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Master's Thesis

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Governing local climate action: Leadership, coordination and cooperation for mitigation and adaptation in smaller German municipalities

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Contents

List of abbreviations

CAP	climate action plan
CAPP	climate action plan(s) and/or project(s)
CPC	Camberg Protects the Climate
CPM	climate protection manager
CSC	cognitive social capital
EEA	European Energy Award
ESD	education for sustainable development
GHG	greenhouse gas(es)
RSC	relational social capital
SAB	Sustainability Advisory Board
SDCD2030	Sustainable Development Conflicts Dialogue 2030
SCDP	sustainable community development process
SSC	structural social capital
USA	United States of America

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1. Introduction

Climate change is recognised by international associations as a pressing problem (European Commission, 2018; United Nations, 2019) and called a wicked problem (Pollitt, 2015) or a super wicked problem (Levin et al., 2012). The time available to reduce emissions before running high risks of environmental and consequential economic and social damage is quickly diminishing. Tackling this challenge is difficult because those who could contribute to a solution often benefit from the status quo, the negative consequences of doing nothing will not be felt in the short-term, and there is no authority who is clearly in charge.

Given the complex and global nature of the problem, international agreements made between national governments have been seen as the most effective and necessary steps towards problem resolution. However, despite being considered secondary players, many local governments have also been taking on this task. Indeed, the German Environment Ministry considers that municipal-level climate mitigation has been institutionalised for years (Schüle et al., 2016). In the context of an immense challenge, maintaining as many players as possible on the board and enabling their effective work is necessary. This project looks at local climate action (at the planning and implementation stages) and how local government actors have managed to make noticeable progress in spite of or perhaps because of the smaller size of their jurisdictions.

A prerequisite for effective climate mitigation at the municipal level is a local climate plan (Reckien et al., 2018). Local climate or climate action plans (CAPs) ensure that the awareness of climate change, human-induced climate change, and its local effects are locally present. However, even with a CAP in place, cities may not succeed with timely implementation, and other municipalities may make similar progress without a CAP. How can actors make the step from awareness to action?

1.1. Problem statement

Research on climate mitigation and adaptation at the city level has been primarily focused on large urban centres, leaving small- and mid-sized cities under-researched, especially from a medium-n comparative perspective (Lamb et al., 2019). Also less clearly understood are the characteristics and dynamics of municipal government structures and decision-making processes (Robinson & Gore, 2015), the contribution of different actors to CAP (Levesque et al., 2017) and particularly how citizens can be empowered in low carbon action (Hoppe et al., 2016). These under-researched topics and the need to better understand how some government and other local actors succeed in working together on climate protection turns my attention to social interactions in the area. Specifically, I address the follow research question: How do aspects of leadership, internal government coordination and cooperation with local stakeholders contribute to a high level of climate action? My main assumption is that in smaller municipalities, there is a higher frequency and intensity of interaction amongst

climate mitigation and adaptation actors, whether in government or in the wider community. This increases social capital and, I argue, shapes how leadership, government coordination and cooperation with local stakeholders positively affect local climate protection.

This thesis builds off of a multiple case study based review of climate adaption in small and medium-sized German cities conducted for the National Environment Ministry (Schüle et al., 2016) and was similarly inspired by an interview-based investigation of smaller American cities that were unexpectedly successful at climate protection (Homsy, 2018). It will focus on a smaller set of six municipalities, which will allow for an in-depth study similar to one conducted by Hoppe et al. (2016) on four small and medium-sized cities in the Netherlands. Smaller municipalities are often more limited financially and are under strain to meet current needs, let alone to address longer-term issues such as climate change. Nevertheless, some smaller municipalities succeed in taking steps towards climate protection. Do these municipal actors benefit from social capital created through their government structures and coordination norms? What role do leaders play in framing climate protection to motivation and maintain action? How do leaders and other key players, within or outside of government, interact in constructive manners? This thesis looks at interactions between government employees and with other local stakeholders in municipalities that have shown a high level of climate action. This should thus shed light on how local government and other stakeholders overcome local barriers to climate action and on whether better interactions and thus coordination and cooperation are at the base of this.

1.2. State of the art on climate action in smaller municipalities

Due to their smaller populations and lower carbon footprints, smaller towns and cities are arguably under less public scrutiny to engage in climate action. Then, what causes them to do so? The study by Homsy (2018) investigated municipalities in the USA with fewer than 25 000 people and looked at the importance of leadership, capacity and citizen activism as drivers of climate action. He found many ways for leaders to motivate climate action and for governments to build capacity. Citizen activism was present but played a modest role.

Further municipal characteristics that can encourage or discourage climate action are the presence and type of multi-level governance i.e. division of power between municipal and regional or national governments, membership or non-membership in issue networks such as the Europe-based Climate Alliance, internal organisation (Bae & Feiock, 2013; Kreft et al., 2010), interest groups (Levesque et al., 2017) and the perception of climate-related risk (Gerber, 2015; Mann et al., 2014), often increased by historical or recent natural disaster events (Zahran et al., 2008).

Demographic characteristics and change and local politics are also potentially relevant (Hoppe et al., 2016). For example, lower population densities can impede the adoption of climate mitigation measures such as district heating (März et al., 2013) and cities with lower

populations tend to have lower total GHG emissions, though emission levels are linked to lifestyles more than to population sizes (März et al., 2013). I have kept these influencing factors in mind, although most interactions of municipalities with actors outside of the local sphere are not within the scope of this research. Following Homsy (2018) and adapting it to the German context, interactions within leadership, local government structures as well as methods of promoting citizen activism are at the centre of this research.

1.3. Research focus

This thesis looks at small and medium-sized municipalities that are considered pioneers in climate action. It asks how pioneering smaller cities work within their local governmental capacity as well as with other local stakeholders to successfully motivate, develop and implement climate policies and programmes, considering both negative and positive interactions. To shed light on this complex picture of multiple interactions, the research focus is divided into three research questions.

Each research question relates to one of three components of governing climate action: leadership; internal (government) coordination; and city-stakeholder cooperation and collaboration. Specifically, I ask: (1) how issue framing and linkage was used by leaders to motivate government activity in an area considered as additional and voluntary and (2) how key actors successfully work together within the government (internal coordination). As with the second research question, the third centres on working together, specifically (3) how local government employees and other local stakeholders cooperate or collaborate. I will be testing hypotheses about issues frames as well as two stating that more social capital leads to more fruitful interaction in government and in civil society, a characteristic that is arguably stronger in smaller rather than larger cities.

1.4. Summary and structure of thesis

It is at the local level where many concrete components of climate mitigation and adaptation currently take place and likely will continue to be realised in the future. There is a significant amount of research available on local climate action, but this has to a large extent looked at the world's handful of megacities. Less attention has been granted to developments in small and medium-sized cities. Filling a shortcoming in the methodological diversity of case study research on local climate action (as identified by Lamb et al. (2019)), this thesis adopts a medium-n case research design with a geographical focus on Germany, a country with a rich history of local climate action and participatory governance (Böde & Gruber, 2000; Walk, 2008). The following chapters give further background on aspects of local climate action relevant to the research questions of municipal leadership, coordination, and cooperation and to the specifics of Germany, where appropriate. An explanation of the methods used and case study histories precede the results and a discussion of the findings.

2. Background

The choice of three interrelated concepts, leadership, government structure and coordination, and cooperation, led me to formulate three questions pertaining to the mechanics of climate action in smaller municipalities: Why and how did towns and smaller cities, often at the urban-rural interface, decide to initiate and maintain the motivation to develop and implement a climate action plan and/or projects (CAPP[1])? How do they work together to successfully develop and undertake CAPP? How do they work with citizens, those normally and not normally active on climate change issues? These are questions of governing; that is, of government and, where citizens are actively involved, of governance. I stress once more that this work does not focus on implementation (*what* climate action has been achieved) but on *how* local actors manage to successfully work together, regardless of whether their "successful work" was the creation of plans or the start or completion of projects. Using social capital theory, the presence or absence of certain social capital aspects will be identified and the relationships between these and the above three questions will be explored.

2.1. Linking local government and civil society action in small municipalities

How are leadership, government coordination and city-stakeholder cooperation for local climate action linked? The interplay of the government, i.e. elected politicians as well as employees of municipal administrations, and other actors in society was referred to by Evans et al. (2006) as the governing of local sustainability. In particular, governing can refer to an intentional attempt to guide or manage parts of societies (Kooiman, 1993, p. 2 in Lange et al. (2013)). A simplified version of local governing for sustainable development (termed the DISCUS model) is pictured in figure 1.

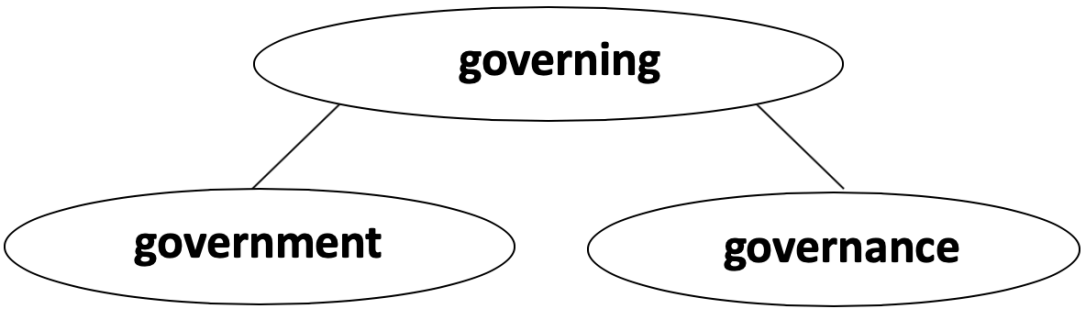

Figure 1. A simplified version of the Developing Institutional and Social Capacity for Sustainable Development model. Based on Evans et al. (2006).

Governance often refers to less traditional forms of governing that may involve non-hierarchical arrangements with non-government actors (Gunningham, 2009; Smismans, 2006). Like governing, there is no broad agreement on a clear definition of governance. I use

[1] This thesis diverges from the more commonly used CAP abbreviation because not all six case municipalities had a climate action plan. Therefore, CAPP encompasses climate mitigation (and adaptation) plans, activities and/or projects that occur in the presence or absence of a local CAP.

governing to refer to government-guided action that includes interaction with non-government actors, and I use *governance* to refer exclusively to situations of interaction between government and non-government actors. Therefore, governing is a broader term encompassing the two foci of my investigation: the *government* or municipal administration and the interaction between said government and other local stakeholders (*governance*).

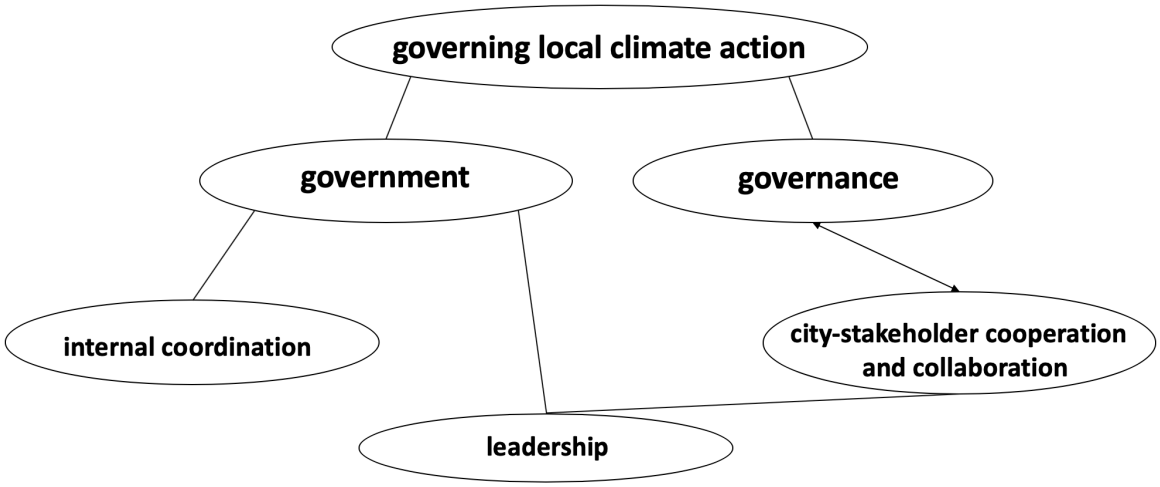

Figure 2. Governing local climate action, composed of government and governance, and three further constitutive components.
Author's figure.

Figure 2 shows a modification of the DISCUS model for my research. As seen in the figure, governing local climate action is an interplay of government and governance. Government is further subdivided into *leadership* and *internal (governmental) coordination*, with leadership also influencing governance, here referred to as *city-stakeholder cooperation and collaboration*.

Evans et al. (2006) focused on a collection of key resources within government, which he termed institutional capital or institutional capacity. These resources ("organizational, knowledge and leadership resources" (Evans et al., 2006, pp. 852–853) are linked to social capacity and are highly beneficial to effective governments. Evans et al. (2006) also looked as social capital as describing how civil society stakeholders are able to take action.

With my assumption that interactions are more frequent or intense in smaller municipalities due to more proximity and less anonymity (Dimitrijevic, 2015; Henckel et al., 2010; Paterson et al., 2017), I will be looking at primarily at social capital in both government and civil society. An introduction to social capital theory will therefore be of particular value.

2.2. Social capital

Social capital refers to relationships between individuals or groups which result in benefits, whether actual or potential (Bourdieu, 2001). Particularly, trust and familiarity resulting from a high frequency of interaction as well as norms or other institutionalized features of group interactions improve the gains from human or financial capital (Freudenburg, 1986) and open

up new opportunities. Familiarity and trust can exist between individuals, within or between groups and in several dimensions. This encompassing concept is therefore well suited to analysing the success of various leadership, internal organisation and external interaction approaches. Relevant main types dimensions and components of social capital are introduced below.

2.2.1. Bonding and bridging social capital

Social capital theory categorises social capital into two to three kinds: bonding, bridging and linking social capital. Linking social capital refers to vertical connections of people or groups to those with more influence (Hatak et al., 2016). Since gauging hierarchical differences between individuals and groups goes beyond the scope of this paper, the examination of internal and external government relationships in the case studies will focus on bonding and bridging social capital with no reference to linking social capital.

Bonding social capital is based on personal relationships (Ruiu, 2016), often between individuals who are close enough to support each other emotionally and share behavioural norms, e.g. close friends, family or colleagues (Johnston et al., 2013). Bonding social capital is therefore commonly referred to as internal connections and can be very strong or "dense". Since these usually exist within groups, a disadvantage of too much bonding social capital is a potential reduction in creative thinking and openness to others (Molina-Morales & Martínez-Fernández, 2009).

Bridging social capital encompasses weaker relations between individuals who do not belong to the same group or come from the same background (Putnam & Goss, 2002). Therefore, while bonding social capital can be very strong, bridging social capital can be very thin (Putnam, 2001). These types of ties do not typically provide emotional support but more often provide useful information or different perspectives and can open up opportunities (Johnston et al., 2013).

2.2.2. Structural, relational and cognitive dimensions

While the division into bonding and bridging types of social capital types is widely used in achieving a differentiated view of social capital mechanics, I also employ the concept of social capital dimensions (relational, structural and cognitive). As described by Go et al. (2013), the structural dimension refers to the ties that arise from regular or frequent interpersonal interactions (often facilitated by spatial proximity) within a group/community or between groups. Structural social capital (SSC) can arise from interactions between individuals as well as through more formalised associations of companies or organisations.

The relational dimension applies when, often due to regular or frequent interactions, trust and mutually beneficial relationships exist. Such relationships can entail reciprocity exchanges that lead to social capital benefits e.g. skill sharing and informal (tacit) knowledge diffusion. In

a now very digitized age, spatial proximity is joined by other types of proximity such as social or cognitive proximity that can also facilitate the likelihood to interact (encouraging the creation of SSC) and the sharing of knowledge (an example of relational social capital [RSC]) (Boschma, 2005; Warren et al., 2015).

The cognitive dimension refers to aims, interests and competencies. The degree to which these are shared or are complementary determines the degree to which cognitive social capital (CSC) is formed and can be used. Since aims and interests play a role in many social interactions and the range of competencies (including everything from theoretical knowledge to practical skills), the cognitive dimension is relevant to many aspects of governing local climate action. A first step towards creating CSC is establishing an understanding of others' preferences (Ishihara & Pascual, 2009). Next steps necessary for truly attaining CSC include choosing arguments to create common interests, repeating arguments over time and/or in various media to create a dominant form of *common knowledge* (Ishihara & Pascual, 2009).

These dimensions of social capital allow the concrete manifestations of the concept to be identified more clearly and do not focus on the strength or the nature of the ties. On the one hand, this is advantageous in this research as the interviews and published material do not always allow the insight necessary to clearly distinguish between bonding and bridging social capital. On the other hand, sometimes combining types and dimensions of social capital e.g. using the weak ties of bridging social capital to work towards the establishment of a dominant sustainable "common knowledge", allows for a better understanding of how social connections can be used to multiply local collective action.

The analysis in chapter 5 will refer to social capital types and dimensions. It will also use six specific aspects of social capital when describing the relationships and interactions involved in local climate action. These aspects are: a high level of interaction; norms (two structural social capital aspects); trust or good relationship quality (relational social capital); understanding of others' preferences or establishment of common knowledge; high density of acquaintance; and access to useful information or opportunities through networking (three aspects of cognitive social capital).

2.2.3. Social capital in smaller municipalities

Some research (Putnam, 2000 in Borck, 2007; Glaeser & Gottlieb, 2006) has found that there are more frequent interactions and likely more trust in smaller cities compared to large cities. Specifically, Putnam (2005 in Borck, 2007) and Glaeser and Gottlieb (2006) stated residents of large cities to be less likely to belong to groups or clubs and to have lower levels of altruism and trust. Glaeser and Gottlieb (2006) also found less trust in larger cities whereas Borck (2007) found no difference between large and smaller cities. He did however report a related finding on perception of risk from crime: residents of larger cities locked their doors more often than those in smaller cities (Borck, 2007).

In regards to political participation and interest, Borck (2007) found that residents of smaller cities participate more in politics and civic life than those in larger cities. Conversely, both he (2007) and Glaeser and Gottlieb (2006) found interest in politics to be higher in larger municipalities. Klages and Vetter (2013) report that Germans have more trust in local than in national politics and institutions, although there is no differentiation between smaller and larger cities here. Overall, it is not clear if there is more social capital in smaller municipalities than in larger ones. Nevertheless, the idea of more social interactions in government and civil society in smaller municipalities remains alive (e.g. Paterson et al., 2017; Schüle et al., 2016).

2.3. Review of the literature on leadership

Leadership studies are a vast and homogenous mix of reflections, insights, and empirical evidence from disciplines as diverse as public administration, psychology, anthropology and religion (Wren, 2007). My research questions regarding the motivation for climate action as well as the work within governments and between government and other local stakeholders imply a focus less on the leaders themselves and more on the relationship between leaders and followers. Included in this study of leadership for climate action are therefore not only who the individuals are who take on leading roles but also how they mobilise support for climate action. The main aspect of leadership I will focus on are characteristics of *problem solving leadership* according to Saul and Seidel (2011), specifically the framing of CAPP or the linking of it to important issues.. For example, smaller cities are typically cash-strapped (Pitt & Bassett, 2013; Schüle et al., 2016) and so engage in energy savings and/or renewable energy production. This is a common co-benefit of climate mitigation (Bedsworth & Hanak, 2013), or a case of *issue linkage* (Saul & Seidel, 2011).

There is a wealth of research on who leaders of climate action are in American municipalities. For example, Young (2010) and Basset and Shandas (2010) have found that government leaders do not have to be the ones spearheading CAPP, but they should at least be supportive. Activists from civil society are rarely leaders but can contribute in other ways, such as improving stakeholder involvement (Martiskainen, 2017) and increasing accountability (Portney & Berry, 2016). This study looks at both formal leaders (often mayors) as well as persons taking on leading roles e.g. within teams or among colleagues. Within municipal administrations, there is usually an employee who takes on either an implementing or a coordinating role in local government-led climate action. In my research below, I refer to these administrative coordinators/implementers as sustainability leads or coordinators, although other colleagues might also have taken on leadership roles.

The literature reports many frames or strategies used to motivate action for climate protection. These include an energy or cost-savings perspective (Bulkeley, 2010), connectedness to nature (Wang et al., 2019), protection of environmental amenities (Lubell et al., 2009) or global responsibility frames (Homsy, 2018). Certain frames represent a linkage

of issues, such as the frame of climate action as economic development framing (Homsy, 2018). Leadership in this research will look at who municipal climate leaders are, what their intrinsic motivations can be and which issue frames are used to motivate others. Equally of interest will be the influence of citizen engagement (i.e. the examination of leadership in this thesis will also take a first look at aspects of city-stakeholder cooperation and collaboration).

2.4. Review of the literature on internal (government) coordination

As hinted at above, I use the term government to refer to both elected politicians (usually the democratically elected representatives in a city or town i.e. municipal council) as well as the employees and officials of the municipal administration. Since in the context of CAPP, government actors who have coordination and/or implementing roles i.e. those in contact with the greatest number of relevant players, are usually employees of the administration, I sometimes use *government* synonymously with city administration.

