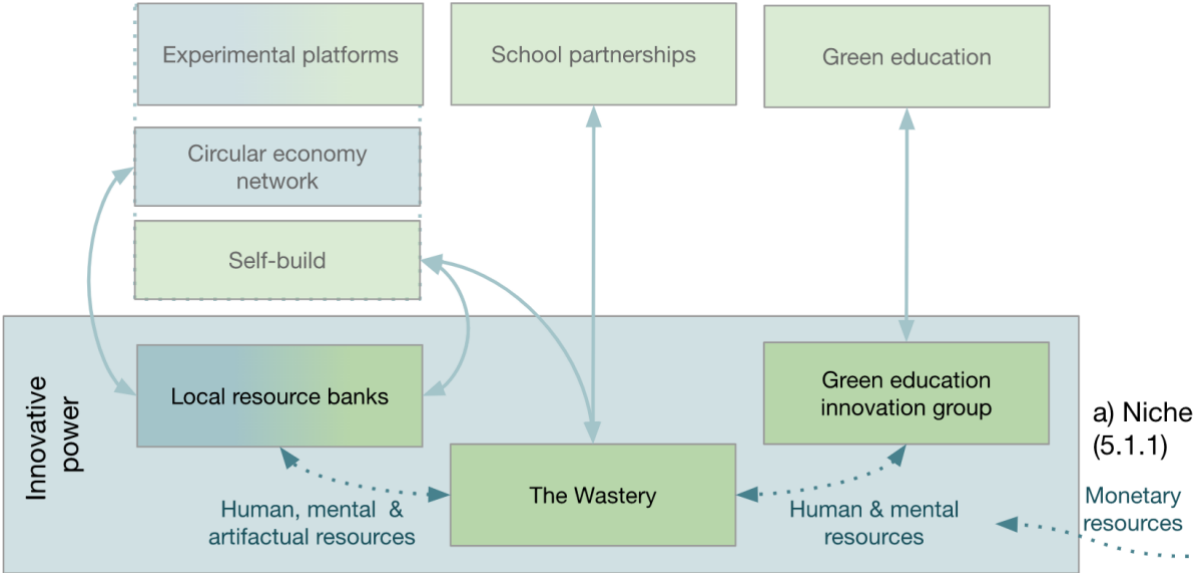


Figure 8 Exercise of innovative power in the niche space (blue box): The niches (the Wastery, green innovation group, and local resource banks) share resources and involved actors (dotted arrows) and support the niche-regime space (solid arrows) with mobilized resources.

School partnerships inspire new educational activities and facilities

Actors from BOFA use a partnership model to establish collaborations with educational institutions (D. Christensen et al., 2021) (figure 9). Here, the school educators mobilize mental resources through BOFA to inspire new ideas for activities around resources and sustainability (7;8;9;12;13;15). For example, BOFA publishes educational material for the schools (Johansen, 2017, 2018). BOFA actors describe these interactions as sources of inspiration for ideas on how they can create engagement around the 2032 visions (4;5;17). Through the partnerships, the educators get access to actors who hold knowledge about sustainable waste management which they as educators would not necessarily have, and who can engage the pupils differently, constituting human resources for the educators (7;9;12;13). Furthermore, by letting external experts from BOFA provide knowledge, it sets free educators' time for them to focus on the dynamic in the classroom (7;12). Also, the educators' access BOFA's resource banks in the form of old items for repair, innovation, or creative activities, e.g., building robots, or construction projects (7;8;9;12;15). Thereby, BOFA mobilizes new human resources and makes sure that the idea of resource banks with recycled goods is developed accordingly as a new function of the recycling station as a space for learning (4;5;17;19).



Figure 9 Visit at BOFA's recycling station: Kids next to residues from the incineration plant (own photo).

For both educators and BOFA the ability to mobilize monetary resources outside the municipal budget can be a support or bottleneck for their ability to expand activities connected to the partnership (4;5;6;10;12). For example, one educator is spending time applying for funding for constructing an orangery at the schools as a new learning space (12). Whereas BOFA strategically tries to mobilize external monetary resources to support the expansion of existing learning facilities of the Waste Tower in the form of The Wastery to accommodate not just schools, but also self-builders, inventors, and associations (4;5;17;19)(figure 8).

Green education develops new ideas of what can be taught

Green education is a result of an innovation group of local stakeholders (figure 8) within the intersection of sustainability and education, counting representatives from schools, kindergartens, municipal school administration, BOFA, and a nature center. The innovation group mainly mobilizes mental resources in the form of developing new ideas of how sustainability is taught in the local schools, for example including outdoor-based activities (4;7;13;14;15). Therefore, its aims also connect to the niche innovation of the Wastery (figure 8). The group inspires new teaching methods and activities for educators by facilitating meetings and conferences for fellow educators (7;13;14;15). The innovation group constitutes new human resources as developers and coordinators of activities (7;13;15). Thus, the group's mobilization of resources is mainly for the educators and administrations at the schools to gain more capacity to implement new courses and excursions (7;14;15). What especially characterizes the innovation group members is that they are mobilizing resources in the form of their free time to meet and work on the agenda (7;13;14;15).

Experimental platforms foster new local competencies across sectors

Through the years, several experimental learning platforms have been developed to co-create solutions for waste management (BOFA & Aalborg University, 2017; D. Christensen et al., 2021). For example, a network for circular economy and competence building for self-builders on Bornholm (16), working to establish new streams of resources from the recycling stations, e.g., through resource banks (figure 8). These actors mobilize mental resources through experiments with discarded materials from the resource banks at the recycling stations and platforms where new competencies can be fostered among local stakeholders (1;2;3;6;11;16). For example, BOFA's project department is working together with universities and the municipality on developing new value streams and usage for local resources, such as demolition waste (3;6;16). As another example, a local civic association invites stakeholders to learn about sustainable resource use by showing how materials from BOFA's recycling stations are

reused locally (11). The projects within the municipal departments and BOFA rely on external funding (6;16;19), which is found through emphasizing the potential of Bornholm being a ‘test island’ for innovations in energy and waste infrastructure (2;6). Thus, compared to the partnerships and the green education, these experimental projects don’t emphasize a formal curriculum, but pursue learning as new competencies across sectors of the participating actors: “So in that way, we try to train, and give tools and knowledge, and make them curious to do new things, between them as well” (Informant 16).

