

Driving the transition:

Intermediary actors in the grassroots e-carsharing niche of rural Germany.

Max Halbwachs

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Masters Thesis

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Abstract

Rural Germany is massively dependent on fossil fuel driven cars. But in many villages, socio-technical innovations have emerged to tackle this dependency. Electric carsharing, often organised in grass-roots-settings, is one of them. For such innovations to spread and grow, different projects from across the country need intermediaries to connect them in networks, or share ideas, and experiences. This thesis identifies the intermediaries and outlines their possible roles in overcoming challenges to the spread of rural, electric carsharing-projects. Semi-structured interviews with both grass roots-activists and potential intermediaries are conducted. The results show several active intermediaries, especially in the state of Schleswig-Holstein. However, challenges persist, including a detachment of projects from each other, political dependencies, disregard of local identities and a need for more intermediation. The practical implications of these results for policymakers and practitioners are discussed alongside theoretical implications for future research around socio-technical transitions to sustainability.

Keywords:

Electric car sharing,
Socio-technical transitions,
Intermediary actors,
Sustainable mobility,
Multilevel perspective,
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Deutschsprachige Zusammenfassung

German summary

Zunächst, falls Sie meinen Interviewpartner:innen angehören: Vielen Dank noch einmal für Ihre Mitarbeit. Ohne Ihre Einblicke hätte ich die folgenden Worte nie schreiben können:

Diese Masterarbeit setzt sich mit dem Phänomen der *Intermediation* im nachhaltigen Wandel des Verkehrssystems im ländlichen Raum Deutschlands auseinander. Bottom-up organisierte e-Carsharingprojekte (im Folgenden ECS-Projekte) wurden dabei als eine Komponente dieses Wandels genauer untersucht, die erste vielversprechende Ergebnisse für ein zukunftsfähiges Mobilitätssystem aufweist, aber noch kaum Forschungsgegenstand gewesen ist. Gerade in Schleswig-Holstein sind in den letzten Jahren eine Vielzahl von erfolgreichen „Dörpsmobilen“ entstanden.

Konkret stellt sich die Arbeit die Frage, welche *Intermediäre* die verschiedenen ECS-Projekte miteinander verknüpfen und den Austausch von Erfahrungen, Expertise und Ressourcen zwischen diesen fördern. Außerdem geht sie der Frage auf den Grund, inwieweit diese Intermediäre dazu beitragen können, Herausforderungen für solche Projekte zu überwinden.

Um diese Forschungsfragen zu beantworten, wurden acht ausführliche semi-strukturierte Interviews mit Vertreter:innen von ECS-Projekten und potentiellen Intermediären geführt. Dazu gehören u.a. auch das Koordinierungsbüro der „Dörpsmobil“-Projekte in Schleswig-Holstein und ein LEADER-Regionalmanagement aus dem Göttinger Raum. In zwei separaten Analyseverfahren der Interviewdaten konnten sowohl die wichtigsten Intermediäre, als auch die größten Herausforderungen für deren Arbeit ermittelt werden.

Die Ergebnisse zeigen, dass gerade in Schleswig-Holstein gleich mehrere Intermediäre tätig sind. Dazu gehören die bereits erwähnte Koordinierungsstelle, die „Akademie für ländliche Räume“ und Individuen aus den Dörpsmobil-Projekten, die als „Botschafter“ fungieren und ihre Erfahrungen offen weitergeben. In Folge dieses organisierten Erfahrungsaustauschs weist Schleswig-Holstein mit Abstand die größte Fülle von ECS-Projekten in Deutschland auf. Aber auch in anderen Bundesländern wird *Intermediation* durchgeführt. Hier sind es vor allem lokale Verwaltungen in Kommunen und/oder Landkreisen, die Netzwerke zwischen einzelnen Projekten herstellen. In Einzelfällen übernehmen auch LEADER-Regionen oder private Institute diese Rolle. Dennoch zeigen die Ergebnisse auch, dass zwischen ECS-Projekten oft noch eine große Distanz besteht. So wussten mehrere Interviewpartner:innen nicht von den Erfolgsgeschichten aus Schleswig-Holstein, oder von bestehenden Strukturen wie Versicherungen oder Buchungssystemen für ECS-Projekte im ländlichen Raum. Auch

politische Abhängigkeiten, v.a. von Förderungen aus der öffentlichen Hand stellen eine Herausforderung für sowohl Projekte als auch *Intermediäre* dar.

Insgesamt hielten die Interviewpartner:innen *Intermediation* für zielführend und wünschten sich vielfach eine stärkere Vernetzung untereinander. In der Diskussion ihrer Ergebnisse stellt diese Arbeit deshalb die Bundesverbände für Carsharing (BCS) und Elektromobilität (BEM) als mögliche Akteure heraus, die auf Bundesebene *Intermediation* betreiben könnten. Bisher geschieht dies nur in einem sehr eingeschränkten Maße. Durch eine stärkere Berücksichtigung von ländlichen ECS-Projekten in ihrer Arbeit könnten die Verbände effektiv dazu beitragen die Distanz zwischen Projekten zu überbrücken. Außerdem wären sie in der Lage, derartige Initiativen stärker in ihre Lobbyarbeit auf Bundes- und Landesebene einzubringen und somit die oben beschriebenen politischen Abhängigkeiten zu bewältigen.

Als weiteres Ergebnis dieser Arbeit darf dabei nicht vergessen werden, dass sich die aktuell erfolgreichen ECS-Projekte vielfach dadurch auszeichnen, dass sie eng mit lokalen Strukturen vernetzt sind und ihre eigene Identität aufweisen. Zum Teil drückt sich dies auch durch die Zusammenarbeit mit anderen Initiativen wie z.B. Bürgerenergiegenossenschaften aus. Während verstärkte *Intermediation* also dabei helfen kann, „Erfolgsrezepte“ bundesweit verfügbar zu machen, ist eine Bewahrung des lokalen Engagements und der „bottom-up-Struktur“ zentral, um die Unterstützung der Bevölkerung an ECS-Projekten sicherzustellen.

Die gesamte Arbeit beruht auf theoretischen Betrachtungen zum „nachhaltigen Wandel“ aus einer „Mehrebenenperspektive“. Diese erklärt wie „sozio-technische Innovationen“ wie ECS dazu beitragen können langfristig das bestehende „sozio-technische Regime“ - in diesem Fall die Abhängigkeit von Verbrennern im ländlichen Raum - zu verändern. Die Ergebnisse dieser Arbeit deuten auf eine mangelhafte Konzeptualisierung von Macht und Handlungsfähigkeit in dieser Theorie hin und leiten daraus Hinweise für zukünftige Forschung ab. Auf diese Details soll an dieser Stelle nicht näher eingegangen werden, sie lassen sich aber in den Kapiteln 2 und 6.2 der Arbeit genauer nachlesen. Außerdem gibt Kapitel 5 eine Zusammenfassung über die identifizierten *Intermediäre* und Herausforderungen. Kapitel 3 gibt einen zusammenfassenden Einblick in die Literatur zum Thema „Nachhaltigkeit und ECS“, Kapitel 4 beschreibt das analytische Vorgehen dieser Arbeit genauer und Kapitel 6.1 greift die oben genannten praktischen Implikationen der Ergebnisse im Detail auf. Bei weiteren Fragen und/oder Anmerkungen zu dieser Arbeit melden Sie sich gerne unter maxhalbwachs@gmail.com

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The countless conversations about our thesis work in the past months taught me that there are two kinds of people: Those who think that writing acknowledgements that no one reads anyway is quite a cringy thing to do and those, who think it's a nice and wholesome way to end and reflect a chapter of one's life. If you belong to the first group, please skip to section 6.2 of this thesis. You'll find your dry theoretical discussions there. If you, like me, belong to the latter group, well... welcome to my little thank you essay:

First and foremost, my deepest thanks go out to all the practitioners I got to talk to for this thesis. Without you, none of the below could have been written. But more importantly, without you, there would also not be any electric carsharing in rural Germany. And no voluntary elderly-care, no renewable energy initiatives. People like you keep up my hope that we, against all odds, will eventually manage to create a sustainable society.

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List of Abbreviations

ALR	Akademie für die Ländlichen Räume Schleswig-Holsteins e.V. <i>Academy for the rural areas of Schleswig-Holstein e.V.</i>
BCS	Bundesverband Carsharing <i>Federal association for carsharing</i>
BEM	Bundesverband e-Mobilität <i>Federal association for electric mobility</i>
ECS	Electric carsharing
EU	European Union
IfaeM	Institut für angewandte e-Mobilität <i>Institute for applied e-mobility</i>
LEADER	Liaison entre actions de développement de l'économie rurale <i>Links between actions for the development of the rural economy</i>
MLP	Multi-level perspective
MOQO	Name of a booking-app for carsharing

1 Introduction

One central purpose of sustainability science is helping to overcome complex sustainability problems by understanding and supporting ongoing transitions towards sustainability (Clark, 2007; Hebinck et al., 2022; Köhler et al., 2019). Greenhouse-gas-emissions from transportation pose one such problem. In Germany, the transportation sector is the only one in the country increasing its emissions since 1990 (Umweltbundesamt, 2021, p.73). Today, road transportation alone stands for 19.9% of German carbon-equivalent emissions (Umweltbundesamt, 2021, p.213), about 60% of which stem from cars (Bundesregierung, n.d.). In addition to these climate related issues, road-transportation entails a number of other problems such as air pollution, the sealing of land for roads, or a higher accident risk than with any other mode of transport (Hennicke et al., 2021). At the same time, cars are deeply entrenched into German culture, while citizens are highly dependent on cars and the topic causes heated debates (Haas, 2020). Especially in rural areas, where access to alternative modes of transport is low and cars are used to access basic services or to commute (Nobis & Kuhnimhof, 2018; Nobis & Herget, 2020), these problems are of great relevance.

Focussing on rural areas in all of Germany, this thesis pays closer attention to one *socio-technical niche-innovation* - a radical novelty combining technological innovations with new social practices (Geels, 2019) that has the potential to contribute to a transition towards a more sustainable rural mobility-sector: grassroots projects of electric carsharing (ECS). Complementing other efforts such as extension of public transportation, such projects can significantly reduce the number of cars used while at the same time strengthen social cohesion in their respective communities (see 3.1). In recent years, a rapid increase of such projects across all of rural Germany can be observed (Appendix 1) - especially in the northernmost state of Schleswig-Holstein. There, a dense network of rural grassroots ECS-projects using a common brand and design has emerged (Akademie für die ländlichen Räume Schleswig-Holsteins e.V. [ALR], n.d.) and gives many examples for the successful operation of such enterprises. That shows that the innovation can spread beyond single, isolated projects - a sign for an ongoing *socio-technical transition* to sustainability (Geels, 2019).

Studying socio-technical transitions, recent research has paid more and more attention to so-called *intermediary actors*, i.e. actors, who, among other things, aggregate knowledge from different innovative projects, communicate it to others, create opportunities for networking and manage partnerships beyond the niche (Hargreaves et al., 2013; Kivimaa et al., 2019a). Their crucial importance is emphasised especially in early transition phases (see 2.2). However, research on intermediaries has

not focussed on the mobility-sector yet and mobility is mentioned only in a few studies, often as a side-note (e.g. Kanda et al., 2020; Kanger & Schot, 2016; Kivimaa et al., 2019a, 2019b; Sovacool et al., 2020). At the same time, intermediation itself still is an understudied phenomenon and in general, little is known about the extent to which intermediaries contribute to “facilitating and accelerating transitions” (Köhler et al., 2019, p.9). The existing research also admits being highly “context-dependent” to the particular cases it studies (Kivimaa et al., 2020, p.431). Consequently, this thesis has a twofold aim: (1) identifying and characterising the relevant intermediary actors and uncovering the extent to which they already influence Germany’s rural ECS-sector, and (2) outlining the extent to which these actors can support a further socio-technical transition against challenges in the ECS-sector. Two research questions result from these aims:

1. Which types of transition intermediaries are there in the grassroots ECS-niche in rural Germany and what functions do they fulfil?
2. How can intermediaries help in overcoming challenges to the ongoing socio-technical transition to sustainability within the rural mobility-sector of Germany?