Characteristics of municipal governments identified by the German Environment Ministry (Schüle et al., 2016) as relevant to climate protection are the structure and internal connectedness of the administration. This can be provided by an interdepartmental management or organisational structure and is influenced by how developed the government's institutional and/or relational capacity is. Institutional capacity refers to knowledge, organisational (also relational) or leadership (also motivational) resources of the local government (Evans et al., 2006; Healey, 1998) that could be gained through experience or professional training. Relational capacity refers to the development or maintenance of relationships between actors that lead to increased knowledge or opportunities (Keys et al., 2016). It therefore both characterises government structure and is a major aspect of internal connectedness.

My research on internal coordination looks only peripherally at leaders (as these will be primarily addressed in sections devoted to leadership). However, I investigate government structure in the case municipalities as this is closely linked to internal coordination. Government structure will encompass overarching sustainability bodies, other involved departments and governmental capacity (personnel e.g. time availability and knowledge resources).

Coordination is determined by the frequency with which municipal employees meet, with whom they consult when preparing or taking decisions, and how these behavioural patterns are developed. Coordination here thus refers to the actors and mechanisms involved in information sharing and regular behavioural patterns a pertinent to local CAPP. I follow the use of the term described by Feiock and Krause (2015), where a low degree of functional coordination can lead to inefficiency or unintended side-effects.

2.5. Review of the literature on cooperation and collaboration with stakeholders

How can municipalities work with local stakeholders to maintain or improve climate action? And who are local stakeholders? Attempts to define a stakeholder have led to much debate e.g. Agatiello (2008) and will be defined only briefly here. A stakeholder of local government-led climate action refers to a resident of or company or organisation located in the municipality. Naturally, most politicians and government employees are also residents, for which reason I sometimes refer to government cooperation with *other* local stakeholders. For the sake of simplicity, I primarily use the single word, stakeholder, to refer to *non-government* stakeholders.

As all individuals or companies who regularly or primarily spend time in a municipality qualify as stakeholders, the total number of stakeholders can be as large as a municipality's population or larger. However, many stakeholders engage only minimally in climate protection, if at all. Therefore, I also define a sub-group of stakeholders, the actor. An actor is a stakeholder who intentionally acts to positively or negatively impact on local climate action. As it is not always clear at what point a passive stakeholder becomes an actor, I sometimes use the term *actor* and sometimes use the broader term *stakeholder*, which can but does not always include actors.

I look at a broad range of ways in which representatives of municipal governments not only work with local actors but also interact with residents who may have little or no motivation to engage in civic life. I use two terms to differentiate between interaction with active and less active citizens. I call work with active citizens as collaborative, a characteristic described in fields such as education and organizational management (Panitz, 1999; Shipper et al., 2013) as a "philosophy of interaction" (Panitz, 1999, p. 3) where the involved parties work towards respect and mutual benefit. Cooperation is similar to collaboration but goes less far: it involves working towards some shared goals while motivations may be vastly different and mutual tolerance is sufficient (Shipper et al., 2013). Rather than taking a game theoretic approach and asking how actors can be made to continually work together, cooperation here simply refers to tolerance and the lack of mutual hindrance.

One sociological view sees cooperation as an art made possible by the act of listening, understanding the other and reacting, with joint action as the goal (Sennett, 2012). Given that smaller municipalities typically have restrained financial situations, the likelihood that they will devote resources to developing truly collaborative relationships with local stakeholders seems smaller than that efforts will go towards the maintaining of tolerance among relevant actors. This research will examine cooperation in terms of maintaining mutual tolerance and working together less intensively, while deeper cooperation, where parties work together more intensively, will also be examined. I will usually refer to this deeper cooperation as collaboration.

Participatory governance and co-production of policy and public services are partially inspired by an attempt to increase the quality and legitimacy of government (Pestoff, 2014). Due to these different motivations and the range of actors, which includes local or regional public organizations, local firms and individuals or groups from civil society, the variety of activities that fall under city-citizen cooperation and collaboration is immense. In spite of this great potential, a study of citizen activism in smaller American communities (Homsy, 2018) found that it plays a minor role but is not a main driver of climate action. This was especially due to a lack of opportunities and low recognition of the importance of public participation. In Germany, however, climate protection as a participatory process has been studied for many years (cf. (Böde & Gruber, 2000; Walk, 2008), so I will investigate whether the situation in my six case sites is different.

2.5. Focusing in: Propositions on leadership, coordination and cooperation

The literature on leadership, specifically, on the issue frames and issue linkages used to motivate climate action, is vast. Despite this knowledge, the situations in which different frames are used is less understood. I therefore developed a proposition following a familiarisation with my case sites via preliminary interviews.

Regarding leadership,

Proposition 1: Citizen-centred issue frames make sense in smaller municipalities with a moderate level of climate-related citizen engagement, whereas a financial benefits approach is more suitable in municipalities with minimal climate-related citizen engagement.

My examination of government coordination and government-stakeholder cooperation and collaboration employs concepts from social capital theory. I propose that the higher frequency of interaction (potentially creating structural social capital) assumed typical of smaller municipalities is a necessary but must be supplemented by a high quality of interaction. This quality of interaction can be embodied either by relational social capital (e.g. trust, reciprocity, or other markers of a good relationship) or cognitive social capital (a dominant form of common knowledge). This leads me to two similar propositions for the governing components of internal coordination and city-stakeholder cooperation:

Proposition 2: Structural social capital (SCS) and relational social capital (RSC) and/or cognitive social capital (CSC) in local government is higher in smaller municipalities, leading to a high level of government-initiated climate action.

My investigation of interactions with *other local stakeholders* is similar to above, with the difference that I do not consider cognitive social capital. Other stakeholders are too large and diverse a group to be able to identify common knowledge (CSC) shared between all or even most stakeholders and local government employees:

Proposition 3: SCS and RSC in city-stakeholder interactions is higher in smaller municipalities, leading to a high level of joint city-stakeholder climate action.

2.6. Summary

Smaller municipalities typically deal with smaller budgets and a lesser sense of urgency to act against climate change. However, several municipalities have begun with climate mitigation and adaptation despite the emphasis in policy and academic circles on national and megacity governments. Given both the smaller size of municipalities, which in some cases leads to less anonymity, and the benefits of local actor involvement to governments of modest capacity, the questions of how actors in government work together and with other local stakeholders are intriguing.

A model for local governing for sustainable development has been modified to visualise the connections between various forms of social interaction for local climate action. These forms, or components of local governing of climate action, are leadership (primarily issue framing and issue linkage), government structure and coordination (e.g. how often which municipal employees meet with each other to work on climate action) and city-stakeholder cooperation and collaboration.

Municipal leadership addresses not only members of government but the broader city or town society. A closer examination of leading via issue framing will therefore also involve citizen engagement. Investigations of how closer interaction may or may not lead to a high level of climate action within the government and between the government and civil society members will make use of aspects from social capital theory.

3. Research design and methods

This chapter introduces the ontological and epistemological considerations informing this research and applies these to explain my choice of research design and method. Data collection and analysis phases of my research method are also detailed. Additional background information follows in the next chapter before the results of the analysis are presented in chapter 5. Limitations of the methods applied will be discussed in chapter 6.

3.1. Research philosophy: Bridging positivism and interpretivism

Implicit ideas of what makes up the world (ontology) and how we can know things about the world (epistemology) inform what we consider science or scientific research and how we research. Discussions around the basis of our choice of research question, research design and research method(s) reveal an enormous variety of categories, terms and concepts for the range of very different to very similar approaches to research. A commonly used term describing a researcher's ontological and epistemological assumptions is research paradigm. Rather than sticking to a single paradigm, I follow the examples of Lin (1998) and Silverman (2017) in adopting beliefs from two of the main research paradigms, positivism and interpretivism, to inform my research methodology and methods.

First, it is important to note the kind of knowledge sought for according to each research paradigm. Positivism is primarily a way of gathering knowledge that examines what can be measured objectively and typically uses operational definitions, facts (Silverman, 2017) and quantitative data to establish causal relationships (Lin, 1998). This involves finding support for or against a hypothesis and not going much further than that (Silverman, 2017).

Lin (1998) contrasts this with interpretive work, seeing interpretive work as focusing on detailed description and the specificities of a selected case in order to arrive at the how, the causal mechanisms involved in a social phenomenon. My research questions deal both with understanding who acts and how people act in certain ways and in describing connections. In addition to these reasons for keeping both positivism and interpretivism in mind during my research, I refer to a further insight from Lin (1998). She highlights the advantages of using aspects of both approaches, since positivist work usually looks for insights that can be generalised. Such generalised insights are often more societally relevant than interpretive work which, despite its value in more accurately explaining how and why something occurs, is not always easily applicable to more than a handful of situations.

Second, positivist researchers typically employ the hypothetical-deductive model of research and quantitative methods (Kaplan & Duchon, 1988; Silverman, 2017) whereas interpretive researchers often rely more heavily on qualitative methods that do not make use of hypothesis testing (Bendassolli, 2013). As mentioned above in section 2.5., I initially examined my interview data regarding leadership in an inductive manner before formulating my hypothesis (H1 described below in section 3.8.) of the situations in which citizen-centred

versus financial benefits issue frames are used. In this way, I followed the interpretive approach of remaining open to meanings that emerge from the data analysis (Bhattacherjee, 2012). My second and third hypotheses were formulated earlier, based on the extant literature.

Overall, I follow the positivist paradigm by using operational definitions and focusing on finding support for (or against) my hypotheses. However, I also do interpretive research by using the evidence gained as well as contextual information to understand situations using meaning-making (Bhattacherjee, 2012). More detail on my use of hypotheses and my analytical strategy is provided in the sections below.

3.2. The case study method

Similarly to how Lin (1998) describes positivist research as focusing primarily on the question of "what" and interpretive work on the "how", Yin (1994) discusses research methods best suited to "what" vs. "how" or "why" questions. Whereas "what" questions can be answered with survey or archival research, "how" and "why" questions about social phenomena are best answered using other methods – specifically, the case study method. The case study method is geared towards phenomena that do not lend themselves to experimentation. Case study research designs are particularly valuable when the context of a phenomenon is relevant, and the context and phenomenon are complicated or undefined enough that it is difficult to distinguish between the two (Yin, 1994). Similarly to Lin (1998) but in a recent systematic review of the case study literature on urban climate solutions, Lamb et al. (2019) remind readers of the usefulness of case studies in providing important contextual insights into policymaking. Flyvbjerg (2006) stresses that learning occurs best through detailed examples. For me, this is one of the most compelling reasons to use a case study design as a way of contributing to the search for climate solutions.

3.2.1. Selection of cases

In order to increase confidence in the generalisability (external validity) of the analysis results, several smaller cities were examined following a multiple-case design. Using replication logic and the basic criteria of population size, population density, city demographic type/population change projections and centrality (i.e. centrality according to the German Central Locations system) or nearness to a larger urban centre, enough cities were used to allow for both literal replication (i.e. at least two municipalities that had multiple similarities) and theoretical replication (there were less similar municipalities). Municipalities in different parts of the country were contacted to additionally increase the likelihood of variation between cases. The varying characteristics of the six cases, located in five German federal states. These are shown (not in their exact geographical locations) in figure 3. More on these is provided in the following chapter.

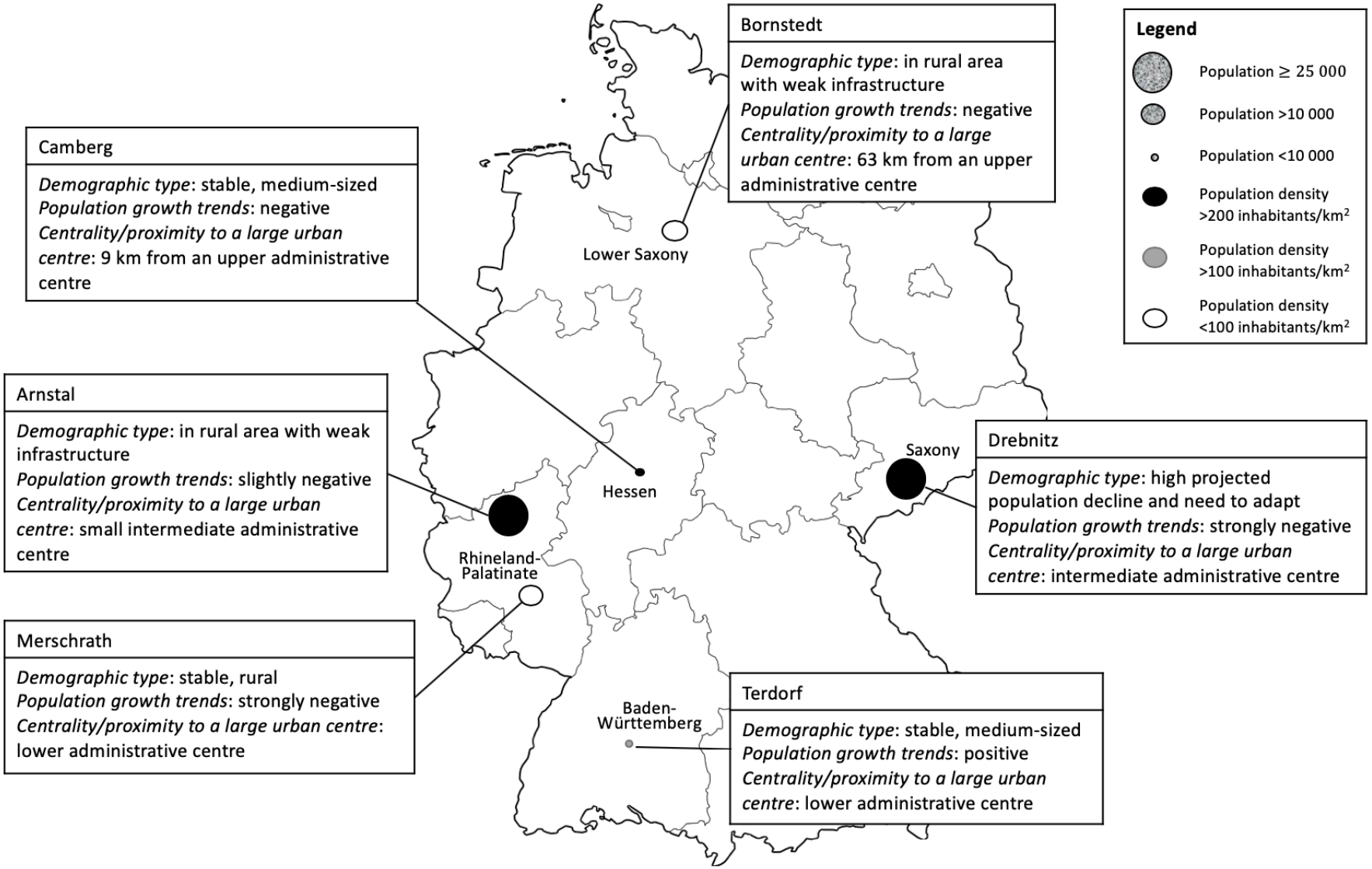

Figure 3. The six case municipalities in their respective federal states.
Author's figure, based on graphic by Liuzzo (2007).

Due to time constraints, only two methods of data collection were used to inform the cases. Online documents written by or about the municipalities were used to provide contextual information and details such as dates and numbers as well as to increase internal validity, particularly when informant statements were more ambiguous. The main source of data is expert interviews conducted with at least two informants on local government-driven climate action per case.

3.3. Qualitative interviewing

In order to achieve the level of depth and nuance that are the well-known strengths of interpretive person-centred research (Rubin & Rubin, 1995), my primary method was qualitative interviewing. This means that the interviews were semi-structured with the use of a continuously tailored interview protocol. In a first scoping round of interviews, all informants were asked the same questions, though they were not interrupted if they addressed other topics and the questions were sometimes asked in a different order that better suited the conversational flow. Information, either verbal or non-verbal (e.g. whether interviewees struggled to answer certain questions or had much or little to say about others), was used to change the order or modify the wording of the questions in the interview protocol. The first round of interviews was broader in design, for example, I was also interested in the interactions between municipal and higher levels of government. A major and some minor hypotheses were formulated during this round of interviews and simultaneous cycles of data analysis.

After the first round of interviews, the set of case municipalities was finalised. The characteristics of the six municipalities as well as analysis of the scoping interview data allowed for further specification of the research questions and a focus on the three components of climate action governing. At least two informants were interviewed per case site in the second round. Not all informants were asked the same questions, but a common set of questions were asked to the totality of the informants for each case site (e.g. questions 2 to 5 were posed to informant 1 in case A and questions 1, 3 and 5 were posed to informant 2 in case A). The minimum, common set of questions to be asked per site ensured information on more objective aspects for comparison purposes. Additional questions were added to the interview protocols for most of the case sites to gain deeper understanding of each unique situation. The form, selection and wording of the interview questions is discussed in detail below.

3.4. Iterative formulation of research questions

The interview (data collection) and data analysis processes took place in parallel, following the model of iterative, ongoing analysis (Galletta, 2013; Rubin & Rubin, 1995). The data collection and analysis processes can be divided into two phases. The first phase consisted of an initial literature review and round of scoping interviews. The second phase consisted of the bulk of

the analysis, including multiple rounds of coding and further analysis steps, hypothesis testing and renewed consultation of the literature in the view of identifying new patterns in the data.

3.4.1. The first phase of analysis

Interview protocols during the scoping phases were based on a more encompassing research question that would later be refined. The initial research question that guided the scoping interviews asked: How do characteristics of small-city municipal governing structures and (decision-making) processes affect the implementation of climate action policies? Several typical factors influence local climate action taken from the literature, as mentioned in chapter 1, provided direction to the interview protocol. In order to gather data relevant to the research question and the targeted characteristics, these were further broken down into seven topics and researchable questions for the first round of scoping interviews (see Appendix 1 for topics and interview questions for round 1). For both rounds 1 and 2, one to two questions were left out from some interview protocols, depending on the position and experience of the expert. Any omitted questions were however included in the interview protocol of the second informant at the case site.

In addition to the academic literature, CAPP documents available on the websites of municipalities were also analysed to begin paring down the topics. These were coded in MAXQDA, created an initial set of deductively (from the theory) and inductively (from real-world evidence) derived codes. The seven topics mentioned above were used for code categories. Codes in the leadership for climate action category were dominated by frames. Government structure and coordination were characterised with eight codes: departments involved in CAPP; climate protection managers or sustainability leads; coordination processes; rules; committees, project groups, internal communication; external communication; and external funding. The transcripts from the scoping round interviews were coded and frequencies calculated in MAXQDA were used to determine the focus of the thesis (i.e. the three research questions) and two additional hypotheses (the importance of an economic development frame and the nature appreciation of the residents as a motivator of climate action).

3.4.2. The second phase of analysis

As the research focus was narrowed between the first and second rounds, the interview protocols for round 2 were based on eight rather than seven researchable questions (see Table 1 on p. 19 for researchable questions for round 2). To achieve the desired depth and detail of information for each researchable question, several interview follow-up questions were prepared per researchable question. An example interview protocol for round 2 is included as Appendix 2. As during the scoping phase, the wording and content of each interview protocol was adapted to the individuals interviewed. A few of the questions belonging to the minimum set of questions per case site could be answered numerically, e.g., on average, how often do

you discuss climate protection measures or projects with colleagues or other partners? This survey-type or less open-ended kind of question represented a smaller sub-set of the interview questions.

The three research questions dealt with the three main components of the study, leadership; internal coordination; and cooperation with external actors. These three questions were further subdivided into eight lower-level researchable questions that were used to identify relevant information provided by informants.

Table 1. Three main research questions and a lower level of seven researchable questions.

Research question 1:	How do small pioneer cities lead and motivate climate action?
Researchable question 1.1.:	What led to major climate action? Who was involved? When, why, how did they act?
Researchable question 1.2.:	Who now has a leading role in motivating/organizing CAPP and what is/are their leadership style(s)/strategy(ies)/motivating frames (& perceived roles)?
Research question 2:	How does the city coordinate its climate protection work to achieve noticeable climate action?
Researchable question 2.1.:	Which departments, individual employees and/or political bodies are involved when developing and implementing (which) climate action policies and programmes?
Researchable question 2.2.:	How do they connect and coordinate? How did they get to know each other, how often do they meet, who takes the decisions?
Research question 3:	How does the city work with local actors to initiate, maintain or further develop climate action?
Researchable question 3.1.:	Who are local actors in climate action sphere and what do/have they done?
Researchable question 3.2.:	How does the city cooperate with antagonistic local actors/passive stakeholders?
Researchable question 3.3.:	How does the city collaborate on CAPP with constructive local actors?

The code list was continuously modified and expanded to better define certain aspects such as government coordination. New codes included: physical location/proximity; tight decision-making (involving up to 8 people); broad decision-making (involving more than 8 people); frequency of group or committee meetings; frequency of other interactions. During the course of the second phase of interviews and analysis, the hypotheses were again modified and social capital theory was adopted to aid in operationalisation of the governing concepts. Specifically, aspects of social capital identified in the literature will help translate the propositions from chapter 2 to testable hypotheses, presented later in this chapter.

3.5. Data collection

In order to identify pioneering smaller cities, I relied on several sources, including the website of a national award for municipalities and an online platform of pioneering sustainable

municipalities (*zukunftskommunen.de*). The research team behind the *Zukunftskommunen* platform chose 30 000 inhabitants as a cut-off for smaller, easily walkable cities and towns (P. Schmuck, personal communication, December 5, 2019). 35 000 inhabitants is the minimum population for an intermediate central location as defined by the federal land planning regulation (Pütz & Spangenberg, 2006). Along the lines of the extreme-case criteria (Yin, 1994), normally used in single-case study designs, I decided to use the lower cut-off of 30 000 for my set of smaller cities or towns. My assumption was that a smaller population size would increase the likelihood of finding higher social capital and effective coordination and cooperation. Nine municipalities with varying characteristics (according to the demographic and geographic criteria mentioned in section 3.1.) were contacted via e-mail with requests for interviews.