5.1.2 Transformative power in the space of the niche-regimes

In the niche-regime space (figure 10), the actors utilize the mobilized resources and new synergies between organizations and sectors to reconfigure organizational structures and practices: Firstly, school partnerships extend BOFA’s role in offering education services. Secondly, green education reconfigures school structures and educator roles. Finally, experimental platforms co-produce waste projects.

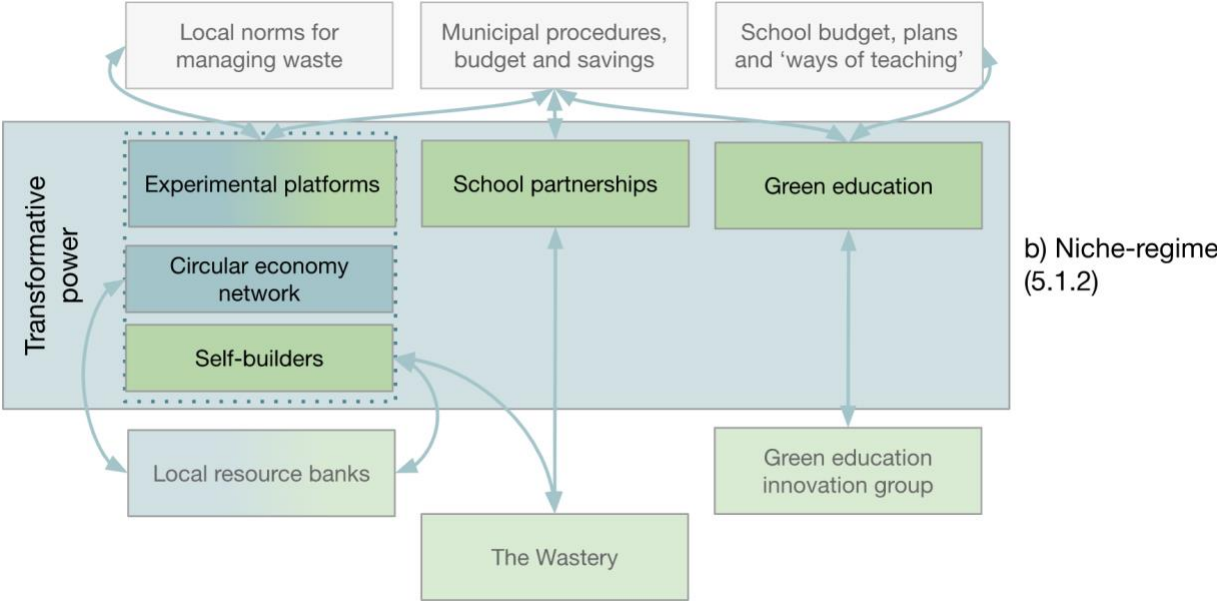


Figure 10 Exercise of reinforcing power in the niche-regime space (blue box): Experimental platforms (circular economy network and self-builders), school partnerships and green education. These are supported by resources from niches below and challenge the structure of the regime above (solid arrows).

School partnerships extend BOFA's role in offering education services

BOFA exercises transformative power by making school partnerships obligatory for public schools on Bornholm (4;5;6;19). In that way, the number of visits from the school to the educational facilities at BOFA is formally organized through five annual visits and a local recycling station at the schools (figure 11). Consequently, BOFA as an organization is extended through the partnerships, because they further legitimize their role in education:

“If BOFA was to have anything to do at all, apart from the ordinary operation, then it was to tell children about waste in collaboration with the teachers, as a part of physics or math lessons. It was kind of legitimate – it was almost a bit cozy.”

(Informant 19).

The development of BOFA's educational role is connected to a tendency in the education system on Bornholm. Here, education services of local organizations to local schools, such as visits, are developed to become more interactive for the pupils and include hands-on activities (4;10;14). Therefore, other administrative and educators have also enabled the formalization of partnerships through transformative power by reserving time in the school schedule for such visits as well as dialogues with relevant societal actors to integrate school visits into their planned activities (10;12;14).



Figure 11 Partnership recycling station at a public school (own photo).

Green education reconfigures school structures and educator roles

Green education is a new component of the municipal school and nature policies (7;12;13;14;15) (Center for Schools, 2023). The innovation group exercises transformative power by advocating through decision-making channels of the municipality to enable change at the schools: “It is the usual framework; we have just utilized it in a different way” (Informant 15). Hence, the actors have advocated for a reconfiguration of the school structures of how teaching is expected to be carried out and where teaching can take place. As a result, schools are required to designate responsible roles to administrators and appoint local ‘green education councilors’ to ensure a continuous exercise of reinforcing power for this agenda (7;12;14;15): “Green education is a part of education now. And it is cool that it’s as if green education used to be a can-do task, now it’s becoming more of a must-do task” (Informant 12). Consequently, a window of opportunity has occurred to rework policy, educator roles, and teaching styles (14;15). In addition to political support, the innovation group has also exercised transformative power by establishing a formal competencies network for educators on Bornholm for green education (7;13;14;15). This network is promoted through the official channels for courses for educators to develop and strengthen their competencies for specific topics related to sustainability (14;15).

Experimental platforms co-produce waste projects

The experimental platforms explore new connections between the state sector actors (BOFA and municipal plan department) and other sectors, such as the community (e.g., citizen-driven resource initiative), the market, and the third sector (e.g., circular construction network). For example, the project department in BOFA has been expanded to house positions which are formally shared between the waste company and a Danish university (6;19). This opens up for experiments with new co-produced project structures, where projects are owned and run by several actors and not just the municipality (6;16;19). The participants in the projects are therefore exercising transformative power when they establish these collaborations through networks and project groups, mainly with the municipal departments or BOFA as facilitators (2;5;6;11;16;19).

5.1.3 Reinforcing power in the space of the regime

Actors exercise reinforcing power by on one hand strengthening new collaborations but also constraining change by reproducing existing practices due to a lack of resources (figure 12): School

partnerships and green education reproduce teaching practices, while experimental platforms are constrained by the political and legal frameworks.