Answering these questions has theoretical and practical benefits. On the one hand, it adds to the literature on intermediaries by adding perspectives from a barely incorporated sector and has the potential to uncover unknown roles that intermediaries play in early phases of socio-technical transitions. On the other hand, the insights from this thesis can be used to inform the intermediation that is happening in the ECS-sector and in turn potentially benefit the practitioners on the ground, especially those founding future ECS-projects in rural areas. This thesis thus produces both theoretical and action-oriented knowledge as is common for research within “science for sustainability” (Spangenberg, 2011, p.277).

To do so, the thesis will continue by giving an overview of the theoretical concepts of socio-technical transitions and intermediary actors (section 2), as well as rural ECS and the ongoing transition of the mobility-sector in Germany (section 3). It then continues to describe its methods of semi-structured expert-interviews, content analysis, and thematic analysis (section 4) before presenting (section 5) and discussing (section 6) its results. A conclusion is drawn in section 7.

2 Theory

This section introduces the concepts used to answer both research questions. The first subsection presents the middle-range theory of the multi-level perspective to frame grassroots niche-innovations as part of socio-technical transitions to sustainability. The second subsection then introduces intermediary actors as a driving force in such transitions. It conceptualises them based on functions their activities fulfil and further describes different types of intermediaries there are.

2.1 The multi-level-perspective, socio-technical transitions and grassroots-innovations

This thesis follows the assumption that ECS poses a sustainable alternative to the existing mobility-system regarding both technology and social practices. Hence, it can function as a *socio-technical niche-innovation* in a *socio-technical transition* (Geels, 2019). To theoretically frame such socio-technical transitions to sustainability, the *multi-level perspective* (MLP) (Geels 2002, 2019) is applied as a well-established way of studying socio-technical transitions. This middle-range theory (Geels, 2010) has been used in the context of studying transitions and intermediation in many cases including energy (Hatzl et al., 2016), or housing (Bush et al., 2017; Lang et al., 2020). It helps identify the crucial actors, structures and dynamics within a transition that is driven by niche-innovations such as ECS. It is therefore deemed suitable to be applied in this thesis.

In the MLP, *socio-technical regimes* are constituted by the dominant “shared rules and institutions” of those actors that are incumbent in the current socio-technical system (Geels, 2019, p.189). This can entail actors and institutions such as policymakers, regulators, large firms, or engineers but even includes the dominant lifestyles and cognitive routines of individuals (Geels & Schot, 2007; Geels, 2019). Regimes are embedded in a macro-level *landscape* consisting of slowly changing variables such as infrastructures, sociodemographics, cultural patterns, the media-landscape or political ideologies (Geels 2012, 2019). Changes in the landscape can pressure and destabilise regimes and thus open *windows of opportunity* for regime-change (Geels & Schot, 2007). The focus of this thesis however lies at the micro-level: *niche-innovations*. These are usually defined as radical social or technological novelties that take place “at the periphery of existing systems, through pioneering activities of entrepreneurs, start-ups, activists, or other relative outsiders” (Geels, 2019, p.189). This thesis further differentiates between *global niches*, i.e. the entirety of these related innovations within a certain socio-political context (Hatzl et al., 2016; Lang et al., 2020) and defines the concept of *local nich-*

es as (clusters of) individual projects on the ground. Figure 1 summarises these multiple levels and their characteristics.

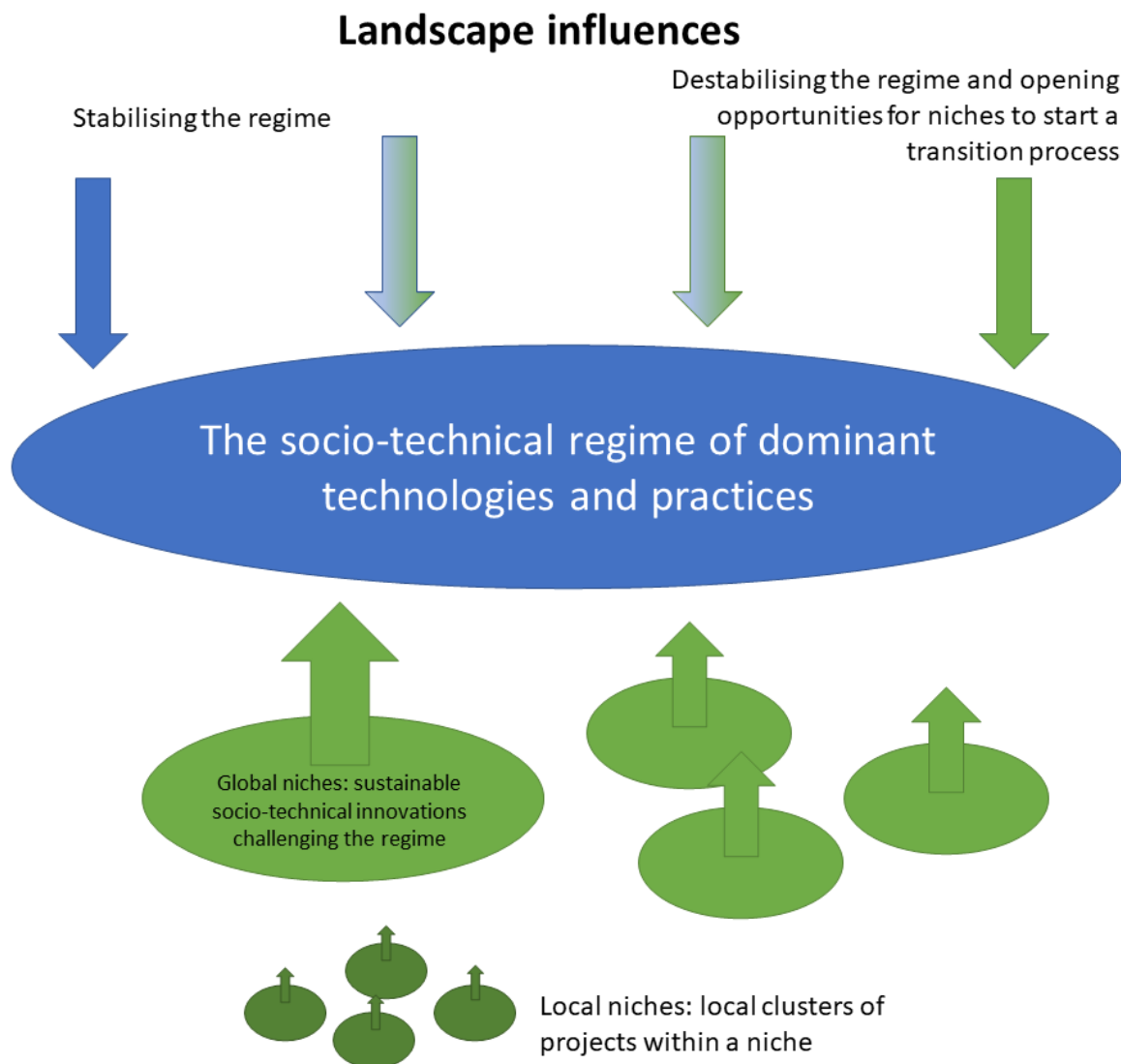


Figure 1 The multi-level-perspective as conceptualised in this thesis. Landscape influences reinforce or destabilise the existing socio-technical regime. Global niches of socio-technical innovations that consist of a variety of local niches aim to become part of or replace the regime (adapted from Geels 2002, 2018).

The idea of a socio-technical transition to sustainability as framed by the MLP is that local niches can align, grow, and become part of or replace the current regime with a more sustainable one (Geels, 2019; Markard et al., 2012). In other words, “transitions [...] are defined as regime shifts” (Geels, 2010, p.495). This process is usually supported by landscape pressures that open windows of opportunity for regime-change (Geels & Schot, 2007). Geels (2019) structures this transition process in four overlapping phases of (1) *experimentation*, where first, independent niche-experiments emerge, (2)

stabilisation, where dominant designs of the innovation are established and implemented more widely, and where more interactions between experiments take place, (3) *diffusion/disruption*, where the innovation increasingly appeals to the mainstream and struggles with the established regime economically, culturally, and politically, and (4) *institutionalisation/anchoring*, where the innovation replaces the old regime, or renews its existing components. Figure 2 shows how Geels (2019) summarises this process. Niche-innovations can fail before passing the entire transition (Kivimaa et al., 2019b). A common critique towards this approach is that it does not actually assess the factual sustainability impacts of the respective niche-innovations it is applied to (Geels, 2019; Seyfang & Haxeltine, 2012). Hence, this thesis describes the sustainability impacts of ECS in section 3.

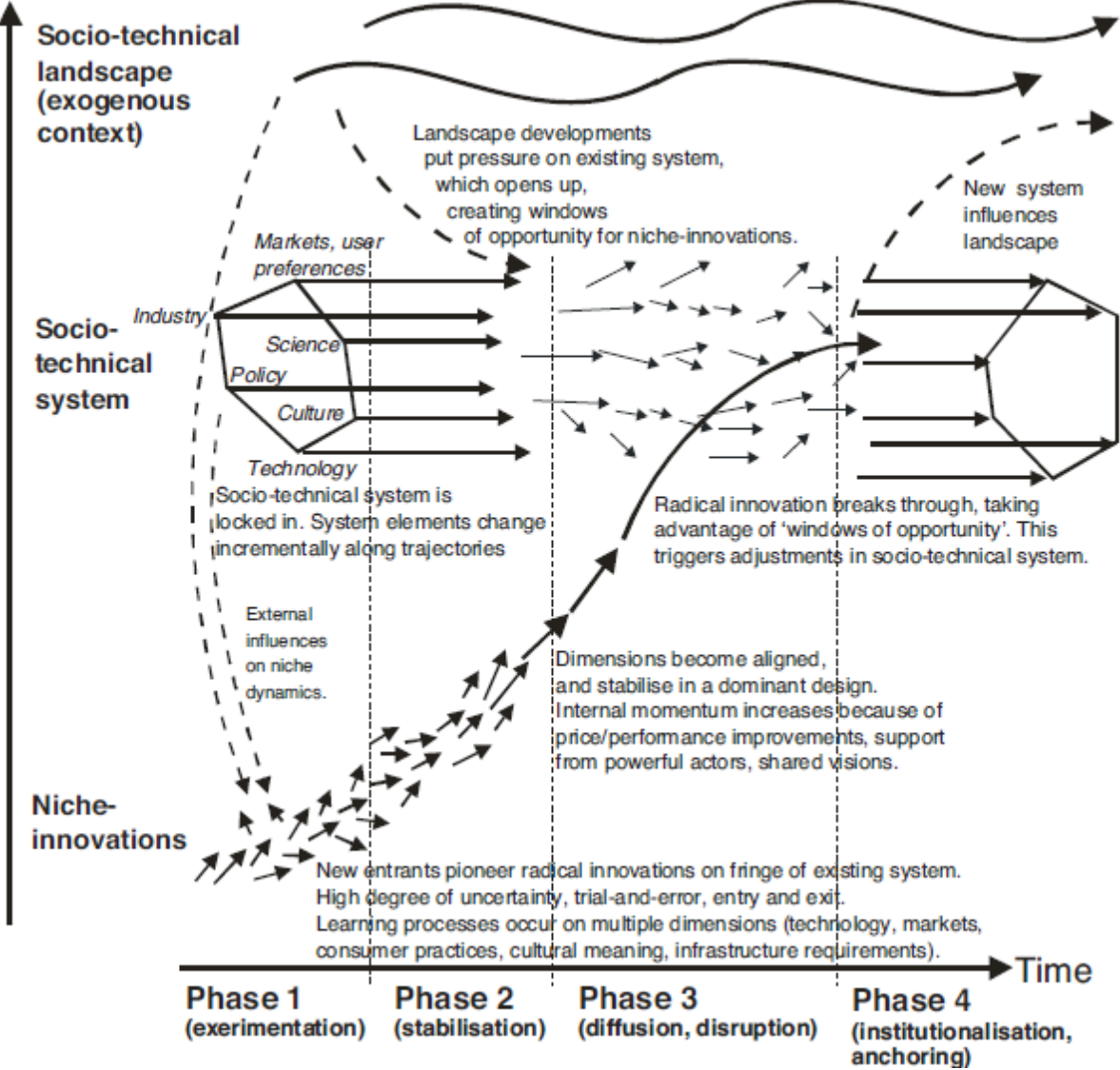


Figure 2 The process of socio-technical transitions as visualised by Geels (2019, p.191). Under beneficial landscape influences, niche innovations can spread, grow, and align into a stabilised niche (phase 2) that then gains the capabilities to challenge the existing socio-technical regime (phase 3) and eventually become a part of it or replace it (phase 4).

