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

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Research report on city level competitions for sustainable energy in Germany

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About SONNET:

SONNET is a research project that aims to develop an understanding of diversity, processes, contributions and future potential of social innovation in the energy sector. It is co-funded by the European Commission and runs for three years, from 2019-2022. The SONNET consortium consists of 12 partners across Europe, including academics and city administrations. For more information, please visit our website: https://sonnet-energy.eu

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1 Forward

SONNET (Social Innovation in Energy Transitions) brings diverse groups together to make sense of how social innovation can bring about a more sustainable energy sector in Europe. The project aims to co-create a rich understanding of the diversity, processes, contributions, successes and future potentials of social innovation in the energy sector (SIE). We define SIE as a combination of ideas, objects and/or actions that change social relations and involve new ways of doing, thinking and/or organising energy. As part of this work, we make use of an embedded case study approach to build a better understanding of the development of diverse SIE-fields (e.g. participatory incubation and experimentation, framings against specific energy pathways, local electricity exchange) over time. Our research questions that frame the case study work are:

- How do SIEs and SIE-fields emerge, develop and institutionalise over time?
- How do SIE-field-actors and other field-actors interact with the 'outside' institutional environment and thereby co-shape the SIE-field over time?
- What are the enabling and impeding factors for SIE-field-actors and other field-actors to conduct institutional work and change the 'outside' institutional environment?

A SIE-field is an arena/space that includes a specific SIE as well as SIE-field-actors working on it and other field-actors enabling and/or impeding it. In this arena/ space these actors take one another and their actions into account and have a shared (but not necessarily consensual) understanding of a SIE and of their relationship to other actors. They recognise (but not necessarily follow) shared norms, beliefs and rules. SIE-fields are often not homogenous but are composed of actors with diverse and contradictory aims and interests. An example: The UK cooperative energy field includes SIE-initiatives and SIE-field-actors (e.g. Brighton Energy Co-op, Cooperative UK, Community Energy England, UK Government, City of Brighton), who have a shared understanding of an SIE, which exists as 'organising under cooperative principles to generate renewable energy'.

The structure of this report is as follows. Section 2 provides a summary of the SIE-field relevant for this report and lists some key insights. Section 3 outlines the boundaries of the SIE-field and shows how it has been studied in the country context. Section 4 shows a visual development of the SIE-field. Section 5 tells the historical development of the SIE-field over time, including analytical/ interpretive reflections from the SONNET researchers and quotes from the actors involved in the field developments. Section 6 outlines key research findings, providing answers to the three research questions. Section 7 outlines recommendations for policymakers based on the findings. Finally,

Section 9 outlines the methodological approach and includes a more detailed timeline of the SIE-field and its actors.

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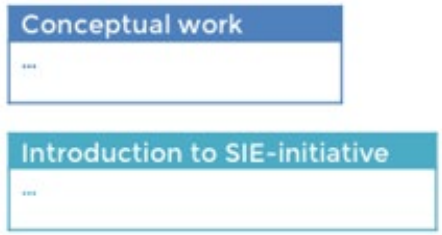


2 City-level competitions for sustainable energy

Definition of SIE and SIE-field boundaries? City-level energy competitions are formats where participants strive to rank themselves, gain or win something that focus on particular local energy topics (e.g. energy savings) contributing to specific energy pathways. This specific type of SIE is therefore concentrating on novel ways of engaging in different (playful) energy competition formats. Its novelty lies in the formats of competition, which allow for new actors to engage in sustainable energy pathways. Furthermore, the formats might involve new indicators for measuring energy related behaviour. While this report concentrates on 'city-level competitions for sustainable energy' in **Germany**, the SIE will also be studied in further case studies in **France** and **Switzerland**. A concluding cross-country analysis will allow for comparing the similarities as well as differences between the situations in the three countries.