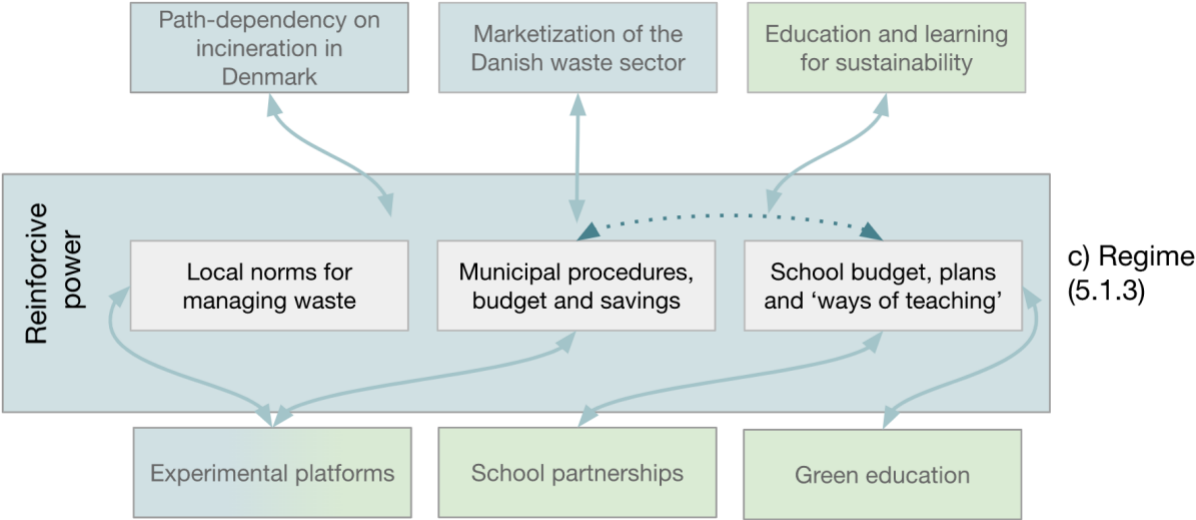


Figure 12 Exercise of reinforce power in the regime space (blue box): The structures of the municipality affect the public schools (dotted arrow). The niche-regimes reconfiguring these structures from below, while contextual pressures and developments at the landscape level open or close for change (Chapter 2) (solid arrows).

School partnerships and green education reproduce teaching practices

Actors express how their projects benefit from having enthusiasts engaged in the cross-field of education, sustainability, and resources, who reinforce the innovations at the local schools (4;14;15;16). Additionally, actors rely on decision-makers to continue the new policies, which they have advocated for (7;4;5;14;15). However, school educators describe barriers to experimenting with the educational activities because they have few hours assigned for preparing their teaching (7;10;12;13;15). This makes them stick with previous educational material, activities, and teacher-team collaborations which they already use and feel competent with (8;12). Consequently, school actors reproduce teaching routines reinforcing the perception of the public schools as “static” (Informant 13). Additionally, actors both at the schools and from BOFA describe a lack of suitable facilities to conduct hands-on and innovative educational activities related to innovation and sustainability (4;5;7;8;10;17). Consequently, educators, unwillingly, reproduce existing teaching practices because of a lack of proper facilities and time.

Experimental platforms are constrained by the political and legal frameworks

Some actors within the municipal organization emphasize how they have limited influence on the activities related to the local transition because of the hierarchical and bureaucratic structure of the

politically controlled organization of the municipality with many decision-making levels (6;16;19) (figure 12). Even though Bornholm is an exception from some national waste legislations, actors from BOFA also describe the legal framework for the waste sector and the marketization as directing their work with waste prevention and new waste solutions (4;5;6;19). Consequently, the actors put effort into making sure that BOFA's activities stay within their license to operate, since it is their legal obligation (4;6;19). "The vast majority of resources, including knowledge resources or skills, are dedicated to optimizing an operation, not to inventing a new operation" (Informant 19). And thus, the legal framework obligates municipal waste company actors to follow the national political plan for the marketization of the waste sector locally. Actors working in municipal departments and organizations are also experiencing a resource deficit in terms of fewer hands or hours dedicated to development due to municipal budget cuts (14;16;19), which for example contributes to higher uncertainty if municipal development projects can continue (16;18). Thus, access to external funding options is vital for the capacity of municipal departments and BOFA to continue projects related to sustainable development and waste (4;5;6;16;19).

5.2 How empowerment of actors is enabled

This section presents findings across the units of analysis on enabling circumstances for actors' experience of empowerment. To structure this section, the findings are related to the dimensions of empowerment: access (5.2.1), strategy (5.2.2), and motivation (5.2.3).

5.2.1 Access: Asking for help and support from external actors

The actors describe improved access to external mental and human resources as well as more focus on sustainability in education, improving access to external funding.

The way actors exercise transformative power further establishes partnerships and collaborations across organizations and sectors. This improves the access of local actors to external resources, e.g., experts and facilities. The actors describe that sustainability-related education as a must-do task supports further local innovation because the access and utilization to external resources are strengthened and legitimate (12;19). The actors connect their experience of working together in the new constellations with feeling competent since they can ask for help from other actors (9;10;12;15) or help others (1;7;8;9;19;12;13). Thus, the actors describe how especially networks are channels for them to benefit from the various backgrounds of the other participants (9;10;12). As an example, the members of the innovation group for green education experience motivation because of their different

backgrounds in teaching: “We are very different people, and we are passionate about different things. But it creates a type of dynamic, which I think is worth pursuing” (Informant 15).

Limited monetary resources are a constraint for local actors to realize their innovative ideas related to educational activities (4;6;10;12) (5.1.1). But the actors also describe how they experience how green education (12;13) and innovation (2;10) related to sustainability are trending as funding opportunities: “When we seek funding for green education, we get a lot of recognition and support from the foundations” (Informant 12). Consequently, by pushing the political level to reinforce the integration of sustainability in schools, enabling circumstances are created with more opportunities for accessing monetary resources for further innovation on the local levels. However, actors also describe how the competition for funding is stronger because of this development (2;4;5;6).

5.2.2 Strategy: Autonomy of local actors to push for political support

Actors utilize two main strategies: Firstly, to keep local autonomy, while secondly benefitting from new policies that assign formal responsibilities and roles.