Beyond this idea of what constitutes socio-technical transitions, it is relevant to underline that research has established differentiated conceptualisations of socio-technical niches. Most importantly, scholars distinguish between *market-niches* and *grassroots-niches* (Hatzl et al., 2016; Seyfang & Haxeltine, 2012; Seyfang & Smith, 2007). While market-niches are usually driven by revenue-seeking firms with economic interests, grassroots-innovations are organised in formal or informal collectives, cooperations, or associations and driven by ideological, cultural or value-based forces that aim at addressing social needs such as inequality or unsustainability (Hatzl et al., 2016; Hossain, 2018; Seyfang & Smith, 2007). Thus, they are often smaller than market-based innovations but can nonetheless contribute “significantly” to sustainability (Hossain, 2018, p.63). Additionally, Schot & Geels (2008) note that within market niches, competition between actors in the same market can hinder the exchange of ideas and experiences and thus the overall advancement of the niche. In contrast, grassroots-niches usually consist of voluntary activists or social enterprises, whose main ambition is to “respond to the local situation and the interests and values of the communities involved” rather than to compete with other businesses (Sengers et al., 2019, p.158). Cooperation amongst grassroots-niches is thus deemed to be more likely. According to a systematic literature-review by Hossain (2018), there is little research featuring grassroots-innovations within the mobility sector. Hossain (2018, p.67) also points out the significant “support from intermediary organisations” that grassroots-niches often need in order to survive. The following sub-section will elaborate on this crucial phenomenon.

2.2 Intermediary Actors

Intermediaries are relevant during different stages of the transition-process described above. Especially in the stabilisation phase of the process, they play a critical role. Their activities increase the chances for the niche to stabilise and grow into a contender to the regime (Bauwens et al., 2022; Bird & Barnes, 2014; Boyle et al., 2021; Geels, 2019; Hargreaves et al., 2013; Hossain, 2018; Kanda et al., 2020; Kivimaa, 2014; Kivimaa et al., 2019a, 2019b; Schot & Geels, 2008). At the same time, a lack of intermediaries in this early transition-phase can impede the formation of a “more robust, global niche” (Hatzl et al., 2016, p.67) and thus threaten a successful transition.

In general, there are numerous conceptualisations of what constitutes an intermediary (Kivimaa et al., 2019a). For this thesis, the conceptualisation by Hargreaves et al. (2013, p.870) will be applied because it is set in the particular context of research on grassroots-innovations. It defines intermediaries as:

“organisations or individuals engaging in work that involves connecting local projects with one another, with the wider world and, through this, helping to generate a shared institutional infrastructure and to support the development of the niche in question” (Hargreaves et al., 2013, p.870)

This definition is explicitly not limited to institutions only, as it is done by other scholars (e.g. Küçüksayraç et al., 2015), but also includes individuals, who are not formally organised. To enable operationalisation of this definition and the identification of relevant intermediaries, Hargreaves et al. (2013) list four functions that they fulfil. These functions are based on the work of Geels & Deuten (2006) and their assumptions of *strategic niche management* (Kemp et al., 1998), with elaborations by Hargreaves et al. (2013).

The first function of intermediaries is “aggregation”. It includes gathering information and experiences from many individual niche-projects, drawing conclusions from them, creating robust and “context-free” knowledge able to inform other projects, and identifying shared rules and trajectories in the global niche (Hargreaves et al., 2013, p.870). Secondly, the “creation of institutional infrastructure” describes how intermediaries create a repository of knowledge or skills, forums of exchange and circulation of knowledge and experiences of the global niche (e.g., conferences, workshops, online-forums, journals) with the goal to ensure long-term survival of intermediation activities (Hargreaves et al., 2013, p.870). The third function “framing and coordination” reverses the process of aggregation and uses the accumulated knowledge and institutional infrastructures to initiate and guide projects on the ground, give advice, encourage them in context-sensitive ways, build their confidence and capabilities, formulate policy and legal issues in ways more understandable for project-partners, or provide guidelines, templates, handbooks, or toolkits (Hargreaves et al., 2013, p.870). Lastly, intermediaries engage in “brokering and managing partnerships” beyond the global niche (Hargreaves et al., 2013, p.877). This is done by influencing policymakers, establishing partnerships in the public and private sectors and mediating possible value gaps between grassroots-niches and more market-oriented actors (Hargreaves et al., 2013).

Generally, it is important to notice that intermediaries are not necessarily the only actors fulfilling these functions and that other actors can potentially have similar influences on the niche. Thus, a careful distinction between deliberate intermediation and “wider processes of ‘intermediation’ which may not always be entirely deliberate or necessarily positive” is necessary (Hargreaves et al., 2013, p.877). This thesis will therefore only consider those actors as intermediaries who fulfil all four functions to at least some extent. If they do so, they can make a crucial contribution to the transi-

tion's stabilisation phase, despite the process still being dependent on other landscape- and regime-developments (Bush et al., 2017).

Hargreaves et al. (2013) further note that in the context of grassroots-innovations, intermediaries fulfil their functions with greater care for the diversity of aims and identities that such innovations might have compared to market-niches, which means that the observed activities in the rural ECS-niche of Germany could be rather diverse. Table 1 compiles examples of such activities from a broad review on case-studies on intermediation to solidify the conceptual understanding of intermediation in that setting.

While these functions suffice to identify intermediary actors, the way they fulfil these functions can vary. That is because they can operate at different levels, with different motivations, backgrounds, origins, approaches, or rules even when fulfilling the same four functions (Bird & Barnes, 2014; Kanda et al., 2020; Kivimaa et al., 2019a). Kivimaa et al. (2019a) summarise these differences in a typology of five different types of intermediaries: *User-intermediaries* (Kivimaa et al., 2019a, p.1071) often emerge from users or activists within niche-projects, often on a local level and with the goal to intermediate between the niche and the potential users of the innovation. *Process-intermediaries* (Kivimaa et al., 2019a, p.1071) are often external project managers or consultants employed to support the day-to-day activities within the niche. They usually have no concrete agenda in the transition process and conduct more neutral networking. *Niche-intermediaries* (Kivimaa et al., 2019a, p.1070) emerge while a niche develops in order to intermediate with the regime and other local niches. They typically aim to advance the niche's goals and that way try to facilitate a transition. *Regime-based intermediaries* (Kivimaa et al., 2019a, p.1070) are actors from within the dominant socio-technical regime, who pursue its change and therefore try to create space for niches, often with a political mandate. This can happen on all levels. Lastly, *systemic intermediaries* (Kivimaa et al., 2019a, p.1070) are actors pursuing the goal of sustainability in certain sectors as a whole and who are therefore intermediating across several levels and within several different niches, aligning their interests. Table 2 summarises this typology in a simplified manner.

The theoretical notions brought forward in this section are operationalised in the following two sections by situating the mobility sector and grassroots ECS-projects in rural Germany in the MLP and outlining the ongoing socio-technical transition (see 3). Then, a method to identify the intermediaries at play and their role in overcoming challenges within the transition is developed (see 4).

Table 1 Examples from case studies of intermediary activities for the four functions of intermediaries identified by Hargreaves et al. (2013)

	Aggregation	Institutionalisation	Framing & Coordination	Brokering & Managing Partnerships
Examples of intermediary activities	<ul style="list-style-type: none"> -Create Toolkits, Handbooks, How-to guides, checklists, databases, codes of practice ^{f, h, k} -Identify common needs and problems for niche-projects ^{j, k} -Produce case studies from different contexts ^f -Assess and evaluate different technologies ^{c, k, p} -Aggregate expectations and visions ^k -Gather and publish news from different projects ^{f, q} 	<ul style="list-style-type: none"> -Run websites ^f -Organise seminars, conferences, workshops, working groups etc. ^{f, p, q} -Creation and facilitation of new networks ^{a, c, k} -Help align interests within and across niches ^{c, k} -Manage financial resources and ensuring own long-term survival ^{f, l} -Connect and organise with other intermediaries ^{f, p} -Establish platforms for meetings with policymakers ^f -Establish first contacts between different projects and connect them to each other ^{h, i, k, o} 	<ul style="list-style-type: none"> -Build confidence and capabilities of local actors ^f -Create standards for projects within the niche ^{e, k, o, r} -Provide actors with useful information ^{c, g, i, k, o} -Provide concrete advice and support in a context-sensitive manner ^{a, c} -Increase local awareness and acceptance for projects ^m -“Translate” administrative, or legal jargon for projects ^{b, r} -Advance of sustainability aims ^d -Advocate for new visions or expectations in projects ^{k, l, o} -Initiate new projects ^{f, m, o} -Preserve local identities of individual grassroots projects ⁿ 	<ul style="list-style-type: none"> -Lobby policymakers on all levels for general policy-standards favourable to the niche ^{e, f, i, m, n, o, r} -Articulate aggregated needs, expectations and requirements of the niche ^j -Help identify and mobilise partners ⁱ -Help actors communicate and understand each other across organisational levels and value gaps ^{b, d, j, l} -Identify and secure potential funding/investments ^{c, e, f, j, n, o, r} -Increase legitimacy of the niche to the outside world and the regime ^{b, l, r} -Be gatekeeper for networks ^{a, j} -De-legitimise and destabilise regime-practices ^{k, l}

Sources*: ^{a)} Bird & Barnes, 2014; ^{b)} Boyle et al., 2021; ^{c)} Bush et al., 2017; ^{d)} Ehnert et al., 2022; ^{e)} Geels & Johnson, 2018; ^{f)} Hargreaves et al., 2013; ^{g)} Hatzl et al., 2016; ^{h)} Hossain, 2018; ⁱ⁾ Kanda et al., 2020; ^{j)} Kivimaa, 2014; ^{k)} Kivimaa et al., 2019a, ^{l)} Kivimaa et al., 2019b, ^{m)} Kivimaa et al., 2020; ⁿ⁾ Lang et al., 2020; ^{o)} Martiskainen & Kivimaa, 2018; ^{p)} Prodi et al., 2022; ^{q)} Schot & Geels, 2008; ^{r)} Sovacool et al., 2020

Note The table shows examples of how the four functions have been fulfilled in examples from previous research on intermediaries. The superscript attributes each activity to at least one of the publications listed below the table

Table 2 Intermediary-typology as adapted and simplified from Kivimaa et al. (2019a)

Type of intermediary	Level of action	Goals of intermediary	Additional characteristics
User-Intermediary	Usually within local niches	Connect users of the niche-innovation	
Process-Intermediary	Usually within local niches	Support the day-to-day activities within the niche	Often external project managers with no own agenda
Niche-Intermediary	Global niche and/or local niches	Advance the niche's goals	Usually emerges from within the niche
Regime-based Intermediary	Niche- and regime-levels	Controlled change of the regime from within	
Systemic Intermediary	All levels	Promote sustainability in certain sector as a whole	Usually interacts with several niches

Note The table shows each intermediary type as described by Kivimaa et al. (2019a), the level of their activities in the MLP (see 2.1), their usual goals in the intermediation process and additional information relevant to this thesis.

3 Background

This section introduces the case of grassroots ECS in rural Germany in greater detail and locates this niche in its broader societal context using the MLP. Section 3.1 gives a brief overview over the existing socio-technical mobility-regime in rural Germany, and the landscape developments supporting it. It also introduces the ECS as a niche-innovation and argues for its contribution to sustainability in the mobility-sector. Section 3.2 defines rural ECS-projects in the context of this thesis and continues to outline which landscape pressures challenge the regime. It also shows how the actors active in the niche have started using this opportunity to contribute to a socio-technical transition and describes which actors potentially play an intermediary role in that transition.

