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SONNET – SOCIAL INNOVATION IN ENERGY TRANSITIONS

Co-creating a rich understanding of the diversity, processes, contributions, success and future potentials of social innovation in the energy sector

D2.2 (D6): Towards a toolkit for harnessing policy networks for encouraging SIE in Europe

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11	City of Grenoble	GREN	FR	
12	City of Warsaw	WARS	PL	
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Executive Summary

SONNET (Social Innovation in Energy Transitions) aims to co-create a rich understanding of the diversity, processes, contributions, successes and future potentials of social innovation in the energy sector (SIE). This deliverable addresses SONNET's objective 2, namely, to identify and analyse socio-political enabling and impeding factors for SIE processes, as well as SONNET's objective 5 – the design of socio-political strategies for encouraging SIE. It provides the conceptual framework and the methodological approach for policy networks as well as the qualitative and quantitative analysis of policy networks in six SONNET cities.

In SONNET's task T2.2 we aim to identify for each of our six SONNET cities the policy network in which SIE-initiatives are embedded. A policy network analysis is conducted with a particular focus on the relations between key actors at the local, regional, national and EU level (e.g. policy-makers, city administrations, energy utilities, businesses and network organisations), and to identify enabling and impeding structures for SIE-initiatives.

This deliverable includes the following topics:

Research questions and concepts:

A brief summary of the key research questions, objectives and concepts relevant for WP2 and T2.2 in particular, and its relations to tasks T2.3 and T2.4.

Methodology:

An outline of SONNET's T2.2 policy network approach.

Reporting on the interviews:

A summary of the key findings from the qualitative interviews conducted in each SONNET city and their comparative analysis.

Comparative analysis of policy networks for encouraging SIE:

The key findings derived from quantitative network analysis as well as the visualizations of policy network structures in the SONNET cities.

Toolkit for harnessing policy networks for encouraging SIE

A checklist that provides an overview of key enabling factors for encouraging SIE. This checklist addresses (local) policy makers and may serve as a practical toolkit.

The Annex includes supplementary material such as the online questionnaire, the topic guide for the interviews conducted by each WP2 country team and detailed networks for each SONNET city.

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Introduction

SONNET aims to co-create a rich inter- and transdisciplinary understanding of the diversity, processes (including enabling and impeding factors) and contributions of SIE (social innovation in the energy sector). Task 2.2 works towards fulfilling SONNET's objective 2, namely, to identify and analyse socio-political conditions that are enabling and impeding SIE processes, as well as SONNET's objective 5, the design of socio-political strategies for encouraging SIE. To meet these objectives, this report addresses the following research question: How are SIEs enabled or impeded through policy network structures and how can enabling structures be realised?

Section 2 provides a brief summary of the key research questions and objectives addressed within T2.2 and its relations to T2.3 and T2.4. It outlines the conceptual framing related to policy networks and power and defines the unit of analysis to be studied in T2.2 in relation to other tasks and WPs.

Section 3 outlines and reflects on SONNET's T2.2 policy network approach and methodology. It describes how quantitative and qualitative data are integrated in a mixed method approach to analyse network structures as well as motives, backgrounds and circumstances of interactions.

Section 4 presents key findings from the qualitative interviews conducted in each SONNET city. It presents the most important SIE in each city and characteristics of policy networks that are identified by interviewees as rather enabling or impeding the development of SIEs. Key factors are finally summarised and their influence on SIE are discussed.

Section 5 provides a quantitative as well as visual analysis of SIE policy networks in the six SONNET cities and their comparison in terms of actors included, their interactions and relations. This section also includes a visualisation of network structures and their comparison.

Finally, section 6 presents a checklist, which may serve as a practical toolkit for (local) policy makers to encourage SIE. It summarizes influential factors that can be shaped in order to support the development of SIE.

The Annex includes the online questionnaire, the interview guide for the interviews and supplementary material, which was used in the sampling process.

1. Research Questions and Concepts

1.1. SONNET WP2 Overview

Socio-political issues play an important role in SONNET's research and its underlying research objectives. WP2 focuses on analysing four key areas: governance arrangements, policy networks, as well as power and policy dynamics. The table below gives an overview of the key concepts to be studied within WP2. For a detailed description of the underlying concepts see SONNET Deliverable D1.2 Report on SONNET's initial conceptual framework (Wittmayer et al. 2020).

Table 1: Overview of key socio-political concepts in SONNET

Concept	Definition	Examples
Governance for SIE	Governance for SIE is understood as a complex process through which a plurality of public, non-public and private actors interact in order to formulate, promote and realize social innovation in the energy sector (SIE).	- City labs - Participatory budgeting - Task committees in which politicians, citizens and local stakeholders work together to reframe the problems at hand and find new and bold solutions
(SIE) policy networks	A *policy network* is understood as a non-hierarchical set of different types of actors, who are connected by interdependent and relatively stable relations (either cooperative or conflicting) and who (could potentially) directly or indirectly shape policy outcomes in a certain policy field. To analyse the *policy networks in which SIE develop in cities,* we study the broader set of actors who (could potentially) shape enabling or impeding conditions for SIEs within a specific city and its surroundings	- Example for national policy network: German energy transition network, which includes national policy makers, administrative organisation as well as interest groups, major energy provider and companies and researchers. - Policy networks of relevance for SIE consists of initiatives, local policy makers and administrative actors, local companies, (local) energy providers, further civil society organisations (those supporting transitions as well as those mobilising against e.g. wind parks) and might also include higher level actors, when actively engaged in local process.
Power (relations) related to SIE	*Power* is broadly understood as the relational and structural (in)capacity of actors to mobilise resources and institutions to achieve a goal. SIEs can refer to the resources being mobilised and/or the goals being aspired. *Power relations in SIE* refer to (a) actors having different kinds/levels of power to mobilise SIE-related resources and/or to achieve SIE-related goals (incl.	- Extractive and exploitative hegemony of decentralised fossil fuel industry - Collective power of international energy cooperative associations to adapt institutional frameworks and mobilise resources for decentralised energy - Decentralisation of resources through community energy

Concept	Definition	Examples
	(in)equality and in/exclusion) and/or (b) actors having power over others in SIE-related processes (including dependency , oppression & exploitation), and (c) actors having power with other actors to achieve collective (SIE-related) goals.	- Selective inclusion of people in community energy movement > exclusion of certain people - Energy poverty
Policy mixes of relevance for SIE	Policy mixes of relevance for SIE encompass policy strategies and instrument mixes at different governance levels and policy fields which enable or impede the development of SIE, and have developed incrementally over many years through policy processes.	- Regarding policy strategies and instruments see "policies" (below) - Regarding incremental development through policy processes see "policy making processes"
Policies of relevance for SIE	Policies of relevance for SIE encompass policy strategies (e.g. climate targets) and instruments (e.g. subsidies, regulations) at different governance levels (e.g. urban, regional, national, European) and policy fields (e.g. energy policy, innovation policy, social policy) - which may enable or impede the development of SIE.	- Example for policy strategy: UK community energy strategy - Example of enabling instruments: German renewable energy resources law with its feed-in tariffs, priority access, etc. - Example of impeding instruments: fossil fuel subsidies, ban on peer-to-peer trading
Policy making processes	Captures SIE consideration/ involvement (or lack thereof) in policy processes of relevance for SIE at different governance levels and policy fields regarding the full policy cycle of policies enabling or impeding SIE (i.e. problem identification, agenda setting, policy formulation, legitimization and adoption, implementation, evaluation / assessment, policy adaptation, succession and termination).	- Public consultation for new policy instrument of relevance for SIE - Working group on SIE field, in which SIE-actors may be represented or not - Passage in law that explicitly relates to SIE-actors (e.g. presuming in EU policy documents) - Recognition of bottlenecks in SIE field development being mentioned in presentation by politician, in workshop announcement, in media, etc.

Source: Wittmayer et al. 2020: Deliverable D1.2: Report on SONNET's initial conceptual framework.

1.2. Overall Research Questions

SONNET's focus on socio-political issues is explicitly addressed in its research objectives O2, which aims to identify enabling and impeding conditions for SIE processes and in O5, which aims to encourage successful SIEs through co-creating socio-political strategies to enhance governance arrangements and policy networks as well as SIE-related power and policy dynamics.

Box 1: SONNET objectives O2 and O5

Objective 2: Identify and analyse enabling and impeding conditions for SIE processes, with a focus on socio-economic, socio-cultural (incl. gender) and socio-political issues and their interrelations with socio-technical aspects.

Objective 5: Encourage successful SIE through co-creating socio-political strategies to enhance governance arrangements and policy networks as well as SIE-related power and policy dynamics.

Box 2: WP2 description

WP2 "Socio-political issues" - The aim of this work package is a comprehensive analysis of the socio-political issues through the three complementary lenses of governance arrangements, policy networks and power dynamics of relevance for SIE. It sheds specific light on influential but often neglected aspects of innovation in governance arrangements, conflict and coordination in policy networks and power dynamics associated with SIE. It contributes towards SONNET Objective 2, foregrounding the socio-political enabling and impeding factors as well as SONNET Objective 5 the design of socio-political strategies for encouraging SIE.

In particular, Task 2.2 aims to identify the policy network in which SIE develops for each of our six SONNET cities. A policy network analysis is conducted to analyse the relations between key actors at the local and regional level as well as their relations to higher-level actors (e.g. policy-makers, city administration actors, initiatives, energy utilities, businesses and network organisations) and to identify enabling and impeding network structures for SIE in cities.

We start with the assumption that policy networks can facilitate and have a major influence on the development of SIE. Therefore, we study which factors influence policy network structures and their emergence, and how these factors in turn enable or impede SIEs in the SONNET cities (particularly mediated through policy network structures).

This task conducts a minimum of 10 structured interviews per city with city officials, policy makers and intermediary organisations (i.e. organisations that support and advocate SIE), SIE-initiatives, energy companies and networks of SIE in the six SONNET cities. These interviews are combined with an online survey that aims to analyse and compare quantitative network structures. In order to minimise time and effort of relevant actors, these interviews also collect data for T2.3 and T2.4.

The analysis provides insights into the policy networks, which surround SIEs in the city, and identifies collaborative and conflictual relations around SIE. In collaboration with the SONNET cities a frame for a toolkit in form of a checklist is developed, which shall help policy makers, SIE-initiatives and other key actors to harness policy network structures in order to facilitate SIE.

Box 3: Main research question in Task 2.2

How are SIEs enabled or impeded through policy network structures and how can enabling structures be realised?

1.3. Basic Concepts, Definitions and Units of Analysis

The focus of our study in T2.2 lies in understanding the policy networks surrounding SIE in our SONNET cities (including the (rural) surrounding where applicable). This includes SIE-actors as well as other actors, who either directly interact with the SIE-actors or shape the conditions for SIE. This policy network can - and is likely to - span across multiple SIE clusters identified within WP1 (i.e. we want to learn more about how the actors interact at the city level, independently of the SIE cluster in which they are involved). In WP1, 18 different SIE clusters were identified empirically, the overview is given in Figure 1.

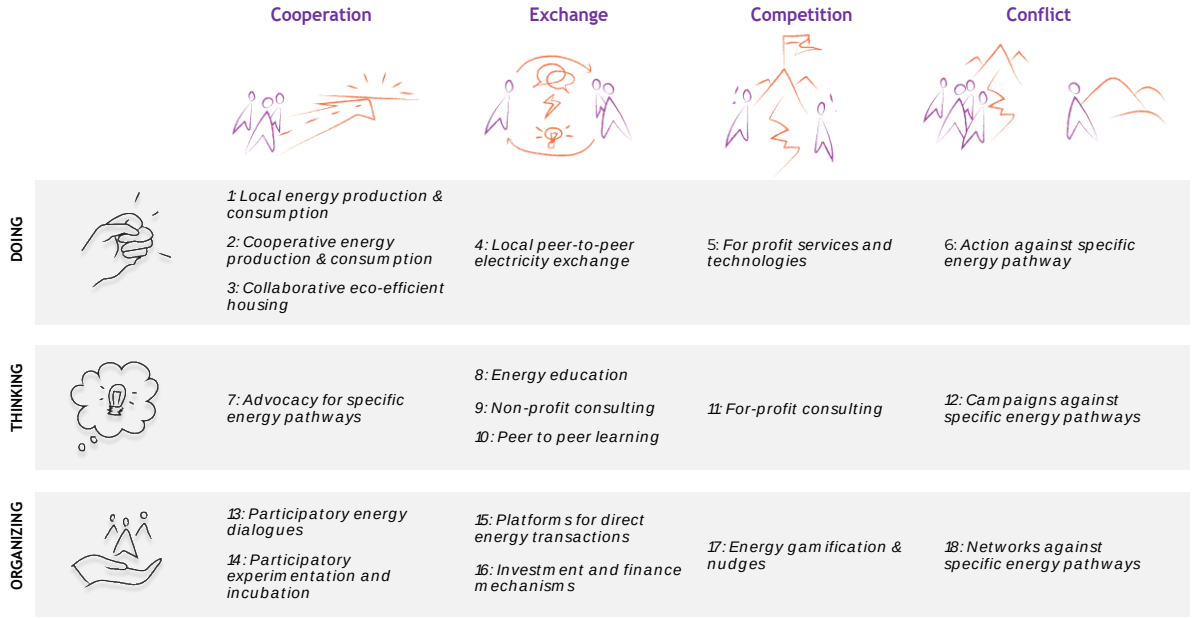

Figure 1: Overview of empirical clusters of SIE

Source: SONNET D1.2

In WP3 the following six SIE-fields were identified for further analysis in the country cases (see Table 2 in Deliverable D3.1):

1. Cooperative organisation models for renewable energy
2. Local electricity exchange
3. Framings against fossil fuel energy pathways
4. Participatory incubation and experimentation
5. Financing and subsidies for renewable energy (solar and wind)
6. City level competitions for sustainable energy

As stated in the main research question of task 2.2, with the research in this task we want to find out more about the network structures that surround SIE in the cities. We want to learn more about which network structures are enabling or impeding SIE, e.g. by providing key actors with the necessary preconditions to exercise different forms of power (see below in Table 2). Furthermore, we want to unveil how enabling network structures evolve (e.g. through self-organization, through city organization or through other forms of organization) to understand how these enabling structures can actively be shaped by different actors. The checklist that summarizes the findings provides information for SIE-actors of how they can become active in shaping enabling network structures either for themselves (if they are actively involved in SIE) or for key actors with which they are connected (e.g. from the perspective of the city administration or networking organisations).

Policy network analysis lends itself to study actor constellations and relations in a structured way. In SONNET, policy networks are understood as a non-hierarchical set of different types of actors (political, administrative, civil society, researchers, etc.) (Börzel, 1998, 254), who are connected by interdependent and relatively stable relations. Policy networks evolve around a particular policy problem (Kickert, 1997, 6) and consist of those actors that (could potentially) shape policy outcomes therein directly or indirectly (Weible, 2005; Henry, 2011; Ingold, 2011). Members of the network can have opposing views and interests and thus their relations can be of cooperative as well as of conflicting nature (Thatcher, 1998). Furthermore, the policy networks have a geographical boundary (e.g. a city's policy network on the energy transition or a nation's climate change policy network).

Policy network analysis allows for a structured and comparative analysis of beneficial and conflicting relations in which the SIE develop in cities, including the relations to various policy relevant actors (Bomberg and McEwen, 2012). This approach identifies structures in actor relations, such as the importance of actors, the density of relations, and the presence of supporting or conflicting relationships (Wasserman and Faust, 1994; Scott, 2000; Henry and Vollan, 2014). It is therefore the prime choice for analysing how certain relational structures can enable (or impede) the development of SIE in cities.

To think about roles of actors and the network and power relations between them, we make use of the Multi-actor Perspective (see Figure 2 below). In their Multi-actor Perspective (MaP) Avelino & Wittmayer distinguish between different institutional logics: (1) the state, (2) the market, and (3) the community (Avelino & Wittmayer 2016, 2017, 2019, based on Evers and Laville 2004, Pestoff 1992). According to the MaP, the so called 'hybrid sphere' is an intermediary logic overlapping the others, which includes non-profit organizations as well as intermediary organizations (e.g. social

enterprises or cooperatives) that cross and/or mix institutional boundaries (profit vs. non-profit, private vs. public etc.). These logics are not fixed, rather the boundaries between them are contested, blurred, shifting and permeable. The MaP unpacks different levels of actor aggregation within these broader institutional logics. Each institutional logic can be viewed as a site of struggle and/or cooperation among different organizational and individual actors (e.g. the state as interactions of politicians, civil servants and voters; the market as interactions of consumers and producers). In each institutional logic, organizational and individual actors play different roles. A city administration is primarily part of the state logic and makes and implements policy, but it also procures energy on the market and/or invests in renewable energy, it collaborates with and/or subsidizes businesses and non-profit actors. A policy-maker is also a citizen, neighbour, consumer and possibly a volunteer in their free time.

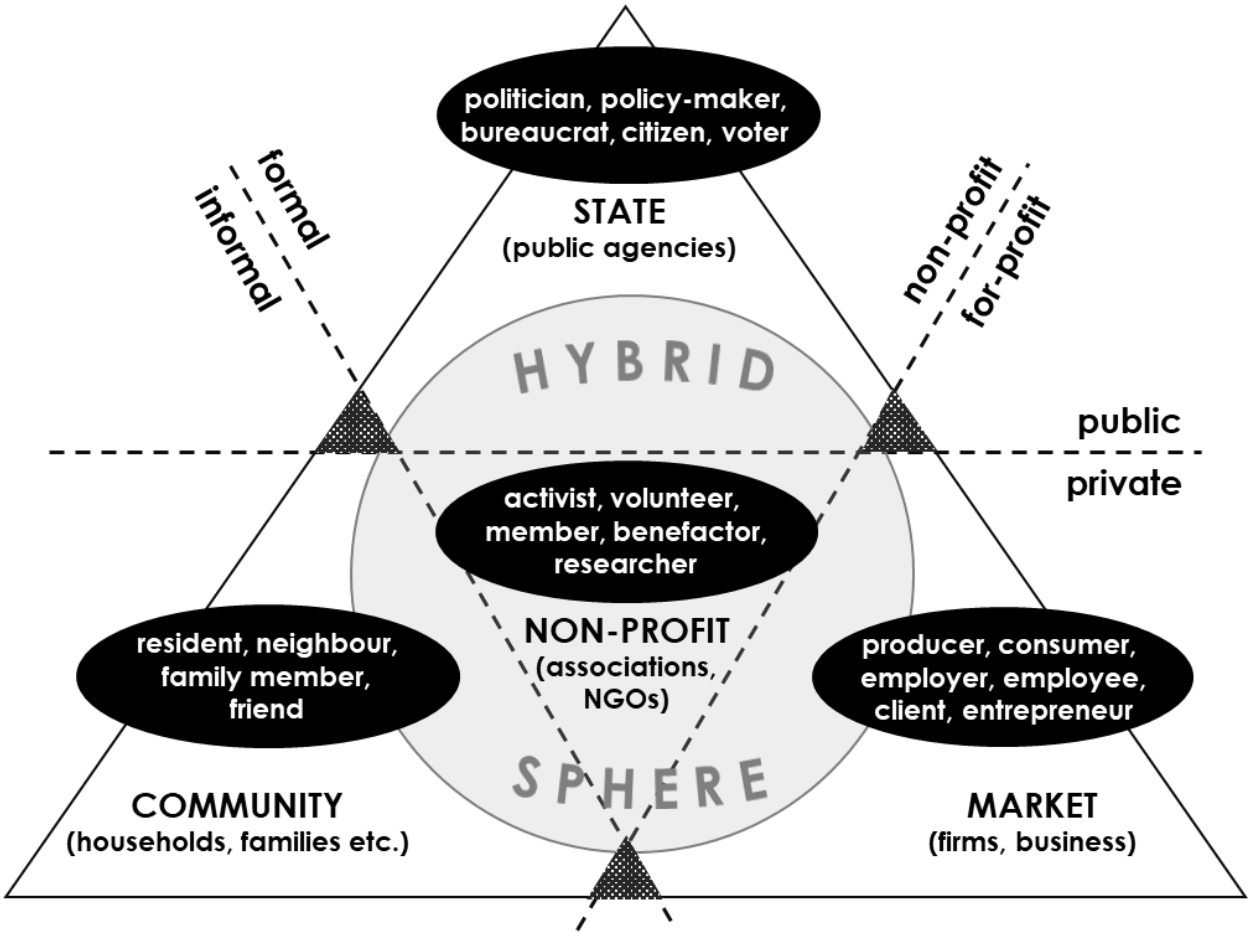

Figure 2: Multi-actor Perspective (MaP)

Source: Avelino & Wittmayer 2019

In T2.2 the MaP was applied to:

- Ensure the selection of respondents in each city covers different institutional logics and different roles.
- Probe respondents during the interviews to reflect about diverse roles and relations across diverse institutional logics: e.g. when a respondent only mentions market actors when asked which organizations they collaborate with, to also ask about other types of actors, e.g. NGOs, community groups etc.
- Ensure that respondents are not just viewed as representing an organization, but also as individuals that play individual roles and have relations with other individuals across institutional logics. This is crucial to get insight to not only formal networks and power dynamics between organizations, but also the more informal underlying networks and power dynamics.