The partnerships and networks create the foundation for local innovation, but also for advocating for new policies (5.1.2). Nevertheless, some of the actors strategically continue their innovative efforts by balancing their dependence on political actors for their engagement (3;6;15;19). For example, in the innovation group for green education the actors state the importance of having the freedom to “geek out” (Informant 15) and of ideas coming from educators (7;13;15). So, educators and project workers in the municipality describe how autonomy from the political level is important to continue to create new ideas (innovative power), which then can push political levels to implement broader policies for the schools (6;7;12;13;15;19). Thus, through forming partnerships and new networks (transformative power), the actors facilitate enabling circumstances in their networks or departments through co-produced projects to strategically mobilize external resources, which they then strategically push ‘upwards’ to decision-makers and administrative levels (6;7;12;19). While this strategy is a way to maintain autonomy, it is also experienced by actors in education and from the community as a necessarily slow process to gain broader support among peers in their community (7;11;13;14;15).

Finally, when actors push policymakers to implement partnerships and green education through policies (reinforcive power), new circumstances are created where positions and responsibilities are formally assigned. The policies contribute to the actors’ experience of an achievement for their

innovations at the individual schools because these activities become a shared effort together with their colleagues (1;7;12;15):

“By making partnerships, then it was not only me, who stood there as a lone soldier and tried to get one more person to join. But it becomes our common responsibility to take care of the environment”

(Informant 7).

Thus, the local actors emphasize the importance of assigned roles or positions at the organization specifically for experimenting with learning (2;4;6;7;10;12;14;16). Furthermore, an important circumstance for the actors in the municipal departments, BOFA, and at the schools is that they experience support from their administration to continue their projects (4;6;7;9;12;15;16;19). At BOFA and municipal departments, actors describe how they see experimental platforms as a unique approach and a result of specifically assigning this responsibility to a department of the organization (4;6;16;19). At the schools, educators also mention how it is their specific role or position at the school, which allows them to start projects (7;10;12;15), like building an orangery out of re-used bricks (12) or creating new electives related to sustainability (8;13). In other words, actors across organizations emphasize the importance of gaining formal positions to take on specific roles and tasks.

5.2.3 Motivation: Impact of individuals on a local and regional level

The actors voice a motivation by experiencing impact through the partnerships and newly assigned responsibilities. This impact is both in their local organization – between peers and pupils – and regional through the broader collaborative projects.

Locally, the educators in the schools reflect on how they can give their pupils the right competencies and knowledge to understand the complexity and uncertainty related to unsustainable resource use (7;8;9;12;13;15). Educators describe that they for example facilitate dialogues with the pupils to critically reflect on the future and complexity of solving sustainability issues (7;8;13). Thus, for the educators and actors at the schools, their experience of impact is connected to the locality of the school and classroom, as it is experienced in their relationship with the pupils and the other educators (7;8;9;10;12;13;15): “As a single human being I have a rather small significance on the transition. But as a teacher, I have the opportunity to matter for the pupils I have” (Informant 8). However, the educators also question if their teaching makes a difference and describe themselves as one out of

many influential actors, who contribute to new knowledge and inspiration for their pupils (7;8;9;12;13), and as mainly influential on their co-workers as green education councilors (7;13;15). Furthermore, the educators express how sharing their passion for nature and sustainability in how they teach is contributing to their motivation through meaningful impact (1;7;8;9;10;12;13;14). However, some actors also express how it can be overwhelming with so many opportunities which come from the innovations and networks in education (8;12;13), and therefore the challenge for some educators at the schools is also related to finding a meaningful way to balance new opportunities, competencies and fulfilling their daily tasks in the classroom (7;8;12;13;15).

Additional to local impact, the new regional competence networks, e.g., in circular construction or green education, give the actors new opportunities to gain impact in their broader community. This is by some actors seen as positive since they emphasize how there is a need to further share and connect local innovations at schools, citizen level, or universities to get more people involved and develop more ideas for how to integrate sustainability in learning (2;4;7;10;11;13;14;15;16). Similarly, for the actors involved in the experimental platforms, the impact is seen as the ability to show that a local transition is possible (2;3;4;6;11;16;17;18;19):

“It motivates me that they have understood that to reach the set goal, there is a need for people who can provide a transition. And you give them the right tools, infrastructure, people, and resources”

(Informant 6).

This involves setting up resource laboratories and physical facilities to showcase what is possible regionally on Bornholm across organizations and sectors (2;3;6;11;16;19). Additionally, among these actors, there is an understanding of Bornholm as a small island and test island, which means that it is easy to influence local projects if you are willing and able to put in the work and resources (2;3;6;9;10;18).

6 Discussion

In this chapter, I answer the two research questions related to the local case (6.1). Secondly, I consider the implications of the chosen theoretical frameworks and integrate the results in the transition research (6.2). Thirdly, I reflect on practical implications for educational activities on Bornholm (6.3), before lastly discussing limitations and suggestions for future research (6.4).

6.1 How actors exercise power and create enabling circumstances

This thesis explores the use of educational activities in the case of Bornholm as a local strategy to enable more engagement and support for a local transition in the waste sector.

The findings for the *first research question* show how actors exercise power to create synergies across state organizations (school partnerships and green education) and sectors (green education and experimental platforms). BOFA, municipal departments, and schools exercise transformative power by reconfiguring the structures, roles, and practices of their organizations. Furthermore, these collaborations are supported by the mobilization of human, mental, and artifactual resources from the involved partners and monetary resources from funding. The actors exercise reinforcing power by advocating their ideas to decision-makers to ensure the long-term position of the collaborations. However, further integration is constrained by limited resources as well as political and legal frameworks.

These insights contribute to the *second research question* of how this creates enabling circumstances for actors to experience empowerment. Firstly, the new partnerships and co-produced projects improve the access to resources such as knowledge of external actors and enable further co-production of ideas. Secondly, actors are enabled through the educational activities to utilize two different strategies: on one hand expanding local autonomy for innovation while at the same time strengthening a sense of shared responsibility through formalized roles. Finally, by engaging in collaborations on educational activities, actors describe how they can gain impact locally (e.g., in the classroom) and regionally (e.g., in the community).

Thus, this study contributes to debates in transition research to go beyond the dynamics between innovations and incumbent institutions and understand how existing institutions accommodate new roles and structures which can facilitate change (Avelino et al., 2020; Pel et al., 2020). To discuss how

this supports actors to engage in the local transition, the following sections integrate these findings into the literature.