How is the SIE-field defined? In the SIE-field under study, we focus on energy competitions that happen at the city level. With the term 'city-level competitions for sustainable energy' we refer to diverse formats related to sustainable energy pathways, where participants strive to rank themselves, gain or win something. These formats can address competitions between city administration (e.g. referred to as 'between city competitions', which take place between different cities) or target changes of individual behaviour (e.g. referred to as 'within city competitions', which take place within the city between different stakeholder groups). What links these formats is their shared aim to promote and mainstream sustainable energy. Our broad understanding of competition includes next to games voluntary comparisons, rankings, benchmarking, etc. and does not necessarily mean defeating others. Participants can strive to gain an award and/ or energy label or win goods (money/prices/lower costs) but also recognition, a feeling of empowerment, opportunities for marketing or for creating political capital, and fun.

What's specific for the German case? In the case of Germany, due to strongly decentralised structures in the federal political system, cities play an active role in developing sustainable energy pathways (Deutsche Energie-Agentur GmbH 2019). However, technologies which allow for real-time energy measurements (such as smart meters or smart energy management systems) are still not very far diffused to individual households in Germany (Giest 2020). This, on the one hand, limits the possibilities of cities to establish energy focused competition formats where energy-efficient behaviour is rewarded. On the other hand, cities stress the importance of taking an integrated approach, which embeds energy related topics in their overall engagement in climate protection activities. City actors describe their understanding of energy related topics as 'entirety of all things that concern climate protection or CO2 reduction, including e.g. mobility' (see Interview DE_CLC_8).

The German case study therefore also considers competition formats with a broader focus on sustainability pathways where energy might be one topic among others. These competitions target behaviour changes towards sustainability and thereby integrate energy related topics.

Key insights:

For the SONNET project, the SIE-field of city-level competition for sustainable energy is particularly interesting because through different formats of competition between cities and within cities, it reveals a number of important issues for social innovation in energy transitions. In particular, it illustrates that:

- The SIE under study emerged out of a situation, which is described to be characterized by a 'discouraged political mood'. This refers to a situation at the beginning of the 21st century, when the political attention for sustainable energy related issues was rather low. Out of this situation, however, individual actors started developing formats to increase attention and attraction of energy related topics.
- Focusing on formats on the city level, organized by (local) city administrations, the SIE-field under study is by definition closely embedded in existing institutional structures such as the organizational and regulatory structures of city administrations or the political of responsibilities in the German federal system. The SIE addresses change within existing administrational structures and aims for opening them up for new actor constellations and new forms on engagement.
- The SIE under study is impeded by technical factors, mainly the lack of smart energy infrastructures and therefore addresses broader sustainability questions, with energy being one topic among others. Cooperation on the local level and close network relationships within cities are enabling the SIE.

3 Introduction to city-level competitions for sustainable energy in Germany

This report investigates the development of the SIE-field 'city level competitions for sustainable energy' in Germany and its social innovation in the energy sector (SIE, see analytical box 'SIE changing social relations' below). The SIE-field stands for novel ways of engaging in different (playful) energy competition formats. Competition is here not limited to formats that are characterized by a strong sense of 'competitiveness' but might also include joyful 'fun formats', awards or labels. What links these formats is that participants strive to rank themselves, gain or win something. To qualify for this study, the formats focus on particular local energy topics (e.g. energy savings) contributing to specific energy pathways. These energy related topics however might be embedded in formats that aim for encouraging a broader engagement in sustainability related issues.

In the German context, 'city level competitions for sustainable energy' is a rather heterogeneous field. It includes a variety of activities carried out by different actors such as city administrations, intermediaries like city networks or by civil society actors in cooperation with city administrations. The fact that the SIE-field is so far neither strongly institutionalized in Germany nor very well studied, makes it difficult to draw clear SIE-field boundaries. We therefore concentrate on activities on the city level as in Germany, cities are very active in developing energy transition pathways and thereby competing against each other (Deutsche Energie-Agentur GmbH 2019; Elmqvist et al. 2019). This means that we concentrate on competition formats in which city administrations are part of organising, participating in, leading and/or carrying out these competitions. However, the formats under study also include cooperative formats that involve different actor groups such as intermediaries like city-networks, civil society actors or private business.