When thinking and asking about power relations, it is important to distinguish between macro-level (power relations between state, market and civil society, consisting of community and non-profit, see Figure 2) as well as at a more micro-political level (power relations between e.g. local and central government, between politicians and civil servants, between men and women, or between specific organisations or departments – see Figure 3 and Figure 4 below). The T2.2 data-collection was designed to provide insights into the macro-level power relations (getting a sense for power dynamics between state and/or market and/or public-private-partnerships (PPP) in the urban energy system of e.g. Antwerp). Additionally, insights on the micro-level power relations were unveiled (e.g. between energy company x and energy company y, or city administration department x and council y, etc.).

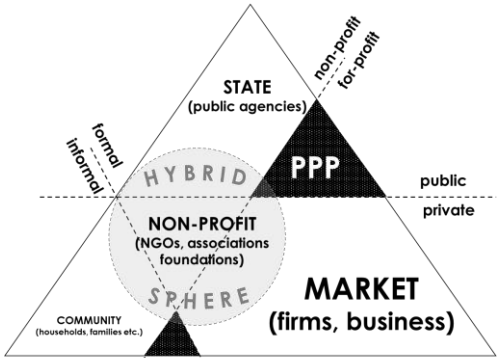

Figure 3: Dominance of state-market sectors and public-private partnerships in Western Society

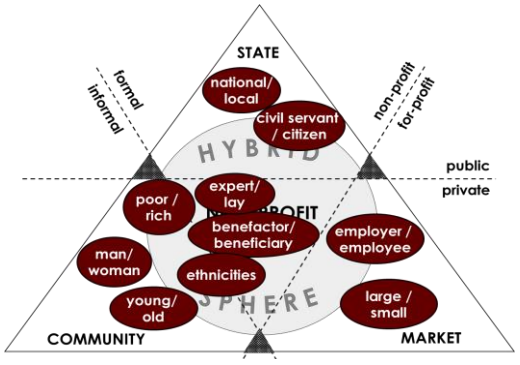

Figure 4: Power relations and hierarchies between individual actors roles within the different sectors

Source: adapted from Avelino & Wittmayer 2016Source: adapted from Avelino & Wittmayer 2016

When thinking and asking about the execution of power, it is important to keep in mind that it involves the mobilisation of various sorts of resources (see table 2). Respondents who tend to only speak about one type of power (e.g. financial power, i.e. mobilisation of monetary resources), therefore should be asked to talk about other kinds of power in terms of, for example, amounts of members/voters/customers, about who owns the natural resources, or who influences the debate/public opinion about energy.

Table 2: Typology of resources mobilised in the exercise of power

Type of resource	What is mobilised
Mental	Information, concepts, ideas, beliefs
Human	Human leverage, personnel, members, voters
Artifactual	Apparatuses, products, construction, infrastructure
Natural	Raw material, physical space, time, organic life
Monetary	Funds, cash, financial stock, currencies

Source: Avelino (2017)

2. Methodological Approach

Within the scope of the study, a mixed methods approach is used to gather quantitative as well as qualitative data. The combination of both methodological approaches helps collecting data on the network structure and gaining in-depth knowledge on motives, backgrounds and circumstances.

Gathering network data is always a challenge in terms of completeness and depth. Depending on the kind of nodes and linkages observed, methods may differ. In our case, the kind of relation we study are interactions between actors of importance in the energy sector relevant to the policy system at the city level (Wasserman and Faust 1994).

Surveying a limited number of actors about their institutional and personal networks leads to so-called 'ego-networks'. Ego-networks allow analysing the embeddedness of these actors and their relations, but do not allow for the deduction of information about the complete network (e.g. the centrality of the egos or other actors). As opposed to ego-networks that focus on a single actor and his/her surrounding network, a whole network comprises of all realised ties between all nodes in the 'population' (Borgatti et al., 2018). In this work, we analyse a mix of these two network designs, which consists of egocentric network data within a sample of actors in a shared context between whom links might exist as well (Cornwell and Hoagland, 2015, 280).

Care is taken that the used analytical concepts are appropriate to the network type under study. To record an actor's direct contacts, the approach chosen here, a survey, allows collecting very comprehensive data. Each interview respondent is asked to fill in a survey, conveying information about the actors they interact with concerning SIE and the energy sector. While the questionnaire concentrates on rather objective questions that can be answered in a quantitative way, the interviews focus on details concerning the interactions, relations and perceptions thereof between actors.

The first interviewees were selected via the SONNET city partners and complemented through snowball-sampling using the questionnaire results. The steps that each of our academic SONNET partners followed in this research process are:

Step 1: **Select / approach 1-2 of your SONNET city partners** and send them the emails, the questionnaire and interview them

Step 2: **Create a long list of potential interviewees**

Step 3: **Approach respondents**

Step 4: **Have respondents fill in the online survey and hold interviews -** See Appendix 2 for a checklist, Appendix 3 for the Questionnaire and Appendix 4 for the complete interview guide. At the end of each interview, ask if the respondent is willing to answer additional questionnaires (for WP6).

Step 5: **Provide analysis, researcher's reflections and report** (based on a provided city summary template and the network data assessed in the surveys).

On one hand, Fraunhofer ISI functioned as coordinator in compiling this deliverable with support from the academic partners providing their insights on their respective cities. On the other hand, Fraunhofer ISI performed the quantitative analysis of the surveys for all six partner cities. The data assessment is based on the work of the different cities' research teams. To minimise this challenge, extensive guidelines and supplementary material were provided for the research teams. These guidelines included the sampling process, the conceptual approach, and the guidelines for conducting the interviews. The interview guidelines consisted of methodological guidelines, a structured questionnaire and information on how the pre-collected survey data might be used to enrich the interviews (see Appendix 2). Regular exchange between the teams enabled the clarification of uncertainties and confusions during data collection (particularly during the conduction of interviews), data assessment as well as during the process of writing the interview summaries.

These interview summaries were required for each city because interviews were conducted in local languages. The interview summaries were structured and formulated based on a template, which was guided by the underlying questions in the interview guide. Our analysis presented in this deliverable builds on the findings that were described in the city summaries.

The survey was sent to interviewees before each interview and intended to inform the interviews. Questions in the survey ask about further actors working together at the city level and their relations. This allowed us to quantify and compare the intensity of network relations in each of the SONNET cities.

The challenges and limitations of this multi-method approach are further reflected upon in the concluding section of this document (section 7).

4. Reporting on the Interviews

As described in section 1.2, we analyse how SIE are enabled or impeded through policy network structures. This analysis is structured in several steps. In 4.1, we briefly outline the contextual conditions that influence the development of SIE before introducing each of the SONNET cities with their most important SIEs as well as the predominant understanding of SIE in each city in section 4.2. Section 4.3 and 4.4 provide a cross-city analysis concerning factors that enable (section 4.3) and impede (section 4.4) SIE. Finally, based on these findings, we describe how these impeding and enabling factors manifest in policy network structures (section 4.5).

4.1. Context conditions influencing the development of policy networks around SIE

The six SONNET cities under study (Mannheim, Antwerp, Bristol, Grenoble, Warsaw and Basel) largely differ according to their historical developments, their specific government arrangements and experiences with social innovation as well as with transformations in the energy sector. Even if these context conditions are not studied in-depth as part of this analysis, these different backgrounds are likely to influence the emergence of SIE and the development of policy networks. We therefore briefly introduce the main factors that may influence the development of policy networks around SIE before we further describe the characteristics of each city regarding the types of SIEs occurring.

Table 3: Overview of SONNET cities and their characteristics

SONNET city	Existing city-based social innovation labs (non-energy)	Strong links between city administration and SIE-initiatives	Potential carbon intensive to low carbon role model	Novel SIE developments (such as smart energy)
Mannheim	x		x	
Antwerp	x		x	
Bristol		x		x
Grenoble	x	x		
Warsaw		x	x	
Basel	x			x

Source: SONNET Description of Action, Part B, page 15

First of all, the six SONNET cities differ according to their **traditional economic focus** and **societal developments**. The cities of Mannheim, Antwerp and Warsaw have industrial urban development backgrounds with **carbon intensive industries**. These industrial backgrounds often still influence the possibilities of addressing low carbon transitions today, e.g. through existing ownership structures. The city of Mannheim, for example, partially owns a coal power plant and the local

energy provider has traditionally a powerful role in the local network, due to the high dependency on (cheap) energy for industries. One interviewee describes the situations as follows:

> *"Mannheim is an industrial city, so the main part of the energy is probably not demanded by the citizens, but by the industry. Maybe that's why they are holding back a bit and saying we do not necessarily want to make us unattractive as a business location, because it's more likely that they will offer you the option of using renewables if you already have the corresponding energy consumption. There are already a lot of energy-intensive production sites here." (MA08)*

Due to this **industrial background** best-practice solutions from front-running cities often cannot easily be transferred to other cities. In the city of Antwerp, the industry-intensive harbour is particularly a challenge for a low-carbon transition (SONNET description of action, part B, page 15). Warsaw, the largest city of the sample and Poland's capital, is also challenged with a strong industrial background as a major challenge for low carbon transitions. In contrast, Bristol's more recent history in terms of energy-related urban development heavily builds on **grassroots movements** that are the basis for its transition towards a sustainable city. In the case of Bristol, this background is often described as a specific eco-system describing a social aspect of this development: "There is a 'special eco-system in Bristol that goes back a long, long way'" (BR01). The city of Basel on the other hand, is rather characterised by a **strong role of city administration** that influenced the role of the energy sector within the city. In 1999, Basel established an incentive fee, 'Stromsparfonds Basel'. Instead of reducing electricity costs for consumers, this fee allows a redistribution of costs and the investment in projects related to (sustainable) energy (see city summary Basel, section 2.1.1.[1]). Finally, the city of Grenoble traditionally builds on innovation "combining industry and engineering communities, academics and researchers" (SONNET description of action, part B, page 76). Also in Grenoble, the city administration takes a strong role, for example by improving energy efficiency in city-owned buildings. Grenoble furthermore was awarded as European Green Capital 2022 (see city summary Grenoble, section 2.2.1).

Next to different historical backgrounds in terms of urban development, the six cities also build on different forms of **experiences with governing social innovation**. The cities of Mannheim, Grenoble, Basel and Antwerp, for example, are already actively engaged in established **social innovation labs**, even if these are not necessarily energy related. In Antwerp, a city lab called 'Stadslab 2050' collaborates with different partners on experiments and innovations around sustainability (see interview summary Antwerp, section 2.1.2). In Basel, social innovation processes are part of a smart city vision (see interview summary Basel, section 2.2.2). Furthermore, Grenoble, Bristol and Warsaw can build on **strong links between the city administration and SIE-initiatives**. The best example for these types of relations can be found in Bristol. The supportive role of the City Council is described as part of the special eco-system that characterises Bristol's roles at the 'forefront of local sustainable energy systems' (BR10). In their analysis of Bristol's 'energy scene' Torrens et al. (2018) describe this relationship between the City Council and grassroots initiatives as twofold:

[1] Due to data protection restriction and in order to guarantee the anonymity of all interviewees that took part in this study, the city summary reports are shared only within the SONNET research consortium.

"An ambiguous relationship between the council and community energy groups emerged: on the one hand, there was increasing support for the grassroots initiatives and BEN [Bristol Energy Network], and on the other, the council was pursuing its own municipalist strategy, focused on the direct provision of energy services carried out by well-funded teams in the BCC [Bristol City Council]." (Torrens et al. 2018)

Finally, cities such as Bristol and Basel gain experiences with novel energy related developments such as smart energy or experimentation with heat networks. These developments might include technological innovation that go hand in hand with changes in social relations and SIE-processes.

4.2. Types of SIE and network relations in the six SONNET cities

The different historical developments and background conditions of each city are the starting point for the development of different types of SIE in the cities. In the next section, based on the responses of interviewees, we summarise the most important SIE in each city as well as the predominant understandings of SIE in each city. It is important to note that the perspective on SIE might vary between the actors interviewed for this study.

Mannheim

In the case of **Mannheim**, there is a variety of social innovation actors such as start-ups and social entrepreneurs. However, in combination with energy, fewer projects exist. According to the reflection of the researchers, "SIE in Mannheim is scarce since SI are developed mostly with a general sustainability focus" (see interview summary Mannheim, section 2.1.2). Attempts to establish SIE initiatives failed in the past, like it was the case with an energy cooperative in Mannheim:

"We used to have an energy cooperative in Mannheim that we helped to set up [...], but as I said, it unfortunately went bankrupt. It is a pity, that there does not seem to be enough acceptance for this kind of cooperation in Mannheim, not then and not now. It is still not the right platform for the city to drive the energy transition here." (MA02)

However, the interviewee emphasizes that further efforts are undertaken:

"[...] the city has set up a joint venture with the energy provider [...] and established a support programme for solar installations. That works better." (MA02)

Existing SIEs mostly refer to projects that are often developed on the district level such as test environments for energy prosuming, in which city administration, local energy providers and further actors such as researchers or the local neighbourhood management are mostly included (see interview summary Mannheim, section 2.1.3). Even if large parts on Mannheim's energy consumption are based on the local industry, projects are often perceived as socially innovative when they include citizen participation and target behavioural changes (see interview summary Mannheim, section 2.1.2). The city administration usually takes a strong role in pushing participatory approaches which in many cases have a broader focus on sustainability where

energy might be one topic among others. City administration actors therefore perceive themselves as enablers and even innovators (while others, however, do not share the opinion on the role of an innovator) who are well connected and can therefore 'get things done':

> *"[...] for example, within the city administration. She [referring to one person as part of the city administration] can get things done, because she knows the right people, the right levers, she knows where to push." (MA04).*

The city administration also plays an important part in organising meetings and establishing network relations. Next to the city administration, the most important actor in SIE is a regional cluster organisation with a rather economic focus. It organises regular meetings that often involve administrative actors, private companies or energy researchers. The network is described as "network of the willing" where people "pass opportunities to each other" (MA04).

Antwerp

In **Antwerp**, a rich diversity of social innovation phenomena could be observed. These phenomena are either innovative as such (e.g. heat grids) or innovative in addressing social issues (see interview summary Antwerp, section 2.1.1). The different phenomena can be structured around different patterns and types of SIE. One of these patterns refers to processes such as the recentralisation, restructuring and democratisation of energy. The focus here is on new governance structures related to energy, such as new forms of energy management or increasing the role of citizens and local governments in the energy system (see interview summary Antwerp, section 2.1.2). Another pattern highlights financing mechanism and ways to address energy poverty, for example, through financing mechanism for investments in energy saving measures, such as one interviewee describes it:

> *"It could be actually possible that a manufacturer says, 'alright, we do not need to generate profit from this group of people for which we provide this model, we will receive our profit from other groups' So for that social segment there should always be a financing mechanism behind it. Why can't that be the responsibility of different actors together?" (ANT07).*

Furthermore, one interviewee also mentions the importance of socio-economic sustainability as important factor, another interviewee describes nuclear energy as an alternative low carbon energy pathway. In Antwerp, diverse types of actors are engaged in SIEs, such as different government levels, energy cooperatives, grid operators or banks. The city government with its specific departments takes different roles in "creating, facilitating, supporting and stimulating networks/initiatives/innovation" (see city summary Antwerp, section 2.1.3). Next to the local level, different governance levels are described as important by interviewees, such as the Flanders Government, which is perceived as impeding by some interviewees due to legal contexts. In terms of network relations, similarly, these often are developed by policy makers and municipal actors or energy cooperatives. In person meetings and informal communication are perceived as crucial factors:

"[...] I myself attended several general meetings on the subject, to tell people what I could contribute. Which at the time was little. But I just went there to see how people would react to that, and that was positive" (ANT04).

Knowledge sharing is one of the central aims of the networks, next to potential influence on policy makers or creating opportunities to create benefits or expanding businesses (see interview summary Antwerp, section 2.2.1.).

Bristol

The city of **Bristol** probably builds up on the longest history in the development of SIEs. There are a large variety of organisations and projects with different types of actors engaged in SIE. Developments are perceived as socially innovative when they involve community engagement and collaborative aspects. The large variety of actors engaged in the 'Bristol energy scene' also increases the number of projects and initiatives mentioned by interviewees as examples of SIE. According to the researcher's reflection, "how you define innovation depends on who is involved" (see interview summary Bristol, section 2.1.2 referring to BR03). For example, the community aspect might be highlighted by one interviewee, while another focuses more generally on the innovativeness of a project or initiative depending on its aim, impact, outcomes or contexts. According to the researchers conducting the fieldwork, "it is important to note that most of the interviewees considered SIE to be energy initiatives defined as community energy in the UK" (see interview summary Bristol, section 1.1). However, in many cases also (research) projects are identified as SIE or, more importantly, alternative governance approaches with innovative ways of governing energy. An example of this is Bristol Energy Company, which was set up by the City Council as separate company:

"And the reasoning behind this was it meant that we would have the commercial independence from the council to be competitive in the energy market, but we would also have the arm's length governance of an elected body, which is what the council does. [...] It worked well in some ways and not in others, to be quite honest. We right up until now, are still very reliant on the council's funding" (BR05).

In Bristol, community groups such as energy cooperatives and different types of grassroots innovations are perceived as particularly important. Due to the large number of actors involved in energy, actors that work as intermediaries also play a central role for representing a collective voice or bringing people together to share ideas (see interview summary Bristol, section 2.1.3). The strong linkages between SIE-initiatives and city administration are highlighted. Overall, the role of Bristol City Council is described as an enabling one:

"I think the city council has quite a key role to play because it's such a big part of the city so they can facilitate by providing land or by providing roofs, other resources for making things happen I suppose [...] City Council has a strong role to play and I think that's particularly because they are really interested in it, because they have Energy Service anyway which is unusual in local authorities' terms." (BR03).

One aspect that is mentioned about the Council is that it invested in building expertise and having 'energy professionals' (BR01) within the City Council. Also the 'risk appetite of the council'

(BR05) that allowed investments in expertise is emphasised as an enabling factor. In terms of network relations, well established local networks, such as the Bristol Energy Network (BEN), the diversity of local groups involved in energy and the supportive role of the Council with its energy experts shape a specific 'eco-system' that can be interpreted as a rich density of network relations, enabling SIE. Bristol attracts well educated people who are interested in energy (see interview summary Bristol, section 2.2.1). However, the number of network relations might also lead to "competing networks [...] duplicating each other's activities and competing for funding" (see interview summary Bristol, section 2.2.1).

Grenoble

In **Grenoble**, initiatives are perceived as socially innovative when they target citizens' engagement and mobilize them to act (see interview summary Grenoble, section 2.1.1). The main difficulty thereby lies in realising long-term engagement of citizens (see interview summary Grenoble, section 2.5). In many cases, SIEs involve technical measures for certain social problems, for example subsidies for housing insulation or financial support to fight energy poverty. Subsidies and financial mechanism often play a central role in the SIEs observed. Also, an energy data platform is mentioned that targets behaviour changes by making energy consumption transparent (see interview summary Grenoble, section 2.1.2). One interviewee sees the social innovativeness of this approach in integrating social psychology:

> *"We try to integrate social psychology to know how we can cause behaviour change" (GR02).*

Similar to Mannheim, also in Grenoble the city administration plays a strong role in initiating and promoting different types of activities. The city administration with its different units (e.g. social service, energy agency) for example sets political goals, financially supports projects or engages in education and awareness raising (see interview summary Grenoble, section 2.1.3). According to the researcher's reflection, "in all of the initiatives the administration is always involved one way or another: either directly through local policies and actions through one of its services, or through its subsidiaries, or as shareholder and board member in different organisations" (interview summary Grenoble, section 2.1.2). Network relations can therefore often be traced back to the engagement of the local administration and might be initiated in the cause of certain policies, (research) projects or as part of the city's status as 'Green Capital' (see interview summary Grenoble, section 2.2.1). These networks often focus on different target groups such as students or home owners (see interview summary Grenoble, section 2.1.2). Even if there can be difficulties in initiating networks, in general, cooperation between different types of actors (e.g. people, who have so far not been part of the network) is perceived as important enabler of SIE: "It is necessary to go and see people outside the network, who are not already engaged" (GR01). However, reaching out to citizens, especially less well educated target groups, is seen as a major difficulty:

> *"In general we lack the means to communicate with citizens. Out of 440,000 inhabitants in the Grenoble metropolitan area we only manage to have about 250 partners/citizens who have invested in our local energy community" (GR11)*

The scope of action of the local administration can however be limited by regulatory conditions, funding possibilities, rules and laws for which the responsibility lies on higher government levels (see interview summary Grenoble, section 2.4.2).