Data was collected in two rounds. The first round was a more exploratory, scoping phase looking at many factors that might encourage or hinder local climate action. As the main purpose of this round was to gain hints as to the most relevant success factors for German municipalities, one informant from each case was considered enough. In the first round, one to two experts were interviewed over the phone from five municipalities.

For the first round, a total of seven telephone interviews, varying in length from approximately 20 to 30 minutes, were recorded after receiving written or oral permission from the interviewees to do so. The recorded interviews were transcribed verbatim and coded using MAXQDA. MAXQDA's coding count was used to identify the most frequently mentioned themes. Further details on the analysis of information from the first-round interviews is provided in the next section.

In the second round of interviews with experts from the final set of six municipalities, a total of eleven interviews were conducted and recorded for later transcription. Two to three experts per municipality were available for interviews, totalling 15 municipal climate mitigation experts. Most of the interviews were in person, with two being conducted on the telephone for reasons of distance (the more convenient telephone alternative was suggested by the first interviewee). Most of the interviews were one-on-one, with four experts only available for group interviews (with respectively three and two informants per group interview). The interviews were generally 30-60 minutes long with the two group interviews lasting 90 minutes.

3.6. Research ethics

The informants were provided with a summary of the background and main topics of interest in the research investigation before the interviews. They were also provided with information on how the interviews would be recorded and where extracts from the interviews might be shared. Consent to the interviews, recording of them and use of excerpts was provided in writing or orally before or at the beginning of the interviews. The names of the informants are

not mentioned in this thesis or their names were changed. For example, main governmental leaders of CAPP are generically referred to as *sustainability leads*. Where excerpts from interview transcripts are included in the text, a number in brackets is used to refer to an anonymised informant. The names of the case sites and other identifying characteristics have been changed to preserve the anonymity of the interviewees. Anonymity was promised to allow for franker interviews. (Kaiser, 2009)

3.7. Analytical strategy

My analytical strategy based on the process of finding meaning in interview data (according to Magnusson and Marecek (2015) and the technique of cross-case synthesis (Yin, 1994). The first phase of analysis utilised the process of identifying repeating or recurring ideas, finding the core meaning behind these and verbalising this with integrative summaries. The automatic code counts from MAXQDA aided me in identifying recurring ideas and in viewing these while formulating integrative summaries. The integrative summaries led me to create a hypothesis for the leadership component of this thesis and confirmed aspects of social capital theory useful for operationalising the proposition on government coordination.

The second phase of analysis used tables to synthesise information relevant to the hypotheses from each case. This allowed for comprehensive treatment of the data (Silverman, 2017). I also considered rival hypotheses (Silverman, 2017; Yin, 1994). Whether the evidence supported the hypotheses or not was determined by the presence or absence of certain aspects (explained in the section below). For some aspects present in multiple cases, a further differentiation was made. Here I divided municipalities into three groups according to the strength of the respective aspect (high, moderate or low), sometimes giving them a numerical value (respectively 3, 2 or 1) to arrive at total values for an aspect. This allowed me to identify connections between e.g. social capital aspects and population size.

3.8. Hypotheses and rival hypotheses

I start with the propositions listed in section 2.5. and formulate hypotheses with empirically testable elements derived both inductively and deductively. The first hypothesis uses dominant issue frames that emerged through analysis of the interview data while the second and third hypothesis are based on elements from the social capital and local climate action literature. To increase the quality of the findings, the most plausible alternative explanations for the phenomena to be tested below is also investigated. These alternatives are listed after each hypothesis with the label of *rival hypothesis*.

Hypothesis 1: Visible, relevant or accessible measures as a frame to motivate climate action make sense in smaller municipalities with a moderate level of climate-related citizen activism, whereas a financial benefits and/or cost savings frame is more suitable for municipalities with minimal climate-related citizen engagement.

The issue framing of visible, relevant or accessible climate protection measures as well as the differentiation between cost savings and other forms of financial benefits arose from analysis of the interview data.

Rival hypothesis 1: Frames used result from path dependency rather than compatibility with the level of climate-related citizen engagement.

Hypothesis 1 will be more plausible than its rival if there is evidence that the choice of frames is related to the level of climate-related citizen engagement. If there is no evidence of such a connection and the frame has a history of being used (path dependency of rhetoric described by e.g. Grube (2016)) the rival hypothesis will prevail.

Hypothesis 2: The smaller a municipality's population, the more frequent and higher quality the interactions between local government employees are, leading to a high level of government-initiated climate action.

Hypothesis 2 relates to the second research question on internal coordination. Do government members in smaller municipalities interact more frequently due to the lower degree of anonymity typical of towns and small cities (creating structural social capital)? If so, must this high interaction frequency be accompanied by a high quality of interaction for government-initiated climate action to result? I use interview data on the level of interaction i.e. meetings and the overall number of collaborators (acquaintance density) to estimate the frequency of interaction on climate issues within local governments. References to trust or good relationships (relational social capital) as well as coordination norms (regular but infrequent meetings including information provision) and common vision (the latter two create cognitive social capital) are used to estimate a high quality of interactions. Finally, I will see if a smaller population is more conducive to such interactions and if these positively affect government-initiated climate action.

Rival hypothesis 2: Governmental capacity is more important than small population size for facilitating a high level of government-initiated climate action.

What if the frequency and quality of interaction is dependent on governmental capacity, which in turn grows with population size and the corresponding greater tax revenues? If the effect of large population size and other factors on governmental capacity (time availability of sustainability leads and resources from issue networks) are more important than a small population size, the rival hypothesis will prevail.

Hypothesis 3: The smaller a municipality's population, the more frequent and higher quality the interactions between government employees and other local stakeholders are, leading to a high level of joint city-stakeholder climate action.

Here, citizen-initiated climate action and forms of interaction with inactive and active stakeholders will be used to estimate the frequency of interaction (structural social capital). A

high quality of interaction will be determined by the number of unique instances or free mentions to trust or good relationships (relational social capital) with mainly already interested parties. Cognitive social capital is not considered here due to the great diversity of stakeholders and thus the low likelihood of attaining a dominant form of common knowledge. Finally, I will see if a smaller population is more conducive to frequent and higher quality interactions and if these positively affect government-initiated climate action.

Rival hypothesis 3: General awareness of climate change or other environmental problems is more important than a small population for encouraging city-stakeholder collaboration.

It is possible that rather than government actions leading to regular, trusting interactions with local stakeholders and thus collaboration on climate action, non-government stakeholders were already motivated to take action. I will search for correlations between awareness of climate change or general environmental concern and local climate action as well as interview evidence in favour of government interactions or intrinsic citizen motivation as the inspiration for city-stakeholder cooperation and collaboration.

3.9. Summary

In sum, I have primarily used an interpretive approach while attempting to understand government-led climate action in smaller municipalities, therefore opting for a case-study design and semi-structured interviews as a research method. In addition to an inductive approach to formulating a leadership-related hypothesis, I used the hypothetical-deductive model more typical of positivist research for the government coordination and city-stakeholder collaboration components of this thesis. I used qualitative interviews and an iterative analysis approach to confirm my choice of hypotheses and rival hypotheses. Data collection took place in two rounds, with the second round involving 15 informants from six case sites. The case sites and individuals mentioned were anonymised to allow for franker interviews. My analytical strategy consisting of meaning finding to identify recurring ideas and a cross-case synthesis to thoroughly consider all evidence for and against my three hypotheses.

4. Background of the case studies

This chapter provides a brief introduction to the political situation in Germany as a stepping stone to a more detailed description of governing climate action in smaller municipalities. It first sketches the overall context which includes geographic and demographic characteristics. The later sections provide fuller descriptions of each case site (the municipalities in general as well as their government-initiated climate action), which will allow for more accurate interpretation of the accounts provided by the interviewees. Some geographic characteristics and details such as particular dates have been omitted for purposes of anonymity.

4.1. Overall context

Climate mitigation and adaptation in Germany is characterised by a multi-level governance system. Local jurisdictions are encouraged to take climate action by programmes and ministries at both federal (*Bund*) and federal state (*Land*) levels. With federal goals of reducing greenhouse gas emissions to 40% below 1990 levels by 2020 and to between 80 and 95% below 1990 levels by 2050, the national Environment Ministry established a particularly relevant programme in 2008 to aid in the development of municipal climate action plans (CAP). EU-level programmes and goals are also often relevant to local governments. In addition, many municipalities are involved in city partnerships in their region or with individual municipalities in other countries (not climate-themed). Membership in climate-related issue networks such as the Covenant of Mayors and the Climate Alliance is high in Germany.

As described in chapter 3, the six municipalities were smaller cities or towns doing more for climate protection than the average smaller German municipality. The choice of the six reflected various combinations of similar and less similar characteristics. For example, three of the municipalities were located in the west of Germany and one each were in the north, east and south, respectively. Two municipalities are home to more than 20 000 residents, two have populations of roughly 12 000 and 10 000 respectively and two have under 10 000 but more than 5000 residents. The six municipalities vary in: population density; demographic type (a municipal categorisation based on population trends and regional infrastructure created by the Bertelsmann Stiftung (2020)); population growth trends; and centrality or proximity to a large urban centre. Centrality refers to the German Central Locations principle (*Zentrale-Orte-Konzept*) that designates municipalities, spatially evenly distributed, as upper, intermediate, or basic urban centres with varying amounts of essential services provision. Being an urban centre or being located near or further from one may have an impact on a municipality's growth strategy. These characteristics will be described in the following sections devoted to each of the six cases.

4.2. Case descriptions

I use three terms to refer to the case municipalities: city, town and community. City is sometimes used synonymously with municipality to refer to all six of the case municipalities, although it always applies to the two largest municipalities, Arnstal and Drebnitz. Town refers to the four smaller municipalities, whereas the smallest two municipalities are sometimes referred to as communities (both a reflection of their smaller size and a direct translation of the German term *Gemeinde)*.

While a further examination of similarities and differences appears in chapters 5 (results) and 6 (discussion), a preliminary coupling of cities has been made in order to keep potential patterns of relationships and mechanisms in mind. I wondered if even within a group of smaller municipalities, finer population differences can be important. The pairs consist of the largest, medium-sized and smallest municipalities: Arnstal and Drebnitz are both home to over 25 000 inhabitants and have intermediate population densities (Statistisches Bundesamt [Destatis], 2020b). The Samtgemeinde Bornstedt (a *Samtgemeinde* is an administrative division that encompasses several smaller municipalities) and Merschrath are the medium-sized municipalities with 12 000 and 10 000 residents respectively and both are over 10 km away from a large city (with over 80 000 inhabitants). Terdorf and Camberg are the smallest municipalities by population and are within roughly 10 km of a large urban centre (cities with over 100 000 and 80 000 inhabitants respectively).

4.2.1. Arnstal, Rhineland-Palatinate

Arnstal is a historical city, with its name reputedly dating back to a Celtic settlement founded there in 500 BCE. Tourism is well-established here with both a historical citadel and a popular geological attraction. It is located in the western German state of Rhineland-Palatinate. The population of Arnstal was just under 30 000 as of 31 December 2018. According to the German Statistical Office (Destatis, 2020a), its population density is intermediate and it is classified as a smaller intermediate centre in terms of Rhineland-Palatinate's spatial planning. Demography-wise, it is characterised by its location in an economically underdeveloped rural area (Bertelsmann Stiftung, 2020). Its population is projected to sink only slightly in the coming decades. It benefits from good traffic infrastructure that includes three highways and a train station serving both regional and intercity (express) trains.

A first, visible environmental sustainability project spearheaded by the municipality was a so-called edible city programme that grew ever larger out of a biodiversity exhibition on tomatoes. Initially planned as a one-time activity, the project met with early success and was renewed over the following years, gradually initiating larger changes in perspective in the city administration and local society. Discussions of a growing palette of environmental issues in addition to biodiversity were partially the motivator for Arnstal to participate in the national Environment Ministry's climate action plan programme. The climate goals of Rhineland-

Palatinate also influenced the Arnstal CAP. The federal state climate goals are similar to the national goals. One important difference is a more ambitious renewable energy production goal: the national government aims (Bundesministerium für Wirtschaft und Technologie, 2010) were renewable electricity production covering 50% of national consumption by 2030 and 80% by 2050, whereas Rhineland-Palatinate aimed for 100% of electricity originating from renewable sources by 2030 and the establishment of the societal acceptance necessary for such changes in the energy system.

The development of the climate action plan lasted from 2013-2014 and was supported by the knowledge transfer centre of a nearby university and led by a project group composed of city council members, members of the city administration (e.g. from the buildings department), representatives of the municipal utilities and contractors. The CAP document opens with an energy and CO_2 inventory and continues with several main categories including heating, renewable energy, municipal properties and public outreach. By 2020, there was not yet an update of the greenhouse gas inventory from 2012 but the implementation of the CAP was being worked on regularly.

The municipality successfully applied for further federally funded projects. These were the upgrading to energy-efficient lighting in the historic city hall, in one kindergarten and in one primary school between 2015 and 2019, a complete energy retrofit of the same primary school (out of a total of seven primary schools and four secondary or vocational and training schools within the city limits) and the development of a climate-friendly public transportation plan between 2017 and 2019. Seven other municipal properties were also made more energy-efficient (e.g. renovations and changes to windows and insulation). Another key project was the next step after the publication of the CAP, the hiring of a climate protection manager (*Klimaschutzmanager*). The climate protection manager (CPM) is a partially federally funded, full-time position in the city administration and has existed since 2016.

4.2.1.1. Arnstal's Climate Action Plan

The CAP from 2014 provides the last comprehensive quantitative evaluation of the city's climate progress, mostly based on 2012 data. In that year, less than 0.5% of the electricity used in the city was produced from renewable sources. Renewable energy in Arnstal was primarily natural gas-powered combined heat and power generation (CHP), followed by solar energy at just over 25% and biogas CHP at 8.8%. The CAP also detailed the potential for energy savings and renewable energy production in the city.

Renewable energy production (REP) potential was estimated to be relatively low compared to the other five pioneering cities. Wind and solar energy led the way. Wind could theoretically contribute up to 10% of the total electricity consumed in Arnstal. The potential of wind energy is limited due to the urban rather than rural character of the city and other obstacles such as its historical buildings and nesting areas for birds. The solar energy potential was estimated at

a moderate 9% of electricity consumed by 2030, although if residential buildings had solar roofs, solar REP could equal 57% of current electricity consumption (excluding one company that consumes an above-average amount of electricity).

Other main strategies for emissions reductions are the use of district heating systems and combined heat and power generation (CHP). The most important aspect of the CAP is however energy consumption reduction through energy efficiency and public outreach. This decision was taken as about a third of energy consumption in the city is attributed to private households. Private households were also a large source of greenhouse gas emissions in 2012 at 29% of total emissions, surpassed only by the transportation sector, which was responsible for 32% of city emissions.

4.2.2. Drebnitz, Saxony

Drebnitz is located in the eastern German Free State of Saxony. It is the largest city in a thinly population rural district, although the larger surrounding region is urban (Bundesinstitut für Bau-, Stadt- und Raumforschung, 2017). Agriculture covers more than half of the municipality's surface area although the city also gains from important manufacturing companies. Drebnitz is home to just under 25 000 inhabitants and has an intermediate population density (Destatis, 2020a). Despite being an urban settlement of intermediate centrality, it appears to be overshadowed by a nearby city of over 500 000 inhabitants. According to the Bertelsmann Stiftung, it is a rapidly shrinking and aging municipality with a pressing need to adapt (Bertelsmann Stiftung, 2020). The city itself sees the demographic adaptation issue as less urgent; it notes less severe predictions for population decreases due to a new trend of young families settling in the city.

Overcoming great environmental challenges related to large coal mines that were closed in the early 1990s, Drebnitz benefits from greenery within the city limits and in the surrounding area, which include a large nature park a 30-minute drive to the east. Starting with a pilot project sponsored by a regional banking group in 2001, it has been actively working to increase the energy efficiency of its buildings ever since. After the end of this first energy efficiency project in 2005, it joined a European management and awarding programme for energy and climate policy (EEA) the following year. Drebnitz earned the EEA silver and gold certifications in the years that followed. In addition to improvements in energy efficiency, they also made great strides in renewable energy production, notably solar. Energy retrofits of multiple city-owned properties, new construction of a kindergarten and residential community according to passive house and low-energy standards and the installation of sustainable heating such as geothermal and district heating were also undertaken, starting as early as 2008. They took part in another federally-funded energy efficiency project in 2009-2010. Related to this project was the creation of a funded Energy Efficiency Manager (EEM) position. The EEM was mainly

charged with networking and climate change awareness and worked until 2016, when the funding ended.

After focusing on energy for several years, Drebnitz began branching out, both geographically and thematically. In 2013 they were partnered with a city in Ukraine within the context of a European energy partnership scheme. In 2014 they joined a German EEA pilot project for cities and climate adaptation and were re-certified with the EEA gold in 2015. They published their energy and climate action plan (CAP) in 2016, with the main topics being renewable energy, building retrofitting, heating, energy management and communications. By this time, they had won multiple sustainable city awards, in large part because of their focus on social sustainability and citizen dialogue. By the time of the publication of their CAP in 2016, they had managed to produce more electricity from renewable sources than was consumed in the city, and had already reached the federal per capita greenhouse gas reduction goals by 2013 (4.3 t per person vs. 15.2 t per person in 1990). Their internal CAP structure also expanded from being the Energy Team to a Sustainability Advisory Board.

4.2.2.1. Drebnitz's Energy and Climate Action Plan (CAP)

Drebnitz's CAP begins with the forecasted effects of accelerated climate change over the next century for Saxony. It mentions the urgency of reducing the effects of climate change and the actions taken by some countries despite the lack of an internationally coordinated plan. After reviewing the national German climate goals, the energy and climate action programme at the state level and economic reasons to reduce greenhouse gas emissions are mentioned. The city sees an especially large scope for action in the area of sustainable energy, since energy provision is a municipal-level service and there is room for improvement in terms of making city-owned buildings more energy efficient. Combining these considerations, their main goals of the CAP are emissions reductions, lowering of operational costs, local economic growth and further tax income generation.

Drebnitz emphasised its cooperation with city-owned companies such as a housing construction cooperative and the municipal utilities. Furthermore, the city's vision statement stresses both the government's part as a role model and the importance of working together with citizens, landlords, suppliers and other economic actors. Regarding greenhouse gas emissions, they aim to reduce per capita emissions by 16% (reference year 2014) by 2030 (82% below 1990 levels) and 30% by 2050, reducing from 4.3 t/year/resident in 2014 to 3 t by 2050. It aims to become an energy exporter, producing renewable energy equivalent to 140% of their consumption. With 4% of heating needs coming from renewable sources in 2014, they want to increase this to 7% by 2030. Finally, influencing user behaviour in the private sector and households is an important component of the CAP.

4.2.3. Samtgemeinde Bornstedt, Lower Saxony

The Samtgemeinde Bornstedt is a collection of four towns located in the northwestern German state of Lower Saxony (*Niedersachsen*). The so-called "collective municipality" (*Samtgemeinde*) was formed in 1974 and is a government body that carries out administrative duties for four municipalities. The combined population was around 12 000 as of 2018 and it has the lowest population density of the case cities at under 60 inhabitants/km^2, versus e.g. 150 for Terdorf (Destatis, 2020a). Like Arnstal, its location is in a structurally weak rural area, although unlike Arnstal, it is not a central municipality but is 15 km away from the nearest intermediate urban centre and more than 50 km away from larger cities of over 100 000 inhabitants.

Smaller municipalities in less populated regions have been noted in academia for their potential to protect and preserve natural resources (Levesque et al., 2017). Key decision-makers in the Samtgemeinde Bornstedt (referred to below simply as Bornstedt or the Samtgemeinde) were also aware of this, who noted that the land area used for residential purposes had increased between 1993 and 2005 by 20%. For decision-makers such as the mayor of Bornstedt, social issues such as employment rates and lucrative use of vacant space were also very important. The large area freed up by the shutting down of a military barracks was the impetus for a community-shaping journey of citizen participation, resource protection and sustainability. The process of deciding how to use the former barracks was dubbed the 'Transparent Conversion' and was used to direct attention towards the problem of natural landscape destruction. By using the former barracks for industrial and commercial buildings, less natural land would need to be converted. The Transparent Conversion ran from 2006 to 2009 and was followed by the creation of a sustainable development vision and Bornstedt's motto of "Sustainably good!" as well as a CAP in 2011. They passed a city climate policy vision in 2009, have had a citizens' council since 2007 (started as part of the Transparent Conversion process) and another programme involving citizens was their "Deeds not delays" energy efficiency advising programme in 2013. For further concrete actions such as the creation of a citizens' wind energy cooperative and the conversion of street lighting to low-energy LEDs, the Samtgemeinde was nominated for and reached the top 3 of the German Sustainability Prize for four years, from 2012-2015. Energy retrofits include both the library and town hall. Their most recent project is a Sustainable Development Conflicts Dialogue 2030 (SDCD2030) programme that aims to address concerns about wind energy.