3.1 The current mobility regime and the sustainability of carsharing

Despite its contribution to various sustainability problems (see 1), there are a multitude of factors keeping the current socio-technical regime of cars as the dominant mode of transport in rural Germany in place. This includes the car industry and its employees depending on this form of traffic for revenue (Geels, 2012, 2018) and influencing German policy makers to support them on both state- and federal levels (Lamprecht, 2017). Additionally, lifestyles and culture are deeply linked to the use of cars. This inhibits change as established regime-practices are taken for granted, while there is scepticism towards alternative modes of transport (Geels, 2012, 2018; Haas, 2020; Kanger et al., 2019; Köcher, 2019; Mögele & Rau, 2020; Sheller, 2012; Sovacool, 2017). Therefore, there are path dependencies such as engineers being educated only for car-transportation or large amounts of capital invested in car-infrastructure (Geels, 2012). Additionally, the physical landscape of already existing road- and fuel-infrastructure benefits the regime as it makes cars the most convenient or even the only possible mode of transportation (Berkeley et al., 2017; Geels, 2012; Kanger & Schot, 2016; Mattioli, 2021). This car dependency is even higher in rural areas, as these often are deprived of any other mode of transportation and the ownership of private cars is even more common (Nobis & Kuhnimhof, 2018; Nobis & Herget, 2020; Siedentop et al., 2013). Because of that, rural populations are also more vulnerable to *car-related economic stress*, having to cut other expenses in order to keep their car-based access to essential goods and services (Mattioli & Colleoni, 2016; van Dülmen et al., 2022).

In literature, electric vehicles are often framed as a technological niche-innovation that contributes to a regime-shift towards sustainability (Geels, 2012; 2018; Graham-Rowe et al., 2012), as they signif-

icantly reduce the emissions from transportation in direct comparison to fossil-fuel driven cars, especially if run with renewable energies (Sovacool et al., 2019). However, a large-scale replacement of fuel driven with electric cars creates adverse effects on its own (Sovacool, 2017; Sovacool et al., 2019; Kanger et al., 2019; Steinhilber et al., 2013); including, among many others, impacts on local environments and human health under precarious labour-conditions in the Global South through the mining of cobalt (Sovacool, 2019) or lithium (Liu et al., 2019). Additionally, a mere replacement of engines in private cars marginalises less affluent communities, who cannot easily afford new vehicles (Sovacool et al., 2019). Apart from these social and environmental issues, private cars in Germany remain unused on average 23 hours a day (Nobis & Kuhnimhof, 2018), while occupying space (Hennicke et al.). All these circumstances call for a broader socio-technical transition towards a regime where not only engines are being replaced but even ownership-models change and mobility as a whole is transformed (Hennicke et al., 2021; Kanger et al., 2019). Using electric vehicles in carsharing can thus have more positive sustainability-impacts than a mere replacement of private vehicles.

Carsharing, as a social niche-innovation (Geels, 2019), can in general act as one effective way to reduce private car ownership and the overall distance travelled by car (Baptista et al., 2014; Clewlow, 2016; Engel-Yan & Passmore, 2013; Ferrero et al., 2018; Hahn et al., 2019; Kopp et al., 2015), and hence the overall emissions (Amatuni et al., 2020; Rabbitt & Ghosh, 2016). This is especially true, when it comes to households that own more than one car (Nijland & van Meerkerk, 2017), which is common in Germany, where an average household owns 1.1 cars (Nobis & Kuhnimhof, 2018, p.3). In rural Germany, even three cars per household are common (Nobis & Herget, 2020).

German carsharing practices can be traced back to the 1980s, when several communities started to own shared vehicles (Lindloff et al., 2014), often for environmentalist reasons (Münzel et al., 2017). Over the years, different carsharing models developed including peer-to-peer sharing of privately owned cars, carsharing businesses offering roundtrips or one-way journeys with rented cars, and non-profit grassroots-projects (Münzel et al., 2017). While urban areas show a great variety of these models, most rural areas are deemed to create little to no demand for profit-oriented carsharing due to their much lower population density (Münzel et al., 2017; Nansubuga & Kowalkowski, 2021; Perschl & Posch, 2016; Wappelhorst et al., 2014), especially with a rising distance to urban centres (Illgen & Höck, 2018). Perschl and Posch (2016) find that such factors are of less relevance to non-commercial, local carsharing projects, which are thus more suited for rural areas as they actively involve local populations and create identification with the project. Accordingly, Münzel et al. (2017, p.281) show that the largest number of carsharing projects in Germany follows a community owned, non-profit scheme, especially in smaller towns and villages. Despite that, a majority of research has

focussed on the commercial aspects of carsharing and thus mainly on urban areas (Ferrero et al., 2018; Illgen & Höck, 2018; Nansubuga & Kowalkowski, 2021). Simultaneously, much of the research on grassroots innovations has focussed on other sectors than mobility (Hossain, 2018). Rural, grassroots ECS-projects are thus located in both these research gaps.

Combining the low emissions from electric vehicles run by renewable energy with the reduction of privately owned cars and the feasibility of non-commercial carsharing in rural areas, grassroots ECS constitutes a socio-technical niche-innovation that provides an opportunity to increase sustainability in rural mobility. Many rural ECS-projects clearly state their aim to provide environmentally friendly mobility that reduces private car ownership rather than just replacing them with electric ones (e.g. ALR, n.d.; Dorfverein Barsikow e.V., n.d.; Holtzmeyer, n.d.; Jain et al., 2017). That way they can contribute to fulfilling the demand for mobility in rural areas immediately, using existing road-infrastructures without having to wait for the introduction of new modes of transportation (Lindloff et al., 2014). Rural ECS could thus act as one component in a multimodal (i.e. composed of several technologies and practices) mobility-system including for instance public transport, ridesharing, cargo- or e-biking (Frank et al., 2021), complemented by reducing the overall need for travelling, for example through digitisation and home-office. That way, it can significantly contribute to a socio-technical transition towards a sustainable, rural mobility-sector. The next section outlines to what extent such a transition is already taking place in Germany, what landscape developments benefit it, which projects are considered part of the niche in this thesis, and who could potentially support the niche as an intermediary.

3.2 The ongoing transition, the ECS-niche and potential intermediaries

A possible transition of the rural ECS-niche into the German mobility-regime is supported by various landscape-pressures. For example, digitisation and Covid-19 have led to a decreased demand for mobility, which is likely to benefit electric and shared mobility in the long run (Geels, 2012, 2018; Kanda & Kivimaa, 2020). Another factor is the rising support for the climate movement in Germany and climate issues being among the most important topics to German voters in representative surveys and a general rise in awareness for environmental issues, even in rural areas (Gellrich et al., 2021; infas, 2021). Even the increases in oil-prices can be regarded as a relevant landscape-pressure on the mobility-regime (Geels, 2018), especially due to recent geopolitical events.

Grassroots ECS is already part of an ongoing socio-technical transition in rural Germany. In the past decade, many new projects were founded (Appendix 1). For active ECS projects to be relevant for this thesis, they must meet the following characteristics derived from the conceptualization of grass-

roots-niches in section 2.1 and the research questions: First, the project is active in an administrative district that is classified as “very rural” or “rather rural” in the Thünen-Index - a common way of measuring rurality in Germany that is based on several factors including population density, agricultural land, or the proximity to urban centres (Küpper, 2016). Second, the project needs to be led by local volunteers. Third, it needs to be publicly accessible for all local individuals, who wish to participate in carsharing. Fourth, it needs to not primarily be revenue seeking. This can be ensured if the project’s initiators are organised in the legal form of a registered association (e.V.) that according to German federal law is legally bound not to pursue economic goals (Bürgerliches Gesetzbuch, 2022, §21).

Most examples of such projects can be found in the state of Schleswig-Holstein. There, the founding of ECS-projects in rural areas was declared a political goal and supported by the association “Academy for the rural areas of Schleswig-Holstein” (ALR), which secured state-funding to create a coordination-office to support the successful founding and further management of the project. This institution has been active since 2019 but its funding was only granted until March 31, 2022. Its future remains unclear at this point (ALR, n.d.). The coordination office even offers a unified brand-name (“Dörpsmobil”, meaning “village-mobile” in Low-German), logos and slogans, insurance-deals, access to a booking-app named “MOQO” and a detailed written guideline (Jain et al., 2017) to the projects. Consequently, the number of Dörpsmobil-projects has increased significantly (ALR, n.d.).

Even in other regions of Germany, ECS-projects express clear ambitions to grow (Steve&Julian, 2021). These developments show the rise of dominant designs and the increasing implementation of ECS-projects, can be seen as clear signs for the niche leaving the first transition-phase as described in 2.1 and entering the stabilisation-phase, in which intermediation becomes a crucial part of the niche’s further alignment and success (see 2.2). Figure 3 summarises the location of ECS-projects in the MLP (see 2.1) in the context of the information provided in this and the previous subsection.

While the coordination-office in Schleswig-Holstein seems to fulfil some intermediary functions (e.g. by distributing the aforementioned guideline), it is rather unclear to what extent and by whom intermediary functions are fulfilled, especially outside Schleswig-Holstein. Scattered signs of intermediation and interactions between projects in other states can be found when engaging deeply with their online-content (Steve&Julian, 2021). Nevertheless, which actors fully engage in all four intermediary functions remains to be uncovered by this thesis. There are some actors who seem to have the potential to fulfil this important position in the niche and whose exact role in the niche still is unclear. This includes the EU’s LEADER-program for rural development. Its regional managers are involved in funding and supporting ECS-projects (e.g. Landkreis Göttingen, n.d.). Additionally, Bau-

wens et al. (2022) indicate that the “federal association of carsharers” (BCS) fulfils some intermediary functions. The “federal association for e-mobility” (BEM) is an organisation of similar nature. Possibly, there are even more, less visible intermediaries (e.g. engaged individuals) at play. The next section thus sets out to describe the methods used to identify them the challenges they face in the transition process.

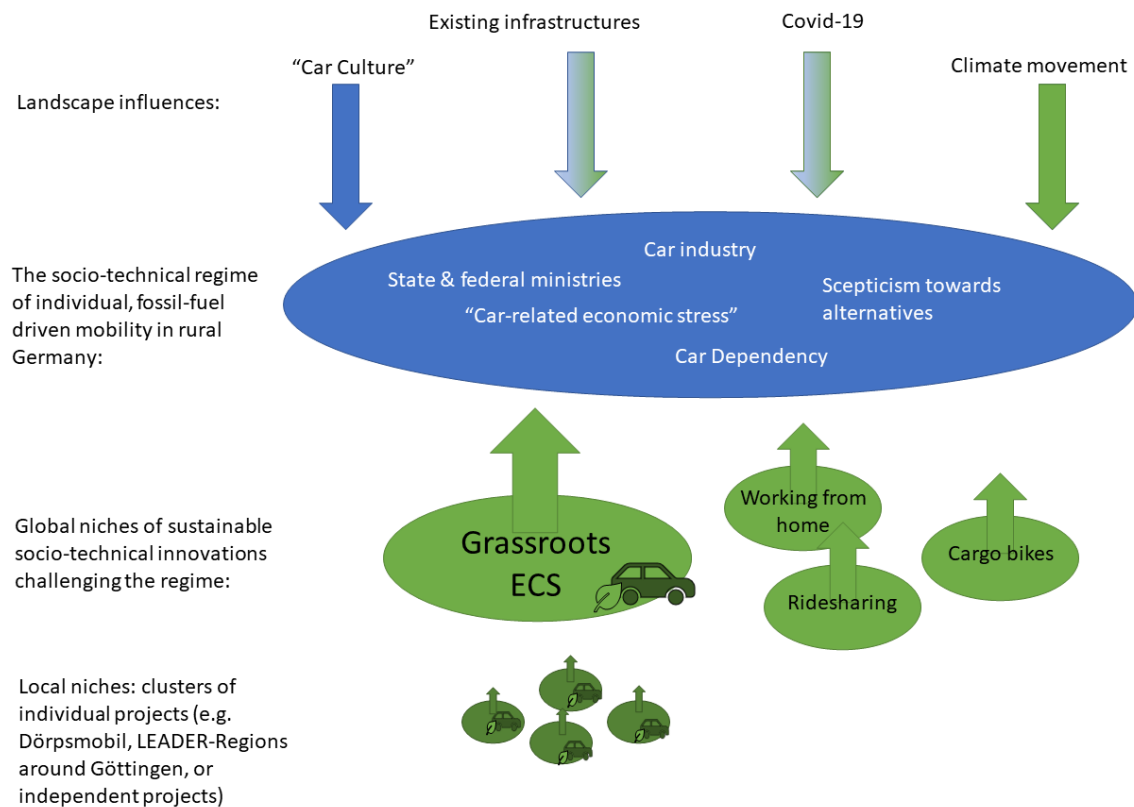


Figure 3 The grassroots ECS-niche contextualised in the context of the MLP as conceptualised in this thesis. As described in section 3, a number of local ECS-niches form a global ECS-niche-innovation that together with other mobility-related niches challenges the dominant regime of individual car-based mobility in rural Germany. This regime is pressured and/or kept in place by various landscape pressures (Based on Geels, 2002, 2018)

4 Methods

In this section the methods used to answer both research questions are presented. Subsection 4.1 describes how semi-structured interviews with various actors from the rural ECS-niche were used to gather relevant qualitative data. Subsection 4.2 then continues to introduce two distinct analytical procedures applied to these data in order to extract the information needed to answer the research questions.