Warsaw

Based on the interviews conducted in **Warsaw**, SIE are often identified as projects and activities in which the city administration tries to involve citizens and/or other stakeholders. Even if local grassroots initiatives are starting to emerge, some of the projects are still in an earlier stage, and getting citizens involved is considered difficult (see interview summary Warsaw, section 2.1.1). In contrast to Bristol, SIEs cannot build up on a long history of development in Warsaw and are currently rather starting to emerge; activities. Activities around energy transitions are described as depending on national policies (see interview summary Warsaw, section 2.1.1). SIEs that could be identified might be part of policy strategies, such as in the case of the Warsaw 2030 strategy or the Climate Panel. One interviewee, who is a representative of the city of Warsaw, describes the Climate Panel as follows:

> *"The climate panel is about building interactions, it is about building the interest of organisations and residents. Perhaps it will go to people who wanted to know how climate change affects the city, but also the opposite, how the functioning of the city affects climate change. For me, first of all, it is just a mine of ideas and potential solutions, an opportunity for discussion. It will be the so-called city in a nutshell, i.e. different people, not only people closely interested in this topic, so there will be different points of view" (WA02).*

Communication aspects, knowledge sharing and awareness raising are important aspects of these SIEs. The city administration is perceived as organiser, moderator and a platform for networking opportunities. Furthermore, the responsibility to implement changes is addressed to the city administration. However, it is not perceived as leading the process but rather as witnessing it (see interview summary Warsaw, section 2.1.3). Due to scarce resources, there is friction between different projects and initiatives that influences the local network around SIEs. Also the lack of knowledge and contacts to reach out to NGOs and business actors limits the scope of the network. "As a result, the existing networks tend to become relatively stable, i.e. the same people are being invited to various projects based on past successful cooperation" (see interview summary Warsaw, section 2.2.5). Therefore, network relations often depend on communication between different departments of city administration or between city administration and external actors. According to one interviewee:

> *"The biggest obstacle in building effective relationships and implementing various projects is that there is often a conflict of interest between the various actors involved. Or maybe a bit of a lack of coordination and the ability to evaluate investments from different points of view" (WA02)*

Network are often based on existing personal relations or cooperation is motivated by the aim to fulfil requirements for funding. Furthermore, interviewees mention that they depend on (national) political agendas, which limits the possibilities to push local initiatives.

Basel

Finally, in the city of **Basel**, the main aspect of SIE refers to including a diverse set of actors in energy related topics. According to the reflection of the researchers conducting the fieldwork, "projects are perceived to be socially innovative when actors that are not traditionally recognised as energy system actors take part in projects with a strong focus on energy" (see interview summary Basel, section 2.1.1). Many of the innovative developments in the energy sector described by the interviewees refer to programs or (lighthouse) projects developed or funded by local authorities. This is possible due to an incentive fee (Stromsparfonds Basel), which was established in Basel 1999 and allows to invest for example in energy related projects or to subsidize specific sectors. The fee is unique in Switzerland and was therefore highlighted in many interviews (see interview summary Basel, section 2.1.2). Some of the SIEs described by interviewees refer to construction projects, including innovative architecture. Furthermore, initiatives such as energy cooperatives play an active role for SIE, for example by establishing Do-it-yourself approaches or community actors engage as intermediaries between different stakeholder groups. According to one interviewee, the innovativeness of approaches especially lies in taking an integral perspective:

> *"Players and projects might be more or less innovative, but what we try to specifically do differently is always taking an integral perspective, for example by looking at the impact a measure is having beyond the sector it is immediately affecting. Thereby, we try to see the city as a highly interlinked ecosystem. This makes it complex, but also exciting". (BS07)*

Especially the utility, owned by the canton, has a strong role, in shaping energy pathways, due to its monopoly. Basel is "canton and city in one, missing one federal level which makes a lot of things easier, less friction" (see interview summary Basel section 2.1.1). The institutional roles also shape network relations around SIE in Basel with many local stakeholders and networking organisations being project dependent. According to the researchers' reflection, actor roles seem to be "more strongly linked with the institutional setting and political realities of Basel than with the transformative allure of SIEs, actor relations seem to be network" (see interview summary Basel. Section 2.1.3). These institutional roles can be an impeding factor, for example in the case of the utility, which has to consider regulatory conditions very carefully:

> *"The local utility is very hesitant. They do not provide information on their own. They always need to be approached several times for project related inquiries. For example, we had to get access to Energierichtplan ourselves to see that a heating network is not a realistic option. Generally, they never approach all citizens that are affected, only the ones they are required to approach due to legislation. Other issues include that for example construction work is not being coordinated with other infrastructure maintenance projects." (BS03)*

However, the role of the utility is also to make projects possible. The utility starts changing its approaches and inner structures and is therefore also perceived as driver of SIE by some interviewees (see interview summary Basel, section 2.4.5). As Basel is a relatively small city, personal relations play a strong role.

Box 4: Innovative network relations

This box summarises network relations that were described as innovative in the six SONNET cities. Innovative relations are for example described using terms such as **community engagement** (Bristol), **citizen participation** (Mannheim) or targeting **behaviour changes** (Grenoble). Also, more generally, the **collaborative aspects** of SIE are mentioned (Bristol) or the **integration of a diverse set of actors** in energy related topics (Basel). Social Innovation is often identified in (research) **project settings**, in which new energy technologies are tested on the neighbourhood level (Mannheim). There are differences in perceiving SIEs as developments **around innovations as such** (e.g. technological innovations or organisational changes), which might involve changes in social relations, or as **innovative in addressing social needs** (e.g. described in the case of Antwerp). Thereby, one focus lies on addressing **energy poverty** (e.g. described in the case on Antwerp, Grenoble). Another aspect of SIE refers to innovative approaches in **governing energy** (e.g. in Bristol). In most cases, this includes financial subsidies or, more general, **funding possibilities** as well as **communication aspects** (e.g. awareness raising). In terms of actors roles on the innovation process, actors might be perceived as **innovative themselves** or as **enabler of innovations** (e.g. by providing funding).

4.3. Enabling factors

Different factors were mentioned as enabling SIE. More generally speaking, network relations are perceived as enabling when they are based on a shared motivation, personal relations and long-term trust building (e.g. mentioned in the cases of Antwerp, Basel, Mannheim). This aspect refers to the **depth and stability of relations** and is considered a prerequisite for working together (ANT06). As one interviewee describes it in the context of Mannheim:

> *"I call it 'the network of the willing'. There are quite a few people who are going in the same direction, who have the same motivation, whether they come from the business development sector, from a municipal company or from the scene" (MA04).*

For building personal and stable relations, local-level **personal meetings** are considered an important factor and are mentioned in all cities. These networking opportunities might be formalised (e.g. project meetings) or informal (e.g. in cafés, restaurants and other informal venues). In most of the cases a combination of both forms is mentioned (e.g. in the case of Bristol, Grenoble, Mannheim), however the importance of informal communication among actors is highlighted (e.g. in the case of Antwerp).

Box 5: Role of trust in networks

This box summarises the role of trust in network described in the six SONNET cities. Trust is considered an important aspect for 'true partnership' (Bristol), **building enabling network relations** for SIE, **making collaboration easier** (Antwerp) and even **integrating actors** in conflictual situations. Therefore, trust is described as a prerequisite for working together (e.g. in the case of Antwerp). **Long-time credibility** (Basel) and a shared history of **experiences in**

working together (Bristol), knowing people personally (Antwerp), regular meetings (Antwerp) and personal meetings (Mannheim) are described as preconditions for trust building. Informality in contacts is considered as increasing trust (Antwerp). Trustful relationships are more likely to emerge between actors on similar power levels (e.g. mentioned in the case of Mannheim). Also the status of actors, for example as neutral government, or in the case of building trust with organisations, the size of the organisation might influence the perception of trust. For example, in the case of Bristol it is mentioned that some actors do not trust the private sector. Trust is therefore important on the individual level as well as institutional level (e.g. concerning the perception of certain public bodies or organisations), with both levels often intertwining (e.g. described in the case of Warsaw). One way to establish trust can also be to agree to certain principles (e.g. cooperative alliance principles), which might take the form of an official document or agreement (e.g. described in the case of Antwerp)

In the specific case of SIE, it is important that some of the actors involved in policy networks have professional skills related to energy. These actors might play a role as hubs in a network. According to this, those central actors have "personal and professional skills and experience that allow them to establish and maintain relationships in the networks" (see interview summary Warsaw section 2.2.1). The following quote from an interviewee in Warsaw further illustrates this aspect:

> *"Cooperation with the city depends very much on people, so just like everywhere else, people as a social factor, greatly influence how something manages to change, how something manages to work out" (WA05).*

In the case of Bristol, these actors are described as 'energy champions', people, "who have spent their lives work on energy projects" (BR01). What distinguishes Bristol from other cities is that the Bristol City Council invested money in hiring 'energy professionals' to work within the Council. One interviewee describes this as follows:

> *"I suppose also the risk appetite of the council was quite important because it meant that we were given the freedom to explore what we needed and to invest in expertise to look into that as well" (BR05).*

This allows a more '**proactive approach**' that is also described in the case of Mannheim. This approach requires to get involved in projects and processes from an early stage on, as one interviewee describes it:

> *"We are very often involved in processes at a relatively early stage, providing impetus, but because the metropolitan region has an extensive business ecosystem in many areas and we also have a large start-up ecosystem that also provides new impetus, we usually find companies very quickly that are active in this area" (MA07).*

In the case of Mannheim, external actors, such as a regional cluster organisation, provide expertise or linking different actors with different forms of knowledge, in addition to the expertise being build up within the City Council (see interview summary Mannheim, section 2.2.4). Clusters that emerged around a specific innovation are also mentioned in Antwerp:

"I think that hydrogen is one of the potential sources for the future. Then if interesting innovation credits are released, we can attract them to Antwerp and we can start working with them in Antwerp. All of this in Antwerp, with the stakeholders that are here, and of course there are quite a few of them, as the largest petrochemical cluster in Europe. Yes, and then starting and seeing you can be a front runner" (ANT10/11).

Here, networks emerge around concrete problems, often in **project settings** that provide the occasion to network around specific activities (e.g. mentioned in the cases of Bristol and Grenoble).

Box 6: Supportive network relations

This box summarises network relations that were described as supportive in the six SONNET cities. In terms of supportive network relations, it is often a small but stable network of people, who might be described as "**network of the willing**" (MA04) and support each other's projects around SIE. In many cases, relationships with the **city administration** are described as supportive, for example when the city administration **provides information** (e.g. described in the case of Mannheim), provides **funding**, initiates **networking opportunities** or "supports with advice and ideas" (ANT03). Financial support is the aspect that is mentioned the most. In terms of policy making, the **support of political leaders** (e.g. the mayor in the case of Mannheim) can be a crucial factor. This might also include "leading by example" (BR02). In contrast, the **lack of political support** for certain projects can be an impeding factor for the development of SIE (e.g. described in the case of Antwerp). However, the **roles of policy makers** are often perceived quite differently, e.g. the local and European level might be perceived as supportive while the national level is rather perceived as impeding (e.g. described in the case of Grenoble). Administrative departments might be open to **external support** for decision making while others reject external influence (e.g. described in the case of Warsaw). Concerning the involvement of citizens, it is found that **public support** might be limited in SIE initiatives because participation often rather emerges around critics and protests (e.g. described in the case of Basel). However, public support for SIEs is important for increasing legitimacy and can also support policy making. Also, the support of big firms or different energy providers can heavily influence the potentials to enable SIE. Some interviewees differentiate between actors, who are **innovative themselves** in contrast to those who are **supportive** (see e.g. MA08). **Trust** enforces reciprocal support between actors (e.g. described in the case of Mannheim). One aspect of SIE refers to supporting people, through financial or social support for **fighting energy poverty** (e.g. described in the cases of Antwerp, Grenoble and Bristol).

As SIE are characterised by changing social relations, next to the depth of the networks also the **diversity** of actors involved in policy networks is a crucial aspect. This also refers to the **size** of policy networks.

In the case of Basel, the approach is described as "the more actors can be convinced, the better" (interview summary Basel, section 2.2.2), e.g. in competitions of ideas. This is less about increasing expertise about specific aspects but rather about gaining **legitimacy** within the city and communicating energy related activities (see interview summary Basel, section 2.2.2). According to the researcher's reflection on this: "the broader the coalition of the willing, the better for the legitimacy of policies and projects" (see interview summary Basel, section 2.4.2). In the case of

Basel, events are therefore often co-designed as information and networking events which enables a more diverse participation (see interview summary Basel, section 2.2.4). Also in the case of Grenoble, one interviewee describes the necessity of expanding the network:

> *"It is necessary to go and see people outside the network, who are not already engaged" (GR01).*

One major challenge in building network conditions enabling SIE lies in finding the **right balance** between the **depth of knowledge and expertise** that is required for innovative energy solutions and, at the same time**, including diverse actors** in the networks, making SIE a socially inclusive topic. For example, as described in the case of Grenoble, networking opportunities are often tailored towards different target groups (e.g. between elected officials and citizens; cooperation between students, researchers and consultants; enterprises and craftsmen – see interview summary Grenoble, section 2.2) to reach different groups of actors with different social backgrounds and different needs. However, in Grenoble, systematic relations with citizens are in general rather rare (see interview summary Grenoble, section 2.2.3). In the case of Bristol, **intermediary organisations** play a central role in connecting different actors with different types of knowledge and different needs. This contributes to creating a rich "eco-system" of SIE related initiatives and connecting it to policy makers and **energy professionals** (BR01). In other cities, depth and diversity of policy networks around SIEs might however be less balanced. In the case of Basel, the term eco-system more generally refers to the need to take integral perspectives and acknowledge the complexity of networks in cities:

> *"Players and projects might be more or less innovative, but what we try to specifically do differently is always taking an integral perspective, for example by looking at the impact a measure is having beyond the sector it is immediately affecting. Thereby, we try to see the city as a highly interlinked ecosystem. This makes it complex, but also exciting". (BS07)*

What is striking in comparing the diverse cases is the central **role of city administrations**. In most of the cases under study the city administration is described by at least some of the interviewees as enabling relationships around SIE (e.g. in the cases of Bristol, Mannheim, Warsaw). This might be influenced by the fact that members of the city administrations spoke in a positive way about their efforts to encourage SIEs. However, while our interview evidence might have a positive bias towards city administration, the survey analysis supports this positive assessment across actor groups (see section 0). The city administration is understood as a major influential factor in several different ways. In the case of Basel, city visions and **strategic partnerships** are described to enable the building of long term relationships (see interview summary Basel, section 2.2.2). In Mannheim, **support of the mayor** is described as a crucial factor (see interview summary Mannheim section 2.3.3).

> *"There is the lord mayor, or his staff [...] There is the clear announcement that if someone is blocking something, report it to me and we will solve the problem" (MA06).*

And in many cases, city administrations play an important role in **organising (formalised) meetings** (e.g. mentioned in the cases of Grenoble, Mannheim, Warsaw), which can furthermore be part of certain policies (see interview summary Antwerp, section 2.2.3). On the other hand, also the networking and lobbying activities that increase policy influence (beyond the local level) are

mentioned, for example in the case of Antwerp where two interviewees are involved in a network "that lobbies for policymaking and participating on a [national] governmental and EU level" (see interview summary Antwerp, section 2.2.2, referring to ANT05 and ANT06). According to one interviewee "it is through that group that a lot of input is given to policy proposals. They also give many signals to policy makers" (ANT07). Overall, SIEs are enabled when they are part of and interwoven in the political strategies and goals of each city.

Box 7: Level of agreement between actors

This box summarises network the level of agreement between actors in a network in the six SONNET cities. As defined within the SONNET project, SIE can include a variety of different phenomena in the energy sector that contribute to changing social relations and building a more sustainable energy system (see SONNET D1.2). Based on the findings from the interviews, there seems to be a **general agreement on the overall understanding of SIE** (Antwerp) and on the **importance of SIE in the future** (Bristol). Disagreement between actors is not often directly mentioned by the interviewees. However, some examples of varying interpretations of SIE might be interpreted as disagreements. Most striking, one interviewee mentions the importance of socio-economic sustainability and describes nuclear energy as important for a low carbon development, even describing it as socially innovative (ANT10/11). While this is the most striking difference to SONNET's understandings of SIE, there still sometimes disagreements mentioned by the interviewees **about what counts as social innovation** and actually contributes to transformative change in the energy sectors (MA08). In case there is disagreement, this often relates to different **measures to reach energy policy targets** and the question whether they are strict enough (Basel). Disagreement can be furthermore found **between different government departments or between organisations** which compete for founding (Warsaw). Also different governance levels that follow different goals are mentioned (e.g. in the case of Grenoble). Agreement with the local city council or the lord mayor is considered an important aspect of enabling SIE (e.g. mentioned in the case of Bristol, Mannheim (MA06)). In the case of Bristol, one interviewee emphasises that it is important in SIE networks to be generally **open for involving people, who might disagree** with a certain opinion (BR02).

Furthermore, in all cities a number of factors are described that influence the emergence of enabling relations rather than referring to relations themselves. Most importantly, the availability of **financial resources** is mentioned a lot. Networks can emerge out of the need to create synergies and gain access to resources (e.g. in the cases of Antwerp, Grenoble, Mannheim). In the case of Warsaw, the key motivation for networking activities is described as emerging out of the need to fulfil requirements for funding (see interview summary Warsaw, section 2.2.2.). However, this can in contrast also lead to competition between different actors.

4.4.Impeding factors

Overall, impeding factors are **discussed less** than enabling ones (as stated e.g. by researchers in the cases of Basel and Mannheim). However, factors that impede network relations refer to different aspects that concern for example the perception of trust within networks, contestations

within networks, the limits of networks concerning their impact on regulatory conditions or influential factors such as monetary and personal resources.

One general finding suggests that a **lack of trust** or the feeling of not being taken seriously, e.g. by politicians, can be a major impeding factor influencing policy networks on the city level. In the case of Antwerp, one interviewee describes this as follows:

> *"And then it starts, you are with seven or eight parties around the table. And you just feel that not everyone is being honest. There are several people just sitting there to watch what will happen, but they have no intentions to share, right. What they want, is to take at the right time" (ANT04).*

This aspect refers to the **perceived quality** of (personal) relations. In the case of Warsaw, this aspect is mentioned in particular to describe the relation between city administration and (local) organisations. As one interviewee describes it:

> *"I must say that it was quite difficult to cooperate where there was no trust between the organizations and the city. It was a glass wall that showed that we do not trust each other, that is, we look at each other in hostile manner and when we look at ourselves like that, we are a bit doomed to failure" (WA05).*

Here it might be that **expectations and role perceptions** of each actor influence how trust is perceived. Furthermore, through experiences in earlier cooperation, actors might already be known for their critical perspectives or a lack of commitment to certain projects, which impedes further motivations to cooperate (e.g. mentioned in the cases of Antwerp, Basel, Mannheim).

Next to these aspects of commitment and trust, also different **structural aspects** can be perceived as impeding network relations, such as different views or **contestations within networks**, with different contrasting and/or competing opinions within the network. For example, in the case of Antwerp interviewees state that policy-makers focus on wrong target groups (ANT04). Furthermore, **clusters of actors, which develop in parallel** and are not well connected, are described as an impeding factor since they might hinder to join forces and combine competences. In the case of Mannheim, especially the large amount of intermediary actors is described as a potentially impeding factor, because it hinders the integration of diverse activities in an overall strategy:

> *We sometimes have too many intermediaries for there to be one big overall strategy" (MA07).*

For example, while social innovations are encouraged by policy actors in Mannheim, they are (still) not very well connected to the field of energy. Also, the **dominant role of some actors** and the dependency on central actors can impede the diversity of actors involved in the network (see city summary Mannheim, section 2.4.2). In the case of Warsaw, it is rather the **lack of actors** that engage in SIE related policy networks that hinders the establishment of new cooperation (see city summary Warsaw, section 2.4.3). One interviewee describes this aspect as follows:

> *"We try to be a promoter of good, interesting solutions, encourage the implementation of various non-standard interesting ideas. But it is terribly difficult to involve people in*

anything, we are not yet so open [...] that we can proactively enter into all such creative works, showing possibilities and solutions" (WA05).

Due to a **lack of competences** within the city administration and a **lack of communication** between different administrational departments, networks are described as "relatively stable, i.e. the same people are being invited to various projects based on past successful cooperation" (see city summary Warsaw, section 2.2.5). These aspects hinder the diversification and growth of policy networks related to SIE. Also in the case of Bristol, internal communication is described as a potentially impeding factor, especially when central actors involved in decision-making processes lack time resources and cause time delays (see city summary Bristol, section 2.2.5 referring to BR02).

Further aspects are mentioned in the case of Antwerp and Grenoble that refer to **cultural aspects** related to policy networks. In the case of Antwerp, one interviewee describes changes in "network culture", which increase the focus on formalised relations – according to the interviewee this might impede the building of strong personal ties (ANT08). In the case of Grenoble, a "strong technological culture" is interpreted as impeding factor for the emergence of SIE, which focus more on social than on technical aspect (see city summary Grenoble, section 2.2.5).

However, next to these aspects that refer to the shape, size or depth of networks related to SIEs, one crucial aspect mentioned in most of the cities is the lack of possibilities to impact political decisions or changes in **regulatory conditions** (e.g. on the national or European level). Despite, the engagement of policy actors on the local level, networks might not be able to provide **access to political decision-making**, e.g. due to existing power relations (see city summary Antwerp, section 2.2.5).

"But with the networks we do not have, so in the power structures of your energy system, you are much less involved. So you also know very little about investment decisions and about why certain decisions are made" (ANT01-02).