4.2.3.1. Bornstedt's Climate Action Plan

The CAP passed in 2011 was motivated both by the federal Economy Ministry's Integrated Energy and Climate Programme and the national climate goals. Taking them directly as stated by the German Chancellor in 2008, Bornstedt aimed to generate 20% of its energy consumption from renewable sources and to reduce its greenhouse gas emissions by 20% compared to 1990 levels by 2020. The CAP had six pillars: regional evaluation through the

ECO2Region programme; energy efficiency, lowered consumption and the production of renewable energy on municipal properties; reductions in vehicle-related emissions; long-term energy and financial savings through energy retrofits of public buildings; short-, medium- and long-term measures for GHG reductions and awareness raising; the establishment of a monitoring and evaluation system to secure progress and adapt plans as needed.

In 2016, their climate policy vision from 2009 was updated to consider the progress made since 2009 and 2011 (CAP) respectively. Key elements of the updated version were a recognition of the role model functions of the municipal government, the need for an energy and climate manager within the administration and the extension of the deadline for their emissions reductions and renewable energy production goals from 2020 to 2025. Finally, economic sustainability and value creation were emphasised as well as the involvement of the public, which was to be encouraged both in the areas of energy production and use as well as through invitations to discuss and potentially co-modify the climate policy vision during each town council electoral period.

4.2.4. Merschrath, Rhineland-Palatinate

Merschrath is a town of over 10 000 inhabitants known for its clean air and is a full two hours away from the closest larger city. It is located in the same federal state as Arnstal, in Rhineland-Palatinate. It has a low population density (it encompasses 19 villages) and the second largest projected population declines of the six case cities. However, it has extensively studied the potential effects of demographic changes and participated in a state-funded future perspectives programme. Perhaps these efforts have paid off: its demography type is that of a stable rural municipality; in fact, it is a small urban centre for the surrounding communities. It is also home to multiple tourist attractions and a park with nature trails.

A defining event in their history climate protection was their decision to use a former military property to both produce energy and showcase innovative renewable energy technology. The Merschrath Energy Park includes a windfarm, a variety of solar panels and solar powered devices, biogas production facilities and pellet stoves that make use of sawmill residue from municipally-owned forests. The decision to establish an energy park was taken in the early 2000s. Over the years, the municipality won several awards and by 2015, it produced enough renewable energy to cover 50% of local energy demands. The city did not opt for a Climate Action Plan but did pass a climate policy vision (CPV, in German *Merschrather Leitbild 2020*) in 2008.

4.2.4.1. Merschrath's Climate Policy Vision for 2020

The Merschrath CPV has two primary aims: to produce enough renewable energy to meet its needs, and to reduce GHG emissions to less than 50% of 2000 levels, both by 2020. Other areas involved in the CPV were an energy audit, environmentally friendly construction,

commerce and industry, transportation, waste and environmental education. The goals were not able to be reached, as the ability to influence the actions of the private sector and households was limited. However, the municipal government was able to make significant strides towards the greening of its own properties and operations. For example, 14 municipal buildings had more efficient or biomass-based heating installed, the lighting in various buildings and in 20% of street lamps was switched to energy efficient forms, and by 2019, renewable energy production within the limits of Merschrath was approximately 3 times the electricity consumed by households, commerce, the agricultural sector and industry (excluding one very large company). Finally, they have also made some impact on local environmental awareness. According to a 2012 report, 78% of survey respondents in Merschrath were aware of the municipality's energy goals and the acceptance of renewable energy technologies was relatively high. There is also an outdoor education centre in that works closely with kindergartens and the primary-secondary school as well as a wood museum that regularly accepts school class visits. Their highlight, the energy park, continues to welcome international guests on weekly basis.

4.2.5. Terdorf, Baden-Württemberg

Terdorf is a town in the southwestern German state of Baden-Württemberg, 8 km north of a larger city. About half of the population of under 9000 lives in the main village of Terdorf while the remaining half are split among four smaller villages that were incorporated into Terdorf in the 1970s, making the population density low, despite its demographic classification as a stable medium-sized town. Within Baden-Württemberg it is considered a basic urban centre. It has the character of a rural countryside town, with woods and moors only a few minutes' walk away. It is only an hour's drive from larger natural treasures such as Germany's largest lake. Nevertheless, the city districts are well connected, with the services of a basic urban centre (kindergartens, primary schools, secondary school, library, swimming pool and a diverse retail sector) and 150 companies that employ 2500 people. They also have a dynamic civic life with 50 community associations.

Terdorf has made waves as a leader in Education for Sustainable Development (ESD), with a part-time city employee responsible expressly for ESD. They began climate projects in schools, working with partners in the nearby larger city, in 2008 and 2010. Volunteer work by residents in the area of ESD has also been important since at least 2011, with the municipality being distinguished internationally for its ESD efforts in both 2014 and 2016.

Citizens have been engaged through a renewable energy co-operative since 2011 and they are pursuing more energy efficiency goals, partially through their participation in the European Energy Award. They ranked in the top 3 in their category for the German Sustainability Prize twice in five years, with concrete achievements including the conversion of half of their street lighting to LEDs (later expanded to three-quarters), the use of only renewable electricity in

public buildings, an energy manager responsible for continuously monitoring and reducing the energy use of government buildings, and their focus on fair and sustainable consumption.

4.2.5.1. Terdorf's Sustainable Community Development Plan (SCDP)

While Terdorf does not yet have a CAP, they are *en route* to establishing one, having commissioned their first sustainability report (an inventory of sustainability achievements in the town, published in 2016) and following this up with their more strategic and concrete Sustainable Community Development Plan (SCDP), that includes the development of a CAP as one of the recommended measures. The motivation for both the 2016 sustainability report and the 2019 SCDP were the belief that sustainability must be a visible, tangible component of municipal politics. They referred to the Agenda 2030 and relevant United Nation Sustainable Development Goals such as Goal 11: Sustainable Cities and Communities. In 2016, they aimed to start making the often abstract term of sustainability applicable to Terdorf, using inspiration from the sustainability strategy of Baden-Württemberg. Their core areas for municipal sustainability were environmental viability, economic and social considerations for a good community life and the structural prerequisites for sustainable community development.

Their SCDP was developed during a year-long participatory process, accompanied by an expert in participatory processes and a citizen group encompassing town councillors, city administration and utilities representatives, as well as actors from the educational, social and economic sectors. This form was used to recognise the value of pre-existing civic engagement and the necessity of continued volunteer support as a complement to town council work. The topics discussed during the participatory process reflected the town's vision of setting ambitious goals accompanied by ones achievable in the short term, and seeing itself both as an actor in a global community as well as a town built by and around its citizens (in German, *Bürgerkommune*). The results of the process were categorised into four areas, one of which focuses on environmentally and climate friendly actions. Climate-related goals were the reduction of greenhouse gases by 25% (compared to 1990) by 2020 and further goals for 2033: sustainable lifestyles; a significant reduction in individual motorised transport; a light rail connection between Terdorf and the nearby city; expansion of public transportation and bicycle, hiking paths, etc.; e-mobility as the standard within residential areas.

4.2.6. Camberg, Hessen

Slightly less populated than Terdorf but with an intermediate population density of approximately 250 per square kilometre (vs 150 per km^2 in Terdorf), Camberg is considered a stable medium-sized town and was home to over 6500 inhabitants in 2018. It is located in central Hessen in western Germany, 8 km from an upper urban centre if over 100 000 inhabitants. Of the six case municipalities, it has the highest percentage of Green Party politicians in city council, at 22% in both 2016 and 2011, compared to second highest

percentages of 13% (in Arnstal in 2019 and in Bornstedt in 2016) and roughly 12% (Merschrath and Drebnitz in 2019).

This political characteristic of the town council might be linked to the work of local entrepreneurs, starting as early as the late 1970s with a renewable energy company that would grow to be active in several European countries, while maintaining its office in Camberg. In addition to this influential solar company, several municipal buildings have had citizen-funded solar roofs as early as 2008. In this year, politically active residents in one of the villages belonging to Camberg also started organising themselves to work on local sustainability. At the time of the CAP publication (2010), solar panels adorned the roofs of two industrial buildings, one store and a church.

Climate-friendly achievements spearheaded by the municipality by 2010 including networking (signatory to the federal state "100 Municipalities for Climate Protection" charter), renewable energy production (mainly solar) and the use of cleaner or more efficient energy sources. For example, they used 100% green energy in the city administration, powered the municipal service vehicle with natural gas and replaced the street lighting with more energy-efficient bulbs. They installed solar thermal heating on the roofs of kindergartens in two parts of the city and continually worked to improve the energy and heating efficiency of public buildings.

4.2.6.1. Camberg's joint Climate Action Plan (CAP)

The decision to develop a joint CAP was taken by four neighbouring municipalities in the fall of 2008. The municipalities were inspired by Germany's national climate goals and internationally important reports and ahead of many others in the state; the larger administrative district and the state of Hessen had at the time not yet passed their own CAPs. The four communities had already been partners on various issues for decades and in the years prior to the joint CAP, this cooperation arrangement had been supported by a state-funded programme. They believed that their main climate protection strategies, greenhouse gas reductions through reduced energy consumption and efficiency and from the increased production of renewable energy, could be better implemented if they worked together. They also emphasised collaboration with citizens during and after the development of the CAP.

Important components of the CAP were a CO_2 and energy audit, an analysis of the potentials of energy efficiency and renewable energy use, as well as an inventory of concrete measures. The potential climate change mitigation from public building retrofits and the production of renewable energy was high. These included greenhouse gas reductions of close to 50% through building retrofits (compared to emissions associated with 2005 energy use levels of the buildings) and solar energy covering 28.9% and 36.1% of electricity and warm water needs respectively. In 2010, only 4.6% of electricity and 2.7% of warm water consumption was covered by solar energy production. In addition to solar energy, biomass for heating is also a potentially large renewable energy source. In Camberg, wind power is not an option as there

were no appropriate land areas (partially due to an airfield within the town limits). From 2012 to 2014, it continued this work through the hiring of a climate outreach manager (*Klimaschutzmanager*). The position was not renewed after 2014, partly due to financial strain. The 2010 CAP does not contain quantitative goals, but the town council later unanimously adopted the goal of 100% renewable energy and complete energy efficiency by 2040. Currently the town is continuing to encourage citizens to actively contribute to climate protection through a federally funded "Camberg Protects the Climate" (CPC) everyday climate protection programme.

4.3. Range and intensity of local climate mitigation and adaptation

All case municipalities were climate pioneers and have engaged in a large number of climate protection activities. The aim of this thesis is not to evaluate the implementation of CAPs but a rough comparison of the palette of actions taken by each municipality will be needed later to address the hypotheses and draw other conclusions. Following the work by Tang et al. (2010) on evaluation of CAPs, the various activities taken (and in some cases planned but not yet started) in the case municipalities are divided into thematic categories, with the addition of an adaptation category.

Table 2. Relative level of climate protection activity in six case municipalities.

Activity category	Communication and collaboration	Land use policies	Transportation	Energy (reduction, efficiency and renewable)	Waste (reduction, recycling and wastewater)	Ecosystem/ Landscape management	Adaptation	Implementation and monitoring	Total
Arnstal	3	0	3	1	1	2	2	3	15
Drebnitz	3	0	2	3	1	2	2	2	15
Bornstedt	2	3	2	2	1	1	0	2	13
Merschrath	2	2	3	3	1	2	2	2	17
Terdorf	3	2	2	3	0	3	0	3	16
Camberg	2	0	2	2	0	2	0	2	10

3 = comparatively high level of activity
2 = intermediate level of activity
1 = comparatively low level of activity
0 = absent

As many of the measures, programmes and campaigns were already described above, table 2 does not list these again but merely makes a relative comparison of activity level between the municipalities (absent, comparatively low, intermediate, or comparatively high level of activity). In determining this coarse, incomplete comparison of overall climate activity, recent, already undertaken activities were given the most weight. Programmes which ended several years before the time of writing as well as policies that detail plans for the future were less important in creating the comparisons. The difference in total levels of activity is not great when comparing municipalities ranked from lowest level to highest (e.g. Camberg's total level of activity is only three points lower than Bornstedt's and Bornstedt's only two points lower than Arnstal's and Drebnitz' totals), reflecting all of the municipalities' status as a local climate

action pioneer. The relative focus the municipalities placed on various activities will be referred to in subsequent chapters.

4.4. Summary

The six municipalities are all being led down the path of climate mitigation (and in some cases adaptation) by their local governments, using a structured Climate Action Plan or a similar document with measurable, time-specific goals. As not quite all of the case municipalities had a CAP, I sometimes also used the broader term CAPP to refer to all climate action plans or projects and therefore to mitigation and/or adaptation actions in the six cities and towns. The contexts of the municipalities vary both in geographic and demographic characteristics as well as in their focuses within the field of climate action and/or sustainability. The following chapter will first detail further why and how local governments chose to concentrate on various topics and then continue to explain how they have managed to maintain motivation and work together internally and with local non-government actors. The second part of the next chapter will take another look at the influences of several contextual characteristics on different types of successful climate mitigation and adaptation.

5. Results

This chapter first presents an overview of evidence and insights gained through the interviews. The overview is divided into three sub-sections, with a preliminary conclusion at the end of each sub-section to summarise evidence in favour of the hypotheses and/or their rivals. In section 5.2., the evidence from 5.1. is augmented in order to ultimately support or refute the hypotheses.

The overview of evidence (section 5.1.) is arranged in order by leadership; internal coordination; and city-stakeholder cooperation and collaboration. Leadership can be a bridge between government and governance. Therefore, one might expect me to begin with government coordination and follow with leadership to transition over to city-stakeholder cooperation. In the following, I will instead begin with leadership for chronological reasons. Usually, an initial project headed by (formal or informal) leaders launches a municipality on its journey to become a climate action pioneer. This evidence is relevant to rival hypothesis 1. I will follow this with an investigation of internal coordination, since my focus is on government-led local climate action. Then interactions between government employees and other local stakeholders will be described.

5.1. Presentation of the evidence

The thesis asked how interactions within local governments, specifically aspects of leadership; internal coordination; and cooperation or collaboration with local stakeholders, contribute to a high level of climate action in smaller municipalities. The question of leadership asks why smaller municipalities chose to undertake a relatively high level of climate mitigation (and in some cases, also adaptation) and who the initial leaders were, revisiting the history of the case municipalities. Most importantly, it asks how leaders motivate climate action through the choice of various issue frames. These questions consider events further in the past, particularly when describing the origin of municipalities' CAPP journey. The second and third research questions focus more on how the governing of climate action looks today: how municipal governments are structured and how this enables different levels and quality of internal coordination (research question 2); as well as how city employees work with inactive or disinterested as well as active or interested local stakeholders (research question 3).

5.1.1. Leadership

The first part of the research question asked about the initiation of climate action policies and projects (CAPP) while the second part looked at the framing of CAPP to establish or maintain motivation. One assumption was that the role of citizens might be stronger here than in e.g. larger municipalities or than in the USA, where citizens were found to play only subtle roles. As mentioned above, this sub-section continues to deal with more events from the further past than will be the case in the sub-sections 5.1.2 and 5.1.3.

5.1.1.1. Path dependency?

As stated in section 3.8, I wonder if the level of climate-related citizen engagement (and population size) affects the choice of issue frames to motivate CAPP. A rival explanation for the choice of issue frames would be the path dependency of discourse. To later assess which explanation is more plausible (in section 5.2.1.), further information on the origins and development of each municipality's CAPP journey is presented below.

5.1.1.1.1. The initial motivation

A common motivator for CAPP, in line with the literature, was energy savings and/or renewable energy production. This was the case for three out of six cases: Drebnitz, Merschrath and Camberg. Some municipalities were able to take advantage of large plots of land for renewable energy production, such as Merschrath with its abandoned military base.

Bornstedt also had to deal with the closing of a military site and did later install some solar panels on the property. However, it belongs more to the other group of municipalities where the decision to strategically address climate mitigation came about after a combination of growing awareness and involvement in other sustainability topics. In Bornstedt,

> *Excerpt 1:* *We've been doing sustainability work for about ten years now, starting with two projects to reduce urban sprawl. We started one on a property here. That was the Transparent Conversion. There was a barracks in a member community [of the collective municipality] that was closed and we accompanied its transformation into a business park and that was primarily about reducing urban sprawl. (5)*

Arnstal was another of the municipalities where awareness of the importance of climate mitigation arose through a related environmental project. The head of economic development describes the progression from Arnstal's participatory "Edible City" biodiversity project to the decision to publish a CAP,

> *Excerpt 2:* *And obviously with such an environmentally oriented project, it's not a big step from there to measures for climate mitigation. (3)*

Finally, Terdorf's sustainable community development concept with a substantial section on climate action was created after many years of citizen-initiated and government-supported education for sustainable development projects.

5.1.1.1.2. Gradual path to climate mitigation

All the municipalities had been engaging in CAPP for at least ten years at the time of this writing, and informants referred to various direct and indirect climate protection projects that built on each other. In Bornstedt and Merschrath, military base closures left a large amount of land free and thus created a good opportunity for re-thinking municipal possibilities. In both cases, the land was eventually used (at least partially) for renewable energy systems and were the beginning of many more climate mitigation and adaptation measures. In the other

municipalities, CAPP or CAPP forerunner projects did not start out of such a decisive turn of events.

Where an already existing large base of support for CAPP was lacking, initial direct or indirect CAPP projects were smaller and inexpensive, sometimes operating without municipal funding or broad support. Informants from at least two municipalities emphasised the unforeseen path that early, relatively modest projects put them on. For example, Drebnitz has won many renewable energy and sustainability awards over the years. The coordinator of municipal action, who has been involved since the beginning, describes the initial energy savings project that started it all in a surprisingly unassuming way,

Excerpt 3: *He [the then district administrator] asked if we wanted to participate. And we said, fine, ok, we'll take part. We took part in the project, it lasted two three years,*

So someone asked you and you said yes.

Well, we had no idea what we were in for. Absolutely no idea. If I had known, back then, what we were in for, I might have said no, I don't know. We said yes, and then everything advanced from there. We more or less stumbled into the EEA [European Energy Award Programme] from that project... (10)

Reminiscent of Drebnitz's first participation in an energy saving programme, Arnstal's climate efforts started from a one-time affair that unexpectedly outdid itself, as the co-initiator of the project, the Edible City (EC) participatory gardening scheme, describes,

Excerpt 4: *From the outset it wasn't the plan to make an Edible City or something like that, it was rather that I met with a few people here, I thought, we have to do something for biodiversity, the federal government had called on municipalities to support biodiversity in their jurisdictions, and the city was of course completely overwhelmed by that, how do I go about this now, and back then we though, well ok, we can make one event [...] It wasn't the plan to make a ten-year project out of it, it grew bigger and bigger and more and more aspects got tacked on...(2)*

The low cost of such projects, often financed through grants from higher levels of government, were important for their realisation. Arnstal's EC initiator explained that some government members were not convinced of the logic of their first project, which they nevertheless went ahead with. The EC initiator emphasised that even if the project failed, no great damage would have been done. Indeed, their first event involved planting 100 tomato plants, which cost only € 1.50 each:

Excerpt 5: *We then really spent € 150. That's not a sum where one says, ok, if it goes wrong, we've lost a ton of money, right? (2)*

In Camberg, they had tried some bigger campaigns but later intentionally decided to reduce their scope and aim for smaller, concrete projects that could grow as the confidence grew. The mayor describes this:

Excerpt 6: *... it's the better strategy, I think, and we do it like that, we go ahead in smaller steps, say for example we work with smaller sums of money, because then you take smaller steps – first we do that, and then it slowly grows... (7)*

5.1.1.1.3. Intrinsic motivation of government actors

Leaders in later periods, after a municipality had been engaged in climate mitigation and/or adaptation for several years, were all members of city government (or the administration) or worked for a city-owned company, whereas the mayor himself played an active role in many of the municipalities. Informants from all of the municipalities mentioned intrinsic motivation for local climate action, i.e. ideals of sustainable resource use or environmental protection, while in three municipalities (Arnstal, Merschrath and Terdorf), environmental protection was explicitly mentioned as belonging to the duties or responsibilities of a local government. The sustainability lead in Terdorf illustrated the internalisation of sustainability into the core duties of a local government:

> *Excerpt 7: A municipality's purpose is to provide public services. That effectively means preserving resources in order to preserve a good life, whatever that might look like, being dedicated to and being concerned with that and creating structures for that. Those are exactly the kinds of services of general interest that communities must and can and should provide. That's a realisation the mayor had. (13)*

These direct environmental motivations are internal ones, representing the cognitive dimension of social capital. That is, engaged government actors understand and agree on collective, strong motivations for action that enable them to work well together on aspects over which they have control (e.g. landscaping and energy infrastructure of municipal properties). This understanding of the role of government applies to smaller or larger groups of key internal, government actors in the various municipalities. These internal motivations differ from the external motivations for CAPP as communicated by government actors to inactive government or non-government stakeholders.

5.1.1.2. Issue frames: External motivation for maintaining or increasing climate action

Not all politicians and government employees shared the common environmental vision of core government sustainability actors. Other local stakeholders (industry, business and citizens) were often equally or more unmotivated to engage in climate action. For these reasons, informants saw local governments as having a duty to motivate behaviour and/or attitude change in citizens, with many of them including public outreach as a core component of their CAPP. Motivating both members of government and other local stakeholders often requires a reflected choice of issue framing and/or issue linkage. Only two of the most important sets of issues frames will be detailed here. These frames reflect the municipalities' general approaches to CAPP as: governments in a role model function and the integration of CAPP with other aspects of city functioning.