6.1.1 Actors widen inter-organizational and -sectoral collaborations

Actors reconfigure roles and thus support their further collaborations across organizations and sectors (5.2.2). In the literature, actors can reconfigure relationships to create conditions in favor of change despite the rigid structures of a regime (Avelino et al., 2020). This is conceptualized as an aspect of social innovation, which mobilizes the creativity and motivation of people when the welfare state is challenged and resources are scarce (Avelino et al., 2019). This is also the case of Bornholm, where actors describe their organizations as static and restricted by lacking resources as well as politically enforced obligations. Here, social innovation is seen as a response to so-called game-changers, which are macro-developments that changes the rules of the game for local actors (Avelino et al., 2019), which in this case is the approaching restructuring of the Danish waste sector through marketization.

It is an example of how actors *widen* the local transition to create a supportive context to expand their ideas beyond their own organization and pool resources (Avelino et al., 2020). This is the case of Bornholm when state actors connect to the third sector, e.g., through university collaborations (BOFA) or as community activists (innovation group). Thus, boundaries between sectors are becoming more permeable (Avelino & Wittmayer, 2016). In transition research, the capacity of actors to move between sectors and organizations is important due to their ability to act as frontrunners (de Haan & Rotmans, 2018) or cross-sectoral intermediaries who connect unbundled parts of a system (Kivimaa et al., 2019). In other words, new municipal education policies reinforce the synergies between education, waste, and sustainability, and as a result, create novel roles (5.1.2) and enable circumstances for the waste and school actors to gain impact through formal positions (5.2.2).

The analysis finds that waste sector actors' roles change due to their intersectoral collaborations (5.1.2). This finding is similar to a previous study of the promotion of circular construction materials on Bornholm, where actors from BOFA take the roles of enablers and facilitators, who increase contact between the stakeholders (T. B. Christensen, 2021). These activities can be seen as a way of governing through partnerships, which is a typical approach to environmental governance at the local levels (Bulkeley & Kern, 2006), and co-production, which recognizes the knowledge of citizens as important for public service management (Castán Broto et al., 2022). This approach is further supported by the transition literature, which emphasizes the role of government actors as "topplers" who create a

general environment for innovations (de Haan & Rotmans, 2018), and avoiding a limiting prescriptive approach to governing a local transition (J. P. Evans, 2011).

The results contribute to an enhanced understanding of the role of educators and schools and how they work together with the waste sector. By becoming dialogue partners with external societal partners involved in sustainability, their roles become political (Carlsson & Jensen, 2006). From the perspective of transitions, educators can therefore also be seen as “connectors” because they support system changes (de Haan & Rotmans, 2018). Thus, they utilize both informal personal networks and formal competence networks to widen the local sustainability transition to the education system. Additionally, the case shows the potential of out-of-school institutions and breaking the wall between the classroom and the surrounding community to integrate sustainability into the curriculum (H. J. Evans & Achiam, 2021). The disruptive potential of these external environments originates from their independence from the school system (Berg et al., 2021), which is present on Bornholm where out-of-school institutions, such as The Waste Tower, are a valuable external resource for educators.

6.1.2 Actors institutionalize innovations

Education on waste has been a focus of BOFA for 20 years (2.3.1), and this study shows how this strategy is further strengthened with new policies that support partnerships and green education (5.1.2). Actors describe this as an important achievement, which they achieve slowly from below (5.2.2). It follows the literature which describes how influencing public policy is a way for actors to accelerate the transition (Köhler et al., 2019; Pahl-Wostl, 2009). However, when actors try to change the institutions, by which they are shaped, it can be described as an ‘embeddedness paradox’ which brings ambiguities to how these changes affect the relations between involved actors (Pel et al., 2020). This is also visible in the case, where actors strategically proceed within the new circumstances in two ways: to maintain local autonomy and navigate their room for maneuver (5.2.2).

Previous literature discusses to which degree actors can integrate their innovations in institutions to achieve change (Avelino et al., 2020; de Haan & Rotmans, 2018; Pel et al., 2020). Institutions are dynamic and constituted by rules which are continuously negotiated by societal actors (Pel et al., 2020). The case of Bornholm shows how the engaged actors from state institutions such as schools and municipal departments experience the new policies as a strategy to push upwards and broaden their innovative efforts, e.g., to achieve formal responsibilities. They thereby make use of advocacy to influence decision-makers and embed their innovations into existing institutions, which are part of a

strategic repertoire of how actors can enact institutional entrepreneurship (Pel et al., 2020). But with more dependence on incumbent institutions to implement innovation, actors face an increased risk of co-optation of their creative and innovative ideas (Frantzeskaki & Rok, 2018). Whereas actors in BOFA describe their vision 2032 as guiding their efforts, other local actors involved in dialogue with the political levels also wish to preserve their autonomy to start local projects at the schools. For example, the innovation group expresses the fear of losing their freedom to “geek out” (5.2.2). This follows previous studies of governance of sustainability transitions, which highlight that actors do not need to share the same visions, but instead a diversity of visions is desired in innovation (Frantzeskaki et al., 2012; Loorbach et al., 2017).

This brings me to the second strategy of navigating the room for maneuver. This study also shows how some actors are overwhelmed by these new opportunities and pressures, which points to potential challenges of realizing broad engagement through policies and state organizations. Thus, the case of Bornholm is an example of how despite local visions, wider implementation of educational innovations is challenging if it does not align with the wider system or if it is not coordinated horizontally and vertically through policy (Markard et al., 2020). In this case, because organizations rely on external funding and actors have to fulfill obligations to the national educational goals and waste plans, the pressure on local actors to navigate this frame themselves increases. Although the fact that Bornholm is exempted from some national regulations (D. Christensen et al., 2021), the local actors still experience restricted capacities on the municipal level to which institutional changes they can implement and reinforce.

6.2 Reflection on theoretical frameworks

In this section, I reflect on the implications and limitations of the theoretical frameworks and consider relevant perspectives which were not included.

6.2.1 Combination of a multi-level and multi-actor perspective

A multi-level and multi-actor perspective on power and roles enable this study to capture the various actors’ engagement in educational activities as a dynamic process, which spans multiple levels and sectors. Hence, this aligns with the socio-institutional perspective on sustainability transitions by looking at changing dynamics and relations between actors as important drivers of social innovations (Loorbach et al., 2017). However, a flat-ontology perspective from the transition literature such as arenas of development could also guide this study to regard the processes as more fluid practices and

hence escape the idea of transitions between states of regimes (Jørgensen, 2012). However, POINT, with its dynamic spaces of power, also conceptualizes actors as flexible and dynamic by recognizing both horizontal and vertical power dynamics. Thus, the combination of POINT as an MLP-based framework and MaP portrays the connection between actors' exercise of power on the micro-level around educational activities as a strategy to navigate the broader context on the macro-level of a planned restructuring of the waste sector. However, this choice includes many levels, actors, and dynamics in the analysis, which necessitates an efficient structure and prioritization of the results.