In some cases, interviewees pointed out that **national legislation** that cannot be directly shaped by local actors and adapted to their need, can be impeding (e.g. mentioned in the cases of Bristol, Grenoble, Warsaw). In Grenoble, it is mentioned that only since 2019 local authorities have the legal possibility to develop energy policies (see city summary Grenoble, section 2.2.5). Also in the case of Bristol it is mentioned that the City Council can only set local policies if the national legislation allows for it (see city summary Bristol, section 2.2.5). This aspect is described by one of the interviewees as follows:

"So if it wants to have a local policy on planning that says to a builder you can't build a home unless it is zero carbon, at the moment our council can't do that. And this is because [...] the national government hasn't got the framework for zero carbon" (BR06)

The tension between local SIE policy networks and national energy policies can be a key obstacle for all cities in all national contexts. More precisely, local policy networks related to SIE are depending on **political agendas** on the national level and can be impeded by these, as mentioned, for example, in the case of Warsaw (see city summary Warsaw, section 2.2.5).

Box 8: Powerful network relations

This box summarises network relations that were described as powerful in the six SONNET cities. Some actors are described as **more powerful** than others. In many cases city administrations or energy providers and grid operators are described as relatively powerful actors. Powerful actors, especially administrations, are also described as **more likely to be influenced by lobbying activities** (Antwerp). However, relations to these actors are also described as the **most hierarchical and stable relations** (BA01). The city council, in the case of Bristol, is also considered as powerful, for example due to their expertise in energy (see city summary Bristol, section 2.4.3). In Warsaw, the city administration is described as having the most powerful role as **gatekeeper and placeholder** (see city summary Warsaw, section 2.4.3). In terms of network relations, **lobbying or counter-lobbying activities**, for example a European network for energy cooperatives lobbying for SIE-initiatives, are described as powerful (e.g. in the case of Antwerp). However, in some cases, networks are failing to bundle activities and rather split in parallel and **sub-networks** (e.g. described in the case of Basel). Also in Warsaw, specialised networks are described as peer networks, through which new professionals start changing power relations (see city summary Warsaw, section 2.4.4). Increasing **cooperation** for example with city administrations might be a strategy to increase countervailing power of SIE-initiatives (Antwerp). In Bristol, the **long-time engagement** of local initiatives allowed to **create legitimacy** and gain support to the city administration (see Bristol city summary, section 2.4.3). In the case of Antwerp, **power relations are described to shift** from market-oriented actors to civil society actors as well as from global supply chains to local energy production (see city summary Antwerp, section 2.4.1). Also, in Grenoble there seems to be a shift from the national level to the local level (see interview summary Grenoble, section 2.4.3). Therefore, the **power of the city** might increase. In Mannheim, however, **powerful network relations exist on the regional level** (i.e. stretching beyond the boundaries of the city and including a larger area with different cities), where different actors such as R&D organizations and economic actors cooperate on new developments in the energy sector (see city summary Mannheim section 2.4.2). In particular, a **few central individuals** are perceived as powerful within regional networks beyond city boundaries (see city summary Mannheim, section 2.4.4).

Finally, the most important factor that is furthermore mentioned as an impeding aspect is a **lack of resources**, both temporal and monetary, to engage in SIE and networking activities (e.g. mentioned in the case of Basel, Bristol, Grenoble and Warsaw) or competing relations that emerge around scarce resources (e.g. mentioned in the case of Bristol). Also the relations with funding authorities might be perceived as impeding SIE (see interview summary Bristol, section 2.2.5).

4.5. Summary of factors influencing the development of SIE policy network structures

In the previous sections, based on our empirical findings, we described factors that enable or impede the development of SIE policy networks. In this section, we now take a closer look at the

role of networks as facilitators that can influence (enable or impede) SIEs and how the factors described above manifest in the network structures.

Many of the factors identified in section 4.3 and 4.4 might be qualified to contribute to the development of policy networks in both ways – enabling and/or impeding SIE – depending on their characteristics. Furthermore, some of these factors apply to the development of policy networks more generally, while others especially apply to the characteristics of SIE networks. In this section, we therefore synthesise our findings on enabling and impeding factors and the characteristics of these factors as rather enabling and/or rather impeding. This results in a spectrum rather than a dichotomy.

We structure influential factors along the following categories: 'network structures', 'personal relations', 'role of the city administration', 'policy making' and 'venues'. For each of these categories we provide an overview of the most important factors that influence the development of SIE policy networks and concentrate on the factors that especially characterise SIE networks. These overviews are followed by short descriptions of the ways in which these factors can be crucial for SIE policy networks.

Network structure

Table 4: Overview of enabling / impeding network structures

Factor	rather enabling	rather impeding
Diversity of actors involved	Good mixture between different types of actors	Very homogenous network with dominant role of some actors
Roles and degree of involvement	Actors are equally involved or have the chance to do so	Dominant role of some actors (e.g. energy companies)
Role perceptions	Role perceptions encourage engagement in SIE	Negative role perceptions (e.g. as critical towards change)
Depth and stability of relations	Good and stable long-term relations between different actors related to energy	Lack of long-term stable relations between different types of actors related to energy

SIE policy networks can be characterised by their specific structure. Especially the diversity of actors involved is an important factor for SIE policy networks as SIE is understood as changes in

social relations. Consequently, SIE is more likely to emerge and institutionalise if policy networks reflect the diversity of actors and social relations. This means that networks which are very homogenous concerning the types of actors involved (e.g. policy makers, researchers from specific disciplines only) can be an impeding factor. However, if networks are too diverse, it might be more challenging to find common ground concerning SIE. Furthermore, it is important that the actors have the chance to get involved in the network, without certain actors or types of actors dominating the network. Role perceptions and prejudices towards certain (types of) actors might be encouraging as well as impeding SIE policy networks. Overall, SIE are enabled when policy networks build on a good depth and stability of relations with long-term and stable relations between actors involved, without turning into 'exclusive relations'.

Personal relations

Table 5: Overview of enabling / impeding personal relations

Factor	rather enabling	rather impeding
Personal ties	Networks build on strong personal ties among all actors involved	Lack of good personal ties or personal ties only between some of the actors involved
Engagement	High level of engagement of actors involved	Lack of engagement of actors
Competences	'Energyexperts' with specialized knowledge as part of the network	Lack of competences or homogenous types of knowledge of actors involved

In general, networks often benefit from personal relations and strong personal ties between actors. This is often the prerequisite for trust and consequently for the stability of networks. However, in the context of SIE policy networks and closely related to the specific structure of these networks described above, strong personal ties might also have an excluding aspects if they only apply to certain actors involved. One crucial factor for enabling SIE is the active engagement of actors with different competences or types of knowledge. On the one hand, energy related topics often require a certain level of expertise. On the other hand, social innovation builds on a broader legitimacy and the engagement of diverse actors with different types of knowledge (e.g. practical knowledge in everyday contexts related to energy usage, technological knowledge related to energy technologies, knowledge related to regulatory conditions and policy making etc.). One specific characteristic of SIE is therefore the involvement of different types of knowledge.

Role of city administration

Table 6: Overview of enabling / impeding role of city administration

Factor	rather enabling		rather impeding
Proactive approach	City administration takes a proactive approach in supporting SIE	⟷	No (pro)active approach of city administration in SIE
Resources	Financial and personnel resources to support SIE	⟷	Lack of financial and personal resources
Competences	'Energy experts' as part of the city administration, good competences concerning related topics	⟷	lack of expertise concerning SIE and related topics in city administration

Many interviewees referred to the important role of city administrations for encouraging SIE. Of course, this might partly refer to the fact that all cities under study have a certain interest in SIE that resulted in their involvement in the SONNET project. However, this also shows that a proactive approach of the city administration in supporting SIE can be an important factor to trigger SIE related processes. One important way to enable SIE certainly is to provide financial and/or personal resources to support SIE. Another aspect refers to the competences that members of the city administration can provide to support SIE. As described above, the involvement of different types of knowledge in networks is a crucial aspect for SIE. City administration can support this by building competences within the city.

Policy making

Table 7: Overview of enabling / impeding policy making aspects

Factor	rather enabling	rather impeding
Political support	Support of elected politicians	Lack of political support or competing political agendas
Access to decision making	Possibilities for SIE-initiatives to gain access to decision making	Lack of possibilities for SIE-initiatives to gain access to decision making
Legitimacy	Legitimacy for SIE (in general and in terms of specific projects and actors) within the city	Lack of legitimacy for SIE (in general and in terms of specific projects and actors) within the city

As mentioned above, an active role of the city administration can be a crucial aspect of enabling SIE. This furthermore includes the support of officially elected politicians who put the topic high on the political agenda. However, local agendas might compete with political agendas on the regional and national level, which limits the influence of actors on the local level. Access to decision making, especially for SIE-initiatives, is therefore an important aspect for enabling SIE. Furthermore, the size of SIE policy networks as well as the diversity of actors involved that were mention above can be understood as factors that contribute to the legitimacy for SIE within a city and increase the (local) support for SIE.

Venues

Table 8: Overview of enabling / impeding venues

Factor	rather enabling	rather impeding
Project settings	Working together in projects encourages networking activities	Lack of projects on energy related topics, overly structured meetings which do not encourage exchange
Formal meetings	Regular, formal meetings are organised	Lack of regular meetings / meetings do not support good networking
Personal meetings	Sufficient opportunities to meet personally	Lack of personal meetings / 'exclusive' meetings hinder the development of broader networks

Networks more generally benefit from a sufficient number of possibilities to meet (in person). This also refers to SIE policy networks. Many interviewees especially referred to the enabling role of working together in different project settings as these increase the number of personal contacts. In contrast, these project settings might be highly structured around certain topics and goals. SIE policy networks especially benefit from a balance between venues that are rather formally structured and organised on a regular basis on the one hand, and opportunities to meet personally on the other hand. Both formal meetings and rather informal, personal meetings might however also have an impeding character for the development of SIE, especially when these meetings are perceived as 'exclusive' and exclude certain (types of) actors.

5. COMPARATIVE ANALYSIS OF POLICY NETWORKS FOR ENCOURAGING SIE

After we have introduced the qualitative findings on how SIE are enabled or impeded through policy network structures, in this section we turn to the analysis of our quantitative findings. For this, we draw on survey data and analyse the networks and actor constellations we observed in the six SONNET cities.

5.1. Actor types

Based on the survey results, the different SONNET cities were compared in terms of the diversity of actors included in the analysis as well as the different types of interaction and relations the interviewees named. As Table 9 shows, 48 out of 64 interviewees filled in the survey, varying from 6 to 11 respondents per city. The number of identified actors relevant to the local policy networks around SIE differed between 12 and 32[2].

Table 9: Survey respondents and identified SIE actors

City	Respondents	Interviewees	Identified contacts[3]
Mannheim	10	10	25
Antwerp	6	11	12
Bristol	7	10	32
Grenoble	8	12	18
Warsaw	8	10	32
Basel	11	11	31
Sum	**50**	**64**	**150**

The actors were classified according to the MaP (see chapter 1.3), consisting of the actor types *Market*, *State, and Civil Society*[4]. Furthermore, they were categorised based on whether their

[2] The respondents are referred to as the **egos** of the network as their specific networks were assessed. At the same time, the **alteri** in the networks are the contacts that were mentioned by the egos, but from whom no direct data was collected, meaning they are situated around the egos.
[3] The numbers do not reflect on the amount of mentions of other actors or organisations, but on the amount of actors or organisations in the network, meaning multiple answers are counted only once.
[4] Civil Society relates to the combination of community and non-profit.

activities focused on *SIE*, *SI*, *Energy* in general, *Sustainability* in general, or either on no specific or altogether *other* areas (such as a political party which has an overall interest in many topics).

Most identified actors belong to Civil Society (111), while 52 are Market actors (typically companies with a focus on social matters, energy, financial support but also other aspects) and 51 can be identified as state actors (municipalities, official agencies, governmental departments and political parties) (see Table 10). The **dominance of Civil Society actors** seems to mirror the novelty of SIE as well as the importance of participation and bottom-up approaches. These (often intermediary) actors are mostly associations, NGOs and R&D actors as well as cooperatives, charities or networks. While the cooperatives (8) always and the NGOs (20) partly are SIE actors, the other Civil Society actors have other foci, which link them to SIE and often operate as **enablers**. They are able to bring together actors with different backgrounds such as energy, SI or sustainability in general and as such may enable the development and implementation of SIE.

When analysing the centralities in the different local policy networks, **administrative actors and dominant actors in the energy sector** are usually the most central ones. In the present case, centrality was measured by relations directed at an actor, counting how often the respective player was named by others (namely, the indegree centrality). While the field access was mainly given through administrative actors and thus, a certain bias has to be considered, the data reflects on the important role of those actors who were identified as central, usually incumbents in the energy sector. In Bristol and Grenoble, however, the most central actors are civil society actors. Here, on the one hand Bristol's history of **grassroots organisations** and on the other hand the two cities' standing as **Green Capitals** and as such the different standing of SIE in these cities seem to show. The differences between the cities and their backgrounds become more obvious when comparing them in terms of the actor distribution between each other and in relation to the overall distribution.

Table 10: Actor type distribution in SIE policy networks in SONNET cities

City	Market		State		Civil Society	
	Egos	Alteri	Egos	Alteri	Egos	Alteri
Mannheim	2	4	3	2	3	21
Antwerp	3	4	1	3	2	10
Bristol	1	12	2	5	4	18
Grenoble	1	11	4	3	3	8
Warsaw	1	5	2	11	5	18
Basel	3	5	4	11	4	15
Total	**11**	**41**	**16**	**35**	**21**	**90**

As Table 10 and **Error! Reference source not found.** show, Mannheim and Warsaw stand out with the **highest shares of Civil Society actors**. In Warsaw though, almost a third of the actors are State actors. This might be due to Warsaw being the Polish capital, since only 3 of the 13 actors (egos and alteri combined) actually are part of the local administration. Both cities have the **lowest share of Market actors** referred to in their SIE policy networks. This seems to reflect the industrial background of the cities, which in those cases manifests in a high-energy consumption and thus dependence on fossil fuels. While such aspects may also result in a higher interest in SIE and the transformation of the energy system, in the observed situations market actors seem not to be

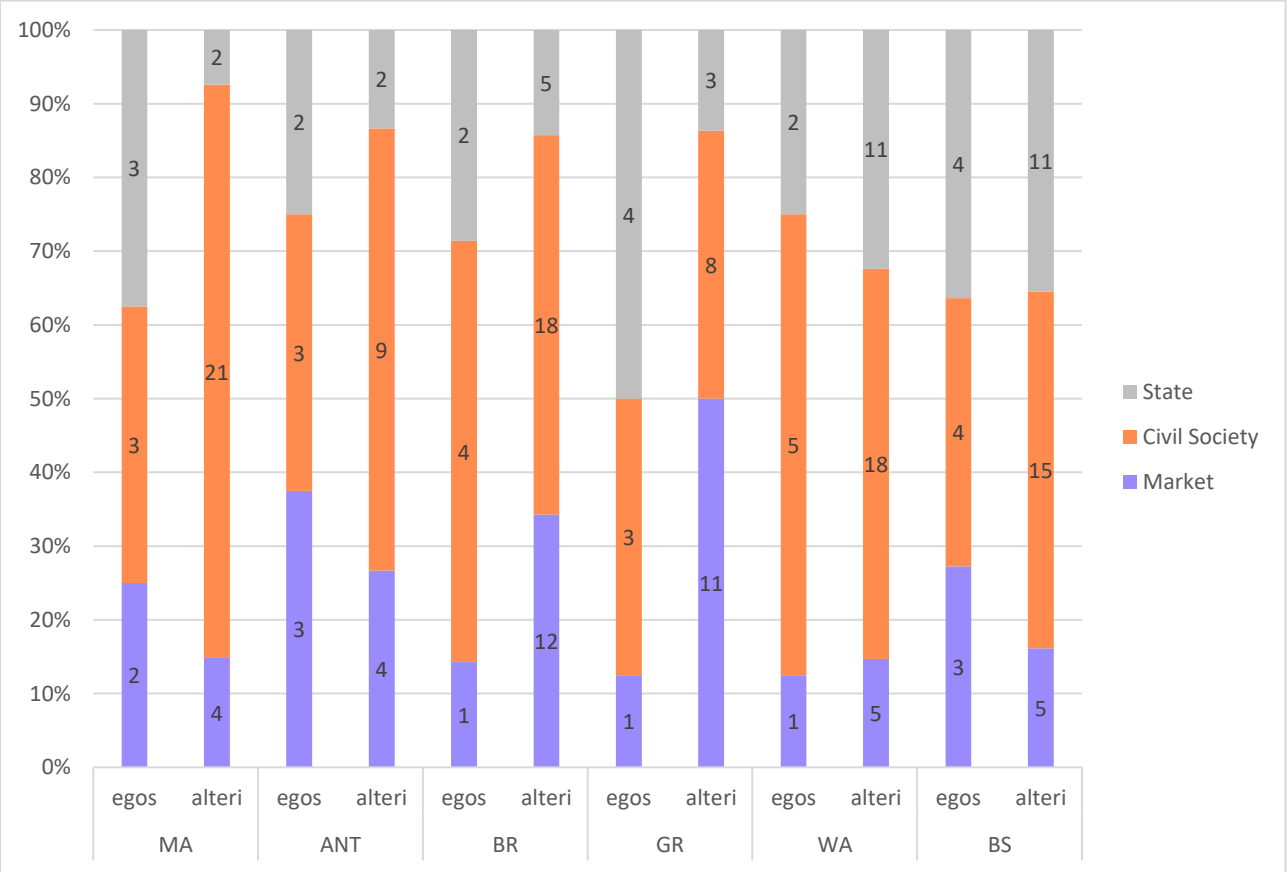

Figure 5: Actor type distribution in SIE policy networks in SONNET cities

Note: MA=Mannheim, ANT=Antwerp, BR=Bristol, GR=Grenoble, WA=Warsaw, BS=Basel

associated with and engaged in SIE. Moreover, there are particularly many **intermediaries** working towards enabling SIE, whereas actual SIE-initiatives and projects as well as bottom-up processes seem to be underrepresented so far.

The SIE policy network in Basel consists of an **above-average share of State actors** (15), of which 7 are part of the local administration. Here, the strong role of the city administration is reflected in this actor distribution. While in the Green Capital Grenoble the administration is of importance as well, most of the identified actors are Market actors. When looking at the network though it becomes obvious that those Market network actors are single-time mentions mostly by one single actor and are not named by any of the other respondents (see Figure 8).

Regarding the distribution of actor focus (see Figure 6), we find that Bristol and Antwerp both show a distribution similar to the average distribution across all cities. In Antwerp, an assessment is difficult due to the low participation in the survey. In Bristol, on the other hand, a more detailed analysis on a different level such as the focus of the actors is more interesting, as the city has a long history of grassroots organisations and SIEs are already established here. As opposed to the other cities, **most of the Civil Society actors in Bristol are SIE-related**. Next to the energy

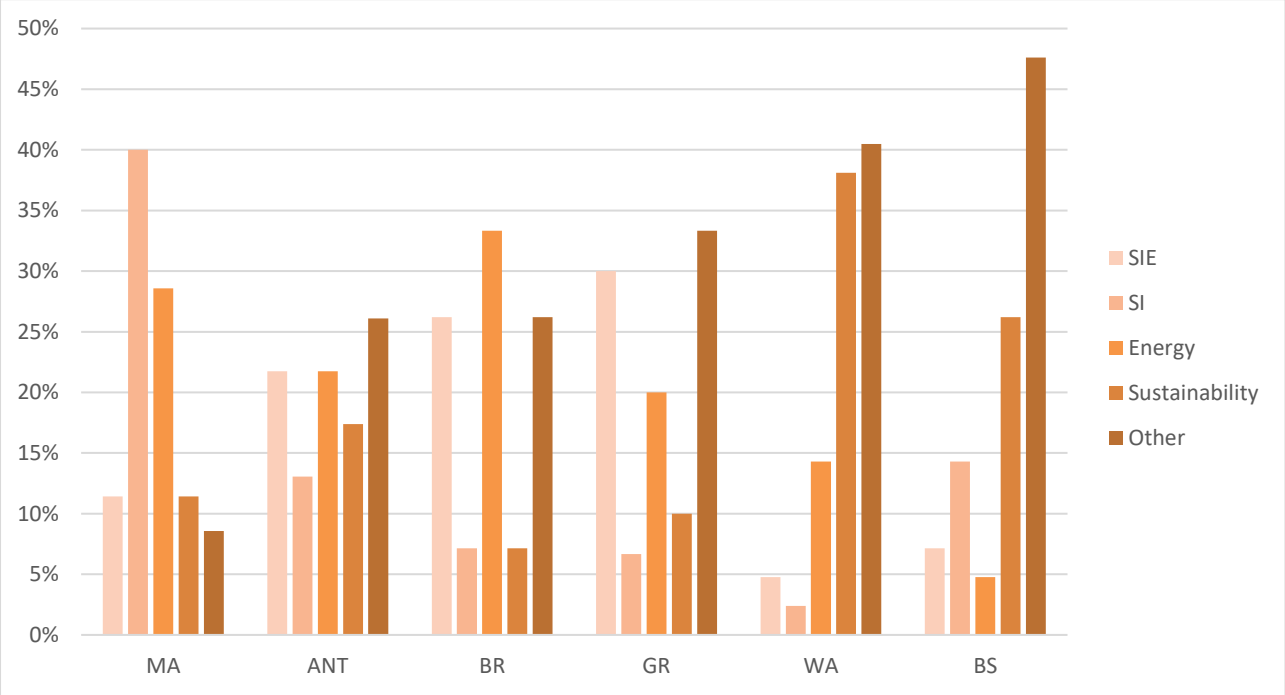

Figure 6: Distribution of actor focus

Note: MA=Mannheim, ANT=Antwerp, BR=Bristol, GR=Grenoble, WA=Warsaw, BS=Basel; SIE=Social Innovation in Energy Sector, SI=Social Innovation

cooperatives, a lot of associations indicate cooperation between different sectors and interests toward SIE. The categories used to classify the actor focus were *SIE, SI, Energy, Sustainability* (which also includes a general interest regarding environmental issues) and *Other*. The latter means a broader interest where SIE (or any of the other categories) can be a cross-sectional topic for the actors in question. While the overall distribution is roughly balanced, the differences between cities are obvious.