5.1.1.2.1. Financial benefits frames linked with long-term fiscal health issue

A common issue of interest to local governments are direct or indirect financial benefits. Three of the larger municipalities (Arnstal, Drebnitz, Merschrath) explicitly mentioned cost savings as a very often used frame. For example, although other functions of CAPP such as embodying

a role model and the provision of information were mentioned in Drebnitz, one motivation was used most often to maintain momentum,

Excerpt 8: *It's a matter of energy efficiency well not only energy efficiency but savings overall. To be found everywhere. That's the main reason. Cost savings. And if we hadn't done that over the last ten or twenty years, the we probably wouldn't be able to pay our operating costs today. You know? We saved so much money through the retrofits we did, through useful renovations, that we really saved money and can say that we can't do without these investments. (10)*

The quotation also clearly shows how *issue linkage* uses the need for fiscal health ("pay our operating costs") to show the importance of CAPP as an energy and thus cost savings measure.

In Camberg, cost savings was also an important decision criterion and in Bornstedt, energy savings were highlighted to push forward CAP implementation. Informants talked about the importance of long-term payoffs or cost savings in four towns (Arnstal, Drebnitz, Bornstedt and Merschrath).

In Bornstedt, the council decided against a climate protection manager (CPM) due to financial reasons but other measures from their CAP were approved. These were ones that for energy savings,

Excerpt 9: *The politicians were reticent to carry the costs for the CPM. So that meant a kind of hibernation for the climate action plan, although I have to say that certain relevant measures were taken. Like for example the new windows here in city hall, the renovation of the library roof, time and again measures have been picked out and then actually carried out (4)*

On the whole, energy and the related cost savings were used as a CAPP issue frame primarily by the larger municipalities with more means to undertake energy projects. The smallest municipalities had a somewhat weaker emphasis on greening of city operations and more on facilitating/activating other local stakeholders and so employed the energy and cost savings frame less.

In addition to energy saving measures, other CAPP such as renewable energy production or adaption to climate change were framed in terms of financial benefits. In Drebnitz, the energy and cost savings frame aimed at city councillors and a personal financial benefits frame was used to generate interest among citizens in a renewable energy cooperative,

Excerpt 10: *Yes, they can't sell any more shares because enough shares have been sold now and the interesting thing was that the return was so good, better than at any bank. So yes, I think because of that it was oversubscribed. (15)*

Keeping the municipal forests in the black was another example of issue linkage i.e. increasing motivation for climate adaption in Merschrath:

Excerpt 11: *The on the other side we had the forest, as I just said, with two dry summers, unbelievable beetles, the pine forests are decimated, the prices are way down, and the question is how the forest can bounce back and get back on its feet financially. (11)*

5.1.1.2.2. Visible, relevant and accessible actions for a motivated citizenry

Some talked of CAPP as needing to be sensible and effective (Bornstedt, Merschrath and Camberg), whereas others put the focus on visibility (Arnstal, Bornstedt, Terdorf and Camberg), relevance (Arnstal and Camberg), and accessibility i.e. understandability or transferability. In Arnstal, Bornstedt and Terdorf, the emphasis on visible results is related to the tendency to continually remind the less motivated of CAPP importance. Less motivated stakeholders were most often the private sector and civil society, though in Bornstedt, support from the town council was also seen as lower than ideal. The energy management leads here referred to a relatively new idea of regular energy reports. Presenting these to the town council that would underscore the need for action,

Excerpt 12: The results of the new energy report will be presented and we hope that with the regular recording of results, we'll be able to illustrate worsening situations and also improvements in a more visual way. And then we'll be able to say that we really have to do something now. (4)

Framing CAPP as relevant and accessible was at the core of strategies used in Terdorf and Camberg. Here they aimed to address citizens such that they become multipliers i.e. pass on their knowledge, insight and/or competencies to family, friends and acquaintances. They emphasised addressing either the most affected citizens (families with young children) or addressing citizens who will support CAPP (for whatever reason) in a more direct and personal way so they become multipliers in the population. In Camberg, they began a climate action programme in partnership with an NGO to support citizen-initiated activity. The programme's title, "Hand on the Heart – Camberg Protects the Climate" invokes individual passion, a strategy also seen in the special opening event that featured an improvisational theatre performance.

Terdorf was a special case both in that the origin of CAPP was attributed to actors from civil society and in their identification of climate projects for very young children as the most relevant and effective CAPP strategy. Of course,

Excerpt 13: […] you start really very young – you have to start with the little ones because in the end, they are the next generation (13)

The municipality's Education for Sustainable Development consultant considered climate action activities for kindergarten students to be most effective as well, since families are the most involved when the children are that young,

Excerpt 14: […] whoever wants to really reach a lot of people has to start in kindergarten, because only there will you reach the children and the families […] (14)

Finally, accessibility can mean making CAPP easily understandable, through tangible projects such as the plants highlighting biodiversity and climate adaptation in Arnstal's Edible City,

Excerpt 15: The tomato is so diverse – you can really feel the biodiversity in its truest sense, you can touch it, you can taste it […] (2)

Accessible CAPP can differ from visible events or actions as explained very clearly by the mayor of Camberg. He described why the town decided to not renew the contract of their climate protection manager:

> *Excerpt 16:* *He organised events, for example there's a farm in the neighbouring community, they have been producing their own wind energy for quite a while now and so we could see how they did it there. He did things like that but – yes, those are inspiring demonstration projects, they're good, it's nice to have a look at them, but the majority can't do something like that themselves. (7)*

This was an example of a visible project that was not transferable to most locals. Framing CAPP to inspire motivation in citizens requires visibility and especially relevance and accessibility.

5.1.1.3. Preliminary conclusion

H1: A citizen-centred approach (visible, relevant, accessible measures frame) makes sense in smaller municipalities with a moderate level of climate-related citizen activism, whereas a financial benefits approach is more suitable for municipalities with minimal climate activism.

The aforementioned frames form a citizen-centred approach to CAPP. Table 3 below summarises the use of citizen-centred issue frames in each municipality, with the municipalities listed in decreasing order by population size. The excerpts from above (and one from below) are referred to in brackets following the informant (referred to by Arabic numerals). I assume that if informants mentioned a frame more than once, this means the frame is considered especially useful. I highlight multiple mentions of a frame by municipal informants with the number of mentions in bold font in brackets.

Table 3. Use of citizen-centred issue frames by the six municipalities.

Municipality	**Citizen-centred issue frame(s) used**
Arnstal	• visible (1, Excerpt 35, p. 54) • relevant • accessible (2, Excerpt 15)
Drebnitz	- [no citizen-centred issue frames used]
Bornstedt	• visible (6, Excerpt 12)
Merschrath	- [no citizen-centred issue frames used]
Terdorf	• visible • relevant (13, Excerpt 13) • accessible
Camberg	• visible (**2 mentions**) • relevant • accessible (7, Excerpt 16)

Table 3 makes it clear that the two smallest municipalities, especially Camberg, use citizen-centred issue frames. However, so does the Arnstal, the largest municipality. I will return to these observations when taking a final look at the hypothesis in section 5.2.1. as well as in chapter 6, discussion.

My hypothesis stated that some municipalities used citizen-centred issue frames more, while others favoured financial benefits issue frames. Table 4 summarises the use of financial benefits issue frames. It appears that municipalities use either citizen-centred issue frames or financial benefits issue frames, but rarely favour both. Mentions of the cost savings frame by Merschrath informants are greyed out as two of the informant statements did not explicitly mention cost savings but referred to energy savings.

Table 4. Use of financial benefits issue frames by the six municipalities.

Municipality	**Financial benefits issue frame(s) used**
Arnstal	- [no non-cost savings financial benefits frames used] • cost savings (**2 mentions**)
Drebnitz	• financial benefits of renewable energy production (15, Excerpt 10; **2 mentions**) • cost savings (10, Excerpt 8; **2 mentions**)
Bornstedt	• financial benefits of renewable energy cooperative* • cost savings (2, Excerpt 9; **2 mentions**)
Merschrath	• issue linkage of financial benefits for community (argument aimed at politicians) and climate mitigation (**2 mentions**) • issue linkage of financial benefits and climate adaptation (11, Excerpt 11; **2 mentions**) • cost savings (3 mentions)
Terdorf	- [no non-cost savings financial benefits frames used] - [no cost savings issue frame used]
Camberg	- [no non-cost savings financial benefits frames used] • cost savings

*greyed out because members of government are involved in this and the local government supports but is not officially part of it since it's a citizens' cooperative.

5.1.2. Internal coordination

To understand how members of government (politicians and especially administrative employees) work together to achieve a high level of climate action, I will be investigating both the frequency and the quality of interactions among members of local governments. A high frequency of interaction can arise both from a large number of actors consulted or otherwise involved in CAPP (a high acquaintance density) as well as intervals at which actors meet. Who the actors are and how often they meet will be presented first. Estimates of the quality of interactions will form a second sub-section.

5.1.2.1. Frequency of interaction

This sub-section begins with an overview of government officials who are either primarily responsible for implementation or who are more responsible for overseeing or coordinating than other employees. I then introduce bodies or smaller groups that meet at regular intervals.

5.1.2.1.1. Sustainability leads and involved departments

An overview of the government employees leading or coordinating CAPP a well as involved departments will allow for an estimation of the *acquaintance density* among government CAPP. The municipalities used a range of formal or informal administrative structures to organise government CAPP. Half of the municipalities had or had considered hiring a full-time climate protection manager (CPM), a position partially funded through the national climate protection programme. Bornstedt discussed the possibility of hiring one, as this was the next phase of the funding programme after the establishment of a climate action policy (*Klimaschutzkonzept* in German). As the funding would have lasted only two years, they would have had to fund their position completely after the initial period. For this reason, Bornstedt decided against a CPM. Camberg had a joint CPM for three years but did not renew the position, also for financial reasons.

In Merschrath and Camberg, the administrative employee filling the role of sustainability lead/coordinator was a building department official. The mayors themselves also had roles of sustainability lead/coordinator in these towns. In Merschrath, the lead has the head of the building department as an additional close collaborator and many other municipal employees are involved depending on the project.

The location of leads in the buildings department brings a parallel to the main contact during Arnstal's CAP development process, who was the head of the building department. After hiring of their CPM in 2016, close collaborators may have been in the building department in the first year, when building retrofits were begun. Later on, the CPM worked most closely with the city landscape planner and the coordinator of the municipal Edible City (EC) programme.

As in Merschrath and Camberg, there are some similarities in the sustainability lead positions in Drebnitz and Bornstedt. In Drebnitz, the sustainability lead had voluntarily headed their initial Energy Team, which later become their Sustainability Advisory Board. The sustainability lead's official position was head of municipal properties and procurement. Of the many close collaborators of the sustainability lead in Drebnitz, one is his office neighbour, the head of municipal communications. In Bornstedt, a primary sustainability lead heads municipal climate and energy management, an outdoor education centre and the municipal Planning and Development. The Bornstedt sustainability team was additionally comprised of the mayor and the coordinator of a programme for sustainable development conflicts funded from 2017-2020.

A somewhat different set-up was used in Terdorf. The smaller city received funding from a different national programme that promotes development initiatives. The full-time position began in 2017 and works towards sustainable community development with four main areas of activity: sustainable procurement, institutionalising sustainability in the city administration, public outreach and youth engagement. The sustainability lead here works closely with the

municipality's part-time Education for Sustainable Development (ESD) coordinator and interacts regularly with many other government employees.

The largest cities mentioned the involvement of many city departments and city-owned companies: the works depot, city planning, landscape management, press office, municipal utilities, city tourism corporation, city housing company, forestry and city trees service. The *acquaintance density* is high in these largest cities and high or moderate in the remaining municipalities, with the exception of Camberg. Here only two people are highly involved in leading or coordinating CAPP. This is due to the size of the administration, as the mayor described,

> *Excerpt 17: Well, we're a relatively small administration. We have 20 people working in the administration in total. But one of them is in the building department and she's responsible for environment, nature conservation and landscape protection measures. She does a bit of the coordination. Otherwise it's something that I usually do myself. (7)*

5.1.2.1.2. Overarching municipal structure

A high level of interaction can occur if there is an overarching municipal structure that encompasses more than one department (e.g. more than the building department). None of the six municipalities had a cross-departmental sustainability structure. However, Drebnitz and Terdorf had sustainability boards containing representatives of various parts of municipal life. Drebnitz's Sustainability Advisory Board (SAB) had grown from their initial, smaller Energy Team, and so has a deeply anchored climate mitigation focus while expanding to including climate adaptation and other issues such as biodiversity. The Drebnitz SAB meets at least twice yearly and is composed of politicians including the mayor and the head of the technical committee, a city planner, a traffic planner, members of the environmental department, representatives of the city utilities and of various associations e.g. for wastewater management and landscape protection. Similarly to Drebnitz's original Energy Team, Terdorf has a team that meets four times per year to coordinate their work within the European Energy Award programme.

Terdorf also has a sustainability board that fulfils the role of a Fair Trade Town steering committee and more. Given the more personal and creative name of Terdorf Future Shapers, it is composed of representatives of the administration, of various formal and informal educational institutions, of other civil society organisations and of the business community. The Future Shapers meet five to six times per year.

Bornstedt had a citizens' advisory board created during Bornstedt's participatory sustainable land use process, the Transparent Conversion. However, the citizens' board is a decidedly bottom-up affair, with only one municipal employee (the sustainability lead) involved. This meant both that the topics were chosen by citizens and not limited to sustainability issues, and that the number of members and frequency of meetings had dwindled over the years.

While Arnstal did not have an overarching sustainability structure, the CPM claimed to fill this role:

Excerpt 18: There's no special working group but – I go to this team meeting, I go to that team meeting, I'm at the weekly meeting for the EC, everywhere – buildings, city planning, trees, landscape protection and so through all of that, it's like a working group. Because I say what I know [at the various meetings] and then we work together on that. I don't know if it would make sense to create a working group with the other actors since I cover everything anyway. (1)

In addition to the CPM fulfilling the purpose of an overarching sustainability structure, the city has planned a new Nature and Environmental Protection Section that should encompass the city's landscape planner, the Edible City coordinator, the CPM and the city's two tree evaluators. This new structure would allow for these five key players to all meet weekly. As the CPM stated,

Excerpt 19: I just find it better when everyone sits together, because then there is – yeah – you're saving time, because everyone's sitting together, you don't have to go to each one individually, and the exchange or the input will just get better too. (1)

The final of the four more active municipalities, Merschrath, did not have a board but both informants referred to regular meetings to discuss climate-related issues. Regular but smaller or informal meetings are discussed further below.

5.1.2.1.3. Frequent interaction in smaller or informal meetings

All municipalities stressed the constant exchange between CAPP coordinators and other relevant actors. In Arnstal, the CPM was new in the administration and in the position. While she is the designated implementer of the CAP, she preferred to consult with more experienced colleagues as often as possible to be surer of her decisions,

Excerpt 20: I'm fresh in my, let's say first permanent position, you always have some uncertainty when you're still a student, if you – well, there's really a lot of responsibility, in the job, and so I'm a little careful and like to be sure of my decisions. That means that as a general rule I ask the people who'd have a say on a matter […] (1)

In some other municipalities (Merschrath and Camberg), the mayors mentioned discussing topics at least indirectly related to climate protection multiple times per week. As mentioned, the sustainability lead and his colleagues in Drebnitz integrated CAP work as much as possible into their regular duties. In Drebnitz, the SAB is a voluntary board, so I asked the sustainability lead how he balanced this with his main work:

Excerpt 21: I've tried to connect them where it makes sense. You know? There are synergy effects. If I do the one thing, I can do it for the other.

And how is it with the other board members?

It's similar. (10)

In Bornstedt, CAP issues were discussed on an as-needed basis whereas in Terdorf the sustainability lead met with the mayor to discuss climate issues and with other colleagues e.g. the municipal energy manager at least monthly.

In addition to the advisory board meetings, Arnstal, Drebnitz and Terdorf sometimes had more regularly occurring meetings relating to specific projects. For example, these were to discuss the European Energy Award in Drebnitz and Terdorf. Additionally, the Terdorf Future Shapers grew out of an Education for Sustainable Development network project and served a dual purpose as steering committee for their membership in the ESD network and in the German Fair Trade Town Network. Arnstal is part of an international Edible Cities Network, for which a steering committee including civil society representatives meets four times per year. A tighter group is the group of Arnstal stakeholders (from various departments in the administration) in the Edible City Project. These representatives meet weekly to discuss Edible City issues.

5.1.2.2. Excursion: Governmental capacity

More details on the availabilities (time-wise) of the sustainability leads and the knowledge and skills resources of the municipalities will be provided below under the header of governmental capacity. This information will be necessary to compare hypothesis 2 with a rival explanation of governmental capacity (generally greater in larger cities) as a prerequisite for more government-initiated climate action.

5.1.2.2.1. Time availability of sustainability leads

Only Arnstal and Terdorf have full-time sustainability leads. It should be noted that Arnstal has an employee charged full-time with climate mitigation and adaptation whereas Terdorf's full-time employee by definition spends more time on activities that are unrelated or only indirectly related to climate protection. In Bornstedt, one individual (not the primary sustainability lead) was employed full-time through a government-funded sustainable development programme. Her main task was however to facilitate civic engagement on the topic of conflicting goals in sustainable development. Therefore, she was not the lead of climate protection although she did collaborate with him regularly. The climate protection lead was not directly integrated into the municipal government but was the director of a municipal company. This was seen as a limiting factor,

> *Excerpt 22: So [climate protection] is only one area of responsibility among the responsibilities of [the sustainability lead]. If we had a staff position for him, one devoted solely to climate protection and energy management, that would be considerably better from a time availability perspective. (5)*

In Camberg, the mayor estimated that CAPP-related topics were discussed regularly but not at a level equivalent to a full-time employee – his discussions averaged twice weekly for 30-40 minutes at a time. The sustainability lead in the administration had been working in her position for only a few months at the time of the interview and had not yet established a regular rhythm for CAPP work. As mentioned in the sub-section on sustainability leads, the coordinating individuals in Drebnitz, Bornstedt and Merschrath split their time between CAPP and their "normal" duties managing municipal properties or in the buildings department. The

sustainability lead in Drebnitz mentioned that he was able to integrate many of his CAP activities with his other tasks and responsibilities.

5.1.2.2.2. Resources from issue networks

Interaction with higher levels of government and actors outside of the municipalities' local jurisdictions lie outside the remit of this research. Yet, some of these interactions are relevant e.g. those that add to the municipalities' climate action knowledge resources. Access to useful tools such as software for greenhouse gas accounting and a framework for inventorying local sustainability activities were gained in all municipalities thanks to work with regional, national or international partners. In Arnstal and Drebnitz, ideas for what became successful activities were taken from material provided through climate action networks, as one informant describes:

> *Excerpt 23:* *For example all the EEA [European Energy Award] cities, we met regularly to exchange on our experiences, and there are many things, there's the so-called best practice catalogue where many report on their good results, you can look at them, there are all the official documents that you can peruse, and you can see how they did it, that's how it goes.*
>
> So there was a lot through the EEA?
>
> *Exactly.*
>
> Not other regional networks?
>
> *No, no I'd say that was the main tool we used. It's really not bad. When you start using it, you realise that it's really quite good. (10)*

All municipalities acknowledged support in mostly individual projects from research institutes or through membership in interregional, national, or international networks.

5.1.2.2.3. Summary of governmental capacity

Table 5 summarises information on governmental capacity in each municipality, which are listed again in descending order by population size. The municipalities were given relative rankings of high, moderate or low levels. Totals were calculated for governmental capacity (composed of available time of sustainability leads and resources from issue networks). This will be referred to again in when returning to hypothesis 2 in section 5.2.2.

Table 5. Governmental capacity in the six municipalities.

Municipality	Time availability	Resources from issue networks	Total
Arnstal	high=3 • **full-time** CPM works tightly with several close collaborators	moderate=2 • support from CPM peers	5
Drebnitz	moderate=2 • lead integrates voluntary climate-	high=3 • important knowledge gains from issue networks	5

	related work with main duties		
Bornstedt	low=1 • lead splits CAPP with main duties • full-time SDCD2030 coordinator is close collaborator	moderate=2 • new ideas from perspectives of others • access to expert knowledge	3
Merschrath	moderate=2 • lead splits CAPP with other duties	low=1 • utility of network membership varied greatly	3
Terdorf	moderate=2 • **full-time** sustainability lead splits CAPP with other aspects of SCDP • work with several colleagues	high=3 • active networking led to the funded sustainability lead position, with goal of institutionalising sustainability	5
Camberg	low=1 • low number of hours per week dedicated to CAPP	low=1 • resources from issue networks often of low relevance	2

5.1.2.3. Higher quality of interaction

Coordination is very closely related to government CAPP structures. Moving away from who key local CAPP players are and what resources they have at their disposal, this sub-section focuses on the quality of their interactions. I start evidence of trusting or reciprocal relationships, then mention coordination norms and other signs of cognitive social capital.