SIE changing social relations

In the context of the SONNET project, social innovation in the energy sector (SIE) are defined as 'a combination of ideas, objects and/ or actions that change social relations and involve new ways of doing, thinking and/ or organising energy' (Wittmayer et al. 2020b, p. 4). In order to observe the diversity of SIE, the SONNET project first developed a typology of contrasting SIE (Wittmayer et al. 2020a). One identified type of SIE is called 'city level competitions for sustainable energy'. A main characteristic of this SIE-type is that participants strive to rank themselves, gain or win something. This specific type of SIE is therefore concentrating on novel ways of engaging in different (playful)

energy competition formats. Its novelty lies in the formats of competition, which allow for new actors to engage in sustainable energy pathways.

City level competitions for sustainable energy include new ideas insofar as formats are striving towards a more playful character. This is in contrast to former attempts, which are so far dominating the German discourse and frame energy related issues as mostly technical or political topics. This new ideas of a playful way of getting engaged in energy related issues is furthermore linked to new actions in terms of new formats being developed and new actor constellations involved in these competition formats. The SIE under study is therefore changing social relations insofar, as SIE-initiatives are actively trying to include new actor groups. SIE-actors are aiming for reaching out to different stakeholder groups such as citizens, city administration staff as well as private companies ('big players'). They do so by developing 'fun formats' for promoting and mainstreaming sustainable energy and for making sustainable energy a more 'fun' topic. The main change is about who is included in the 'game' and which forms of engagement the game offers: participating in a competition and having fun doing so is considered a good way of motivating people for getting engaged, of knowledge transfer and learning. New actor groups are getting engaged in developing games and competition formats. Civil society actors, private initiatives as well as city administrations are taking new forms of responsibility. Furthermore, the SIE-under study might also include new objects such as the development of digital Applications, tools or platforms that help to carry out the competition. Competitions, in the understanding of this report, are however not limited to digital settings only.

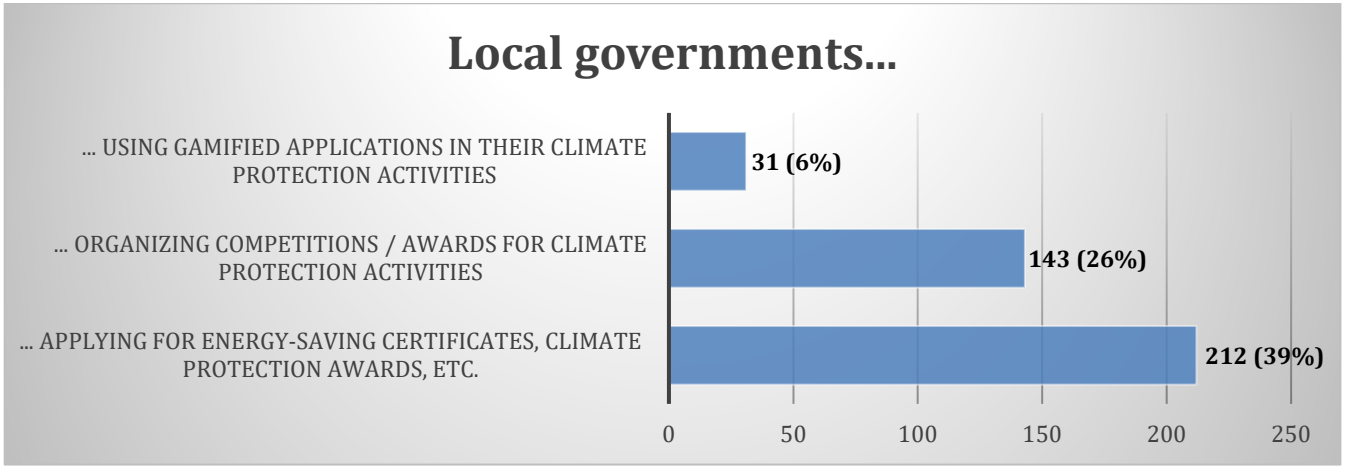
In Germany, the development of 'city level competitions' is based on the relatively strong role of local governments in Germany's federal system. This leaves municipalities space to engage in different types of activities and explore new formats that target energy related issues. However, it also increases the responsibility of local governments and the pressure to innovate on the local level. One of the main challenges for municipalities thereby is how to involve different stakeholder groups such as citizens, civil society actors, private business or city administration staff in local energy transition pathways. One novel way to do so is to develop competition formats that are often embedded in information campaigns (see Interview DE_CLC_6). Engagement in sustainable energy project thereby also helps to improve the image of cities and helps to promote 'location advantages' (Andersson 2016). In the German context, a large amount of formats therefore target competition formats or awards between different cities. City networks, foundations or federal ministries often organize these formats. Examples are the Germany sustainability award (Deutscher Nachhaltigkeitspreis) which is organized by a foundation with the same name, or the competition 'energy municipality of the moth' (Energie-Kommune des Monats), which is organized by the