6.2.2 Implications of an agent-centric power perspective

The theoretical frameworks adopt agent-centric power perspectives and originate from a debate on when an instrumental use of power to implement normative visions on sustainability can be justified (Avelino, 2017) and who should exercise this power (Avelino & Wittmayer, 2016). This choice differs from previous studies of power relations between local governments and individual actors, such as citizens, which follow a discursive power perspective through the concept of governmentality as a technology of government (Berthou & Ebbesen, 2016; Bulkeley et al., 2007). Hence with an agent-centric power perspective, this study is not able to conclude dominant framings or authority, but instead emphasizes the specific experiences of individual actors, who navigate local changes from within their organizations. Thereby, the study contributes to the literature on how new competencies of municipal waste companies in Denmark are developed (Moalem & Kerndrup, 2022), and how they on Bornholm not only involve growing marketization but also complementary partnerships with schools and actors from the community and universities.

Furthermore, through this study, I highlight the role of educators as partners and consider how they can utilize new opportunities and external resources. However, the chosen theoretical frameworks did not fully explain how the relations between the actors are important for their experience of local and regional impact. Therefore, the study could benefit from additional perspectives on interpersonal dynamics, such as trust and care, and how these contribute to actors' engagement in change, found in for example literature on education for sustainable development. This field specifically works to integrate sustainability in educational outcomes (Barth & Michelsen, 2013), and recognize the role of teachers as change agents in schools (Brandt et al., 2019). Especially relevant for this thesis, is a perspective on teachers in education for sustainable development as on one side interacting with students on the micro-level and institutionalizing change on the macro-level (Timm & Barth, 2020). Hence, this would allow for an exploration of how school partnerships and green education contribute

to how educators become more structure-oriented, and how this compares with their in-class interactions with pupils.

6.3 Practical implications for local stakeholders

For the findings of this study to be useful for local stakeholders outside of research (Lang et al., 2012), this section presents practical recommendations for local stakeholders which reflect the three circumstances for empowerment (5.2).

- 1. Access to external resources:* External resources, especially out-of-school institutions are constituting a valuable resource for educators (5.1.1). Moreover, because of the limited capacity to find time in the schedule and education goals, the structure of the partnerships and green education is important as a supporting framework (5.1.2). The plans of establishing The Wastery are therefore perceived positively by many educators, because of limited facilities in the schools to work with resources and innovation. The focus on locally sourced materials in hands-on activities makes this niche stand out from existing offers on Bornholm for educators, which are either exhibitions or focused on technical tools. Therefore, the biggest potential of such a place to crystalize is for BOFA to co-develop the current hands-on activities with the educators either in the Waste Tower or in the schools. By looking at the Wastery another question arises: How to go beyond the schools? Here, the potential of the niche of resource banks shows to be the most promising focal point of the interest of civic entrepreneurs, schools, and citizen associations (5.1.1). In this case, a synergy could therefore be explored between The Wastery and the public-civil partnerships of the experimental platforms.
- 2. Keep local momentum despite 'slow' institutional changes:* The local actors involved in social innovation around teaching styles and new experimental use of resources voice how it is important to achieve slow change (5.2.2). Therefore, an emerging challenge for decision-makers on Bornholm is to identify the balance between broad support and progressive policies, so the local actors feel supported in their new tasks. Consequently, experimentation with co-production and coordination through networks are still promising approaches.
- 3. Local vs. regional roles of actors:* Since the partnerships and collaborations foster new roles, especially for the engaged educators at the schools, it is important to clarify the difference

between classroom competencies and partnership competencies. This is already done through assigning the role of green education counselor at a school (5.2.3); however, it could be more explicit for the actors how these 'connecting roles' are to foster and inspire peers. Additionally, ideas for how educators can participate in the activities *with* external experts could enhance in-class competencies.

6.4 Limitations and future research

The socio-institutional perspective, specific gaps in the research, and the longitude of the fieldwork guide this thesis to focus on the current social dynamics and roles of actors on Bornholm, and consequently, it is not within the scope of this thesis to infer effects over time or on waste prevention or treatment. Also, I intentionally did not include children and adolescents, who are the main recipients of many educational activities, due to ethical considerations. Thus, this thesis mainly presents insights into the experience of engaged actors in the cross-field of education and waste on Bornholm.

During the data collection, I found it challenging to ensure insights beyond formal collaborations and as a result, the main group of informants is within the state organization. On one hand, interviews with these informants provide findings on how engaged actors within municipal organizations are able to push for change. On the other hand, I do not present less vocal, more radical, or opponent actors from other sectors to the same degree. This could have given further insights into barriers, disempowerment, and radical-moderate dynamics of niches, which this thesis did not include in detail due to its scope set around enabling circumstances. However, future research could include these perspectives and potentially also those of decision-makers to gain understandings of the influence of policymaking. This would further contribute to escaping a persistent bias in transition studies toward bottom-up change processes (Geels, 2011).

Furthermore, a majority of informants from the state sector can have given priority to more formalized learning settings, and thereby also strategies of institutionalized curriculums and facilities. Social innovation is conceptualized as broader ongoing learning processes (Pel et al., 2020; Sol et al., 2013), which also takes place in informal settings, which still needs more research (Singer-Brodowski, 2023). Thus, future research would benefit from developing an approach to analyze nuanced dynamics between formal and informal learning situations facilitated by stakeholders involved in education.

Moreover, it has been challenging that the transition idea as a local concept is different from the transition literature. This can cause confusion both during the interviews and in the presentation of

findings. Consequently, this report explicitly differentiates between the theoretical “sustainability transition” and the case-specific visions for a “local transition”.

Finally, in a local context like Bornholm, the engaged stakeholders have multiple engagements besides their formal roles and occupations. It proved to be a challenge in this study to systematically capture these various connections, which also influence the ability of actors to mobilize resources or their personal motivation. The MaP was useful to categorize and analyze the dynamic roles (Avelino & Wittmayer, 2016), however, the mapping actors was challenging. Thus, future studies could benefit from developing an intuitive dynamic mapping tool for the complex roles of stakeholders in local sustainability transitions.