5.1.2.3.1. Relational capacity via trust and reciprocity

Closely related to frequent meetings are trusting relationships and general cultures of cooperation and reciprocity. One can also refer to this as bonding social capital, i.e. the ties that bind together those who identify as a group. This was hinted at in two municipalities, where additional informants joined interviews after being invited spontaneously (in Bornstedt and Camberg). In one of these situations, the mayor referred to the three key actors as three

Excerpt 24: "true believers you can't do without!" (5)

In one of the cities, the sustainability lead was relatively new and so able to recount an experience of growing trust and benefits from cooperation. After months of regular meetings with close colleagues and sessions where a broader range of co-workers were invited to give their perspectives on CAP projects, and most importantly, having successfully organised two large events, the atmosphere at work was different:

Excerpt 25: Yeah, you feel like you're taken seriously, like you've found your place, you know how to speed up processes... (1)

Relationships became good enough that it was possible to consult with certain colleagues who would give an honest opinion:

Excerpt 26: […] as a general rule I ask the people who'd have a say on a matter, who are honest to me if they think it'd be a flop […] (1)

It was also possible to benefit from a general culture of cooperation and reciprocity:

Excerpt 27: [there are] cooperative co-workers who say, I'll help you set this up in my free time [...] As soon as I have anything and ask, I'd have people who help me right away. (1)

As in reciprocal relationships, the help can also go the other way:

Excerpt 28: And so when I sit there [in a meeting with city architects], I'm actually there for climate action, then of course I'd like to have solar somehow, but then say to the colleagues, for example last time, Hanna [pseudonym] has a contact for an office through her funded position, a contact for roof and facade greening and so you network for them. So you're also a multiplier for others. So then he doesn't just talk with me, he also then goes directly to Hanna and does that greening bit, and then I say, let's have a few solar panels there, that's great. You know? That's how it works. (1)

In other cities, good relationships with city-owned companies were mentioned. In one municipality they were emphasised as a key factor of CAP success:

Excerpt 29: One of my special partners is our municipal utilities, we have our own utilities, who provide me with excellent support from a technical perspective and so it's really a good story that's developed there. They advise us on many projects, well they don't only advise but they also support us with their technical expertise, with things. And that's what stays in the end, that we've really built up a really good team that can face the challenges of the future. (10)

5.1.2.3.2. CSC as coordination norms and common vision

Norms of who *makes which kinds of decisions* and who *prepares the information* necessary to make decisions were useful for government CAPP coordination. Broad decision-making (involving a larger group of decision-makers, e.g. more than eight individuals) usually took place when long-term, strategic decisions involving larger sums of money were the issue. These often involved municipal councils, which are larger groups. In Arnstal, long-term projects included an updated local transportation plan that would mean the construction of new bicycle lanes, for which many stakeholders were involved. In Terdorf, a year-long participatory process was used for their sustainable community development vision, which will guide the town for the 15 years. Such processes were extensive and involved, taking longer than other CAPP decisions but usually supported by a broader base, as mentioned by one sustainability lead when referring to larger-budget decisions,

Excerpt 30: [...] everything beyond that [the mayor can take decisions unilaterally when the cost is below a certain cut-off] must and should also be determined by the town council, because that's why they're elected. And the town council should be informed about all of these projects, because in the end the administration is really like the operating body of politics, and the town council is the elected politicians who more or less take decisions in parliament. So it's good that we can't decide much spontaneously ourselves... (11)

Similarly, city budgets were allocated by city councils at regular intervals. Once these sums have been assigned to various departments, smaller undertakings requiring modest amounts of money could be taken by the mayors or in some of the municipalities with a CAP, by the administrative sustainability lead. Decisions that were not part of the CAP were prepared by the administration and final decisions were taken by the relevant committees composed of city councillors.

While all six municipalities mentioned decision-making norms that allowed for smooth coordination and kept less involved government members informed of key CAPP developments, municipalities differed slightly in their support for CAPP. As would be expected from climate action pioneers, most municipalities referred to broad government backing and many mentioned unanimous (Merschrath, Terdorf) or cross-party support for CAPP (Arnstal, Merschrath, Camberg). This represents a *dominant form of common knowledge*, or CSC.

There were a few exceptions to this. In Bornstedt, CAPP is sometimes low on the agenda, although the situation is improving,

Excerpt 31: But you can also already notice that the town councillors are becoming more resolved, and are asking more questions and say, we have to consider this and that, or can we look into that more, so, there's been a change. But I think there's still a lot to do in that area. (5)

The mayor in Camberg stressed high motivation in the council and town society for local climate action, while the sustainability coordinator saw some discrepancy between words and deeds,

Excerpt 32: Because the mayor wanted to participate, and because I'm the only person here who, firstly, is interested in climate protection and secondly, can speak English, so that's why he's always said yes [to these projects] and I was allowed to be in charge of them [...]

Did you say you're the only one interested in climate protection?

Yes, that's right. I come from the non-profit sector and I'm in the Green Party so people always knew that I was the default choice for this stuff.

So you have a particularly strong interest in the topic but since Camberg has been doing things in the area since at least 2008, the others are moderately interested?

In the administration – no. The mayor, the previous one, he was interested and Ms. Schmidt [pseudonym] definitely as well, but she doesn't have time and – I don't know what happened, back then, 2008, we made a lot of commitments, [for example in] '99, that we should use only recycled paper, and that was ignored for ten years. (8)

Finally, the town council in Merschrath had passed CAPP measures unanimously for many years before starting to tire of the topic. The sustainability lead adopted a new issue frame to return government motivation back to its previous level.

5.1.2.4. Preliminary conclusion

Hypothesis 2: The smaller a municipality's population, the more frequent and higher quality the interactions between local government employees are, leading to a high level of government-initiated climate action.

Table 6 summarises the frequency of interaction in each municipality, which are again in descending order by population size. The frequency of interaction is estimated by acquaintance density and the level of interaction, which was estimated by meetings of a larger sustainability board and smaller but still regular meetings. The municipalities were given comparative rankings of high, moderate or low levels of the above aspects, with the levels being assigned values of 3, 2 and 1 respectively. Some aspects were completely absent, as indicated in the table. This allowed for a frequency of interaction total that served as an overall ranking.

Table 6. Frequency of interaction (SSC) in the six municipalities.

Municipality	**Acquaintance density** (number of colleagues worked with at unspecified intermittent intervals	**High level of interaction/ Regularly scheduled meetings**		**Total**
		Large overarching sustainability board with regularly scheduled meetings	Smaller meetings at regular intervals	
Arnstal	high=3 • 2 mentions	high=3 • CPM fulfils that purpose	high=3 • daily-4x/year • 2 mentions	9
Drebnitz	high=3	moderate=2 • meets twice/year [subsets more often]	moderate=2 • 1-2x/month in busier years	7
Bornstedt	moderate=2	absent=0	absent=0 • as-needed basis only	2
Merschrath	moderate=2	absent=0	moderate=2 • weekly-monthly	4
Terdorf	high=3 • 2 mentions	moderate=2 • meets four times/year and 5-6 times/year	moderate=2 • at least 1x/month	7
Camberg	low=1	absent=0	high=3 • twice weekly	4

Table 7 summarises the second component of H2, the quality of interaction represented by either RSC or CSC. Coordination facilitated via decision-making norms was not included in the column displaying CSC as all municipalities were roughly equal in this respect.

Table 7. Quality of interaction (RSC or CSC) in the six municipalities.

Municipality	**Relational capacity (RSC)**		**Common vision (CSC)**
Arnstal	high=3 • close collaborators CPM can trust • general culture of reciprocity among co-workers		high=3
Drebnitz	high=3 • good relationships with municipal partners • good relationship with close collaborator		high=3
Bornstedt	moderate=2 • high among main collaborators		in progress=2
Merschrath	high=3 • good relationships with close collaborators and due to high acquaintance density achieved through 20 years on the job	**OR**	high=3
Terdorf	moderate=2 • no explicit mention but likely given high acquaintance density		high=3
Camberg	moderate=2 • no explicit mention but informant 9 joins spontaneously; two Camberg Protects the Climate colleagues worked together		in progress=2 • mayor maintains that councillors from all political parties recognize importance of climate protection; employee disagrees

How frequency and quality of interaction work together to improve government coordination and consequently local climate action and what role population size might play in this is addressed in section 5.3.2. below. A further discussion of governmental capacity will also follow.

5.1.3. City-local stakeholder cooperation and collaboration

Is there more climate-related citizen engagement in smaller municipalities and are there more or better (e.g. trusting) interactions between government and other local stakeholders in small cities and towns? An overview of both private sector and citizen climate activism as well as intermittent or otherwise less involved interaction provides an idea of the frequency of city-stakeholder interaction in the case municipalities. The quality of interaction is gauged by regular meetings between government employees and local stakeholders and other approaches taken by municipalities to generate trusting relationships with the private sector, local groups and individuals.

5.1.3.1. Frequency of city-stakeholder interaction (SSC)

The number of local stakeholders is much greater than the number of local government employees, entailing less detailed estimates of interaction frequencies. I first look at independently initiated citizen activism, as a higher level of this is a good precondition for a higher frequency of city-stakeholder interaction on climate issues.

5.1.3.1.1. Independently initiated citizen activism

In the smallest cities, individuals, groups, organisations and firms were active without government encouragement. In Camberg, several companies produce renewable energy, including one that has become an internationally known solar power company after its founding in the 1970s,

Excerpt 33: *Yes. That's a good point. Lots of citizens moved here who had fairly green thinking, who cared about climate change. Because Camberg had that kind of reputation. (9)*

So the town has had a reputation as a green city for over 13 years.

Yes. (9)

Yes, because of Churchtown Solar, I'd forgotten about them. (8)

Yes, that's what we've heard over the last 13, 14 years, that the company and the employees and the CEOs did a lot together with the town, like the solar farm. (9)

Also in Camberg, a non-profit organization lives both social and environmental sustainability by helping troubled youth get back on their feet working on a biodynamic farm and taking care of other gardening projects. As mentioned, Terdorf's CAPP journey began when a kindergarten director and a private citizen started a first climate protection project at a kindergarten. Informants from both of these municipalities judged civic engagement to be average whereas informants from the other municipalities generally saw civic engagement as lower than it could be.

While all municipalities had at least some stories of civic engagement, these seemed generally to be the exception rather than the rule. Informants from two of the smaller municipalities (Bornstedt and Camberg) had the impression that there was generally more engagement in the smaller villages belonging to the municipalities and Merschrath, a city composed of 19

villages, was consider to generally have a high level of civic engagement (but not climate protection related). The largest cities had small Fridays for Futures demonstrations and all but the smallest municipality there were climate-related activities in schools, initiated both by teachers and non-governmental organisations.

5.1.3.1.2. Regular and ad-hoc interactions

As mentioned above, Arnstal, Drebnitz and Terdorf had steering committees or advisory boards involving local non-government stakeholders (Edible City steering committee, Sustainability Advisory Board and Terdorf Future Shapers). Bornstedt invited citizens to discuss wind energy conflicts three times in 2017 as part of their Sustainable Development Conflicts Dialogue 2030 (SDCD2030) programme. Camberg convened meetings with citizens the most often, once a month for their Camberg Protects the Climate (CPC) everyday climate action programme.

Informants from most municipalities reported working with already active individuals or already existing local companies or institutions to jointly achieve mutual benefits. Examples of collaboration are with consulting and/or planning firms (in Arnstal and Merschrath), with an adult education centre (in Bornstedt), with a supermarket (Arnstal) and with renewable energy producers (in Drebnitz, Merschrath and Camberg).

Merschrath stands out as having regular (though project-based and not always frequent) interaction with local stakeholders despite not having a climate-related board or committee. Instead, they had a history of working with local companies and also attracting companies to the town thanks to their energy park,

> *Excerpt 34: [...] companies come with new technology to us here in Merschrath because we have this project [the energy park] and say, you're open-minded, we'd like to install this here and advertise it, to show that it's possible, is that ok? [...] May we do this here? Will you be part of this? There've been some very exciting times. (11)*

In Terdorf, the sustainability lead was a personal, frequent presence at externally organised events, mainly in the educational sector. This way the municipality was able to maintain a close relationship with the dynamic ESD volunteer community. The CPM in Arnstal had a similar approach, appearing and engaging personally in several public outreach events including giving tours in an interactive sustainable shopping exhibit:

> *Excerpt 35: [...] first you have to convince people here that the position is needed at all, you have to show your face, and that's why I find public outreach so important, because yeah, then you're there, both for the employer and for the citizens, so they see, ok, someone's there who's doing something, yeah? (1)*

Arnstal and Camberg additionally mentioned more than one instance of engaged citizens approaching them with ideas for joint projects or requests for support. The mayor of Camberg described one recent interaction with an engaged citizen,

Excerpt 36: *For example, we have a young woman here who would like to start a food cooperative, a group that gets their produce from local farmers. She was looking for a space so I called her and invited her here so we could discuss that and see how the town could support her. (7)*

5.1.3.2. Higher quality of interaction (RSC)

I rated the quality of city-stakeholder interaction based on good relationships between government employees and active citizens (e.g. in the abovementioned committees and boards) as well as trust among the broader public. In most cases informants stated the difficulty of gauging trust or willingness to work together with the city on climate action. Due to the small number of references to a generally trusting relationship characterizing joint city-stakeholder climate action, I have included attempts to build up trust (despite the results being uncertain).

5.1.3.2.1. Good relationships with active parties

Good relationships with individuals, groups and other sub-sets of the broader public were mentioned by several informants. For example, the CPM in Arnstal had worked on repeat occasions with a supermarket employee who also runs a water protection initiative. I asked the CPM how she had come in contact with the citizen who had proposed a tree planting fundraiser in cooperation with the supermarket,

Excerpt 37: *Yes, the employee and I have been working together since I started here. We organise the Sustainability Markets and she is the initiator of the water protection clean up events. (1)*

The sustainability lead in Drebnitz has developed a very productive relationship with SAB members over the years,

Excerpt 38: *And what's impressed me the most about this is that we've found a team here that's become tighter knit, with various actors from various areas. From all parts of the city. Starting with city council, to the city companies to the unions, associations, they sit together and govern, influence everyday things, city issues, talk with each other. That's really, really important, that everyone talks to each other. (10)*

In Terdorf, there is some fluctuation among the citizens involved in the Future Shapers but citizens active in the Education for Sustainable Development are constants. This is in large part due to Terdorf's history of activity in ESD. As the sustainability lead says,

Excerpt 39: *[…] when it comes to the educational sector, schools, kindergartens, they very consciously approach me or us, the ESD coordinator [as well], and want to organize events and activities with us. So when it comes to educational actors, we're often the ones being approached, and in civil society it's the other way around. (13)*

5.1.3.2.2. Establishment of trust with the broader public

Two of the municipalities (Drebnitz and Camberg) emphasised a participative attitude to interacting with residents, and the importance of avoiding a lecturing style when communicating with the public. Municipalities (Merschrath and Drebnitz) went to the neighbourhoods where projects were planned with information and question events. This is

usually expanded to give active opponents of CAPP the opportunity to voice their opinions or inform themselves further and potentially change their views:

Excerpt 40: In the end politicians and the administration have to work together very closely and then we also try to involve as many citizens as possible that means informing early. That way we can get a feel for the opinions in the community, so it makes sense to be really on the offensive with public participation and citizen information events. (11)

At least three of the municipalities (Bornstedt, Merschrath and Camberg) took a pro-active approach in informing and offering the public opportunities to discuss planned projects, with the aim of preventing or reducing opposition. Whether more was done than the provision of information in the press and through town hall meetings is not known for Camberg. In Bornstedt, the municipality specifically invited vocal opponents to group discussions that were arranged as part of the local sustainable development conflict and dialogue programme. In Merschrath, town hall type meetings were held in areas that would be affected by large projects e.g. upgrading of wind turbines. In these meetings, residents were able to,

Excerpt 41: not only receive information, but also to get involved with their worries, questions and ideas" (12)

In Merschrath and Drebnitz there were small groups publicly voicing concerns against the municipalities' plans (against a new wind park and for more trees in the city, respectively) and in both cases the municipalities made efforts to reach a common understanding with these groups. In Drebnitz, the citizens' concerns led to the creation of a question and answer page regarding the issue of public trees on the city's website.

Just as municipal representatives went to different neighbourhoods as a sign of good will, Bornstedt worked on creating trust with youth, an underrepresented societal group, by sending every youth in the municipal a personal invitation by post to take part in their sustainable development dialogues. Bornstedt went to great lengths to invite youth, also advertising the dialogues on Facebook, in schools, arranging the workshops during school hours and organising separate workshops for town councillors, youth and other stakeholders, so that the youth would not feel intimidated by the presence of key adult decision-makers. The multi-pronged approach was a small success:

Excerpt 42: Yes, we sent out about 2 220 letters and 17 young adults took part in the workshop. (6)

Excerpt 43: It was a success, because in the first workshops for example, in 2009 we didn't have any young adults at all and now some of them are there. (4)

City- or government-wide CAPP or more generally sustainability-related participation processes also created interest and support for CAPP/sustainability in Arnstal and Terdorf. In Arnstal, citizens were invited to participate in the creation of the city's vision for 2030, although this did not directly address climate protection measures. More importantly perhaps is pride in the city's edible greenery project. While relatively few people accept the invitation to participate, general awareness is high and some changed perspectives have been noted:

Excerpt 44: *But lots of people know the project and lots of people say it makes Arnstal more interesting. There are some people, they say, Edible City? Not so great. They go on holiday, to Mallorca for example, and they end up talking with other people and they say, I'm from Arnstal. Ah! The Edible City! Like that. and then they come back and are proud of their city all of a sudden. I've heard that from several people. (2)*

Both Arnstal and Drebnitz gained information through university-led surveys on environmental awareness of the population. While climate and biodiversity projects led to motivation to act in government, it was not possible to know if citizens were more motivated to take action through the work of the government. A large percentage was however aware of city sustainability projects,

Excerpt 45: *But lots of people know the project and lots of people say it makes Arnstal more interesting. There are some people, they say, Edible City? Not so great. They go on holiday, to Mallorca for example, and they end up talking with other people and they say, I'm from Arnstal. Ah! The Edible City! Like that. and then they come back and are proud of their city all of a sudden. I've heard that from several people. (2)*

Informants in both Drebnitz and Camberg) emphasised a participative attitude to interacting with residents, and the importance of avoiding a lecturing style when communicating with the public. The mayor of Camberg elaborated on this, specifying that a personal approach is more fruitful. Camberg launched its CPC everyday climate action programme partly to reach a broader audience through direct interaction with active citizens and the further dissemination of ideas and motivation through these active citizens,

Excerpt 46: […] they/re basically our multipliers into the other sections of the population. I think that it's really important to motivate people with personal interaction. These 30 to 40 people are very valuable in that sense. They bring their neighbours along or friends and say, we can do this together, I believe it's very motivating (7)

Additionally, the mayor mentioned several smaller groups of citizens actively involved in direct or indirect climate protection. When asked how he knows about these groups, he replies,

Excerpt 47: *The good thing is that here, they come to us. Sometimes when I hear of something, I address it directly myself, but generally they come to us. Or to me specifically. They know that I'm open to [such projects] and we have some leeway there to offer support. So of course we gladly do that. (7)*

5.1.3.3. Preliminary conclusion

Hypothesis 3: The smaller a municipality's population, the more frequent and higher quality the interactions between government employees and other local stakeholders are, leading to a high level of citizen-initiated or joint city-stakeholder climate action.

Table 8 summarises frequency and quality of interaction between government employees and other local stakeholders in the area of climate action. As above, the municipalities were accorded a relative ranking of high, moderate or low for the level of the two aspects, frequency of interaction (SSC) and quality of interaction (RSC). Cognitive social capital was not considered here as there was informants did not mention or infer a dominant form of common knowledge among the broader public.

Table 8. Frequency (SSC) and quality of interaction (RSC) within government in the six municipalities.

Municipality	**Frequency/High level of interaction (SSC)**	**Higher quality of interaction/ Trust or good relationships (RSC)**
Arnstal	moderate=2 • Edible City steering committee brings stakeholders together four times yearly • ad hoc collaboration with various stakeholders/engaged citizens	moderate=2 • good relationships with **individuals** • *working on trust* among broader public
Drebnitz	moderate=2 • SAB brings stakeholders together at least twice/year • climate-related public participation events ~ once/year	moderate=2 • good relationships with **SAB members** • *little interaction* with other stakeholders
Bornstedt	moderate=2 • SDCD2030 brings stakeholders together thrice/year	low=1 • *modest* success of trust-building approach aimed at **youth**
Merschrath	low=1 • collaboration with local firms or public participation ~ once/year	low=1 • *working on trust* among broader public
Terdorf	moderate=2 • Future Shapers brings stakeholders together 5-6 times/year	moderate=2 • good relationships with **ESD actors** • *working on trust* among broader public
Camberg	high=3 • CPC brings engaged citizens together once monthly • ad hoc collaboration with engaged citizens	high=3 • good relationships with **CPC participants** • trust among engaged citizens

5.2. Analysis: Return to hypotheses and rival hypotheses

This section presents combined summary tables for H1 and H2 and incorporates the remaining elements of each hypothesis for a final evaluation. Rival hypotheses are compared and the most plausible explanation is determined. Discussion of questions emerging from the analysis is treated in the next chapter.

5.2.1. Hypothesis 1: A citizen-centred approach (visible, relevant, accessible measures frame) makes sense in smaller municipalities with a moderate level of climate-related citizen engagement, whereas a financial benefits approach is more suitable for municipalities with minimal climate-related citizen engagement.

The final component of H1 was the level of climate-related citizen engagement. This should be moderate either in the smallest municipalities (Camberg, Terdorf, and Merschrath) or in the municipalities that favour citizen-centred issue frames (Camberg, Terdorf, and Arnstal). Table 9 shows estimates of the level of climate-related citizen engagement, with supporting excerpts in Appendix 3. Here I consider citizen-initiated rather than city-stakeholder collaboration. There is a correlation between a moderate level of climate-related citizen engagement and the favoured use of citizen-centred issue frames.