German Renewable Energies Agency. Next to these awards, also labels play an important role as competition formats in Germany with the most prominent label being the European Energy Award.

The role of cities in sustainability transitions and especially the engagement of city administrations in developing sustainable energy pathways significantly increased during the last years. This is why some academic scholars working in the field of (urban) sustainability transitions are describing this development as emergence of the 'urban century': 'the current century should rightly be labelled the urban century, where cities will require a fundamentally new holistic perspective for understanding [global] challenges [...] (Elmqvist et al. 2019). City administrations can thereby take different roles e.g. as actors, who push for change through climate emergency declarations (Rode 2019), as policy-makers that encourage urban experimentation formats (Bulkeley and Kern 2006), as intermediaries coordinating activities in a multi-governance frame (Gustafsson and Mignon 2019) or as role models in international comparisons through their city branding activities (Andersson 2016). These different roles might also lead to different forms of engagement in competitions as a means for cities to take action. City-level competitions for sustainable energy is a type of SIE that so far is not very well studied. In the context of sustainability studies, academic scholars often take a broader focus on the role of experimentation in urban sustainability transitions (Evans et al. 2018) or study a certain format of urban competition such as gamified applications (Albertarelli et al. 2018; AlSkaif et al. 2018). However, overarching studies on the role of competitions on the city level in the context of social Innovation in energy transitions so far are missing.

Concerning the format of competitions, a survey conducted by Fraunhofer ISI[1] among German municipalities showed that the relevance of different competition formats highly varies between municipalities. About 39% of the municipalities stated that the city administration already applied for prizes or awards in the field of sustainable energy and climate protection activities and 25% of the municipalities indicated that the city administration organizes competitions within their municipality. In contrast, only 6% of municipalities indicated, that gamified applications play a role in their climate protection activities (own data by Fraunhofer ISI, status October 2020, N=554).

1 The survey is part of the project NostaClimate, which examines the role of non-state actors and their interactions with state and individual actors. The project is funded by the German Federal Ministry of Education and Research (BMBF) within the second phase of the funding priority "Economics of Climate Change" (FKZ: 01LA1813). The survey was conducted among German municipalities with 5.000 to 500.000 inhabitants. In total, 550 municipalities participated in the survey.



Gamified applications mostly build up on smart energy technologies which allow for real-time energy measures (Albertarelli et al. 2018; AlSkaif et al. 2018). These technologies are still not very far diffused to individual households in Germany and were excluded from this case study due to their small presence in Germany. The focus rather lies on two different levels of activities which correspond with two phases of development of the SIE-field: competitions between cities and competitions within cities.