4.1 Semi-structured interviews

This thesis employs a qualitative approach because it can both identify the central intermediary functions and explain uncertainties around such findings (Adams, 2015; Yin, 2016). More precisely, expert-interviews have been chosen as a method. Here, the term *expert* refers to actors from within the rural ECS-niche or intermediary institutions surrounding it, as they possess the in-depth-knowledge relevant to answer the research questions (Helfferich, 2019). This method has proven applicable to identify intermediaries in previous research as it provides deep insights into the dynamics within a socio-technical niche (e.g. Boyle et al., 2021; Hatzl et al., 2016; Hargreaves et al., 2013; Kanda et al., 2020; Kivimaa et al., 2020; Lang et al., 2020; Martiskainen & Kivimaa, 2018).

To begin, three informal scoping interviews with prominent actors from the ECS-niche took place in February. This helped adapting interview questions and setting timeframes for the formal interviews (Adams, 2015). Afterwards, eight semi-structured interviews were conducted because they allow for appropriately considering uncertainties by asking spontaneous follow-up questions, while keeping a degree of structuration that avoids departing from the most relevant information (Adams, 2015; Helfferich, 2019).

Interviewees were chosen from a list of ECS-projects fulfilling the characteristics established in section 3.2 (located in rural area, led by locals, publicly accessible, not primarily revenue seeking). Even actors that show signs of intermediary-activities (see 3.2) were added to the list. As no such list existed, it was self-compiled based on online-searches and extended based on recommendations by interviewees (Appendix 1). The list does not claim to be exhaustive because not all projects are present online. Projects from various local niches in different states were invited for an interview, to make sure to identify intermediaries who might not be active in the whole country. The final selection of interviewees (Table 3) was based on positive responses to that invitation. A volunteer from each project or a representative of an intermediary institution was interviewed in a zoom- or phone-call

except for interview VII, where three project-members wished to be interviewed together. All interviews were conducted in German.

Table 3 Overview of the interviews conducted for this thesis.

No.	Organisation of Interviewee	Potential Role in niche	State	Project started in
-*	Mobiles Eisdorf	ECS-project	Niedersachsen	2019
-*	Dörpsmobil Klixbüll	ECS-project and potential intermediary	Schleswig-Holstein	2016
-*	Coordination office Dörpsmobil Schleswig-Holstein	Potential intermediary	Schleswig-Holstein	2019
I	Dorfmobil Barsikow	ECS-project	Brandenburg	2020
II	Dörpsmobil Gettorf	ECS-project	Schleswig-Holstein	2020
III	Coordination office Dörpsmobil Schleswig-Holstein	Potential intermediary	Schleswig-Holstein	2019
IV	eFüßle	ECS-project	Baden-Württemberg	2015
V	Mobility Sharing Steyerberg, IfaeM and BEM	ECS-project and potential intermediary	Niedersachsen, federal level (BEM only)	1991
VI	Dörpsmobil Klixbüll	ECS-project and potential intermediary	Schleswig-Holstein	2016
VII**	Dorfbeweger Effolderbach	ECS-project	Hessen	2020
VIII	LEADER regional management of the region "Osterode am Harz"	Potential intermediary	Niedersachsen	2017

*) informal scoping-interview, not transcribed or analysed but used to inform later interviews

***) the organisation wished to participate in the interview with three representatives

Note The table gives an overview of all interviews conducted for this thesis, including the name of the respective organisation and the role they play in the niche. To showcase the diversity of the selected interviewees, their federal state and founding year are also displayed in the table.

During the interviews, a guideline divided in three blocks of questions was applied: (1) introductory questions to accommodate the interviewee within the interview situation (Helfferich, 2019), followed by (2) questions about how each of the four functions of intermediaries as outlined in section 2 applies in the interviewee's context, and finally (3) questions about the interviewees' perception of future challenges, visions or wishes for their ECS-project and/or intermediation-activities and rural ECS in general. For each block, broad questions encouraging the interviewee to speak freely about

the respective topic were asked first in order to uncover potentially new information and ask follow-up questions spontaneously or from a prepared list to cover content that has not yet been brought up by the interviewee (Helfferich, 2019). To keep the interview within the announced timeframe, all interview-questions were ranked by their relative importance to the research questions (Adams, 2015). Appendix 2 shows two generalised examples of the interview guidelines. These were adapted continuously to accommodate for the particular context of the interviewee and new details that have come up in the interviews before (Bryman, 2016, p.481).

All interviewees orally agreed to a consent-form (Appendix 3). The interviews were recorded and naturalised transcriptions (Bucholtz, 2000; McMullin, 2021) were produced and analysed. For that analysis, as outlined in the next section, the original, German transcript was used. English translations are made available alongside the original transcripts in Appendix 4 but not used for analysis or referencing. Direct quotes in this thesis are translated to English.

4.2 Data Analysis

To analyse the interview transcripts, a distinct analytical procedure was chosen for each research question. This analytical separation is justified by the fundamental difference in the kind of information needed for the respective questions. The first research question is a descriptive one and asks for a procedure that is capable of identifying intermediaries as entities clearly conceptualised through their functions. The second question however is of more exploratory and prescriptive nature and aims to identify previously unknown ways of how those entities can address challenges.

The first research question was addressed using deductive qualitative content-analysis as it enables a comprehensible and systematic identification of every mention of intermediation the interviewees made (Blatter, 2018). Concretely, a procedure as outlined by Mayring and Fenzl (2019) was applied to the interview-transcripts. Crucial steps in this process included the decisions to regard all interviewees' utterances as truthful to the best of their knowledge, to classify even single words as eligible for coding and to use the entirety of each transcript to provide context for the interpretation of the coded excerpts. The coding was conducted using a carefully reviewed coding guideline (Appendix 5) that classified all relevant excerpts of the text as one of the intermediary functions (see 2.2) and assigned them to the actor that fulfilled them.

In the end, the coded data lined out all intermediary functions named by the interviewees. That way it became apparent which actors fulfil all four functions and thus qualify as an intermediary. The data even included information on the motivations and the level of operation of the respective intermedi-

aries. That way, a placement of the respective actors in the typology by Kivimaa et al. (2019a; see 2.2) could be conducted as a final step of the analysis. This ensured a further characterisation of the intermediaries useful to discuss the results of both research questions (see 6). The results of this procedure are presented in section 5.1.

The procedure chosen to answer the second research question was a 6-phase-model of *reflexive thematic analysis* as presented by Braun and Clarke (2006; 2019; 2021). It was chosen because it can group contents of *shared meaning* (i.e. *themes*) that cannot necessarily be predicted or identified beforehand. By interpreting the data that way, clear fields of action for intermediation in the socio-technical transition can be pointed out. Choosing this approach also ensured openness for identifying unexpected results in the context of the theoretical framework of intermediation (see 2.2).

An initial coding procedure identified every excerpt of the text that was relevant to the second research question, i.e. that referred to challenges of the projects and/or possible utterances of intermediary actions related to overcoming those. For every excerpt one or several codes described why it was selected. After several iterations, these codes then served as a basis to generate the mes that describe common challenges around intermediation in the ongoing socio-technical transition. These themes and the excerpts they included could then serve as a basis to discuss possible future roles of intermediaries in the transition (see 6.2).

In both analytical procedures, the interview-transcripts from Appendix 4 were referred to by their number in roman numerals (Table 3), and their line-number in the German version of that transcript (Figure 4). The information generated by both procedures will be presented in the next section.

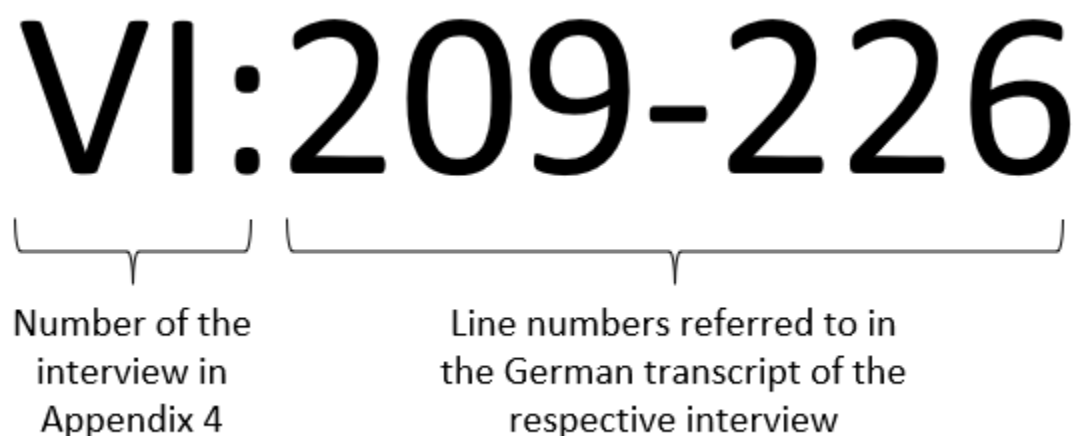


Figure 4 How to read the references to interview contents in this thesis

5 Analysis

This section presents the results of both analytical procedures conducted in this thesis. Subsection 5.1 Presents the results of the content analysis, which are predominantly relevant to identify and classify the intermediaries at play in the niche and thus answer the first research question. Subsection 5.2 presents four challenges in the socio-technical transition that were identified in the thematic analysis and are relevant to answering the second research question about how intermediaries can help to overcome such challenges.

5.1 Content analysis: identification and classification of intermediaries

This subsection's purpose is to address the first research question, which aims to identify and classify the intermediaries at play in the ECS-niche. Therefore, the functions of each identified actor are presented along with their placement in the typology by Kivimaa et al. (2019a) in the subsections below. It showcases five actors who fulfil all functions and thus act as an intermediary (5.1.1-5.1.4) and further actors who fulfil some, but not all functions and are thus not active as full intermediaries for the time being (5.1.5). Below the most crucial insights are summarised. Appendix 6 presents all identified intermediary functions.

5.1.1 The Dörpsmobil coordination-office and the Academy for rural areas of Schleswig-Holstein

The interviewees from the state of Schleswig-Holstein all reported that the “Dörpsmobil” coordination-office fulfils all four intermediary functions. There, one project manager has been employed full-time since 2019. The employment ended in April 2022 and the future of the coordination-office remains unclear. Figure 5 summarises the most crucial intermediary activities conducted by this actor.

The identified activities, with few exceptions (e.g. III:224-226), take place in the context of Dörpsmobil-projects. The intermediary thus operates on a local/regional level. As the coordination-office is run by a single project manager without a clearly articulated own agenda, it can be classified as a *process-intermediary* (Kivimaa et al, 2019a).