Whereas Antwerp is close to the overall distribution, the other cities diverge from it. As Figure 6 shows, **Basel stands out for having very few players in the SIE** (7.1 %) and energy (4.8 %) sectors. Sustainability in turn plays a bigger role (26.2 %) and almost half of the sample is categorised as "Other" (47.6 %).

In Bristol, on the other hand, **one third of all actors can be assigned to the energy sector**. Furthermore, **26.2 % are actors in the SIE sector, which is considerably more than the average.** Accordingly, SI and sustainability are far less represented (both 7.1 %), and those who cannot be clearly assigned also make up a rather small proportion (26.2 %).

Grenoble notably has a **high share of SIE actors** (30 %), while SI and sustainability are much less represented. This fits the status of Grenoble as Green Capital and the fact that SIE already seem to play an important role.

In Mannheim and Warsaw, on the other hand, other focuses are more prominent. Both cities have an industrial background and still rely heavily on fossil fuels (see section 4.1). In the city of Mannheim, **only four SIE-actors** have been named out of which only one is locally active and thus relevant for SIE in Mannheim. The other three actors are not directly located in the city of Mannheim and are mostly relevant on a macro level, primarily engaged in terms of peer-learning processes and knowledge transfer among administrative actors for example. The most important actors in terms of SIE have been identified in the **sectors Energy and Social Innovation**. Especially the latter is an important aspect of local policies and development efforts. Contrarily, in Warsaw most active actors **either have a focus on sustainability or a broader range not directly linked to SIE.** The third largest group are players in the Energy Sector, still they make only 14.3 % of all actors.

5.2. The policy networks in the six SONNET cities

Network Structure and Actor Roles

The policy networks around SIE in the six SONNET cities are built around the respondents of the online survey. Figure 7 shows that many actors are perceived to be relevant for SIE by only few of those respondents. As such, a diversity of actors seems to be involved, even if only marginally.

In each city, at least one administrative actor is one of the two most central ones. When interpreting the results, the access to the sample through administrative actors needs to be kept in mind. This approach might explain the network structure and actor constellations observed in the different networks (see Figure 8).

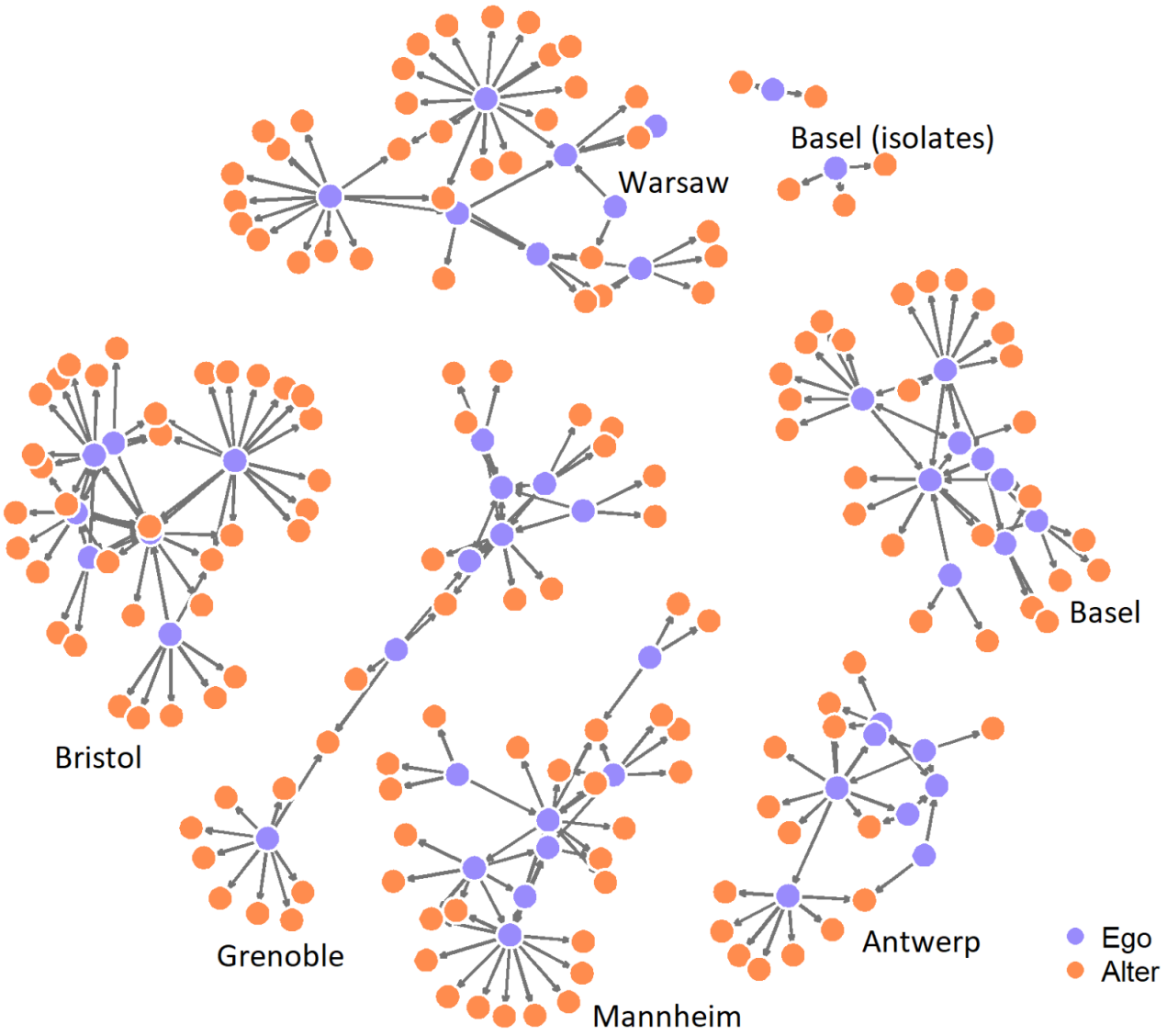

Figure 7: Policy networks in the six SONNET cities

Note: Edges indicate cooperation on the topic of SIE (past and/or present).

Considering the field access through State actors, one might have expected a larger share of these, in particular of administrative actors. Instead, **SIE seemingly mostly rely on civil society**. Local administrations and energy companies play important roles in these processes, though, since they are substantially involved in processes in the energy sector and local energy transitions. The interview summaries pointed toward a similar conclusion, since only in Bristol an SIE-project was mentioned which had been realised without the local administration or the utility. Overall, when keeping the results of the qualitative analysis in mind, the importance **of actor diversity in a policy network for enabling SIE** seems to be mirrored in the networks, but especially the impression that SIE is largely related to **bottom-up processes with administrative and market actors as enablers.**

In the city of **Mannheim**, a **more detailed network analysis** was possible based on an aggregated database, since here, the data on existing relationships from the survey could be supplemented with information from the interviews. The network shows a core-periphery structure, meaning a dense centre and hardly connected peripheral nodes (actors). A cluster analysis[5] of the actors in the network produced five groups, two out of which are of no further interest since they consist of the peripheral actors. The other three groups though show a clear distinction between actors with a focus on social innovation or sustainability versus actors with an economic focus or energy in general. These two groups are linked by a group of only five intermediary players consisting of three administrative actors and two dominant players of the energy sector. Out of these five, four actors have a high indegree centrality, which measures how often others named them as contacts. As a result, the overall group centrality is notably higher than in the other groups. This group classification and network structure mirror the importance of these five connecting actors regarding SIE and their ability to link actors with different foci in order to enable SIE. As such, presently SIE appear as a cross-sectional topic at the junction between SI and the Energy sector connected by a group of players central to SIE, but they are not yet a distinct issue in local policy processes or planning. The current power structures can inhibit the development of new SIE and especially of bottom-up processes. Incumbents perceive themselves as enablers but also have conflicting goals due to the city's industrial background. Also, historically, SIE were not successful in the city which may also be due to low acceptance among the general public.

In the **other cities**, the databases for the analyses are based exclusively on the surveys. Still, the observed structures and actor constellations allow for some interesting reflections. In our analysis, we focus on the administrative actors and their individual networks. Only those administrative actors were included in the analysis who also filled in the survey, as only their networks were directly assessed.

In all the cities, the contacts named by administrative actors mirrored the overall actor type distributions per city. Trust, support and innovativeness were all perceived in about two thirds of all relations reported in the surveys. Except for one contact in Mannheim, **no disagreement** was indicated and all levels of power were assessed with a slight **majority of contacts perceived as not very powerful**.

It was, however, noticeable that in Bristol, **all the administrative actors' contacts were considered innovative, trustworthy and supportive** in terms of SIE. Also, most interesting here is that the two administrative actors had opposing impressions of their three shared contacts' levels of power. In Basel, one respondent thought none of their contacts supportive. In the city of Mannheim, while the interviews suggested that the administration sees innovativeness mostly with themselves, in the survey **80 % of all their contacts were said to be innovative**.

[5] A hierarchical cluster analysis based on Euclidean distances was applied here.

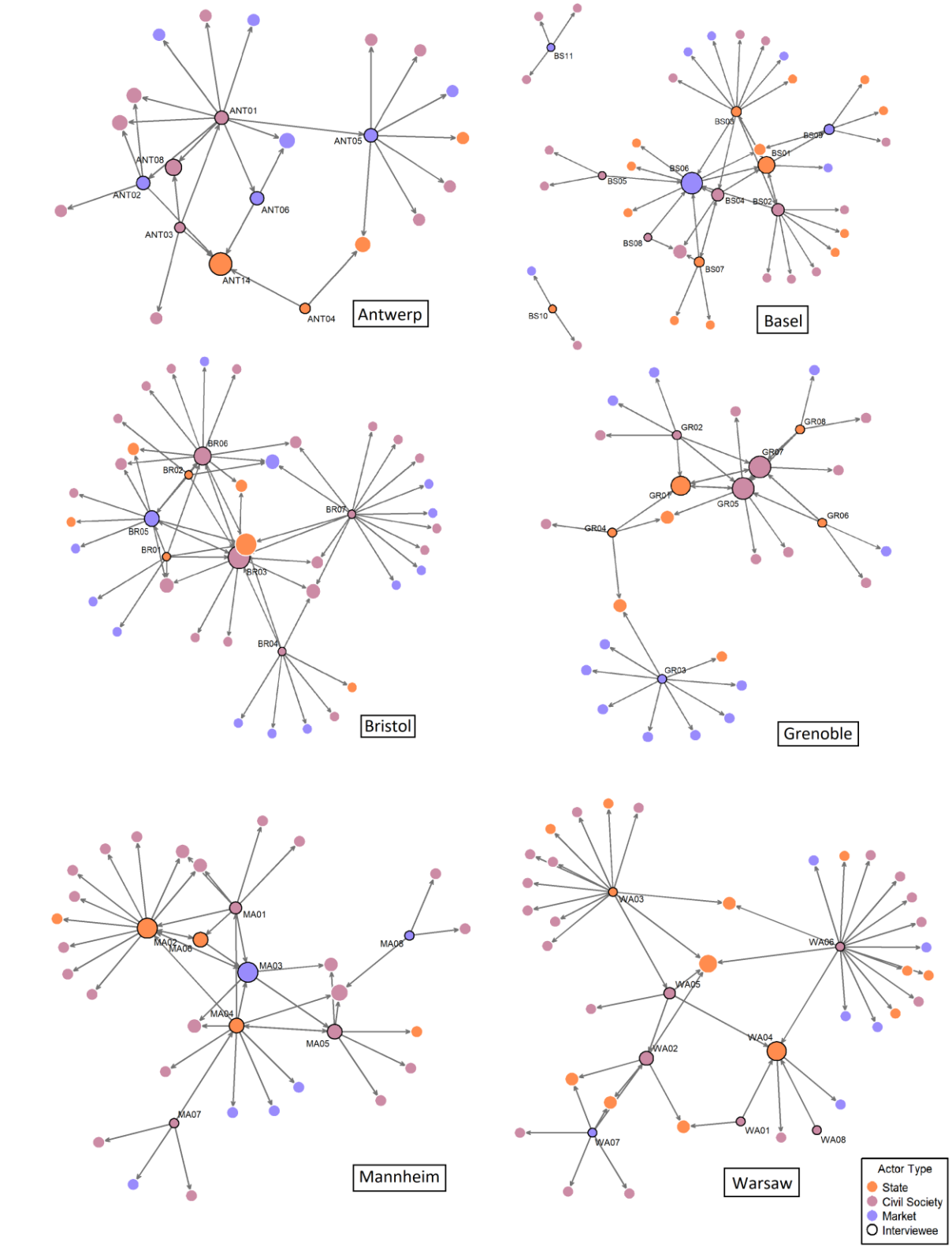

Figure 8: Local policy networks in the six SONNET cities

Note: Colours indicate actor types. Node sizes vary according to indegree centrality. Edges indicate cooperation on the topic of SIE (past and/or present).

On the other hand, with **cross-tabulation**, correlations between the relationship types Innovativeness, Trust, Support, Agreement and Power and whether or not the actors were administrative actors were assessed. The chi-square tests for innovativeness and support showed no correlation between these variables and the actors being part of the administration. Also, administrative actors were perceived as trustworthy with only few exceptions[6]. For power though, the test shows a high significance[7]. The cross-table shows that **administrative actors are proportionally perceived as powerful, and very powerful far more often than other actors**.

In summary, the data **confirms the special role attributed to administrative actors when enabling SIE**. The further analysis lies on types of interaction and types of relations supporting or impeding the development of SIE.

Types of Relations and Interaction

The different types of relations and interactions were assessed and analysed on the macro-level with a focus on the interrelations between types of interaction and types of relations.

In particular, it is of interest how and to what extent the relationship types *innovative*, *trustworthy*, *supportive*, *agreement* and *power* influence the interaction between the actors. Agreement and power were surveyed with five-point Likert scales and asked as the level of agreement between the respondent and their named contact and the named contact's perceived level of power in terms of SIE. The other were binary data on whether or not the properties applied to the named contact.

Innovative Ties

Perception of innovativeness of one's contacts (see Figure 13 in Appendix 7) may influence choices on who to cooperate with regarding SIE. On city level, it is noticeable that in Mannheim and Bristol most contacts are indicated to be innovative whereas in Basel and Warsaw, more contacts are perceived to not be innovative. In Mannheim though, the actors perceived **not to be innovative** are mostly the incumbents influencing the actions around SIE and situated rather at the **centre of the network**. In Bristol, on the other hand, the contacts perceived as not innovative are situated rather in the **periphery** of the network. This may point towards a preference of bottom-up processes when promoting SIE considering the central position of civil society actors in the SIE policy network in Bristol. This seems to reflect on the advanced standing of Bristol in terms of SIE, since enablers for SIE are situated in the centre of the network whereas possibly impeding actors seem to be situated in the periphery. Seeing that funding will be rather given to actors who are perceived as innovative it might be an issue when only few actors are being seen as innovative and thus, less projects and initiatives might receive funding.

[6] The p-value of 0.050 after a chi-square test indicates no high significance for the correlation between trust and being an administrative actor, though.
[7] p-value = 0.018

Support

In all cities, **more relations are perceived to be supportive**. The fewest unsupportive contacts relative to the supportive ones are named in Bristol and Mannheim.

The networks showing the perception of support between the actors (see Figure 14 in Annex 7) show that, **especially the central actors, mostly the incumbents, are generally seen as not supportive.** An exemption of this is the network in Bristol (see Figure 9), where the central actors are perceived almost exclusively as supportive and overall only very few relationships are perceived as unsupportive. The high share of relations perceived as unsupportive stands against the qualitative data suggesting that many actors perceive the local administration as supportive. When concentrating on administrative actors only though, the quantitative data supports this assumption. Out of 35 ties to administrative actors, in 26 cases the **administration was considered to be supportive**. Mostly, administrative actors are considered supportive as well as trusted. Although in 25 % of the mentions of administrative actors they were perceived as unsupportive, they were still **mostly trusted contacts with whom a high level of agreement was shared**. The actors perceiving administration as unsupportive were only two other administrative actors with a focus on SI, Market actors from the energy sector and SIE actors from Civil Society.

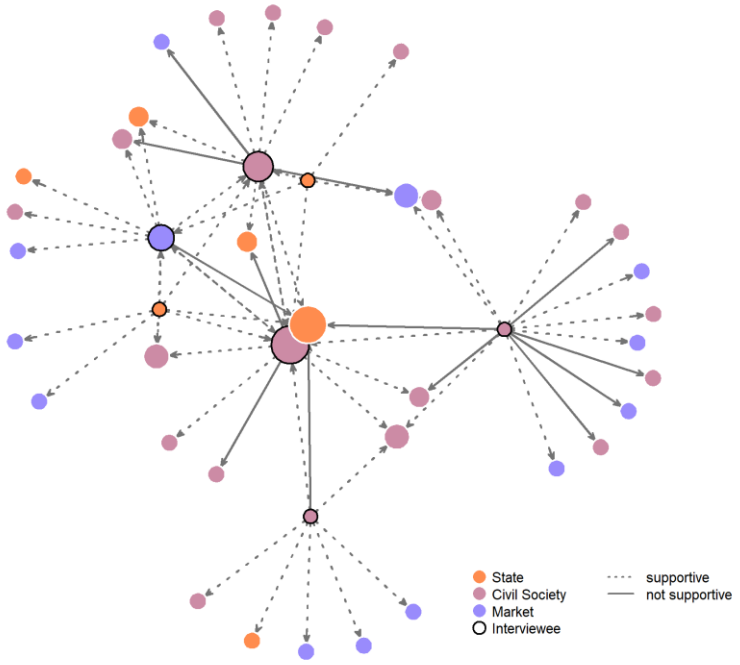

Figure 9: Supportive and non-supportive relationships in the policy network of Bristol

Note: Edges indicate cooperation on the topic of SIE (past and/or present).

Trust

The different local networks (see Figure 15 in Appendix 7) show that usually **the very central actors are well trusted,** and a chi square test supports the assumption from the qualitative findings that

trust matters for the willingness to collaborate. Particularly concerning the provision of funding, trust seems to play a bigger role. In Basel, Bristol and Mannheim only very few contacts were perceived as not trustworthy. Grenoble and Warsaw though indicate different structures. In Grenoble, **mistrust was indicated between the most central state actor and one of the most central civil society actors**. Particularly the latter is mostly mistrusted which may point toward difficulties in the development of SIE and maybe inhibitions in the collaboration toward that goal.

In Warsaw, **more relations of mistrust than of trust occurred**. This aspect reflects in **Error! Reference source not found.**, showing how especially state actors are mistrusted, and **Error! Reference source not found.** which visualises who is perceived to be blocking one's own actions. Not all contacts who are perceived as not trustworthy and those who block the Egos' actions are the same and

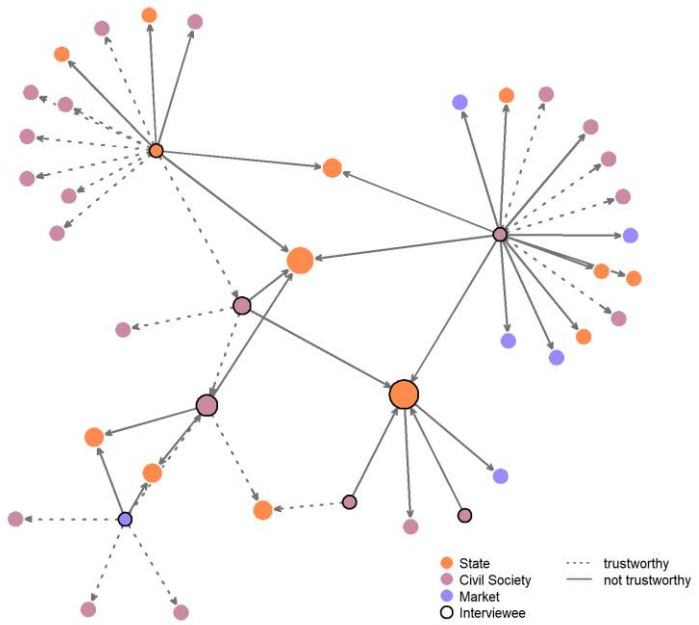

Figure 10: Trust relationships in the policy network in Warsaw

Note: Edges indicate cooperation on the topic of SIE (past and/or present).

vice versa, but especially in the network centre the **overlap of mistrust and conflict** becomes apparent. The perception of supportive relations gives a similar impression, although one actor perceives two state actors as supportive although they seem to block the actor's actions.