7 Conclusion

In the context of a changing Danish waste sector, this thesis explores how local actors in the cross-field of waste and education – i.e., teachers, municipal waste company, and municipality officials – navigate these pressures locally. More specifically, how actors on Bornholm exercise power when they develop educational activities for more civic engagement in the local transition. Actors from schools and municipal departments exercise transformative power through new school partnerships, green education networks, and experimental platforms which foster synergies between education and waste management. As a result, collaboration across organizations and sectors enables actors to introduce their innovations into education. Through their transformative power, local actors co-produce projects with the market sector but also involve other public institutions and community members in addition to third-sector organizations. Furthermore, municipal and school actors attain new roles which facilitate these collaborations across organizations and sectors. For actors in the municipal departments, this involves the role of a facilitator of co-produced projects. For educators, it involves supporting a further integration of local sustainability issues in their teaching through connections to other societal actors. Thus, the engaged actors reconfigure practices, roles, and structures of especially public organizations on Bornholm.

With changing municipal obligations and limited local resources, these collaborations can be understood as a strategy for actors to utilize the creativity and motivation of local actors to foster the capacity for rethinking education. Through innovative power they mobilize resources for their niches: new teaching styles, resource banks for local experimentation, and out-of-school facilities. Hence, locally on Bornholm education become a field of social innovation, where actors pool local resources in their partnerships and networks. With newly mobilized resources, the engaged actors advocate their innovations to local decision-makers and utilize policymaking to further legitimize and broaden their innovations. Thus, a strategy for the local actors is slowly pushing decision-makers to reinforce new ideas and collaborations through municipal policies. With the new policies and strengthened collaborations, the actors create enabling circumstances for local empowerment. One circumstance is how actors gain greater access to monetary and human resources. Additionally, actors are motivated by gaining impact on both local levels for pupils and peers and regional levels through competence networks. Finally, with new policies, actors benefit from formal roles and responsibilities, while they also actively try to maintain their autonomy from the political level.

This study thereby contributes with nuances to how sustainability can be integrated into the educational system and the changing role of educators. However, it also provides insights into the challenge of gaining broader engagement through educational activities, because the lack of resources continues to put pressure on engaged stakeholders to find resources outside of the municipal budget. Additionally, new policies and innovations in education present numerous opportunities to local educators, who can be overwhelmed. Consequently, the local stakeholders are encouraged to explore the potential synergies of niche resource banks and school partnerships, clarify local educator roles, and continue local co-production as a way forward.

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Appendix 1 Example of interview guide to waste sector actors.

Section	Question
Introduction	1a Description of the thesis and interview
	1b Consent for recording
	1c Consent for using interview in thesis
Background information	2a What is your current role at [name of organization]?
	2b What are your primary responsibilities and areas of work?
	2c Who do you collaborate with from Bornholm in your work related to education on sustainability and resources?
	2d Which importance does these collaborations have for your project?
Purpose and visions	3a What is the purpose of your project?
	3b How is your work related to the greater visions of a transition for Bornholm?
	3c According to you, what are the biggest challenges for this transition to take place?
Education and learning	4a Which role does learning and education play in your project?
	4b How do you support learning and education?
	4c Who learns?
	4d What do they learn?

	4e Which specific learning activities do you host?
	4f What do you expect from the participants?
	4egBOFA has plans to establish a new facility for education on resources and waste. What do you think that such a place would do for your work?
Understanding of own role in transition	5a What motivates you to work with the transition?
	5b Which influence do you feel like you have on the transition?
	5c What is for you the most important competencies to have to fulfill your role?
	5d Do you experience that there is enough support present for you to contribute to the transition? Which support is present – what is missing?
Final remarks	6a Is there anything you think we should discuss, which we haven't touched upon?
	6b Are there any people or organizations who I should reach out to in relation to my thesis?
	6c Can I contact you if I have follow-up questions?

Appendix 2 Example of interview guide to educators.

Section	Question
Introduction	1a Description of the thesis and interview
	1b Consent for recording
	1c Consent for using interview in thesis
Background information	2a What is your current role at [name of school]?
	2b Which topics do you teach and what are your responsibilities?
	2c Who do you collaborate with from Bornholm in your work related to education on sustainability and resources?
Education and learning	3a How do you work with topics such as a transition, resources, and waste in education? Can you give examples?
	3b Which role does hands-on activities play for you?
	3c What are your experience of the effect of having these topics on the school schedule?

	3d According to you, what are the biggest challenges in conducting teaching on these topics?
	3e According to you, what is the most important lessons the pupils should take from these educational activities?
	3f Which questions or reactions do you get from your pupils on these topics?
	3g According to the bigger visions for Bornholm, green education and sustainability in education have to be promoted. As a teacher, what do you think about these visions?
	3h BOFA has plans to establish a new facility for education on resources and waste. What do you think that such a place would do for your work?
Understanding of own role in transition	4a What motivates you to work with the transition?
	4b How would you describe your own role in educating in the transition to sustainable resource use?
	4c Which influence do you feel like you have on the transition?
	4d What is for you the most important competencies to have to fulfill your role?
	4e Do you experience that there is enough support present for you to contribute to the transition? Which support is present – what is missing?
Final remarks	5a Is there anything you think we should discuss, which we haven't touched upon?
	5b Are there any people or organizations who I should reach out to in relation to my thesis?
	5c Can I contact you if I have follow-up questions?

Appendix 3 Table over informants interviewed for the thesis.

#	MaP Sector	Organization	Description of organization	Primary role
1	Market/ community	Local workshop	A local workshop for citizens with a weekly repair café	Educator
2	Third sector/state	University	Working on establishing facilities for researchers and university students to come to Bornholm	Coordinator
3	Market	Business incubator	The purpose is to support business promotion locally and regionally, e.g., by establishing networks and business development projects	CEO
4**	State	Municipal waste management company	The educational facilities which welcome various groups to the waste management company to educate and teach about processes and sustainability	School service educator
5*	State	Municipal waste management company	To plan, establish and operate the necessary facilities for the treatment and recycling of waste from the regional municipality from both companies and citizens.	Specialist
6	State/Third sector	Municipal waste management company and university	The formal partnership between the municipal waste management company and a Danish university to support development projects in sustainable waste management locally	Project leader
7	State/market	Private school	An independent institution that operates a school within a legal framework, offering education from preschool, primary and lower secondary education. The schools are funded by the state and parent payment.	Teacher
8	State	Public school	Public schools run by the regional municipality covering compulsory education from preschool, primary and lower secondary education.	Teacher
9	State	Public school	<i>See informant 8</i>	Teacher