The very existence of the coordination-office is based on the activities of another actor in Schleswig-Holstein that fulfils all four intermediary functions: the ALR. Figure 6 summarises these intermediary activities. These data-points make clear that the ALR follows multiple purposes to support rural development and does not exclusively focus on ECS-projects. At the same time, the intermediary's lob-

bying activities clearly show a goal of promoting sustainable projects in the state. The organisation is thus to classify as a *systemic intermediary* (Kivimaa et al, 2019a). However, it needs to be noted that even the ALR focusses its activities to the state of Schleswig-Holstein and does not operate on a federal level.



Figure 5 Overview of how the Dörpsmobil coordination office fulfils the four intermediary functions by Hargreaves et al. (2013)

Academy for rural areas of Schleswig-Holstein

<p>Aggregation of knowledge</p> <ul style="list-style-type: none"> • Creating Dörpsmobil-guideline based on first Dörpsmobil-project 	<p>Institutional Infrastructure</p> <ul style="list-style-type: none"> • Creating tender for the creation of the MOQO booking-app • Offering apps for village-internal communication
<p>Framing and Coordination</p> <ul style="list-style-type: none"> • Founding the coordination office and employing project-manager • Making informative movies about rural innovations in Schleswig-Holstein, including Dörpsmobil 	<p>Brokering & Managing Partnerships</p> <ul style="list-style-type: none"> • Lobbying the state government for funding of coordination-office, MOQO and guideline • Communicating positive results from Dörpsmobil-projects to decision-makers

Figure 6 Overview of how the ALR fulfils the four intermediary functions by Hargreaves et al. (2013)

5.1.2 LEADER-Regions

Several interviewees reported on their local LEADER-regions to interact with ECS-projects in some way. In the region around the city of Göttingen, the LEADER-region even played a major role in eight projects (VIII:5-28). According to the interviewees, LEADER-regions, most often through their regional managers, thus fulfil all intermediary functions. However, the extent to which this is the case, depends on the region. Figure 7 gives a summary how the LEADER-regional management in the Göttingen region fulfils all four intermediary functions. Nevertheless, the fact that LEADER-regions do not necessarily include ECS-projects or interact with them shows that not all of them take on an intermediary role. Others might possibly not fulfil all but only some intermediary functions.

Assigning LEADER-regions to an intermediary-type based on the information this analysis provided, is not an easy endeavour. It is clear that all intermediation happens within the LEADER-regions, on a local level. LEADER-regional managers themselves are mainly fulfilling their functions in the fashion

of a project manager, without an own agenda. However, interviewee VIII also stated to be dependent on decisions made by the regions' local action group, a body of politicians and representatives from economy and civil society that decides on the region's funding (VIII:305-311). This makes LEADER-regions a possible hybrid between *process-* and *regime-based intermediaries* (Kivimaa et al, 2019a).

LEADER-regional management (Example: Göttingen Region)	
<p>Aggregation of knowledge</p> <ul style="list-style-type: none"> • Searching information from BCS and Dörpsmobil coordination-office • Researching complicated matters for projects 	<p>Institutional Infrastructure</p> <ul style="list-style-type: none"> • Temporarily employing project-manager • Organising regular meetings and information-events
<p>Framing and Coordination</p> <ul style="list-style-type: none"> • Motivating locals to start ECS-projects • Supply project with Dörpsmobil-guideline • Assisting projects in application for LEADER-funding 	<p>Brokering & Managing Partnerships</p> <ul style="list-style-type: none"> • Connecting projects to relevant experts (e.g. legal counsellors) • Presenting projects in LEADER-summits • File application of ECS-projects for prizes • Interact with local LEADER-action group

Figure 7 Overview of how LEADER-regional managements fulfil the four intermediary functions by Hargreaves et al. (2013)

5.1.3 Local Authorities

Several interviewees reported that authorities and administrators on a municipal or county level fulfil intermediary functions for them. This concerns both politicians such as mayors (e.g. in case of interview VI), or administrative units (e.g. in case of interviews I or VII). Based on the content analysis, Figure 8 gives an overview of how such actors can fulfil all functions and work as an intermediary.

Local authorities either have clear political goals or, in the case of administrators, clear political instructions. By their nature, their activities are limited to a local level. It can hence be inferred from the data that local authorities pose a *regime-based intermediary* (Kivimaa et al, 2019a) with the goal to change the existing mobility regime from the inside.

It needs to be pointed out that local authorities do not act as an intermediary everywhere. They might also block the fulfilment of intermediary functions (I:103-105), or simply remain passive (IV:181-193).

Local authorities (municipalities & counties)	
Aggregation of knowledge <ul style="list-style-type: none"> • Visiting general information events • Collecting input from ECS-projects in the region 	Institutional Infrastructure <ul style="list-style-type: none"> • Establish clear contact person in administration • Enable collaboration with other municipal sustainability-projects
Framing and Coordination <ul style="list-style-type: none"> • Motivating the initiation of ECS-projects and supplying them with funding • (Co-)owning ECS-projects • Administrators getting directly involved into projects or supplying them with their expertise 	Brokering & Managing Partnerships <ul style="list-style-type: none"> • Supplying projects with cheap public insurance • Establish contact to experts • Secure public funding for projects

Figure 8 Overview of how local authorities fulfil the four intermediary functions by Hargreaves et al. (2013)

5.1.4 Individual project-members and the IfaeM

Several interviewees reported that other ECS-project-members or they themselves fulfilled intermediary functions. In the case of Steyerberg, the project even resulted in the foundation of the consultancy “Institute for Applied Electromobility” (IfaeM). Figure 9 summarises which intermediary functions the interviewees from ECS-projects (I, II, IV, V, VI, and VII) reported to fulfil by themselves and how.

The data shows that some project-members, and especially the IfaeM fulfil all these functions and can be regarded as intermediary actors. As niche-insiders intermediating between various projects and regime-actors such as local politicians (II:381-387) or car-traders (V:50-51; 276-279), always with the clear goal to advance the niche, they can clearly be seen as niche-intermediaries (Kivimaa et al, 2019a).

Individual project members and IfaeM	
<p>Aggregation of knowledge</p> <ul style="list-style-type: none"> Analysing failures of other projects Attending e-mobility conferences 	<p>Institutional Infrastructure</p> <ul style="list-style-type: none"> Creating chatgroups with other projects Hosting exchange- and information-events
<p>Framing and Coordination</p> <ul style="list-style-type: none"> Sharing experiences with actors interested in founding a similar project Setting standards for new projects to copy Actively advocating the idea to found ECS-projects in other villages 	<p>Brokering & Managing Partnerships</p> <ul style="list-style-type: none"> Involving political representatives into the projects Facilitating relationships with car-traders (IfaeM) Referring each other to possible sponsors, insurances etc.

Figure 9 Overview of how individual projects and the IfaeM fulfil the four intermediary functions by Hargreaves et al. (2013)

5.1.5 Other actors fulfilling intermediary functions

The interviewees named several other actors, who fulfil some but not all intermediary functions and can thus not be considered intermediaries of any type.

BCS and BEM (see 3.2) were the most frequently named non-intermediary actors. Both were reported to offer institutional infrastructure regarding networking about ECS and broader e-mobility in general (I:251-253; V:218-228). Two interviewees reported BCS to have framed their projects to some extent by offering insurances, discounts on cars and information-brochures on carsharing in general (I:83-89; VII:301-304). The LEADER-regional manager from the Göttingen area even reported them to have given an informative presentation upon request (VIII:87-88). BEM is reported to have initiated charging-infrastructure that ECS-projects benefitted from (V:218-228). Both associations lobby federal policymakers for generally carsharing- and e-mobility-friendly decisions (V:335-336). However, there are no reports of them aggregating knowledge from the ECS-niche at all and neither of them provides institutional infrastructure for that niche in particular. That is why at this point in time, both actors cannot be considered full intermediaries.

Apart from these associations, an interviewee from a project using the MOQO-app (see 3.2) reported that MOQO created institutional infrastructure by offering seminars to help its customers network (I:144-146). The app also frames projects by being updated according to their needs (I:59-68; VI:449-453). The project "Dorfbeweger" from Hessen reported to cooperate with the company "Regio-Mobil" that provides them with cars and software for a monthly fee and itself emerged from a former ECS-project (VII:276-277, 401-412). This actor thus coordinates the project by being available for questions (VII:379-381) and finding appropriate technology for it (401-403). It also engaged in negotiating insurance for the project (VII:397-399). However, the interviewees did not report on that actor aggregating knowledge from other projects or offering institutional infrastructure for exchange with those.

Lastly, research institutes and universities have been mentioned to accumulate information from several projects (I:172-177; VI:143-147). In the case of the project in Steyerberg, the Fraunhofer research-institute has even negotiated a partnership between the project and a supplier for their cars (V:18-38). However, no further intermediary functions were reported on these actors.

5.2 Thematic analysis: challenges to overcome

As a result of the thematic analysis, four themes were generated that characterise challenges in the rural ECS-niche that the interviewees mentioned as particularly important and that can inform future intermediation within and beyond the niche.

5.2.1 Need for continued Intermediation

This first theme points at the key insight that the intermediation that is already happening within the ECS-niche is effective and relieves time-pressure from the volunteers. Consequently, the interviewees wish for more intermediation.

Signs for effective intermediation are interviewees praising the Dörpsmobil-guideline. This includes even some projects from other states than Schleswig-Holstein (I:70-75, 325-329; II:87-88). In that state, networks for the exchange of information work well to solve problems within the projects (II:98-102), brokered partnerships led to the projects finding cheaper insurance (VI:55-58), and gave projects access to important expertise (e.g. in legal or IT-issues; VI:464-469) that motivates volunteers to take more responsibility as they gain confidence in these areas (VI:464-469). Projects from outside Schleswig-Holstein reported similar insights on intermediation, e.g. through local administrators, who simplify finding affordable insurances, expert-knowledge and answers to urgent questions (VII:328-330, 382-389; VIII:72-76, 246-248). Interviewees even state that knowing about other projects' experiences through intermediation can help to convince regime-affiliated ECS-sceptics (VIII:368-372) and simplifies the initiation of new projects (IV:225-229).

Several interviewees report that volunteers in ECS-projects have little time to fulfil their various tasks (I:175-176, 193-195; V:319-320, 400-402 VII:103-109) and that intermediation can take significant amounts of time-pressure off them by supplying them with information or partnerships that would otherwise need to be searched for in a longer process. Hence, they can dedicate more time to tasks out of intermediaries' direct reach such as convincing the local population to join their project (VI:114-116, 120-125; VII:214-219; VIII:48-55). Normally, volunteers have little time to network with other projects, but if an intermediary facilitates such interaction, the process is simplified to an extent that makes engaging with it attractive for volunteers (I:153-157, 266-269).

A lack of intermediation and networking leads to projects making avoidable mistakes (IV:69-76). Accordingly, one interviewee deems intermediation as necessary for the further development of projects within their local niche (VIII:215-222). In line with that, all interviewees wish for intensified in-

termediation. The Dörpsmobil-projects want their coordination-office or a similar institution to subsist or even expand (II:106-109, 224-226; III:72-77, 188-192, 200-201, 247-249; VI:305-307, 325-330). Other interviewees wish for a similar institution to exist in their region (IV:315; V:188-190; VII:537), or for public authorities to fulfil more intermediary functions (V:323-327, 451-452; VII:560-570). Projects that have interacted little with other local niches even state that they would have benefited from knowing about more projects through an intermediary, when founding their ECS-project (IV:212-216; VII:214-219) and that they possess information worth sharing with new projects through an intermediary (VII:614-618).

5.2.2 Detachment between niches and intermediaries

All interviewees reported that grassroots ECS-projects and intermediaries are detached from each other and often do not know about each other's existence. This is exemplified by an interviewee from the project in Effolderbach (founded in 2020) stating: "My personal perception was also that there was practically no one else when we started." (VII:253-254, own translation). With projects in other regions being founded as early as 1991 (V:2-4), this clearly is a misconception. However, it showcases how project-members, especially outside of Schleswig-Holstein, are unaware about other (successful) ECS-projects (I:9-11; IV:94-99; VII:132-140). Projects from other states than Schleswig-Holstein often do not know about the success of Dörpsmobil-projects or the very existence of their coordination-office (IV:242-250; VII:530-531). Even intermediary actors themselves do not always know about each other. The intermediaries active in IfaeM and the LEADER-region around Göttingen mutually report not knowing each other despite being located in the same state (V:287-289; VIII:121-126). IfaeM is also unaware about the intermediation in Schleswig-Holstein (V:188-190).