The findings indicate a difficult status quo in Warsaw, which singles the city out among the six SONNET cities in the conditions for the development of SIE. The following section on agreement shows that the data on agreement and disagreement further supports this impression.

Agreement

The logistic regression indicates that agreement does not play an important role for collaboration on SIE. Considering that in hardly any cases disagreement was considered between the contacts, this was to be expected. When focusing on the relationships for which disagreement was indicated (see Figure 16 in Appendix 7) or that the other party blocked ones' actions, the first thing that stands out is that none of the cases are in Antwerp or Bristol and most of them are in Warsaw.

Considering the industrial background and the conflict around the coal phase-out in Poland, this situation points toward a lot of complications when trying to enable SIE. Here, **the respondents disagree mostly with State actors**, out of whom only one is a local administrative actor. The others are Market actors from the Energy sector. In spite of meetings between them and the respondents, in only three cases (out of 13) there is collaboration. For all of these relations, the contacts were said to block the respondents' actions and in five of those, the respondents blocked their contacts' actions as well. Still, they received advice from more than half of these contacts.

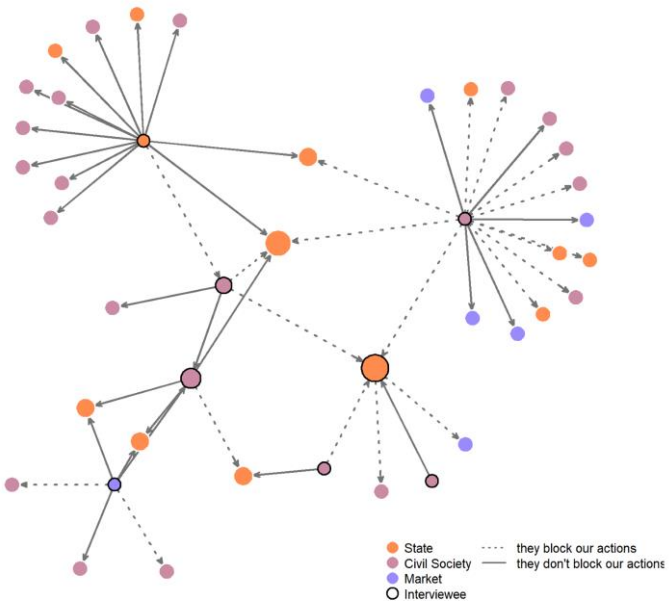

Figure 11: Actors feeling being blocked by others in the policy network in Warsaw

Note: Edges indicate cooperation on the topic of SIE (past and/or present).

Further analysis of the conflict variable only for the city of Warsaw suggested that the contacts who were blocking the respondents' actions were considered less innovative, not trustworthy and especially as unsupportive. A **conflict between national and local governance seems to be of particular concern** here and the local development of SIE might be impeded through the status of being capital city and national politics slowing down efforts for the energy transition. The large

Polish energy providers are important economic players in the country which is still largely dependent on fossil fuels and especially coal. As such, in this context SIE might still be further away and SIE needed might be especially on the level of 'Thinking'.

Overall, disagreement and actual conflict are hardly indicated, which might be due to the respondents' unwillingness to share such information. Still, the findings allow for the idea that in terms of the energy transition and society's part in it, **actors agree in their opinions** on the importance of social dimensions in the energy transition or at least accept the importance of those aspects. As such, personal relationships and power seem to be what further development of SIE relies on.

Power

Power relations (see Figure 17 in Appendix 7) are an important factor in the policy networks around SIE in the six SONNET cities. Administrative actors in particular are often perceived as powerful whereas civil society actors are seen as less powerful. The actors considered to be most powerful are mostly active in the energy sector or have a broader focus. Those perceived as less powerful focus on SIE, SI or sustainability. This reflects on Civil Society actors as hardly being considered as powerful, whereas State and Market players are the most powerful ones. Overall, the six cities confirm that impression. Still, in Mannheim, SI actors and in Warsaw, actors with a focus on sustainability are mostly considered to be powerful in the context of SIE. In Bristol, **more Civil Society actors are perceived as powerful whereas Market actors are attributed less influence** (see **Error! Reference source not found.**). In this context and considering that SIE seem to lie mostly with society and the other actors could be more involved (see section 5.2.1), this aspect raises the

assumption that a **power shift** from market actors towards civil society actors as observed in Antwerp (see Box 5) may follow or even be necessary for SIE.

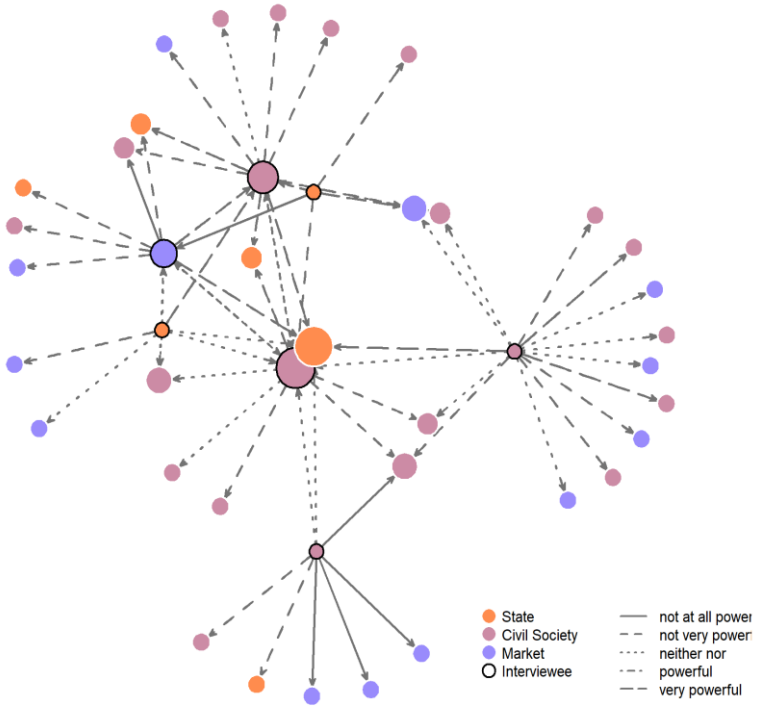

Figure 12: Power relations in the policy network in Bristol

Note: Edges indicate cooperation on the topic of SIE (past and/or present).

6. Towards a Toolkit

Based on our findings from the qualitative and quantitative data analysis, we developed a checklist that is intended to serve as a practical toolkit for policy makers, especially on the city level. It provides an overview of advices to establish network relations that enable SIE. This has to be considered as a living document that will be further reflected together with SONNET's city partners and supplemented with findings from further work in SONNET conducted on the city level (e.g. SONNET's city lab evaluations).

Box 9: Checklist with practical advices for policy makers

Checklist

Network structure

- ✓ Diversity of actors involved: there is a good mixture between different types of actors in SIE
- ✓ Roles of actors involved: different types of actors are equally involved in SIE
- ✓ Role perceptions: encourage the engagement of different types of actors in SIE by avoiding prejudices and negative role perceptions

Personal relations

- ✓ Personal ties: the network builds on strong personal ties without being 'exclusive'
- ✓ Engagement: different types of actors equally and actively engage in SIE
- ✓ Competences: different types of competences and knowledge are included in the network

Role of city administration

- ✓ Proactive approach: the city administration actively engages in supporting SIE
- ✓ Resources: financial and personal resources are provided by the city administration to support SIE
- ✓ Competences: the city administration provides competences (e.g. knowledge and practical skills) concerning SIE and related topics

Policy making

- ✓ Political support: SIE are supported by officially appointed politicians
- ✓ Access to decision making: SIE-initiatives have possibilities to gain access to decision making
- ✓ Legitimacy: SIE is widely supported and legitimised within the city

Venues

- ✓ Project settings: provide possibilities to include diverse types of actors in SIE in project settings
- ✓ Formal meetings: Regularly organise meetings and provide opportunities for exchange
- ✓ Personal meetings: Allow to build strong personal ties without being exclusive through regular opportunities to meet in person

7. CONCLUSIONS

In this section we summarize our key findings based on our mixed methods approach, and then close with some reflections on the limitations of our study.

7.1. Summary of key findings

The main aim of this deliverable was to answer the question how SIEs are enabled or impeded through policy network structures and how can enabling structures be realised. To answer this question we identified factors that enable or impede SIE in the SONNET cities and, in a next step, analysed how policy networks emerge and contribute to enabling or impeding SIE.

Building on a multi-method approach, the emerging policy networks were both studied using qualitative interview data as well as quantitative data based on an online survey. The analysis of qualitative interviews showed that a proactive approach of city administrations can be a crucial factor for enabling SIE. This includes providing resources, organising meetings or supporting with competences around SIE. SIE are characterised by their specific network structures that require both in-depth knowledge and a broad legitimacy within the city. To enable SIE, networks therefore have to find the right balance between the depth of relations and the size of the networks. They have to include a variety of actors with different types of knowledge and at the same time be based on professional knowledge around energy. Factors that impede SIE are mostly linked to a lack of communication and cooperation between actors or the lack of resources to work on energy. These factors are closely linked to network structures that can be considered as impeding SIE.

The quantitative data confirms the assumption that administrative actors play a central role in enabling or inhibiting SIE in a local context. They are perceived as very powerful, and, in the boundaries of the study, as supportive for those actors relevant to SIE within the local policy networks. At the same time, civil society actors seem to be those important in bringing SIE forward. Thus, incumbents (State as well as market actors) can support bottom-up processes and the initiatives and projects initiated by civil society actors to enable SIE. As such, state and market actors could and should be involved more. In their important function as possible enablers, they might overthink their own roles as well as which actors to support. A diversity of actors in the respective policy networks can bring in different ideas and knowledge and thus help to develop new SIE. The importance of SIE or energy transitions seems to be shared, even though differently pronounced. At the same time, with a limited diversity of actors within the network and collaboration also relying heavily on trusted relationships, further development and establishment of SIE may be inhibited due to limited access. Another factor can be limiting context factors which may be difficult to overcome, particularly if there are power imbalances between incumbents and new SIE actors entering the network (or trying to.

To counteract such impeding factors and to enable SIE within local contexts, the checklist in section 6 provides a first frame of orientation.

7.2. Reflections on limitations

The aim of the mixed-methods approach was to combine an in-depth view on relations surrounding SIEs in the city (qualitative interviews), with a systematic, comparative approach to understand the impact of policy network structures on enabling and impeding SIEs (quantitative survey). This approach allows linking the qualitative data gathered about motives and background of realised interactions with data on contacts and types of interaction between SIE actors. While the approach was able to fulfil this overall aim of combining qualitative and quantitative information, some limitations remain.

Since the first field access was achieved through administrative city actors, chances are that the network is characterised by these first stakeholders and their closer contacts. The sampling strategy of using the first access and using a snowball approach from there on to find other relevant stakeholders further amplified this potential issue. To counteract this, the strategy was extended by desk research and by contacting relevant actors who were identified during WP1 of SONNET. This helped approaching also those who were not mentioned by the other respondents. The network data from the survey was used as a list of actors to contact and was further complemented by stakeholders identified by interviewees as relevant for SIE in their city. Still, the actor diversity may be somewhat limited, although this may differ between the six SONNET cities.

Partly as a result of the pandemic circumstances, the number of interviews conducted was smaller than initially planned. A minimum of 10 interviews was conducted per city (as compared to the initially planned minimum of 12). It has to be kept in mind during the analysis that only a part of the local policy networks around SIE could be mapped and analysed. To counteract the smaller number of interviews and to ensure the collection of sufficient and reliable quantitative data, an online survey was conducted in addition to what was originally planned. This aspect is particularly important for the quantitative analysis of the network data and had to be taken into account when interpreting the observed results. The sample sizes and hence, the networks are not representative. Only the networks of the interviewees were assessed, not including the possible relationships between their named contacts as well as further actors who were not mentioned by the interviewees and survey respondents. The interviews also showed that not all relevant contacts were named in survey responses. Moreover, since not all interviewees filled in the survey, some individual networks were not assessed and analysed quantitatively at all. Consequently, the measure of centrality used is based only on the amount of times the actor was named by other interviewees. The different data bases, owed to the differences in detail in which the questionnaire has been filled in, allowed for a varying degree of detailed analysis. In Table 9 one can see the very different numbers of participants in the study. This means not only overall limited amounts of data, but also different levels of response from city to city.

Still, with those limitations in mind, significant observations were made and presented in this Deliverable. They are the basis for a toolkit to enable SIE in local contexts.

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Appendix 1: EC summary requirements

Changes with respect to the DoA

According to SONNET's grant agreement we were planning to conduct a minimum of 12 structured interviews per city (e.g. with city officials, policy makers and intermediary organisations, energy companies). We reduced the minimum number of interviews per city to 10 interviews to address increasing corona obstacles. Instead, we added a quantitative questionnaire to be answered by the interviewees (in addition to our qualitative interviews). This was not planned in the proposal, but allowed to collect quantitative data through a survey, thereby also providing more interview time for answering qualitative questions. Together, this has helped us in collecting sufficient information to achieve the objectives of WP2, and T2.2 in particular, even with a lower number of interviews. In addition, the deliverable deadline was extended by 2 months, from 30 April 2021 to the new deadline of 30 June 2021.

Dissemination and uptake

The deliverable is important for further analysis, especially in T2.3 and T2.4. Furthermore, the checklist developed in this deliverable serves as a starting point for a practical toolkit for practitioners and policy makers and will be further developed and presented on one of SONNET's on tour workshops in autumn 2021. The results presented in this deliverable will be further developed and submitted for publication in a peer-reviewed journal.

Short Summary of results (<250 words)

The aim of this deliverable was to answer the question how SIEs are enabled or impeded through policy network structures and how enabling structures can be realised. The analysis of qualitative interviews showed that a proactive approach of city administrations can be a crucial factor for enabling SIE. This includes providing resources, organising meetings or supporting with competences around SIE. To enable SIE, networks therefore have to find the right balance between the depth of relations and the size of the networks. They have to include a variety of actors with different types of knowledge and at the same time be based on professional knowledge around energy. Factors that impede SIE are mostly linked to a lack of communication and cooperation between actors or the lack of resources to work on energy related aspects. The quantitative data confirms the assumption that administrative actors play a central role in enabling or inhibiting SIE in a local context. They are perceived as powerful, and, in the boundaries of the study, as supportive for those actors relevant to SIE within the local policy networks. At the same time, civil society actors seem to be important in bringing SIE forward. At the same time, with a limited diversity of actors within the network and collaboration also relying heavily on trusted relationships, further development and establishment of SIE may be inhibited due to limited access.

Evidence of accomplishment

This document.

Appendix 2: Supplementary Material for the Sampling Process

The following templates were used for establishing interview contacts via email. The use of these templates was not mandatory. The research partners could adjust information and vary their wording according to the situation.

E-mail #1 - Template for initial establishment of contact.

Dear Mr./Ms. XYZ,

Within the EU Horizon 2020 project SONNET (https://sonnet-energy.eu/), our research consortium (led by Fraunhofer ISI) is investigating the social and political dynamics of social innovation in energy (SIE) in your city. We are particularly interested in understanding the role of networks, policy and power relations in SIE in six European cities, with your city being one of them.

[xxx] has indicated it would be good to talk to you due to your expertise on [xxx]. The **interview** would take 1-1.5 hours depending on your availability.

In brief, the interview covers the following topics (within your city):

- The role of social innovation in energy (SIE)
- The role of networks in enabling and impeding SIE
- The perception of policies and the policy making process of relevance for SIE
- The role of power in SIE

If you agree to participate in the interview, we would like to send you an **online pre-questionnaire**, which will take between 15 and 20 minutes to fill in. This questionnaire is meant as a brief preparation for yourself and us as researchers for the topic of the interview.

Please find more detailed information about the project, the study and the procedure in the attached participant information sheet.

If you have any questions about our study, please send an e-mail or call [insert name/title/organization] at [insert e-mail and phone number]. In addition, you can find the first project outputs of the SONNET project here.

Thanks for your consideration. We would be delighted to learn from your experience to derive at a better understanding which role social innovations play for the energy transition.

Sincerely,

[Name]

[E-Mail signature]

After initial response of interest

Follow up with details on timing, tool, etc.

Follow-up E-mail with details

The follow-up e-mail was supposed to be sent about 1,5 - 2 weeks later max.

Dear Mr./Ms. XYZ,

We are very glad that you agreed to participate in our SONNET interview on social innovation in energy (SIE) and provide us with more information on the networks, the policies and the power relations surrounding SIE in your city.

As agreed on, our interview will take place on the [date] at [time] via [provide link, phone number, etc.]

As announced in the first e-mail, we would ask you to fill out the pre-questionnaire prior to our interview appointment. It will take you between **15 and 20 minutes** to fill in. This questionnaire is meant as a brief preparation for yourself and us as researchers.

The questionnaire asks about your professional relations and the role collaboration and power play therein to enable or impede social innovation in the energy transition in your city and beyond. It shall also help as a means of preparing for the topic of the interview.

Please follow the [link] to access the questionnaire.

Of course all of your data will be treated confidentially and only analysed in an anonymised way. At no point will you or your organization be identifiable in the outputs we generate from this research.

If you have any further questions about the interview, the questionnaire or our study in general, please do not hesitate to contact me.

Sincerely,

[Name]

[E-Mail signature]

Recording the interview

Recording the interviews was key for extracting the information later. Audio recordings were clearly preferable to written notes only, and in most cases interviewees were given permission for audio recordings (informed consent process, including consent form).

The following resources for simple recordings in person, by phone, or by software were recommended.

Interview in person	Interview by landline phone	Interview by software
…using your mobile (link)	…using landline phone (link)	…using GoToMeeting (link)
	…using Android (link)	…using Zoom
	…using Iphone (link)	…using Teams

You are free to use the method you prefer (but only if these remain within the constraints of our ethics and data management provisions).

If the interview was recorded, researchers were encouraged to provide an audio file of the recording (.wav, .mp3, or others). If due to technical issues or if the participant did not provide consent for recording, researchers needed to rely on written notes for filling in the city summary.

Checklists

The following checklists were provided for the interviewers for before and after conducting your interview.

Checklist prior to the interview:

- Ensure to send the link for the access of the online survey well before the interview (see mail above).
- In case you have not arranged the appointment through Outlook or similar software, send an email or call a few days ahead to remind participants of the interview appointment and of the online survey.
- Inform Fraunhofer ISI team when the interview is planned so that we have sufficient time to provide you with the questionnaire responses.
- Make sure you share a current version of the **consent form**, which is a very slightly shortened version as the one for WP3 (no consent for video recording required) (an English version of which can be found in the interview preparation folder).
- Conduct a brief background check on the interview participant (position, fields of expertise, current tasks). Use LinkedIn, Researchgate or other established websites.
- Check the online questionnaire responses to relate to them during the interview
- Check proper functioning of your recording devices or software.

Checklist after each of the interviews:

- Make sure you have a good and complete documentation for yourself of the interview - we would suggest to use the template of the interview summary (appendix) for that and extend it as a living document as you continue reporting the other interviews
- If available, upload the audio recording of the interview to the dedicated folder (here). Please make sure that the file names are anonymized (and that your list linking the number of the audio file with the name of interviewee is kept separately and only at your end) - Please check section 6 for details on ethics and data management.
- If the interviewee agreed to answer a further questionnaire (for WP6) send a follow-up e-mail to the interviewee, which includes the link to the questionnaire.
- Share any suggestions for improving the interview process for the following interviews with the project partners.

After all interviews are completed:

Finalize the Interview Summary report.

Appendix 3: WP2 Pre-Questionnaire

Understanding the role of relations and networks to enable or impede social innovation in energy transitions

- Pre-Interview Questionnaire

GENERAL remarks on questionnaire:

Dear participants,

this questionnaire is meant as a brief preparation for yourself and our researchers to the interview you have kindly agreed to participate in.

The questionnaire asks about your professional relations and the role collaboration and power play therein to enable or impede SI in the energy transition in your city and beyond. It shall also help as a means of preparing for the interview topic wise.

It will take you about 15 to 20 minutes to fill out this questionnaire, which will be of great benefit to you to start thinking about the issue we will dive deeper into during the interview.

Beside preparing the interviews, the data that we obtain from the questionnaire will feed into a detailed network analysis, which helps to understand the role of network structures and power in enabling or impeding social innovation in energy transition.

The results of the network analysis will be shared with you in a Webinar organized by ICLEI as soon as they become available, which will share insides on what different organizations (such as initiatives or city administrative actors) can do to create enabling environments.

We therefor kindly invite you to participate in the questionnaire to contribute to a better understanding of creating these enabling environments!

Informant consent information:

As part of this research project, we need your consent to collect data on your organisation/ project.