10	State	Youth school	A municipal offer to youth between 14-18 years as supplement teaching outside school hours, full day teaching for youth with special educational needs and additional school after completion of compulsory education.	Project worker
11	Community/ third sector	Resident association	An ecovillage which renovates their buildings with sustainable materials, and hosts workshops, etc.	Board member
12	State	Public school	<i>See informant 8</i>	Pedagogue
13	State	Public school	<i>See informant 8</i>	Teacher
14	State	Municipal school service	An educational service institution that develops, organizes and conducts teaching for daycare, primary and secondary schools in collaboration with a wide range of cultural institutions.	Coordinator
15	State	Youth school	<i>See informant 10</i>	Teacher
16	State	Municipal planning department	A center responsible for planning, building and environmental permits.	Project leader
17	State	Municipal waste management company	<i>See informant 4</i>	School service educator
18	Community/ third sector	Citizen association	Representing the citizens and function as a sparring partner for the municipal council around activities and development of the city	Board member
19	State/Third sector	Municipal waste management company and university	<i>See informant 6</i>	Former project leader

**Scoping interviews conducted before fieldwork, however these are also transcribed and analyzed.*

***One informant was interviewed twice, for scoping and during fieldwork.*

Appendix 4 Codebook for thematic analysis.

Code name	Description	Framework reference
1. Sector		
Sector_third_sector	Actor describes efforts and internal relations in the third sector in relation to the local transition (non-profit-formal-private)	MaP
Sector_state	Actor describes efforts and internal relations in the state in relation to the local transition (non-profit-formal-public)	MaP
Sector_market	Actor describes efforts and internal relations in the market in relation to the local transition (for-profit-formal-private)	MaP
Sector_community	Actor describes efforts and internal relations in the community in relation to the local transition (non-profit-informal-private)	MaP
2. Role of actor		
Actor_role	An actor describes their role in general	MaP
Actor_role_third_sector	An actor describes their role as connected to the third sector	MaP
Actor_role_state	An actor describes their role as connected to the state	MaP
Actor_role_market	An actor describes their role as connected to the market	MaP
Actor_role_community	An actor describes their role as connected to the community	MaP
Actor_role_shift	An actor describes a shift in their role or in their role in relation to other actors	MaP
3. Empowerment		
Empowerment_relatedness	When an actor describes their capacity as impacted (positively/negatively) by a relationship to another actor(s): "We are connected to each other/we belong"	Avelino et al., 2020
Empowerment_autonomy	When an actor describes their capacity as impacted (positively/negatively) by their autonomy and independence: "We can determine what we do"	Avelino et al., 2020

Empowerment_competence	When an actor describes their capacity as impacted (positively/negatively) by competence: “We are good at what we do”	Avelino et al., 2020
Empowerment_impact	When an actor describes their capacity as impacted (positively/negatively) by having impact: “We can make a difference”	Avelino et al., 2020
Empowerment_meaning	When an actor describes their capacity as impacted (positively/negatively) by it being meaningful: “We believe in what we do/doing this is meaningful to us”	Avelino et al., 2020
Empowerment_resilience	When an actor describes their capacity as impacted (positively/negatively) by the ability to learn and recover from setbacks: “We can adapt and recover”	Avelino et al., 2020
Empowerment_individual	When an actor describes their capacity as an individual to mobilize resources and institutions to achieve goal(s). This can be both positive and negative.	POINT/MaP
Empowerment_group	When an actor describes the capacity of a group or network to mobilize resources and institutions to achieve goal(s). This can be both positive and negative.	POINT/MaP
Empowerment_sector	When an actor describes the capacity of a sector to mobilize resources and institutions to achieve goal(s). This can be both positive and negative.	POINT/MaP

4. Power type

Power_type_innovative	When an actor describes their capacity to create new material or immaterial resources which are visible to plural actors	POINT
Power_type_reinforcive	When an actor describes their capacity to reinforce or reproduce existing structures or institutions of the regime of a system	POINT
Power_type_transformative	When an actor describes their capacity to develop renew or reconfigured structures or institutions compared to the existing regime of a system	POINT

5. Power dynamic

Power_dynamic_over	A power relation between two or more actors, where one actor has power over the others	POINT
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Power_dynamic_more_less	A power relation between two or more actors, where one actor has more or less power over than the others to achieve something	POINT
Power_dynamic_antagonistic	A power relation between two or more actors, where the actors have different types of power which challenge each other	POINT
Power_dynamic_synergetic	A power relation between two or more actors, where the actors have different types of power which enforce each other	POINT

6. Resource

Resource_mobilization	When an actor describes their access, strategies, or willingness to mobilize resources to achieve a local sustainable transition. This is also connected to the actor's description of own perceived influence on the local transition	POINT
Resource_type_mental	The type of resource which is mobilized or needed to achieve a local sustainable transition, e.g., information, ideas, beliefs	POINT
Resource_type_human	The type of resource which is mobilized or needed to achieve a local sustainable transition, e.g., human leverage, personnel, members	POINT
Resource_type_artifactual	The type of resource which is mobilized or needed to achieve a local sustainable transition, e.g., products, constructions, infrastructure	POINT
Resource_type_natural	The type of resource which is mobilized or needed to achieve a local sustainable transition, e.g., raw materials, physical space, time	POINT
Resource_type_monetary	The type of resource which is mobilized or needed to achieve a local sustainable transition, e.g., funds, cash, stocks	POINT

7. Transition

Transition	When an actor in general describes the local transition to sustainability	POINT
Transition_exogenous_trends	When an actor describes exogenous, broader conditions outside of the system of study e.g., climate change in relation to a local sustainable transition	POINT

Transition_endogenous_trends	When an actor describes broader trends originating from human intervention e.g., transnational movements in relation to a local sustainable transition	POINT
Transition_regime_niche_interactions	When an actor describes how the current waste management regime on Bornholm is challenged by niche or niche-regime innovations. This challenge can be moderate or radical.	POINT
Transition_regime	When an actor describes the stability of current accepted structures or institutions of the current waste management regime on Bornholm	POINT
Transition_niche	When an actor describes the innovative potential of emerging niches related to waste management on Bornholm. This innovation can be moderate or radical.	POINT