Table 9. Level of climate-related citizen engagement in the six municipalities.

Municipality	**Level of climate-related citizen engagement**
Arnstal	• low • low to moderate level of sustainability-related engagement (2, Excerpt i)
Drebnitz	• only as an exception (15, Excerpt ii)
Bornstedt	• a couple of examples from the educational sector (4, 5, Excerpt iii) • low level of climate and sustainability-related engagement (4, Excerpt iv)
Merschrath	• low (12, Excerpt v)
Terdorf	• moderate, could be higher (14, Excerpt vi)
Camberg	• moderate level (8, 9, Excerpt vii)

Table 10 shows a minimal version of tables 3 and 4, combined with the gist of table 10. Barring Arnstal, which is an exception in terms of population size, the smallest cities and the cities with a moderate level of climate-related citizen engagement are indeed those that favour citizen-centred issue frames. The municipalities with minimal (excluding Arnstal) climate-related citizen engagement are indeed those that favour the financial benefits issue frames.

Table 10. Frames used and levels of climate-related citizen engagement in the six municipalities.

Municipality	**Citizen-centred issue frame(s) used**	**Level of climate-related citizen engagement**	**Financial benefits issue frame(s) used**
Arnstal	high	low-moderate	moderate
Drebnitz	-	low	high
Bornstedt	low	low	moderate
Merschrath	-	low	high
Terdorf	moderate	moderate	-
Camberg	high	moderate	low

What remains to be seen is whether there is evidence that the use of each set of frames makes sense given a certain population and level of citizen engagement. Examining the smallest municipalities provides evidence that the use of citizen-centred frames makes sense in small municipalities. Prioritising active citizen engagement on concrete projects makes sense in Camberg, since in a smaller municipality, only so much can be down in a top-down manner. The mayor had already referred to the low number of administrative employees. The other informants agreed and further explained the limited availabilities of administrative employees with one also stressing the importance of citizens' own motivation:

Excerpt 48: That's the problem with small municipalities – there are – there's let's say in one or two employees in a department who have to take care of everything. Not only buildings, also streets, canals, ponds, rivers, streams [laughs], trees, forests, fields (9)

Excerpt 49: So a project that the community wants but the citizens couldn't care less about, that won't happen in such a small community because the municipality doesn't have the means, not like in a large community. That's really how it is. If something has to be done in a big city, then they can commission an engineering firm and they organise the participatory process, they get it done with a lot of manpower, but we don't have that. If it doesn't come from themselves, from civil society, then nothing happens. (8)

Terdorf has followed a similar trajectory. With the work initiated by passionate Education for Sustainable Development (ESD) expert and the support of the mayor, environmental and climate protection action began to become a regular fixture of municipal activity. Awareness of sustainability and ESD also grew within civil society. More recently, the town invited residents to work with the council and administration in a year-long participatory sustainable community development process (SCDP). Over 300 citizens attended the SCDP kick-off – quite a large number for a town of 8 500. This was an important, visible step in creating legitimacy for the town's sustainable community development concept and cementing support within the municipal council:

Excerpt 50: If we hadn't done it, then there wouldn't have been this broad acceptance. And it's there, the awareness is there and people are aware of the importance of working on these topics. Otherwise the policy wouldn't have been passed unanimously. (13)

What of the rival hypothesis?

R1: Frames used result from path dependency rather than compatibility with level of climate-related citizen engagement.

There is some evidence that path dependency is responsible for the frames used in Arnstal, Drebnitz and Bornstedt. As mentioned above, Arnstal's CAPP journey was inspired by its visible, tangible Edible City biodiversity project. The EC grew bigger and bigger over the years and is still now an important component of their CAPP, which could explain their use of visible, relevant and accessible frames. On the other hand, it was obvious from Camberg informant statements that it makes sense for them to use the potential offered by an engaged citizenry. Arnstal's use of citizen-centred frames could also be explained as an acknowledgement of a low to moderate level of climate engagement.

Drebnitz favours the financial benefits frame and started its CAPP journey by participating in an energy efficiency project and subsequently taking part in other energy programmes. The low level of citizen engagement could be why Drebnitz did not prioritise citizen-centred frames. More potential reasons for which Drebnitz favours the financial benefits frame (that likely outweigh or at least balance the path dependency reason) will be presented below.

Bornstedt's Transparent Conversion was a highly visible participatory process, which could explain Bornstedt's continued use of the visible CAPP issue frame. Nevertheless, Bornstedt also uses financial benefits frames, and these to a greater extent than the citizen-centred frames. For example, Bornstedt's sustainable development conflicts process promotes dialogue rather than concrete projects. In terms of tangible action for climate mitigation, the target group remains members of the municipal council rather than citizens. For councillors, issue linkage of climate mitigation with municipal energy and cost savings is more suitable for Bornstedt, where the public is as yet largely unwilling to actively engage in climate protection – and so the municipal council remains uncertain as well.

This situation evokes parallels to Drebnitz, where citizen engagement is perceived to be low. One exception is a group of citizens who have been vocal against tree removal. In this case as with the other forms of municipal outreach in Drebnitz, the focus is on initiating dialogue with antagonistic or inactive stakeholders. In addition to interacting with the citizen initiative for tree protection, the municipality tried out a variety of activities for engaging the public. Nevertheless, these do not go as far as to promote citizen-run projects. With low citizen climate action, the focus is on practical reasons for government, the private sector and civil society to green their operations: with CAPP as a route to financial benefits.

Informants in Merschrath made it clear that citizen CAPP engagement is next to non-existent. In contrast, the city has worked with local companies and planning offices on renewable energy production and climate adaptation. Given the inaction of residents beyond individual decisions such as the installation of solar panels on roofs, it is unsurprising that citizen-centred frames are not used in Merschrath. Instead, with its successful projects with local firms, the most widely used CAPP frame by far is one of financial benefits (local value creation/economic development).

There is therefore more evidence for H1 than for R1: it makes sense both for cities with moderate levels of citizen engagement to use citizen-centred frames and for those with minimal levels of climate-related citizen engagement to favour financial benefits frames. Arnstal represents a partial exception and this will be touched on in chapter 6.

5.2.2. Hypothesis 2: The smaller a municipality's population, the more frequent and higher quality the interactions between local government employees are, leading to a high level of government-initiated climate action.

Table 10 summarises tables 5 and 6 from above. As the table shows municipalities in descending order by population size, the first part of the hypothesis (the smaller a municipality's population, the more frequent and higher quality the interactions between local government employees are) is not supported. The second part, whether both more frequent and higher quality interactions within government lead to a higher level of government-initiated climate action, still needs to be addressed.

Table 11. Frequency (SSC) and quality of interaction (RSC) between government employees in the six municipalities.

Municipality	**Frequency of interaction**	**Quality of interaction**
Arnstal	high	high
Drebnitz	high	high
Bornstedt	low	moderate
Merschrath	moderate	high
Terdorf	high	high
Camberg	moderate	moderate

Informants from two cities (Arnstal and Bornstedt) give some hint that more frequent interactions lead to more government-initiated climate action. In Arnstal, the newly designated Nature and Environmental Protection section was expected to improve collaboration by regularly updating co-workers on projects of relevance to each other and allowing those involved to better understand and hopefully better support each other. As cited above, the CPM says,

> *Excerpt 51: I just find it better when everyone sits together, because then there is – yeah – you're saving time, because everyone's sitting together, you don't have to go to each one individually, and the exchange or the input will just get better too. (1)*

The primary sustainability lead in Bornstedt also speculated about an improved situation. In addition to being responsible for climate and energy management, he was the manager of a city company and had his office in city hall but did not belong to a department or section of the administration. For this reason, he was not always able to communicate with co-workers on relevant issues in a timely fashion:

> *Excerpt 52: The difficulty that we have is that I might sit in the town hall, but I'm not a member of the administration, I'm manager of Planning and Development Bornstedt. And so it's a long and tedious process to get integrated into the administration. It's much easier if you have a position, or if there's really, a department made up of one person, which all the others, the other sections can access […] there are no set procedures, so I'm not always involved in projects right from the beginning. (4)*

Fewer collaborators means a lower acquaintance density and lower frequency of interaction. This was mentioned by informants in Camberg as a barrier to climate action,

Excerpt 53: Yes. That's the problem with small municipalities. I'll say there are one or two employees in a department who have to take care of basically everything. Not only buildings but also streets, canals, water bodies, rivers, streams, trees, forests, fields. (9)

I posited that frequency of interaction must be accompanied by either relational social capital (e.g. trust) or cognitive social capital (e.g. dominance of common knowledge, aims or interests).

In Bornstedt, strong and constant support for climate action in the council was not quite present. Still, two senior informants emphasised the usefulness of referring to the town's climate policy vision that the council had passed some years before:

Excerpt 54: 2014, I think, the council passed it and uh so we keep trying to go back to it from different angles and to commit the council to consider everything in it more, and uh it's getting better little by little but there's still a long way to go. (5)

Information from sustainability leads in Drebnitz and Terdorf suggest that strong backing from the council is not always necessary or is less important than strong support from the mayor (who presumably creates a dominant form of common knowledge by virtue or her or his authority). For example, Drebnitz had been actively engaging in climate mitigation for several years before the entirety of municipal government was finally convinced of CAPP importance. In Terdorf, an informant weighs in whose support is important,

Excerpt 55: It's extremely important that the administration and the council support the issue, well, first the mayor supported the issue, and our mayor has always made sustainability a big issue. It's not like that in every community. So our mayor backs the issue completely. So does council. (14)

The sustainability lead in Merschrath had worked in the municipal administration for 20 years and was proud of the strong support (almost) always present for CAPP in the government. He mentioned one recent period where town councilors became tired of hearing about climate protection and started to be more concerned with immediate cost savings than the longer-term issue of climate mitigation. The lead switched from his former language of climate protection as a necessary duty to use the frame of financial benefits for the community,

Excerpt 56: […] we'd been constantly winning awards and then at one point people said, we don't want to hear about it anymore. So I always brought up local value creation whenever I couldn't make headway anymore with environmental protection and climate change and so on, when people say, hey, I don't want to hear about it, then you have to bring up the money, then we're back to local value creation. When that works and you can explain to people, then things are back on track. (11)

This allowed for a return of a common interest in supporting climate mitigation (CSC).

What of the rival hypothesis?

R2: Governmental capacity, usually higher in larger municipalities, is more important than small population size for facilitating a high level of government-initiated climate action.

Table 12 combines table 11 with a slimmed down version of table 5 on governmental capacity to compare which is more important for facilitating a high level of government-initiated climate action.

Table 12. SSC and RSC or CSC vs governmental capacity for facilitating a high level of government climate action.

Municipality	**SSC and RSC or CSC**			**Governmental capacity**	
	Frequency of interaction	**Quality of interaction**		**Time availability**	**Resources from issue networks**
Arnstal	high	high		high	moderate
Drebnitz	high	high	**VS**	moderate	high
Bornstedt	low	moderate		low	moderate
Merschrath	moderate	high		moderate	low
Terdorf	high	high		moderate	high
Camberg	moderate	moderate		low	low

One can see in table 12 that, contrary to R2, governmental capacity is not higher in the largest cities than in Terdorf. The smallest of the smaller municipalities can use resources from issue networks to reach a similar level of governmental capacity as less small (here Arnstal and Drebnitz) municipalities.

Regardless of a potential relation to population size, which is more important for high level of government-initiated climate action, frequency and quality of internal government interaction or governmental capacity? Taking a second look at the diversity and intensity of climate mitigation and adaptation activities summarised in table 2 (copied below), it appears that frequency and quality of interaction explains total climate action slightly better than governmental capacity (the four municipalities with the highest level of climate action are those with high or moderate-high frequency and quality of interaction: Arnstal, Drebnitz, Merschrath and Terdorf). The difference is slight and will be discussed further in the next chapter.

Activity category	Communication and collaboration	Land use policies	Transportation	Energy (reduction, efficiency and renewable)	Waste (reduction, recycling and wastewater)	Ecosystem/ Landscape management	Adaptation	Implementation and monitoring	Total
Arnstal	3	0	3	1	1	2	2	3	**15**
Drebnitz	3	0	2	3	1	2	2	2	**15**
Bornstedt	2	3	2	2	1	1	0	2	13
Merschrath	2	2	3	3	1	2	2	2	**17**
Terdorf	3	2	2	3	0	3	0	3	**16**
Camberg	2	0	2	2	0	2	0	2	10
3 = comparatively high level of activity 2 = intermediate level of activity 1 = comparatively low level of activity 0 = absent									

5.2.3. Hypothesis 3: The smaller a municipality's population, the more frequent and higher quality the interactions between government employees and other local stakeholders are, leading to a high level of joint city-stakeholder climate action.

Table 13 summarises frequency and quality of interaction between government employees and other local stakeholders. The conclusions here are similar to above regarding H1. The frequency and quality of interaction are highest in the smallest municipality (Camberg) and are moderate in the second smallest city (Terdorf), but are also moderate in the two largest cities. Moreover, the medium-sized cities have lower levels of SC than the largest ones. The cases of the medium-sized cities will be addressed in the next chapter. Comparing only the largest cities with the smallest municipality, there is slight evidence that the first part of the hypothesis is supported.

Table 13. Frequency (SSC) and quality of interaction (RSC) between government and other local stakeholders in the six municipalities.

Municipality	**Frequency/ High level of interaction (SSC)**	**Higher quality of interaction/ Trust or good relationships (RSC)**
Arnstal	moderate	moderate
Drebnitz	moderate	moderate
Bornstedt	moderate	low
Merschrath	low	low
Terdorf	moderate	moderate
Camberg	high	high

Do more frequent and higher quality interactions lead to a high level of joint city-stakeholder climate action? I use combine the frequency and quality of interactions to create a relative ranking of city-stakeholder CAPP collaboration among the six municipalities (column 2 in table 14 below. It remains to be seen if there is evidence that regular contact (frequency) and good relationships (quality) are responsible for joint action.

Table 14. Level of city-stakeholder CAPP collaboration and level of environmental awareness in the six municipalities.

Municipality	Level of city-stakeholder CAPP collaboration	Level of environmental awareness
Arnstal	moderate	moderate • low due to low perceived personal risk, maybe growing
Drebnitz	moderate	moderate • "hard to say" (10) but big part of municipal communications
Bornstedt	low-moderate	moderate • growing general environmental awareness (not specific to climate change)

		• fewer positive opinions to wind power
Merschrath	low	high • high and growing among general population
Terdorf	moderate	high • high and growing among general population
Camberg	high	high • high and growing among general population and some stakeholders

It was seen above in section 5.2.1. that smaller cities benefit greatly from work with other local stakeholders. As seen above in the section on city-stakeholder cooperation and collaboration, there is a good relationship between the city and citizens in Camberg, which leads to many small projects. The ESD coordinator in Terdorf, herself first an active citizen before obtaining a contract with the local government, speaks of the good relationship among citizens and with the city,

Excerpt 57: *ESD in the community was started by me as a private individual, I found allies and supporters in the community relatively quickly […] I find it astonishing that there is so much going on in a small municipality. There are various working groups now – a working group is working on setting up a Repair Café, there's a working group called Green Terdorf where they take care of green spaces and check up on them. (14)*

Both this informant and informants in Camberg mention the importance of someone (usually from the government) generate momentum which is then carried on by citizens,

Excerpt 58: *If it's not encouraged anymore and no one advertises that kind of event or organises them, then of course it [citizen engagement] becomes a bit less (9)*

There is some evidence that the frequency and higher quality of interactions has a positive influence on climate action. A more nuanced look at interactions will be touched on in chapter 6.

What of the rival hypothesis?

R3: General awareness of the climate crisis/other environmental problems is more important than a small population for encouraging city-stakeholder collaboration.

Table 14 shows that awareness of climate change and/or other environmental problems is highest in the smallest municipalities. As it increases with decreasing population, it Is not possible to tell which of the two (awareness and population size) has more of an effect on joint climate action. Most importantly, neither general climate/environmental awareness nor population size have as great an effect on joint climate action as the frequency and quality of interactions between government employees and other local stakeholders. R3 is not supported and H3 is supported although the population size component will need to be re-examined.

5.3. Summary

I examined three components of interactions for government-led climate action: leadership, internal coordination and cooperation or collaboration with local stakeholders. I was interested how leading government players frame climate issues to motivate action, how government employees work together and how they interact with other local stakeholders. My assumption was that there are more and higher quality interactions in smaller municipalities and that these have a positive impact on local climate action.

In terms of leadership, the six municipalities could be grouped into those with a moderate level of climate-related citizen engagement (i.e. interactions in civil society) and those with only minimal citizen engagement. It made sense for the municipalities with some citizen engagement to favour the use of citizen-centred issue frames and for the remaining municipalities to focus on financial benefits such as energy and cost savings. The two smallest municipalities belonged to the first group with a focus on engaging citizens, but so did the largest municipality.

In terms of internal government coordination, there was a moderate-high level of frequency and quality of interaction within governments in the smallest municipalities and evidence that this contributed to local climate action. However, interactions were not greater in the smallest than in the largest municipalities but the other way around. The two largest cities (Arnstal and Drebnitz) had the most frequent and highest quality of interaction.

In terms of more and better interactions for a high level of joint city-stakeholder climate action, there was also evidence that frequent and higher quality interaction contributes to more city-stakeholder climate action. The smallest cities (Terdorf and Camberg) had moderate and high levels of city-stakeholder interactions. However, the two largest cities also had moderate interaction levels.

6. Discussion

This chapter first provides presents possible sources of bias and how I addressed them. These are organised according to limits of the materials (section 6.1.), limits of the methods (section 6.2.), and limits of the hypotheses (section 6.3.). I then look at the extent to which the results answer the research questions. As I discuss the importance of the results in this context, references to the extant literature (section 6.4.) point to remaining ideas for further research (section 6.5.). The chapter closes with implications for policy (section 6.6).

6.1. Limits of the materials

A limit to the materials pertains primarily to the section on leadership. I was interested in the origins of CAPP and frames used, both currently and in the past. Some of the informants referred to periods of time before they were employed in government whereas others referred to their own experiences, some of which were quite long ago. This means that some statements may reflect their current memory of e.g. issue frames used rather than actual past occurrences. I attempted to keep this to a minimum by asking informants mostly about their own experiences and asking most questions to at least two informants per case.

A second limit to the materials is the lack of direct link to climate mitigation or adaptation of much of the evidence. I purposefully decided to also collect data on activities indirectly related to climate protection in order to increase the amount of overall data on local governing that potentially relates to climate action. This choice may seem confusing to readers who are searching for direct climate action only but in my view is reasonable, especially as it reflects the common local governmental strategy of linking climate action to other issues.

6.2. Limits of the method

A limit of the method is the selection of the six municipalities. I was interested in the possible effect of a small population size on the frequency and quality of interactions for local climate action. Including large cities (e.g. over 500 000 inhabitants) might have allowed me to draw conclusions about smaller municipalities. Given cases I ultimately selected, I am not able to say if the characteristics of smaller municipalities differ from those in large municipalities. I chose to study interactions in cities under 30 000 as I was unsure of any differences in interactions between larger and smaller cities and hoped to find more interaction at least in the smallest of the six municipalities. There are advantages and disadvantages to both case selection options – my case selection allowed me to concentrate fully on interactions in smaller municipalities.

Another limit results from my belief in the importance of citizen engagement, which could have blinded me or focused my attention on certain pieces of information only. I used methods from Silverman (2017) to reduce the potential effects of this bias. These were comprehensive data treatment (using all relevant informant statements to arrive at

conclusions) and deviant case analysis (ensuring that statements seeming to be contradictory at first glance prompt a re-analysis of all relevant statements to improve the analytical conclusions).

6.3. Limits of the hypotheses

A limit to assessing the validity of H2 is the incomplete nature of R2. The rival hypothesis stated that *Governmental capacity is more important than small population size for facilitating a high level of government-initiated climate action.* Only two aspects were used to rank the relative governmental capacity in the six municipalities. Some municipalities may have had a greater governmental capacity than determined via the analysis R2. This was likely this case with Merschrath, which disposed of more resources due its many connections with non-local partners. This will be touched on in section 6.5.

A limit of H3 is the difficulty of estimating its components (frequency and quality of interactions between the government and other local stakeholders). Estimation is difficult as many interactions take place on an ad-hoc basis and calculating an average frequency was not feasible. Finally, the municipalities employed many different strategies to establish trust with stakeholders. In some cases, it was quite clear that trust had been created but in many situations, this was not certain. Therefore, the rankings of these municipalities in these two aspects might be inaccurate. I attempted to use related information such as statements about the general level of climate or environmental activism to improve these estimates.

6.4. Linking results back to the literature

To what extent do the results shed light on the contribution of leaders' issue framing, interactions within government and with other local stakeholders on the governing of municipal climate action? I first look at how conclusions about the three components of governing climate action relate to the literature. This section concludes with a return to the DISCUS model of governing local sustainability by Evans et al. (2006).

The investigation of issue frames used by climate leaders added support to the finding in the literature that linking climate action with financial benefits is a sensible strategy (März et al., 2013; Pitt & Bassett, 2013), especially for smaller municipalities without the support of engaged citizens. Other often used issue frames were the visibility, relevance and accessibility of CAPP. These make sense either in municipalities with limited capacity, as in Camberg with an administration of 20, or in smaller municipalities where there is some citizen engagement. For example, Drebnitz and Arnstal were the largest of the six municipalities and had several individuals regularly involved in CAPP, as opposed to Camberg where there were only two to three individuals regularly involved. Both Arnstal and Drebnitz had active public outreach, but informants in Arnstal emphasised the importance of CAPP being visible, relevant and

accessible. In cities with good growth potential of citizen engagement, finding creative ways for climate protection to speak to a broad range of individuals is a good strategy.