Data collected through this survey is kept strictly confidential and will only be available to the research team. Only the person who contacted you for the follow up interview will be able to connect your answers to your personal information. This personal data however will be stored in separate locations in secure institutional servers. Research data will be analysed and presented in a way that does not allow someone to trace the responses back to an individual. You can refuse to participate or withdraw from the survey at any time and without any negative consequences.

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Do you consent to the collection, storage and use of the data you provide in the survey as described above? By clicking on the "Next" button, you acknowledge that you have read and understood the consent.

Context information

QQ1a: Which Organization do you work for? Or based on which the affiliation to which organizations do you respond to this questionnaire?

[Please note that this information is only needed for linking the collected data. All data will be processed in a way that complete anonymity is guaranteed to you and your organization]

QQ.1b: Which actor type do you represent?

- Administration
- (Local) Government
- NGO / initiative with energy focus
- NGO / initiative with other focus (e.g. social, environmental, networking)
- Others, please specify _____

QQ.2: Since how long

- are you holding your current position?
- are you engaged in topics surrounding energy?
- are you engaged in topics surrounding social issues?
- have you been living in your city?

QQ.3: Please rank the importance of the following aspects for the future energy system:

- having an affordable energy transition
- maintaining/creating new jobs
- market players remaining competitive
- increasing the amount of renewable energies
- focus on Energy Efficiency
- reduced land consumption
- securing social equality
- improved storage options
- improvement of the public health
- independence of resource-providing countries/reduced energy imports

Activities

QQ.4: In which energy related areas is your organization involved? Check all that apply.

- Mitigating climate change
- Adapting to climate change
- Energy use or production
- Energy efficiency
- Renewable Energy
- Toxins in the environment (incl. air pollution).

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- Other health related issues
- Nuclear Safety
- Mobility
- Living (e.g. Heating & Comfort in buildings)
- We do not work in any issue concerning energy
- Other, namely _____

QQ.5: At which of the following geographic scales does your organization operate? Check all that apply.

- Local contexts within the city (neighbourhood)
- Urban
- urban-rural relationship
- intracommunal/ translocal relationships (regionally, nationally, internationally)
- regional
- national
- European (which countries)
- international (which countries)

QQ.6: There are varieties of ways in which organizations work on issues related to energy.

In which of the following activities is your organization engaged? Also, include the activities, which your organizations supports others to perform, even if your organization itself is not active in performing these. Check all that apply.

- Producing, trading or consuming energy locally
- Producing & consuming energy cooperatively
- Providing of collaborative eco-efficient housing
- Advocating for specific energy pathways
- Participating in or organizing energy dialogues
- Participating in or organizing energy related experiments and incubation
- Exchanging electricity locally through peer-to-peer trading
- Providing energy education
- Consulting on energy related issues (non-profit)
- Learning on a peer-to-peer basis
- Organizing platforms for direct energy transactions
- Organizing investment and finance mechanisms
- Providing energy related for profit services and technologies
- Consulting on energy related issues (for-profit)
- Developing energy gamification and nudges (e.g. gamifying apps)
- Being active against specific energy pathways
- Campaigning against specific energy pathways
- Networking with others against specific energy pathways
- Other ways, namely _____

Actors and organizations

In this section, we would like to learn more about the organizations, interest groups, administrative and policy actors particular within your city, but also beyond, with which you interact regarding 'social innovation in the energy sector' (short: SIE). Under **social innovation in the energy sector** we understand **all kinds of innovation in the energy sector which are not strictly or solely technical**. While a technical innovation would for example be the technical improvement

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of solar photovoltaic cells, a social innovation would be new forms of organising the energy production and distribution with solar PV through energy cooperatives or peer-to-peer energy trading. Other examples are the fields provided in the previous question such as, but of course not limited to, providing of collaborative eco-efficient housing, advocating for or against specific energy pathways, participating in or organizing energy related events, organizing investment and finance mechanisms, developing energy gamification and nudges (e.g. gamifying apps).

All those examples have in common that they refer to combinations of ideas, objects or actions that change social relations and involve new ways of doing, thinking and/or organising energy. Also, a new combination of existing ideas, objects or actions can be socially innovative.

QQ.7: Which are the most relevant organizations with which you interact around issues related to social innovation in energy? These can include (but are not limited to) administrative or policy actors, network organizations, initiatives? Name the most relevant organizations, regardless if the interaction is generally positive or negative.

Some examples of what we mean by "interact" include working jointly, sharing of advice or information, or jointly participating in collaborative meetings, but also for example applying for or providing funding or permissions, competing for resources, blocking of actions (e.g. based on competing interests).

[Maximum of 10 possible]

- Organization 1
- Organization 2
- Organization 3
- ...

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Types of interaction

QQ.8: In general, what types of interactions / relations around energy do you have with the organizations you mentioned previously? Please check all that apply even if the interactions do not occur often.

	We work jointly	*We jointly participate in meetings*	*We provide advice or information to…*	*We receive advice or information from…*	*We provide funding, permissions or other resources to…*	*We apply for funding, permissions or other resources from…*	*We compete for resources (e.g. funding)*	*We block their actions*	*They block our actions*
Org1									
Org2									
Org3									
Org4									
Org5									
…									
…									

QQ.9: We would like to know more about your perception of the organizations you nominated above. Would you describe the organization to be… (check all that apply)

	Trustworthy	Innovative	Supportive
Org1			
Org2			
Org3			
Org4			
Org5			
…			
…			

QQ.10: We would like to know more about the level of agreement between your organization and the organizations you nominated above regarding issues surrounding social innovation in energy.

Rate the level of general agreement between your organization and the nominate organization regarding energy transition issues.

[scale, where 1 = Totally agree; 2= Mostly agree; 3= Neither nor; 4= mostly disagree; 5 = Totally disagree

- Org1
- Org2
- Org3
- …

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QQ.11: On a scale from 1 to 5 (where 1 means not at all powerful and 5 means very powerful), how much power do these organizations exercise in influencing the energy sector in your city?

- Organisation #1
- Organisation #2
- Organisation #3
- Etc…

QQ.12: On a scale from 1 to 5, and compared to the organizations above, how powerful do you consider your own organization in influencing the energy sector in your city? *[Scale 1- 5]*

QQ.13: One way to understand power can be the ability to mobilize resources to achieve a goal. Based on this definition, how powerful do you consider your organization in the following categories on a scale from 1-5:

Ability to mobilize resources [1= not at all powerful, 5= very powerful]

- Mental (e.g. information, concepts, ideas)
- Human (e.g. support, members, votes, personnel)
- Artifactual (e.g. products, technology, real estate, infrastructure)
- Natural (e.g. raw materials, land, organic life)
- Monetary (e.g. funds, cash, financial stock, currencies)

QQ.14: We would like to learn at which occasions you meet other relevant actors. List the most important occasions (e.g. formal or informal venues, self-organized meetings, meetings organized by the city or higher level actors, voluntary / mandate meetings, etc.).

- Venue 1…
- Venue 2…
- Venue 3…
-

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Appendix 4: WP2 Interview Guide

Introduction for interviewers

In the sections 1, 2 and 4 all questions are to be asked to all respondents. The section 3 on policy processes distinguishes between policy & administrative actors and other respondents, such as initiatives. Please make sure to use the right set of questions.

Throughout the guide, information for the interviewer is summarized in boxes.

Besides that, the interview guide below distinguishes between:

Q: questions to ask directly
Questions printed in bold are to be prioritized. Other questions can be skipped, if the time is to short.

- Prompts (grey Italic bullets). The prompts are formulated in a way that they can also be asked verbatim.

Please note, that the prompts are not a list to use from top to bottom, but should be a reminder / clarification for the interviewer what is behind the overarching questions, and hence what needs to be prompted – the interviewer is free to use the prompts as they see fit and as time allows.

We have minimized the connections to the questionnaire as much as possible. Still, the questionnaire will help respondents to make more / faster sense of the questions asked in the survey. For questions that are still based on the questionnaire, alternative formulations are provided in the footnotes in case the questionnaire was not filled out in advance.

Starting the interview

Introduction by interviewer(s) towards interviewees

As shortly introduced in our email, we are interested in understanding the social and political dynamics of social innovation in energy **in your city**. With the term 'Social innovation in the energy sector' (short: SIE).

Under **social innovation in the energy sector** we understand **all kinds of innovation in the energy sector which are not strictly or solely technical**. While a technical innovation would for example be the technical improvement of solar photovoltaic cells, a social innovation would be new forms of

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organising the energy production and distribution with solar PV through energy cooperatives or peer-to-peer energy trading.
Other examples are:

- providing of collaborative eco-efficient housing
- advocating for or against specific energy pathways
- participating in or organizing energy related events
- organizing investment and finance mechanisms,
- developing energy gamification and nudges (e.g. gamifying apps)
- [Feel free to add further / other city-specific examples here]

All those examples have in common that they refer to combinations of ideas, objects or actions that change social relations and involve new ways of doing, thinking and/or organising energy. Also, a new combination of existing ideas, objects or actions can be socially innovative.
During this interview, we are in particular interested in understanding the role of networks, policy and power relations.

Our interview consists of 4 main parts, each of which has several questions:

1. SIE in the city
2. Networks
3. Policy
4. Power

Formalities

Consent form:

Before you start the interview, please go with the interviewee through the consent form. The consent form is the same as for WP3, an English version of which you can find here. And assure that the interviewee signs the form.

Please make sure that the interviewee agrees to be recorded on the consent form. Assure the respondent that this is simply for quality control purposes. This is to ensure that we can process the things being said as direct as possible. The recording will only be accessible to the researchers directly involved in this work package and will strictly follow the data management procedures set out for the whole project. The recording will not be used for any other purposes than the analysis and it will be ensured that the information is processed in a way that does not allow to trace it back to the individual or organization.

Start recording if interviewee agreed to it!

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Topic 1: SIE

Note to interviewers: The questions in this section are to be asked to all respondents.

In this section, we are interested in understanding the relevance of social innovative approaches in the energy sector within your city and the different roles that city administration, initiatives and other actors thereby take.

Q1.1a: Which projects are you working on that are related directly or indirectly to energy?

Q1.1b: From your perspective, among those projects, which are the projects that are more innovative?

Prompts:

- E.g. which bring new ways of doing things?
- Why are they new?
- Do you know other examples of social innovations in your city, in which you are not (directly) involved?

Q1.2: Thinking about those social innovations with a relation to the energy sector, which of them do you perceive most important in your city and why?

Prompts:

- (How) are they important for the city and for your organization?
- What do you find socially innovative about them?
- How are they innovative in terms of new ways of doing, thinking and organizing?
- What would you describe as the most dominant way of doing, thinking and organizing about energy in your city? How is this specific for your city (e.g. how does it differ from other cities)?

Q1.3: Which different roles do you and your organization take in SIE in your city?

Prompts:

- For example as provider of funding, promoter of new ideas, intermediary between different actors?
- Apart from their primary role (e.g. policy-making) an organization can play different roles, such as investor (e.g. where does the organization itself get its energy from), role model, etc. In which primary and which other roles do you see your organization?
- [For non-SIE-initiative respondents]: Do you have any personal involvement with SIEs? [For non-city-representatives]: How are you personally connected to 'your' city?

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Q1.4: What do you think are the future potentials of SIE in your city?

Prompts:

- Do the ideas of SIE initiatives diffuse in your city and if so, which ones and how is this observable?
- Are ideas of SIE been taken up by other actors (e.g. the city administration)?

Topic 2: Networks

Note to interviewers: The questions in this section are to be asked to all respondents. Please make sure to ask the questions 2.1 and 2.2. Use the prompts only were necessary to specify the question. Questions 2.3, 2.4 and 2.5 are optional, depending on the time you have for the interview.

In this section, we would like to understand better, how relations among different actors can enable or impede social innovation in your city.

We would like to start with the relations you perceive to be enabling.

Q2.1: Thinking about your relations with other organizations that you perceive are enabling you to be innovative. Can you tell us more about what you experience to be the most important ways in which these relations are enabling and supporting your organization and other organizations / initiatives to be social innovative with regard to energy issues?

Prompts:

- In which regards are these relations enabling and supporting you?(e.g. providing support in rethinking structures, in actual implementation of projects or in reorganizing energy)
- By which means are these relations enabling? (e.g. provision of financial or other resources, providing networking opportunities, providing 'on-the-ground' knowledge, information, loyalty, etc.)

Q2.2: Can you tell us more about the ways in which these enabling relations developed?

Prompts:

- Which role did personal and pre-existing contacts play?
- Which role did bottom-up network activities play?
- Which role did city activities play?
- Which role did the venues play in which you participate?

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Q2.3: Can you tell us a bit more about the venues in which you meet other relevant actors?

Prompts:

- How relevant are these venues for you to establish and maintain relations?
- How are these venues organized?
- How do the venues in which you participate differ from each other? (e.g. by different actors, different formats)
- Can you describe the openness of the different formats (e.g. are these mostly one-way informative meetings; roundtables, etc.)How much can you influence the content of these venues (e.g. by developing the agenda of these meetings)'?

Now we would like to learn more about the relations you perceive to be impeding.

Q2.4: Can you tell us more about the ways in which these relations are impeding your organization and other organizations / initiatives to contribute to SIE?

Prompts:

- In your perception, which root does this impediment have (e.g. disagreement concerning overarching goals; competition regarding resources)
- How do these disagreements manifest?
- How do you handle conflicts with these organizations?

We would like to learn a bit more about the organizations you perceive as trustworthy.

Q2.5: Could you tell us more about how you perceive trust in relationships with these organizations?

Prompts:

- In which situations or through which actions does this trustworthiness manifest?
- Can you tell us more about how these trustful relations evolved?
- Are there contacts you would rather ask for support when facing difficult situations or conflicts?

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Topic 3: Perception of policies and policy making process

Note to interviewers: These questions are to be asked only to representatives of SIE initiatives, organizations and/or networks. The questions to administrative and political actors in the cities (and beyond) follow below - however, they are very much alike.]

For Basel, Warsaw and Grenoble: if you run out of time, then you can omit the prompts and instead only ask the two top-level questions. Since in T.2.4 we focus on multi-level policy (making), please try to get some insights on city vs other governance levels (prompts in bold).

In this section, we are interested in how the voice and interests of SIE and you as SIE actor are being considered by policy makers in your city and beyond.

Q3a.1: Which policies do you consider as particularly relevant for your SIE-initiative, and why?

[Explanation: by policies, we mean certain policy instruments (such as subsidies or information provision), but also policy targets, such as 2050 climate or energy efficiency targets; by relevant we mean both policies that are enabling SIE, but also those that are impeding SIE]

Prompts:

- Which policies (instruments and targets) do you consider most enabling and which most impeding for your SIE initiative/ field, and how so?
- What is the **relative importance of city level policies compared to policies at the regional, national and/or European level** for your SIE initiative/ field?
- Which policy changes would be beneficial for your SIE initiative / field? (e.g. new policies, changes to instrument design, termination of existing policies)

Q3a2: Can you tell me a bit about how you typically participate in the policy making processes associated with such policies of relevance for your SIE-initiative?

Prompts:

- When and how do you get involved? (when asked vs proactively, directly vs indirectly through representation of your interests by others, in a formal vs informal way, regularly vs ad hoc)? If never, why not?
- Do policy makers and administrators explicitly make space to listen to your voice (i.e. do you feel empowered to contribute)?
- With which type of actors do you engage with to influence policies for your SIE initiative/ field? (e.g. administration, politicians, mayor, interest groups, other SIE actors, etc.)
- Is there someone who would be important to work with but difficult to get access to (within the city administration and beyond)?
- Which actors support your interests, which impede them, and how?

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- How do engagement opportunities and your participation in policy making processes differ for enabling vs impeding policies?
- Beyond your city: How do you **participate in relevant policy making processes at a regional, national and/or European level**, and how does this differ from your involvement in city-level policy making processes? If not, why not?

Note to interviewers: The following questions are only to be asked to administrative and political actors in the cities. The question are not asked to the respondents who answered the previous questions on the policies and the policy making process.

[For Basel, Warsaw and Grenoble: if you run out of time, then you can omit the prompts and instead only ask the two top-level questions. Since in T.2.4 we focus on multi-level policy (making), please try to get some insights on city vs other governance levels (prompts in bold

In this section we are interested in how the voice and interests of SIE are being considered by policy makers (administration & politicians) in your city).]]

Q3b.1: Which policies do you consider as particularly relevant for SIE in your city, and why?

[Explanation: by policies, we mean certain policy instruments (such as subsidies or information provision), but also policy targets, such as 2050 climate or energy efficiency targets; by relevant we mean both policies that are enabling SIE, but also those that are impeding SIE]

Prompts:

- Which policies (instruments and targets) do you consider most enabling and which most impeding for SIE in your city, and how so?
- What is the **relative importance of city level policies compared to policies at the regional, national and/or European level** for SIE in your city?
- Which policy changes would be beneficial for SIE in your city? (e.g. new policies, changes to instrument design, termination of existing policies)

Q3b.2: Can you tell me a bit about how SIE-actors typically participate in the policy making processes associated with such policies of relevance for SIE in your city?

Prompts:

- When and how do SIE actors in your city get involved? (when asked vs proactively, directly vs indirectly through representation of your interests by others, in a formal vs informal way, regularly vs ad hoc)? If never, why not?
- Does your city (policy makers and administrators) explicitly make space to listen to the voice of SIE actors (i.e. empowering them to contribute)?

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- With which type of actors do SIE actors engage with to influence policies for SIE in your city? (e.g. administration, politicians, mayor, interest groups, other SIE actors, etc.)
- Is there someone who would be important to work with but difficult to get access to (within the city administration and beyond)?
- Which actors support SIE interests, which impede them, and how?
- How do engagement opportunities and the participation of SIE actors in policy making processes differ for enabling vs impeding policies?
- Beyond your city: How do SIE actors **participate in relevant policy making processes at a regional, national and/or European level,** and how does this differ from their involvement in city-level policy making processes? If not, why not?

Topic 4: Power relations

Note to interviewers: These questions are to be asked to all respondents. We trust that you can adapt it accordingly, e.g. when you are interviewing a SIE initiative, you might complement questions about "SIEs in your city" by asking examples from their own initiative. When you are speaking to a policy-maker, you can prompt for specific examples/experiences in their policies/departments.

If it is difficult to use the term 'power' in your local language (e.g. if it has a too negative connotation), please use the wording that you find most appropriate (e.g. influence).

In this final part, we would like to learn more about the power relations around energy in your city .

Q4.1: To what extent do you think that SIEs in your cities hold and exercise countervailing power (i.e. are able to "countervail" i.e. challenge, alter or replace the existing, dominant energy actors and structures)? What do you think could be strategies to increase this countervailing power of SIEs?

Prompts:

- Can you think of ways in which your [organisation/ department/ initiative] could be more empowered through networks or other forms of strategic collaboration?
- Are there specific power structures or networks that you think need to be countervailed (challenged, altered and/or replaced) and if so, which ones, and how?

Q4.2 : Which organizations would you characterize as being the most powerful incumbents in your city regarding energy? How would you characterize the relation that these incumbents/ powerful actors have towards each other, and towards SIE in your city?

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Prompts:

- What kinds of resources are being dominated by these incumbents/ powerful actors?
- How would you describe the power relations between these incumbents/ powerful actors and the SIEs in your city?
- Which networks are these incumbent organisations part of? (networks can be local, regional, national and/or international)? What kind of networks – lobby, policy, business…?
- How do these power dynamics that you describe manifest themselves [at the micro-level] in power relations between specific organisations, departments or people? Can you give an example?
- (How) do these power dynamics that you describe manifest themselves at the macro-level? And/or: How would you describe the overall power dynamics between the market, the state and civil society in your city?

Q4.3 : To what extent do you think that SIEs so far have impacted the power relations in your city?

Prompts:

- Who, so far, wins and who loses from the SIE-developments?
- To what extent do you think that the SIEs in your city are actually really challenging, altering and replacing these powerful/ incumbent actors discussed earlier? And/or: How and to what extent are SIEs challenging, altering or replacing the dominant ways of doing, thinking & organizing discussed earlier?

Q4.4: Earlier in the interview you reflected on the future potentials of SIE in your city. How do you think that energy-related power relations in your city are shifting or might shift in the (near) future, and how?

Prompts:

- Can you give an example of how power relations have shifted around your own [organisation/ department/ initiative]?
- Between which actors (organisations, departments, people) are/might/should power relations be shifting?
- In your vision, which power relations need to change and how in order for the energy system in your city to become more sustainable & just?

Q4.5: We would like to learn more about the role of networks in power dynamics. How are SIEs empowered through networks, and to what extent do you think that SIEs in your city are enabling/impeding each other through e.g. collaboration in networks?

Prompts:

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- To what extent do you [your organisation/ department/ initiative] strategically collaborate with other similar [organisations/ departments/ initiatives] in other cities and countries?
- Could you tell us a bit more about whether you [your organisation/ department/ initiative] is empowered by being part of these networks, and if so, how you are empowered?