These detachments are amplified by spatial and administrative borders. For example, the Dörpsmobil-coordination-office was reported to have fulfilled intermediary functions in some cases outside of Schleswig-Holstein (I:70-75; III:90-98; VIII:96-103). However, the coordination-office is only assigned responsibilities and resources for projects in Schleswig-Holstein and all intermediation happening beyond that are mostly personal engagement of its employee (III:102-111). Even niche-intermediaries from individual projects report their activities as mostly limited to their own state (V:290-292; VI:227-230).

Projects that joined the BCS reported in several interviews that the association, while representing car-sharers in Germany, is detached from the grassroots-ECS niche and there is little to no interaction with them (I:83-86, 247-263; II:198-205; V:367-368; VII:300-310). One Interviewee exemplifies this as follows:

“They also have networking [...] events for carsharing-organisations with less than 20 cars [...] but it seemed very top-down to me. [...] It was labelled as a meeting for small organisations but a lot of what they said there was like: ‘this is what we decided with the big guys’”. (I:251-256, own translation)

However, a certain potential for the BCS to be of help is recognised (I:266-269; VI:457-461; VIII:91-93) and it fulfils some intermediary functions (see 5.1.5). Interviewee VI deems the BCS more likely to cooperate with larger-scale projects (VI:457-461). The BEM on the other hand is barely known by any interviewee, and if so, not recognised as a helpful institution (VI:470-475). Its representative stated that they aim to change this situation (V:462-464).

5.2.3 Money, Power and Politics

Many interviewees reported that their ECS-projects largely depend on public funding, especially in a project’s early phase. This includes the financing of different components of a project including the electric cars (II:48-50; VIII:357-365), legal costs (I:91-94), charging-infrastructure (VIII:357-365), booking-systems (VI:116-120), or other service-providers (VII:366-370). Consequently, several interviewees question whether most rural ECS-projects could exist without public funding (I:308; V:136-139; VII:214-223). Even the coordination-office in Schleswig-Holstein is financed by the state-government (VI:98-102, 116-120). Projects that do not receive significant public funding instead report to be reliant on private sponsors from local companies (IV:205-208), or financial flexibility of their user-community (V:65-72).

Interviewees stated their wish for ECS to be recognised by politics as an equal part of a (public) mobility system in transition. They argue that they provide services similar to public buses that are largely financed publicly (I:295-305; VI:343-346). Consequently, many projects do not wish to remove the financial dependencies. Instead, all interviewees wish for improved political support for their cause and even increased public funding (I:365-368, II:367-371, III:298-303, IV:269-273, 297-299; V:400-403; VI:362-365, VII:560-570; VIII:374-378). Such support is not limited to monetary issues. Often, projects are even initiated or run by local politicians or administrators (I:118-122; II:15-18; IV:7-10; VI:6-8, 191-193; VII:290-292; VII:326-328), who then use their competencies to create favourable conditions for the projects to thrive (II:51-58; VI:191-193; VII:425-431; VIII:313-320).

Not having political support means that the volunteers need to engage even more personally to achieve the same results (IV:182-193), while open political or administrative opposition to ECS-projects can make both running them and intermediating between them hard or even impossible (I:104-110; VI:304-306; VIII:330-333). Administrative rules can even hinder intermediary functions

from being fulfilled, for example by forbidding the Dörpsmobil-coordination-office to create chat groups with ECS-volunteers (III:153-158), or to expand their activities beyond Schleswig-Holstein (III:102-111).

5.2.4 Local identities

In several contexts, the interviewees reported the importance for projects to remain in the hand of local people and in a grassroots-setting way of their respective village's identity.

To begin with, the involvement of local experts, who can solve common problems such as IT, legal, insurance, or technological issues, is often crucial for a project's success and to create knowledge that - through intermediation - can be used by the entire global niche (I:86-88, 91-94, 182-184; II:7-13; VI:307-313; VII:224-233). The interviewees emphasise that such on-site trouble-shooters will always be needed in ECS-projects (V:400-402; VIII:384-393). This is especially relevant for challenges that are out of reach for the intermediaries described above (see 5.1). This mainly refers to creating a relationship with the local population and recruiting volunteers and users for the ECS-projects (I:36-46, 207-214; II:65-68; IV:38-46, 133-140, 281-293; VII:95-101). According to some interviewees, this explicitly cannot be done by external actors, as there needs to be trust between users and initiators of the project, which, they claim, is much more likely to occur in grassroots-settings (I:207-214; IV:69-76; VI:48-51; VIII:412-414). Some interviewees state that grassroots-settings are the only (financially) feasible option to organise ECS in rural settings (I:207-214; II:373-375; III:317-326). Part of the reason for that is that they describe individual projects to have highly individual needs and ideas that no standardised, external approach can meet (VIII:396-405). Volunteers who get to make their own decisions about e.g. pricing schemes claim to stay more motivated than volunteers who cannot make their own decisions (I:62-70; III:330-339, 341-350; V:125-128; VII:568-573). This is summarised by the LEADER-regional manager of the Göttingen region as follows:

“[...] I definitely see a future for [rural ECS], but, as with so many projects, you need someone on the ground to take care of them. People who really want it. Imposing something like this and saying: ‘we'll put a car there for you and you'll do carsharing’, that won't work.” (VIII:341-344, own translation).

Apart from that, local circumstances also matter regarding the fact that many interviewees reported strong interlinkages between their ECS-projects and other local initiatives. This includes improving internet access, creating opportunities for distance-working, renewable energy, improving the overall quality of life, establishing alternative living-quarters, and sharing other forms of mobility (e.g. cargo-bikes), or different goods and services beyond mobility (e.g. tools or gardening-equipment)

(III:387-397; IV:133-140, 264-266, 281-293, 319-331; V:3-8, 42-44, 177-181, 389-392; VI:6-8, 81-83; VII:12-17, 180-185; VIII:48-55, 215-222). Several ECS-projects also aim to improve social cohesion in their villages (I:372-377; IV:319-331). This is for example done by providing transport to the elderly (II:354-365; IV:281-293; VI:173-180; VIII:349-352) or offering options for cheap mobility for the economically less-privileged (VI:53-59) and young people (IV:281-293; VI:180-182). According to the interviewees, such interlinkages to other local initiatives are of crucial importance to gain trust in the local population (IV:133-140) and to promote sustainability as a whole (VI:284-291).

6 Discussion

This section discusses the implications and limitations of the previously presented results. Subsection 6.1 brings forth practical implications of the results and thus aims to answer the second research question on how intermediaries, as identified in section 5.1, can help overcome challenges in the transition. Subsection 6.2 further reflects on the theory applied in this thesis and points at future research directions. Both subsections also discuss methodological limitations relevant to their contents.

6.1 Practical implications of the results: Overcoming challenges in the transition

The findings of this thesis have some direct, practical implications for the rural ECS-niche and its intermediaries in Germany. These implications can contribute to overcoming the challenges described in section 5.2: a need for continued intermediation, the detachment between ECS-projects, the dependence on political and financial support and the dependence on local identities. This subsection discusses the two most outstanding insights: a need for more *systemic intermediation*, and to preserve local identities of grassroots-projects.

6.1.1 Introducing systemic intermediation on a federal level

This thesis shows a growing network of rural ECS-projects that is moving beyond single, isolated projects and is stabilising to what could become a serious contender to the privately owned vehicle in the rural mobility-regime. As described in section 5.2.1, the interviewees see the activities of the identified intermediaries as an effective part of stabilising the rural ECS-niche. However, the detachment between different local niches and intermediaries they described (see 5.2.2) indicates that there is a need for more *systemic intermediaries* on a federal level - a role that for example BCS or BEM could fulfil if they increase their intermediation-efforts.

The example of Schleswig-Holstein shows the effectiveness of a strong intermediary presence (see 5.1.1). Here, a systemic intermediary (the ALR) helped the local niche to thrive and aims at continuing to do so, even if funding for the coordination-office may be discontinued (III:306-314; VI:325-330). In contrast, the detachment that intermediaries in other local niches face becomes even more visible - a finding that is in line with research on intermediation in grassroots photovoltaic-projects by Hatzl et al. (2016), who also found individual projects to have little knowledge about each others' activities. To advance the entire "global" rural ECS-niche in Germany, the information and experiences gathered in successful projects in Schleswig-Holstein and beyond should thus be spread across local niches in all states more effectively by intermediary actors, who "establish a central point of coordination" (Hatzl et al., 2016, p.67).

In the light of this thesis's results, *systemic intermediaries* could play this role and help overcome the detachments in the ECS-niche (see 5.2.2) and help fulfil the need for continued and intensified intermediation (see 5.2.1). Kivimaa et al. (2019a), Kanda et al. (2020) and Prodi et al. (2022) emphasise how this type of intermediary is in touch with several global niches of different innovations, their respective local niches and various other intermediaries at once, while also interacting with established, regime-affiliated institutions. In turn, this could help actors such as local authorities, LEADER-regions, or institutions such as IfaeM, who are affiliated with only some local niches, to fulfil their intermediary functions more efficiently on a local level. An additional *systemic intermediary* on a federal level could also contribute to better securing the political support for the niche that the interviewees expressed a need for (see 5.2.3).

BCS and BEM are two associations that could fulfil the role of a *systemic intermediary*, if they prioritised representing and connecting rural, grassroots ECS-projects more (see 5.2.2). Both are well established institutions on a federal level that already fulfil some intermediary functions for several ECS-projects. However, they cannot be regarded as a full intermediary yet (see 5.1.5). Their taking on this role would be in line with the findings by Hatzl et al. (2016), who recommend actors who already have some existing contacts into the niche, to do so. BCS and BEM could contribute to overcoming detachments (see 5.2.2) by aggregating and providing more clear information about rural ECS online, and by actively reaching out to ECS-projects to become members and offer networking-infrastructure to them. This would make cases in which ECS-projects barely know about each other (e.g., Interviewees IV, or VII) much less likely. Simultaneously, the additional support would give their volunteers more time to deal with tasks unique to their project (see 5.2.1, 5.2.4).

Additionally, BCS and BEM can contribute to overcoming political challenges of the niche. Policymakers on all political levels need to be made aware of the massive (financial) influence they have on the

rural ECS-niche (see 5.2.3) and act accordingly, if they are interested in supporting a transition towards sustainable rural mobility. This could be done by continuously providing funding for both ECS-projects and *process-intermediaries* such as the coordination-office in Schleswig-Holstein. A more systematic approach to the challenges of sustainable mobility in rural areas in general would correspond with the wishes voiced by the interviewees, e.g. by recognising ECS as a legitimate part of the public transport-system (see 5.2.3). In a recent publication, Kivimaa et al. (2020) report that *systemic intermediaries* can effectively contribute to this by influencing policy makers' agendas through voicing the niche's common demands and expectations. To do so, BCS and BEM can make use of their already existing lobbying-capabilities on several political levels (see 5.1.5). In their recent study of (non-electric) carsharing in Germany, Bauwens et al. (2022, p.146) underline how the BCS already now functions as a "guarantor of community values" by gatekeeping the network - a role that can be expanded to the ECS-niche and utilised in the association's lobbying-activities.

According to interviewee V, the BEM already plans to engage more with non-commercial ECS-projects in the future (V:462-464). Information on the BCS is limited to statements by third parties as no representative of the organisation was available for an interview. Either way, the results of this thesis showcase the option to engage more strongly with rural, grassroots ECS-projects to both associations. Whether or not there are more actors on a federal level who could take on the role of a *systemic intermediary* is beyond the methodological scope of this thesis. Interview questions aimed primarily at identifying already existing intermediaries and little room was given to exploring which other actors could fulfil that role in the future (Appendix 2, 4). Even the selection of interviewees was based on actors who already showed some signs of intermediation prior to the interview (see 4.1). Identifying more potential future intermediaries would thus require an approach in which interview-questions are more clearly directed at this issue, potentially by employing visioning techniques.