My examination of social capital within smaller municipal governments found that frequency and quality of interaction certainly contribute to local climate action, but so does governmental capacity. There is no clear difference in the importance of these two enabling factors. I had also expected that the more common social interactions ascribed to smaller municipalities (Boehnke et al., 2019; Paterson et al., 2017) to be confirmed in the cases. On the one hand, of the smallest municipalities, only Terdorf had a moderate-high frequency of interaction and a moderate quality of interaction (Camberg had low-moderate and moderate levels of these). The largest municipalities had moderate-high and high levels of these aspects. On the other hand, Terdorf, Arnstal and Drebnitz all also had the highest governmental capacity of the six municipalities.

Regarding social capital, Camberg did (along with Arnstal) have high level of smaller meetings at regular intervals. This is a confirmation of more social interaction in smaller municipalities. However, it is clear that there is an interplay between governmental capacity and governmental social capital. For example, an informant in Camberg mentions receive greenhouse gas inventory software through external funding but not repeating the inventory in subsequent years due to lack of personnel. Thus, while smaller municipalities theoretically have access to the same resources to increase their governmental capacity, the lack of personnel or time availability of employees prevents them from fully exploiting such resources. Just as with using GHG inventory software, if an employee has few hours to devote to CAPP, she or he will also be less able to build up social capital with actors in this area.

This finding is similar to others on smaller municipalities, e.g. that they might be less able to afford studies on their specific circumstances (Campos et al., 2017)or rely more on external partners due to low numbers of employees (Orderud & Winsvold, 2012), but emphasises the particular effect of the vicious cycle of sparse resources on something that should be an asset in smaller cities, their higher social cohesion. (Boehnke et al., 2019)

As with the leadership findings on the preference for citizen-centred issue frames in municipalities with some citizen engagement, interactions between government employees and other local stakeholders enhance existing citizen motivation or engagement. More frequent and higher quality interactions contribute to more joint city-stakeholder climate action and this was seen especially clearly in the smallest municipality. Again, Terdorf, Arnstal and Drebnitz had similar levels (moderate levels of frequency and quality of interaction between government and other local stakeholders). There is some evidence that such interactions are higher the smaller the municipality.

This is good news for those enquiring about the role of citizens in climate action and how they can be empowered (Hoppe et al., 2016). The example of Camberg shows that partnering with

a local association (in their Camberg Protects the Climate everyday climate protection programme) can allow for small-scale citizen-initiated and run projects that nevertheless have a large impact accessible projects that enable social learning and learning by doing.

Overall, how do government and governance connect to form the governing of local climate action in smaller municipalities? Through my investigation I found that:

- There is some degree of social capital within local governments, but that this should be leveraged by *de facto* or actual full-time employees dedicated to climate action.
- Where employees are able to *de facto* regularly dedicate substantial time and effort on climate action, a regularly high level of activity is possible.
- Actually having full-time personnel (as in Arnstal and Terdorf) works towards institutionalisation of climate protection and helps governments overcome a shortcoming typical of local climate action: low levels of implementation and/or monitoring (Boehnke et al., 2019).
- The common frame of co-benefits works well to motivate climate action.
- Where there is potential for citizens to become more engaged, putting energy into framing CAPP as visible, relevant and/or accessible makes sense.
- Smaller municipalities do often have higher levels of social capital and this can be exploited to empower local stakeholders via citizen-initiated and citizen-run projects.

These findings show what is possible in smaller municipalities that have managed leverage their social capital to achieve a high level of climate action. These are in four boxes in the bottom of figure 4. Caveats to these findings are outlined in the next section.

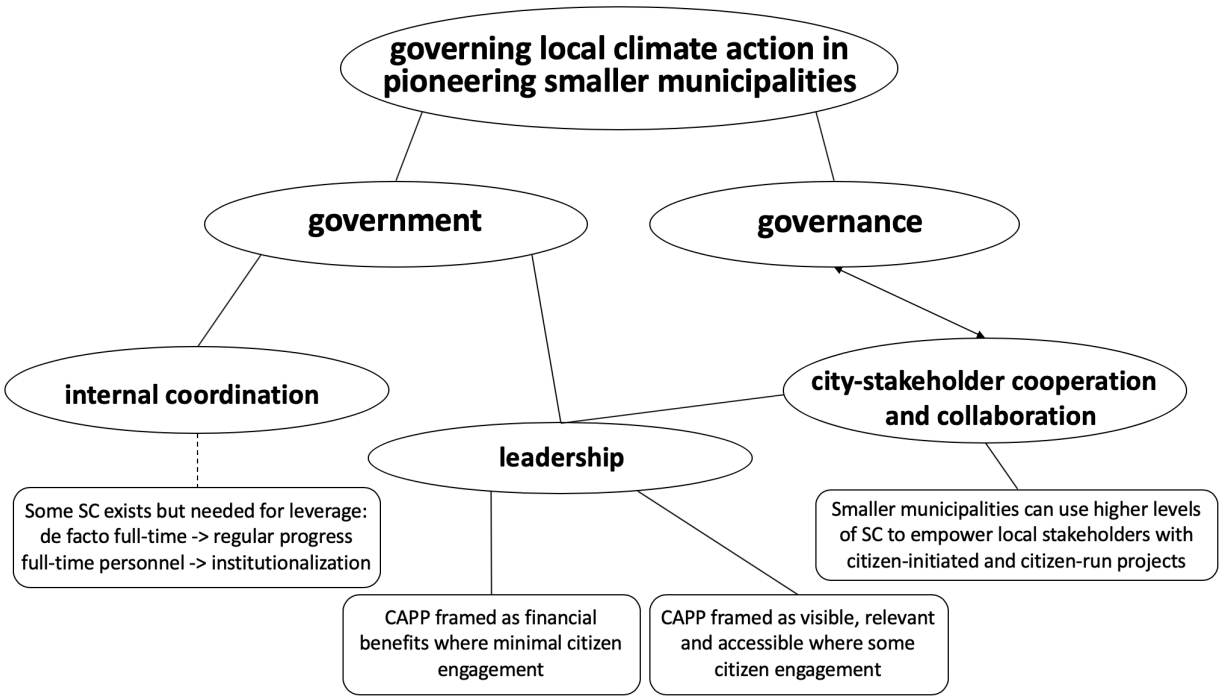

Figure 4. Social capital-related elements of governing climate action in pioneering smaller municipalities. Author's figure. SC = social capital

6.5. Implications for research

The medium-sized municipalities, Bornstedt and Merschrath, have been somewhat neglected in the past several sections. Why have they been lower in social capital regarding civil society (in Merschrath) and in government as well as concerning interactions with civil society? Why is there less citizen engagement here (this applies to Drebnitz as well)?

Factors I initially thought might be important and did not return to (until now) are population density, demographic type and demographic growth projections and centrality/nearness to an urban centre. These characteristics can group several of the municipalities that at terms represented "deviant cases". I address each of these below.

Low population density puts municipalities at a relative disadvantage, as factors that can decrease GHG emissions such as transportation or district heating are less efficient. (März et al., 2013) In terms of social interactions, municipalities with low densities may also suffer from fragmentation – for example, Merschrath consists of 19 villages. Bornstedt also had a lower population density and it might seem less fragmented than Merschrath as it is a collective municipality covering four municipalities, each of these itself encompasses several villages. As was the case with Merschrath and Bornstedt, focusing on financial benefits frames for CAPP such as producing renewable energy or reducing sprawl by commercially revitalising abandoned land might be the best chances for climate action in low population, low density municipalities. Understanding more nuances about the various frames relating to financial benefits (new revenue sources, costs savings, cost neutrality, etc.) could help identify which CAPP strategies are best suited to municipalities with both low population size and density.

Drebnitz, Bornstedt, Merschrath and Camberg were all predicted to shrink in population over the next five years (by between 3 and 8% (Bertelsmann Stiftung, 2020)). Additionally, Bornstedt and Merschrath were far from the next upper administrative centre (central city) and while Drebnitz itself is an intermediate administrative centre according to the German Central Locations Principle, both Cölbe and Drebnitz sit in the shadow of neighbouring cities ten times their size. Merschrath has been able to attract international interest as well as buttress its economy through partnerships with local and regional actors in its energy park. Research into other possible synergies between climate action and fighting against regional importance as a shrinking municipality could reveal useful insights.

6.6. Implications for policy

Two important barriers to more local coordination and collaboration on CAPP mentioned above are limited fiscal resources and personnel as well as low engagement of non-government local stakeholders. Smaller municipalities have been creative and active in constructing their own opportunities, entering into partnerships with local firms or non-profit organizations, as well as taking advantage of external funding from higher levels of government. However, only two of the six municipalities had full-time dedicated sustainability

leads at the time of writing – informants from these municipalities emphasised the importance of institutionalising local sustainability.

Arnstal – one of the largest municipalities and yet emphasising both financial benefits and citizen-centred issue frames – could be a case of more time availability (enabled through the CPM position) allowing a multi-pronged approach to climate action. The same applies to Terdorf with its full-time sustainability lead also the main contact for climate protection. In fact, both of these municipalities were the strongest of the six in terms of implementation and monitoring (see table 2 in section 4.3). This suggests that smaller municipalities should prioritise gaining and maintaining full-time positions for climate protection.

Two other municipalities had had dedicated energy efficiency or climate protection managers in the past and these informants stressed the need for consistent funding available to all municipalities. Despite informants in Camberg and Merschrath having low or mixed perspectives on the utility of networking, the experiences and rewards of exchange with others in the four remaining municipalities suggest that networking is a task with unreliable outcomes but should nonetheless be prioritised as well.

6.7. Summary

Potential sources of bias in the results were due to limits to the materials, methods and hypotheses. Limits to the materials are related to questions asked of informants about events in the further past. I attempted to maintain reliability of the data by asking multiple informants per case. A second limit results from my broad interest that including issues only indirectly related to climate protection – I nonetheless chose this approach to remain open to unexpected links to local climate action. Limits to the methods consist of the case selection, which allowed me to compare differences within a subset of pioneering small municipalities but excluded a comparison with large cities, and a possible person bias towards citizen engagement, which I attempted to counter with comprehensive data treatment and deviant case analysis.

Limits to the hypotheses resulted from incomplete or difficult operationalisation. The limited number of aspects used to operationalise R2 may have disadvantaged Merschrath, which engaged in high level of interaction but with regional partners not considered in my analysis. H3 contained frequency and quality of interactions between local governments and other stakeholders, which are difficult to estimate. The comparison with a rival explanation that considered the municipalities' general levels of climate or environment-related citizen engagement supported the estimates.

Going back to my modified DISCUS model for governing local climate action, I summarised the possibilities for small municipalities as illustrated by the six pioneering cases. Social capital within the government does exist to a moderate or high extent in local governments but must

be leveraged by full-time or *de facto* full-time employees for a consistently high level of climate action to result. Limited governmental capacity often compels smaller municipalities to choose a single set of issue frames with which to motivate climate action. Financial benefits frames are most suitable where climate-related citizen engagement is minimal, whereas when this is higher, framing CAPP as visible, relevant and accessible is more promising. Finally, there is evidence to support a higher level of social capital also between government employees and other local stakeholders in smaller municipalities. When this is the case, citizen-initiated and citizen-run projects can be facilitated to empower more bottom up climate action.

Many aspects I originally intended to investigate were ultimately set aside. Other characteristics of smaller municipalities such as population density, population growth projections and centrality (or lack thereof) could be the focus of research investigating synergies between demographic pressures and local climate action. One example is a more nuanced look at some of the multitude of financial benefits frames used.

Implications for policy derive from the interplay between internal government coordination and governmental capacity. Arnstal is not one of the smallest cities and so not as expected to have high social capital. Terdorf is the second smallest city and so might be expected to be under more financial strain. However, both of these municipalities had high levels of social capital. This is likely due to the full-time or nearly full-time employees responsible for climate protection. These cases and other municipalities that benefitted in different ways from resource networks identify to priorities for smaller local governments: engaging in networking and hiring and maintain a full-time employee for climate protection.

7. Conclusion

This thesis looked at the governing of local climate action in smaller German municipalities of under 30 000 inhabitants. It asked how interactions between leaders, within members of municipal governments and between government employees and other local stakeholders were different in smaller municipalities of varying size. Here I assumed that interactions were more frequent or of higher quality in municipalities with smaller population sizes and that this was beneficial for climate action.

In order to search for and confirm these and any other population size-related differences among small municipalities, I performed a multiple-case case study on smaller towns and cities that were pioneers in local climate action. I reviewed secondary documentation and interviewed key informants from two municipalities of over 25 000, from two with roughly 10 000 inhabitants and two with roughly 8000 inhabitants.

The research focus was refined to three questions centring on leadership, internal government coordination and government-stakeholder cooperation and collaboration. The first looked for recurrent use of issue frames to motivate climate action. This led to two groupings of municipalities: 1) some used primarily external motivations linked to financial benefits where there was minimal citizen engagement and 2) citizen-centred frames where there were some already active civil society members.

There was a marked difference between the largest cities of around 30 000, which had enough personnel to work regularly on CAPP, and the rest. While social capital certainly exists within smaller governments, this must be supplemented by governmental capacity, particularly personnel. One of the ways to attain this is a consistently high level of networking.

The last question asked how cities worked with other local stakeholders to initiate, maintain or further develop climate action. As above, I expected the quality of interactions to be higher in municipalities with smaller populations, and for this to be beneficial to climate action. This was to some extent confirmed, though the level of citizen engagement on climate issues seemed more important than nuances in the population size of towns and smaller cities.

Specifically, collaborating with the wider town society (e.g. the private sector, local associations and informal groups) is crucial for the achievement of municipal climate goals such as energy autonomy or carbon neutrality. This is often the beyond the scope of smaller municipalities with limited governmental capacity. Therefore, where motivated individuals garner support from key government decision makers, smaller towns and cities pursue climate mitigation and adaptation within municipal properties, linking climate protection with much needed energy and cost savings. However, where a moderate level of citizen activism and broad support for CAPP exist, smaller municipalities (whether their populations are under 10 000 or close to 30 000) can leverage residents' passion to engage in more joint government and citizen-initiated or citizen-run climate protection projects.

Many questions remain as to motivations, frames and approaches to local climate action in smaller municipalities with personnel and fiscal constraints. When and how is a mere cost neutrality sufficient, and when must one speak of energy savings, or explicitly of cost savings? Do municipalities need to be lucky to happen across motivated government employees or citizens, or can a steady flow of visible and subjectively relevant climate-related actions trigger a virtuous cycle of city-citizen co-production? Good relationships characterise interactions within government and in broader small town society – but smaller cities and towns must persist in finding resources and time to fully benefit from this basis for climate protection.

8. References

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9. Appendix

Appendix 1. Interview questions for the scoping interview round.

Characteristic/Topic	**Interview question**
government structure	1. Which departments and interest groups are involved when developing and implementing CAP? Are there specific individuals who are (especially) active in favour or opposition of CAP? 1.1. What mechanisms are used to develop and/or implement CAP e.g. who meets to work on CAP and how often?
leadership	2. Which departments and interest groups are involved when developing and implementing CAP? Are there specific individuals who are (especially) active in favour or opposition of CAP?
leadership, citizen activism	3. Do you have campaigns or programmes to encourage department, employee and/or citizen involvement? If so, what language/motivation do you use? 3.1. Were some campaigns/programmes obviously more successful than others? If so, why were they more successful (who, when, where, how)? Which framings do/have you used and how successful were they?
multi-level governance	4. How [and how often] do you communicate with external actors (external to government e.g. consultants, academics and external to city e.g. other levels of government, other cities)? 4.1. Are you part of issue networks?
general	5. In your view, which were the necessary factors for CAP development (and implementation)? 5.1 Why do you think your city has a better CAP than the average small municipality?
capacity, perception of local climate risk	6. Are there any local characteristics you haven't mentioned yet that you think had an influence on your successful climate protection measures?
general	7. What are current challenges and knowledge gaps regarding CAP in small municipalities?

Appendix 2. Example interview protocol for second interview round.

1. Leadership
   - 1.1. What led to the first big city-led sustainability project?
     - 1.1.1. Who were the leading people involved in the project launch?
     - 1.1.2. How did these people come together?
     - 1.1.3. What arguments were used often to motivate the launch and continuation of the project?
   - 1.2. What arguments do you now frequently use to motivate climate action?

2. Government structure and coordination
   - 2.1. Who works with you regularly on climate protection?
     - 2.1.1. What is the name of the climate advisory board? Who sits on it?
     - 2.1.2. Are there other groups that meet regularly to discuss climate protection or other sustainability issues? Who is in these groups?
   - 2.2. How often do these involved people meet?
     - 2.2.1. How often do you work with other colleagues (those with whom you work intermittently)?
     - 2.2.2. What percent of decisions can you take alone?
     - 2.2.3. What percent of decisions do you take together/On what percent of decisions do you consult with a small group (up to eight people) and with a larger group?

3. Cooperation and collaboration with citizens
   - 3.1. You mentioned that volunteers from a local association sometimes help out when the city works department is too busy. What are other ways in which volunteer initiatives support city programmes?
   - 3.2. How was citizen reaction to the information event you held last month?
   - 3.3. Which other participatory processes or awareness raising campaigns are you planning?
     - 3.3.1. Would you repeat a public outreach event like the one last month?

Appendix 3. Supporting interview excerpts for the level of climate-related citizen engagement.

Municipality	Level of climate-related citizen engagement	Supporting excerpt
Arnstal	• low • low to moderate level of sustainability-related engagement (2, Excerpt i)	*Excerpt i*: How has the climate change awareness of the citizenry changed throughout the years? You've learned a lot in the administration [since the beginning of CAP development] and in civil society since 2012. Can you say that there are changes? *Too few. Too few. Definitely too few… As I said already, it's not making it to the mainstream. When we see pictures on tv, ice is melting, in the future Indonesia or I don't know, islands in the South Pacific get flooded, that's far away. Far away from us. And what is to expected as dangers in the future, it's not tangible or noticeable enough for people. (3)*
Drebnitz	• only as an exception (15, Excerpt ii)	*Excerpt ii:* There's the Landscape Conservation Association – are there other associations or groups in the city, from civil society, with whom you are in contact? *On the topic of – (15)* As cooperation partners, for events, or festivals… *No, not really. (15)* *On that specific topic, climate protection, or climate adaptation, climate mitigation, the Landscape Conservation Association advises us and otherwise we now and then [may work with others], if we need someone. Otherwise all the big players are here on this list [points to list of members of Sustainability Advisory Board] (10)*
Bornstedt	• a couple of examples from the educational sector (4, 5, Excerpt iii) • low level of climate and sustainability-related	*Excerpt iii:* *But the school on the whole is very active in climate mitigation, they've been distinguished multiple times as an – (5)* *Environmental school (4)* *Distinguished as an environmental school, they've really done a lot (5)*

	engagement (4, Excerpt iv)	*Excerpt iv:* Since you're the leader of the BOEC [outdoor education centre], do you hear more about who the active people and groups are? *Well for groups active in climate protection we have just had a founding of Extinction Rebellion…* …on Saturday…? *Yes exactly, on Saturday, a volunteer who's with us at the BOEC for a Voluntary Ecological Year is doing that as her major topic and is going to do that for the year. So she's trying to push that, and otherwise we have the usual suspects, not for climate protection but generally for nature and environmental protection, the NABU (Nature And Biodiversity Conservation Union). Although they aren't especially active here. It's a small local group and the problem is that people here think that we're in a rural area, we're in an area with a lot of agriculture, forest, nature, we don't need something like that. It's been difficult. (4)*
Merschrath	• low (12, Excerpt v)	*Excerpt v:* Are there groups or especially active citizens who have suggested having a citizens' dialogue, is there sometimes initiative that comes from civil society? *No.* No. Ok. Very clear answer. *Yes, you're welcome. Yes, sometimes there are open question hours for citizens. We have them at every council meeting and there's not always a resident who asks a question. There are sessions where there's not even a single citizen there. (12)*
Terdorf	• moderate, could be higher (14, Excerpt 57)	*On page 66.*
Camberg	• moderate level (8, 9, Excerpt vii)	*Excerpt:* *Public participation is more or less average, I'd say. It could be more but it could also be less, we'll have to see how it develops. (8)* *[…]* And how often does it occur, that something comes from citizens, maybe it's not practical but that there are any ideas at all? *How often there are ideas from citizens? (9)*

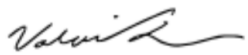
		Regularly. (8) *You'd have to ask the mayor. I'd guess at least 50 to 100 citizens a year have ideas, for sure, also in regards to climate protection. (9)* Every year? *Sure. Yeah, it's a lot. But what turns out to be an interesting project for the town, maybe there are one or two of those per year. (9)*

Declaration of Authorship

I hereby declare that this thesis is the result of my own work and that I have indicated all sources, including online sources, which have been cited without changes or in modified form, especially sources of texts, graphics, tables and pictures.

I confirm that I have not submitted this thesis for any other examination. I am aware that in case of any breach of these rules, procedures concerning plagiarism or attempted plagiarism will be taken in accordance with the subject-specific examination regulations and/or the *Allgemeine Satzung zur Regelung von Zulassung, Studium und Prüfung der Humboldt-Universität zu Berlin* (ZSP-HU).

Berlin, 10 July, 2020



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