Follow-up question on further survey participation (for WP6)

Q5.1: Would you be willing to answer an additional questionnaire about the success of SIEs/SIE-fields?

a. If the interviewee is a member of an SIE-initiative: send her/him an invitation for Survey 01 version 1 (regarding perceived importance and contribution of his SIE-initiative). At the end of this survey, s/he will be asked to provide contact points for Survey 2 (regarding SMART metrics for the activities and contributions of his SIE-initiatives) and Survey 3 (i.e. a survey among the members / supporters etc. of the SIE-initiative)
b. If the interviewee is NOT a member of an SIE-initiative: send him an invitation for Survey 01 version 2.

An overview of all WP6 surveys, as well as the links to invitation emails and the results which can be used by WP3 and WP2 researchers can be found in this document: Working Process from the Perspective of a WP3 Researcher.docx

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Appendix 6: Analysis of Interaction and Relation types

Table 11: Correlations between types of interaction and types of relations (corrected AIC)

	advice1	advice2	funding1	funding2	conflict	conflict WA
(Intercept)	0,02	-0,42	-0.87 **	-2.99 ***	-2.00 ***	-1.58 *
	(0.22)	(0.22)	(0.28)	(0.47)	(0.43)	(0.62)
Trust	0,47	0.53 *		0,70	-1.03 *	-1.74*
	(0.26)	(0.27)		(0.43)	(0.43)	(0.89)
Support			0.59 *	1.00 *	0,80	2.31**
			(0.30)	(0.42)	(0.45)	(0.68)
Agreement			-0,28		0,31	
			(0.15)		(0.21)	
Power			0,21	-0.58 ***	0.62 **	
			(0.13)	(0.18)	(0.20)	
Innovativeness			-0,42	0,49		1.36
			(0.28)	(0.34)		(0.75)
N	278	278	278	278	278	48
AIC	377,94	385,26	354,00	266,09	199,47	59,97
BIC	385,19	392,52	372,14	284,22	217,61	67,46
Pseudo R2	0,02	0,02	0,06	0,17	0,16	0,32

All continuous predictors are mean-centred and scaled by 1 standard deviation.
*** p < 0.001; ** p < 0.01; * p < 0.05.

Note: Conflict in WA refers to who feels the other actors block ones' own actions.

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Appendix 7: Network figures

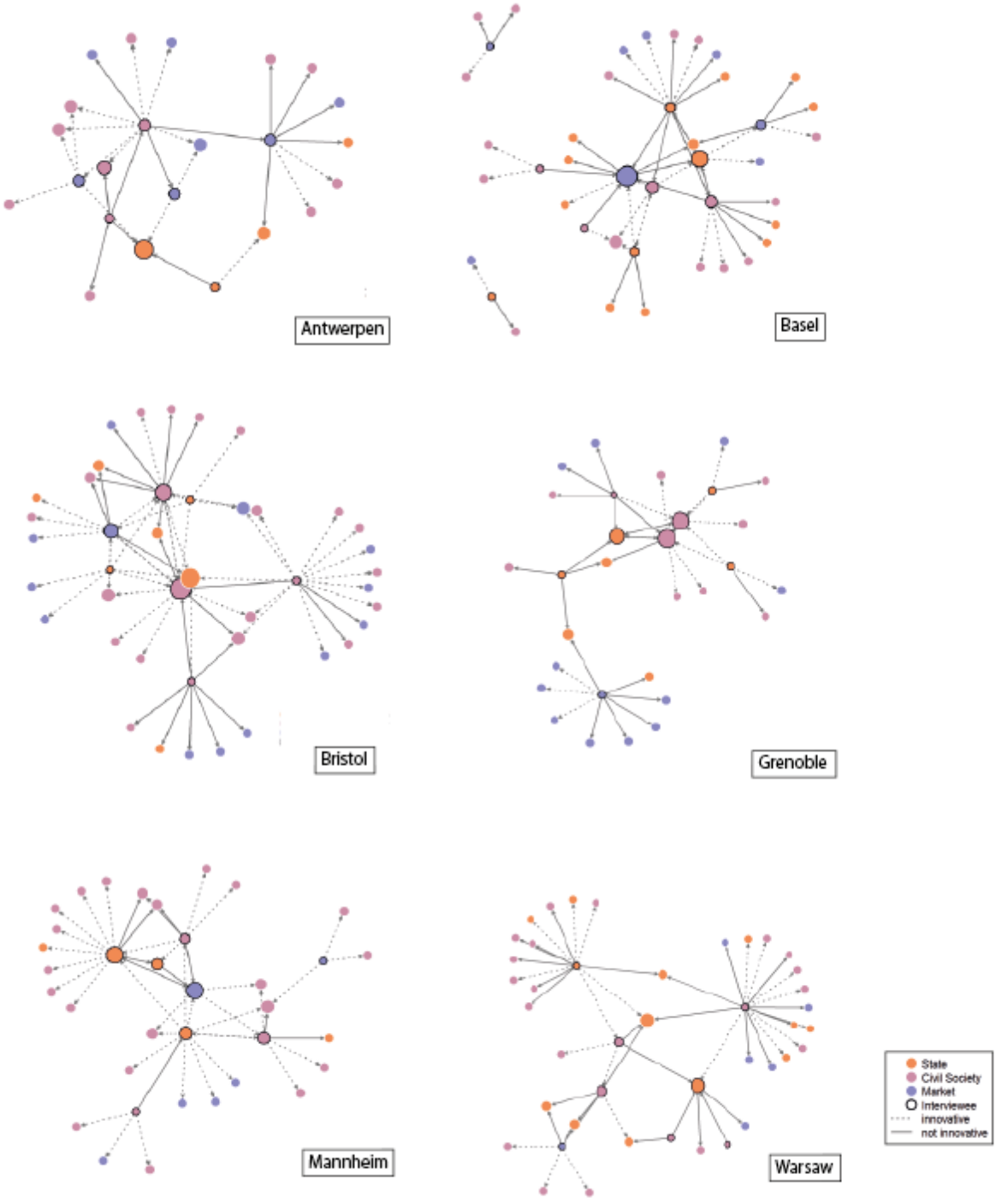

Figure 13: Perception of actors' innovativeness

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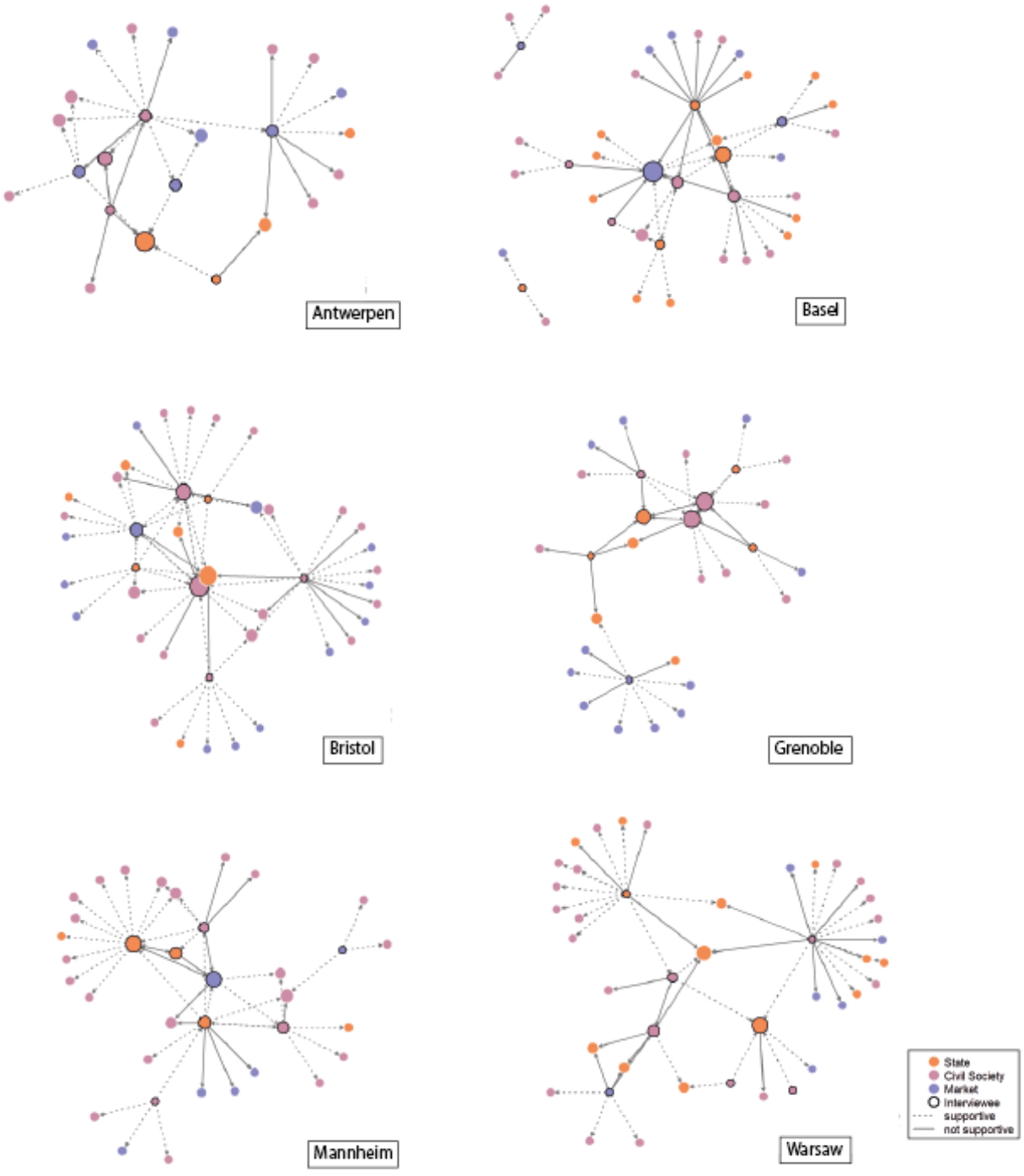

Figure 14: Perception of support

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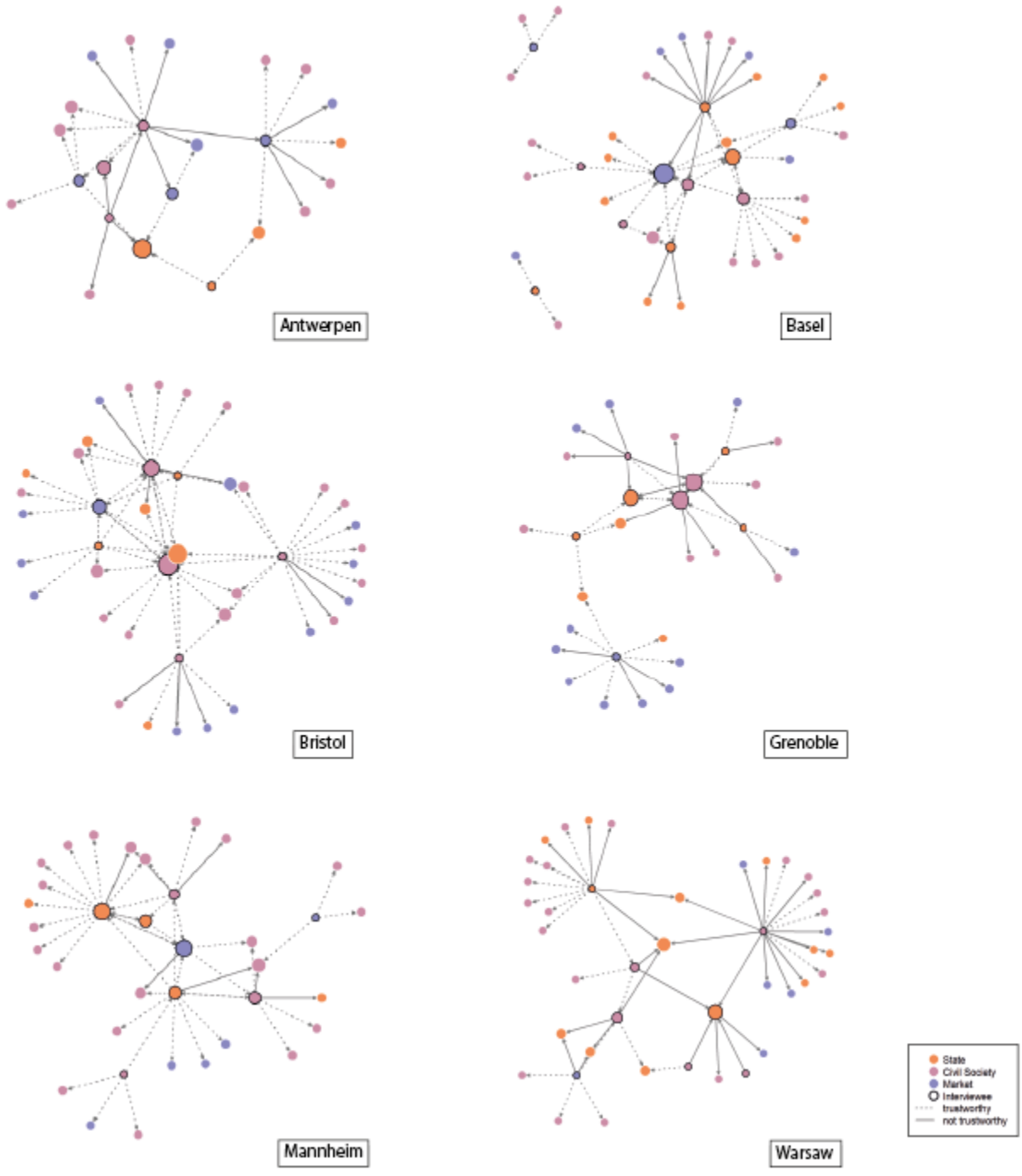

Figure 15: Perception of trust

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 837498.

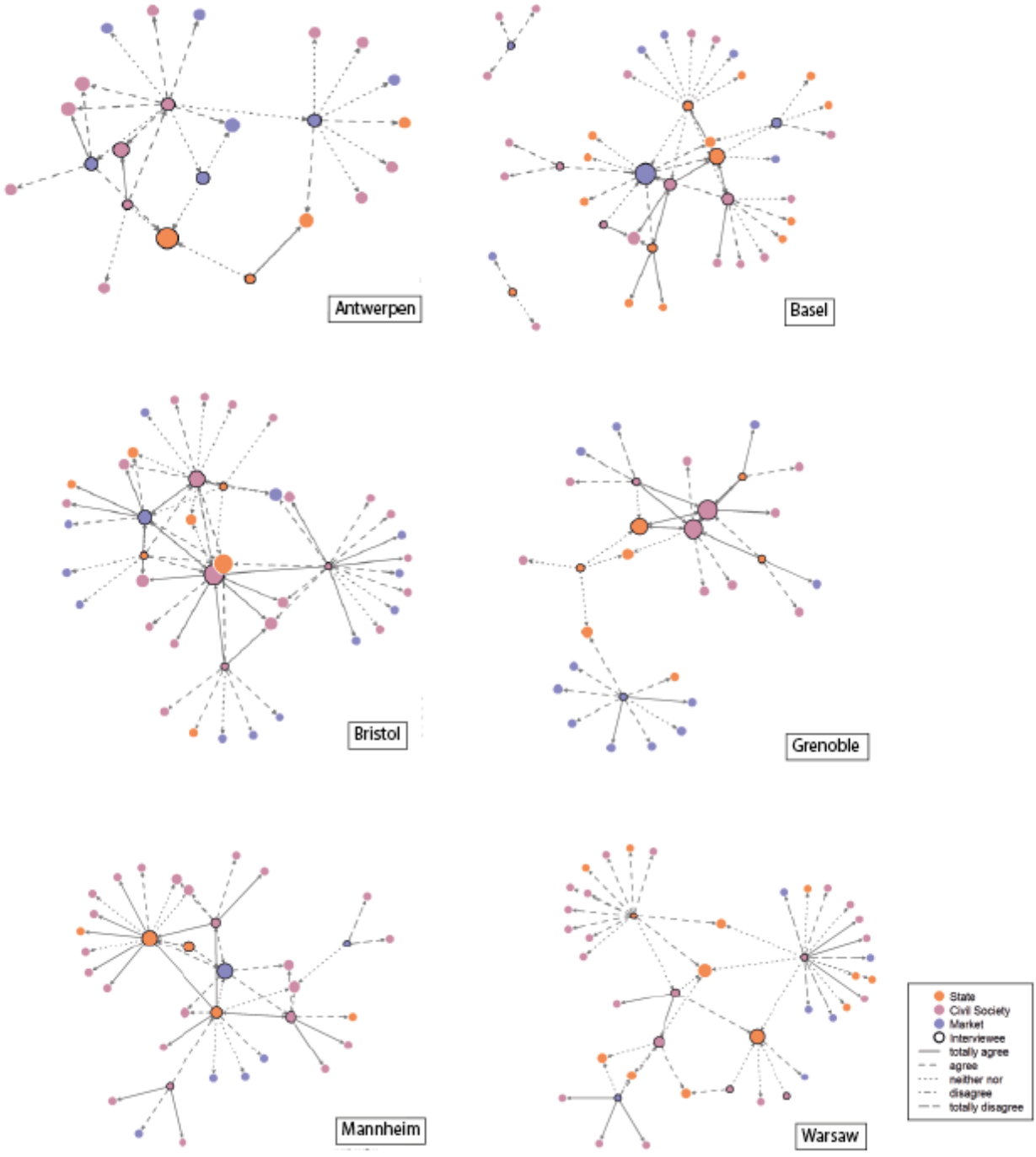

Figure 16: Perception of agreement

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 837498.

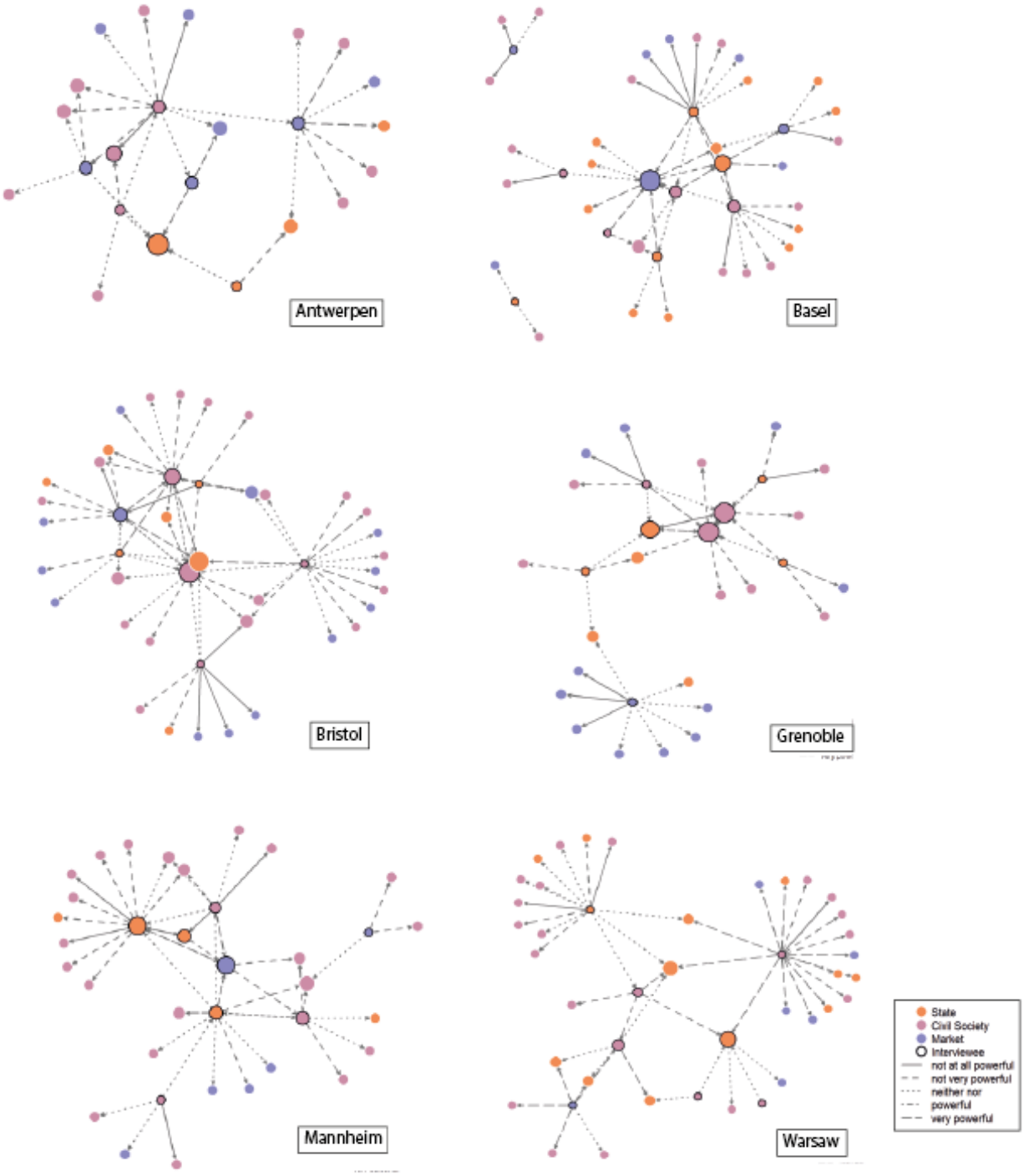

Figure 17: Perception of power

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