6.1.2 Preserving local identities

Despite the need for *systemic intermediation*, the findings about the importance of considering local circumstances and identities (see 5.2.4) also indicate that intermediaries should refrain from interfering with ECS-projects' local activities, as these keep the projects able to adapt to their respective circumstances. These insights are in line with the conclusions researchers drew in other niches: In the case of community-energy, Boyle et al. (2021, p.7) for instance argue that even when "locally embedded organisations [...] are coordinated centrally", there should remain "local factions built on volunteerism". Hatzl et al. (2016) claim that close interlinkages that grassroots-niches have with their communities will make these more adaptable to landscape-influences. Lang et al. (2020, p.69) even

hypothesise intermediation to “pull niche-participants away from their local project objectives” in some cases.

These insights and the results of this thesis (see 5.2.4) show that an increased intermediation on a higher level (see 6.1.1) risks standardising project-designs in the rural grassroots ECS-niche to a level where the volunteers lose their agency to make independent decisions about issues important to their communities. A hypothetical example can demonstrate this: If an intermediary on a federal level would broker a deal that provides ECS-projects with cheap leasing rates for electric cars but ties the individual projects to a certain pricing-model or energy-supplier, the volunteers would lose the opportunity to adapt their prices to the socio-economic structures of their village, or to partner up with local renewable energy-initiatives. In the long run, such issues could lead to a loss of trust of the local population into the project and endanger the whole grassroots ECS-niche (see 5.2.4).

To avoid such complications, *niche-intermediaries* such as IfaeM, or individuals from successful ECS-projects (see 5.1.4) can use their direct connections to local communities to communicate the importance of local embeddedness of projects to both newly founded ECS-projects and higher-level intermediaries (such as ALR and the coordination-office in Schleswig-Holstein, or, in future, possibly BCS and BEM). Knowing their local circumstances, such actors can also foster connections to other niches in the social and/or sustainability sphere in order to help ECS-projects connect to their individual contexts and become anchored within their communities. This will also ensure that ECS-projects can effectively work together with other innovations in the mobility-sector which then, together, pose a serious contender to the incumbent regime (see 3.1)

6.2 Theoretical and methodological reflection and implications for further research

Apart from practical implications, the results also contribute to the theoretical debates surrounding socio-technical transitions and intermediation. This subsection describes the two main insights in this regard and outlines how they can contribute to further research. To do so, it firstly reflects upon the theory employed in this thesis and how it contributed to answering the research questions. Secondly, it elaborates on phenomena related to politics and power that could not be explained by the applied theory and require further inquiry.

6.2.1 Reflection of the applied frameworks and methods

This subsection will reflect in what way the theoretical concepts it employed (i.e. intermediary functions and the intermediary-typology by Kivimaa et al. (2019a) framed within socio-technical transi-

tions to sustainability in the MLP) and the applied methods have contributed to answering the research questions and discuss what open questions they have left.

This thesis shows that identifying intermediaries based on their functions and through qualitative interviews can be successfully applied to identify intermediaries even in formerly unstudied niches. This has been common practice in research before (Kanda et al., 2020; Kivimaa et al., 2019a). The methodology of this thesis did however not make sure to identify every intermediary actor potentially at play in the rural ECS-niche. Whether or not there are additional actors who could become involved in addressing the intermediation-challenges identified in section 5.2 can also not be answered here. That is because this thesis could not include interviews with actors from all federal states even though there are active ECS-projects in more states (Appendix 1). Additionally, the rather narrow framing of what constitutes a rural-ECS-project in this thesis (see 3.2) could have led to intermediaries not being identified. For instance, it is possible that projects interacted with carsharing-groups that do not use electric vehicles. This however was not asked for in any interview as it was considered out of scope of the research questions. Even international connections (VI:237) and who might have intermediated them, were not further investigated.

The typology by Kivimaa et al. (2019a) further helped discover lacking levels of intermediation and helped formulate concrete practical implications for BCS and BEM (see 6.1.1). However, especially the case of LEADER-regions (see 5.1.3) shows that there can be significant overlaps between the different types. This makes it harder to understand the motivations and goals of this actor within the given framework and, in turn, to formulate specific policy-implications. The typology's analytical appropriability has also been discussed by Boyle et al. (2021, p.6), who note that there is "potential for further investigation" of each type's characteristics. Future studies can elaborate on each type as Kanda et al. (2020) have done it regarding *systemic intermediaries*. While this thesis's interview-questions did not aim at a deeper characterisation of each intermediary, the identified actors (see 5.1) could provide case-studies for such research.

The broader theoretical framing of the thesis within the MLP helped create a precise picture of the current developments in the ECS-sector and identify a variety of ECS-projects to draw information from. The notion of local niches helped outline potential intermediaries prior to gathering data and to make meaningful decisions regarding the choice of interviewees (see 4.1). In the end, interviewing projects from different local niches was crucial to describe the detachment between projects as a central challenge to the ECS-niche. When employing the MLP, the concept of local niches as defined in this thesis (see. 2.1) can thus be useful even to research on intermediation in other contexts.

Much in line with previous publications about transition-intermediaries, this thesis has focussed on one such socio-technical niche in particular. However, the results show that there are a large number of interconnections to other niches including among others renewable energy or social-projects such as elderly-care (see 5.2.4). While these insights are useful to draw practical implications from (see 6.1.2), they cannot be well explained by this thesis, as it largely only focussed on the ECS-niche and the wider mobility-regime. In general, such interrelations between other niches and regimes are not yet well conceptualised and it is unclear whether such interrelations are crucial to advancing socio-technical transitions to sustainability or to what extent intermediaries of all types are involved. To increase the understanding of intermediation in transitions, future MLP-based research could thus benefit from widening the conceptual understanding of how different socio-technical niches interact.

6.2.2 Notions of Politics and Power

The results regarding the challenge of political and financial dependencies of the rural, grassroots ECS-niche (see 5.2.3) raise questions that cannot be fully explained by the theory employed in this thesis. This is exemplified by the fact that some interviewees reported a variety of public authorities to take on intermediary roles (see 5.1.3) or get directly involved in projects (see 5.2.3), while others name opposition of public authorities as one of the toughest barriers to running a rural ECS-project (see 5.2.3). What makes public authorities get involved in projects or take on an intermediary or an oppositional role remains unclear. Potential explanations can include (political) landscape pressures affecting the regime differently in different locations, or power relationships in the affected areas.

Conceptualising “politics in transition”, Avelino et al. (2016) address this kind of problem by criticising schematic analytical separations between niche and regime as they are common in the MLP and conducted in this thesis. In line with that, Avelino (2017) offers a framework for the analysis of power in transition-processes that specifies how different actors on all levels of the MLP possess different kinds of power. Sovacool et al. (2020, p.15) emphasise the often decisive intermediary role that incumbent regime-actors can play to promote socio-technical transitions, asking for future research to “overcome the original ‘David vs. Goliath’ myth” between niches and regimes. Future inquiries about rural Germany’s ECS-sector can pick up on such notions to better explain the political dependencies discovered in this thesis and to find out how intermediaries can navigate them. In general, there remains “ample potential to connect future research on intermediaries to [...] important topics in sustainability transitions studies, including the politics [...] in transitions” (Kivimaa et al., 2019a, p.1073). So, while the more recent MLP-based literature in general has taken notions of power, agency, or

political conflict into consideration (Geels, 2014, 2019, 2020), its particular strand on intermediaries has room to increase its engagement with such questions.

7 Conclusion

This thesis studied intermediation in the socio-technical transition towards a sustainable mobility-regime in rural Germany. The socio-technical niche-innovation of grassroots e-carsharing (ECS) projects was shown to be one promising component of that transition (see 3). Especially in the northernmost state of Schleswig-Holstein, where a publicly funded coordination-office assists the niche, there is a significant growth in the number of ECS-projects in rural areas. Literature broadly agrees that intermediation between different projects and regime actors is necessary to achieve such growth and by that attain a transition (see 2.2). However, only a few of these publications touch upon the mobility-sector, none upon rural ECS in particular. Thus, this thesis asked (1) who the main intermediaries in the rural ECS-niche of Germany are and what types of intermediaries there are according to a typology by Kivimaa et al. (2019a), and (2) how intermediary actors can contribute to overcoming challenges that the niche is facing.

The first research question was answered using semi-structured interviews (see 4) with volunteers from ECS-projects all over the country and with potential intermediary actors. Based on the resulting data, the main intermediaries active in the niche were identified by studying the functions they fulfil in the niche and classified based on the level of their activities and their motivations (see 5.1). It was found that in Schleswig-Holstein, the coordination-office indeed plays a major role as a process-intermediary, supported by the independent ALR, a *systemic intermediary*, and *niche-intermediaries* from individual projects. In other states, intermediation is not present to that extent. However, the interviews clearly indicated that local authorities such as county or municipal administrations, LEADER-regional managements, or, again, project-members themselves also act as intermediaries in some cases.

Using thematic analysis, the interview data also gave insights regarding the second research question. A need for more and continued intermediation, a detachment between intermediaries and projects, high dependencies on political support and public funding as well as the crucial importance to recognise each project's local circumstances and identity were identified as the main challenges that intermediaries have to face in the future (see 5.2). Discussing these results in the light of the most recent research showed that these challenges could be overcome, if more *systemic intermediation* between niche-projects from several sectors and regime actors would happen on a national level

(see 6.1.1). BEM and BCS were identified as possible actors to take on that role as they are already active in the sector and fulfil some intermediary functions. By connecting projects and intermediaries across spatial and administrative boundaries, they could contribute to overcoming the detachment between projects. They also have the capacities to lobby politicians on several political levels to handle the high political dependencies of the sector. At the same time, the results indicate the importance of retaining the grassroots-character of the ECS-projects in order to embed their enterprises in the local ecosystem of sustainability-efforts and to win the trust of the local population. Strong niche-intermediaries, who originate from the projects themselves and understand their identities from within, can make sure to achieve that (see 6.1.2).

The thesis's findings also contribute to the broader academic debate around intermediation and socio-technical transitions (see 6.2). To begin with, they show that the established procedures of using the multi-level perspective to frame the circumstances of intermediation and identifying the active intermediaries based on their conceptual functions work in sectors that were unstudied before. The concept of "local niches" helped gain a more nuanced overview of the niche and identify the right interview partners. However, the results also showcase the limitations of this theoretical framing. For instance, the various interrelations between ECS and non-ECS-niches from other sectors on a local level are hard to conceptualise in a framework focussing on one socio-technical regime in particular. Future research can thus benefit from widening its conceptual understanding of what constitutes a socio-technical niche in order to better understand how, for example, ECS-projects and renewable energy projects benefit each other. The thesis cannot either fully explain the political dimension of the ongoing transitions, such as the reasons for political support or opposition for ECS-projects by local politicians. Future research on intermediation can address such shortcomings by questioning the strict analytical dichotomy between niches and regimes and by applying existing frameworks of power and agency in transitions to their cases (see 6.2).

One thing, however, was made very clear by this thesis's results. The transition towards a more sustainable mobility sector in rural Germany strongly benefits from the engagement of volunteers in grassroots-ECS projects. Examples of how people stop using their own, fossil-fuel driven cars and start sharing a communal, electrical one grow in number every year. With the support of effective intermediation, there is a realistic chance that these projects will be able to seriously challenge the existing regime as a part of a multimodal mobility-transition. Insights from science for sustainability as provided in this thesis can and will assist their action for long-term, sustainable change.

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Appendix

The Appendix is composed of the following components:

1. A self-composed list of rural ECS-projects fulfilling the criteria established in section 3.2 and of potential intermediary actors. (1 page)
2. Two exemplary interview-guidelines (8 pages)
3. Consent form for interviewees (1 page)
4. Full interview transcripts of all eight interviews including translations (219 pages)
5. Coding guideline for the content analysis described in section 4.2 (1 page)
6. All intermediary functions identified in the content analysis sorted by actors. (6 pages)

All appendices are available until May 25th 2022 under the following link:

<https://drive.google.com/drive/folders/1gCPP7gUb3UH-7E064F1XfIEVALQi336t?usp=sharing>

They can also be requested at maxhalbwachs@gmail.com and are uploaded to the **zip-file** for examiners of this thesis