Formats	**Within Cities**	**Between Cities**
Focus	Often focus on behaviour changes of different target groups	Focus on specific indicators and benchmarks, climate protection targets and measures by city administrations
Participation type	Different city administration units, individual citizens, schools, private companies	City administrations
Organiser	City administration as part of the organizer (in cooperation with other actors such as NGOs, private companies, etc.)	Federal governments, city networks, associations

Level of competition	Often rather playful character, focus on learning	Comparison and rankings between different cities
Process	Often (short-term) project-like character	Rather structured and institutionalized character
Reward	Recognition, Material prizes, financial participation in monetary savings	Recognition, monetary awards
Examples	Project fifty/fifty (energy savings at schools), CO2-Fasting-Challenge city of Nuremberg	German sustainability Award (Deutscher Nachhaltigkeitspreis), energy municipality of the month (Energiekommune des Monats)

'Between city competitions', taking place between cities on the national or international scale, are the first step of engagement of cities in competitions for sustainable energy. As a consequence of an increasing engagement of city administrations in sustainable energy pathways, in a second phase, cities strive to increase the awareness and engagement of citizens in these pathways. Therefore, 'within city competitions' are the second level which were examined for this report. Next to the participating cities, actors involved in organizing competition formats on the city level are national or regional governments and ministries, who implement programs and funding opportunities (e.g. energy consulting for municipalities) to foster local energy transition pathways. Furthermore, city networks like C40[2], covenant of mayors or ICLEI[3] are playing a crucial role in developing these formats as their role is to offer peer-to-peer learning possibilities and comparison between cities (Frantzeskaki 2019; Smeds 2019). In addition, private companies are engaged in these competitions, e.g. as sponsors (see interview DE_CLC_7). In many cases, also research partners are involved as partners in competitions. Researchers are e.g. deciding on the winners. Therefore, new indicators are being developed which allow for measuring the success of cities in the SIE-field of sustainable energy pathways. Such indicators, on the one hand are measurable numbers such as the amount of renewable energies consumed by municipal properties or the amount of CO2 emissions reduced through local saving measures. On the other hand, indicators also include the self-evaluation of municipalities, their commitment towards the United Nations' Sustainable Development Goals

[2] "C40 is a network of the world's megacities committed to addressing climate change. C40 supports cities to collaborate effectively, share knowledge and drive meaningful, measurable and sustainable action on climate change"; See: https://www.c40.org/

[3] "ICLEI – Local Governments for Sustainability is a global network of more than 1,750 local and regional governments committed to sustainable urban development."; see: https://iclei.org/en/Home.html

(SDGs) (see Interview DE_CLC_7).

'Outside' institutional environment shaping the development of the SIE-field

SONNET looks at the interactions and relations between actors, working on a SIE and a broader institutional context in which the SIE is nested in (Wittmayer et al. 2020b, p. 7). An empirical focus lies on the development of SIE-fields. Following Fligstein and Adam's field definition (Fligstein and McAdam 2011), an SIE-field within the SONNET project is understood as 'an arena/space that includes a specific SIE as well as SIE-field-actors working on it and other field-actors enabling and/or impeding it. In this space these actors take one another and their actions into account and have a shared (but not necessarily consensual) understanding of a SIE and of their relationship to other actors. They recognise (but not necessarily follow) shared norms, beliefs and rules. SIE-fields are often not homogenous but are composed of actors with diverse and contradictory aims and interests' (Hielscher et al. 2020, p. 17). While the SIE-field is constituted by SIE-actors and SIE-field-actors' activities, it is also influenced by the outside institutional environment, which can interact, shape, enable or impede the development of the SIE. This institutional environment is constituted by formal as well as informal institutions (Hielscher et al. 2020, p. 19).

The SIE-field development of 'city level competitions' for sustainable energy is embedded in the institutional structures of city administrations and their role in the federal system in Germany. Therefore, while the actors involved in developing new formats of city level competitions for sustainable energy are changing, this change happens embedded in existing institutional structures such as administrational arrangements with its specific organizational and financial conditions. This can be an impeding factor when it comes to different organizational units within the city administration, which have to work together on developing and implementing new energy related formats and pathways. It can however also be an enabling factor because municipal self-government allows for flexibility in finding local solutions. Competition formats that take place within the city are therefore often purposefully addressing administrational structures. They are trying to encourage processes of cooperation to overcome 'silo thinking' and motivate for new forms of learning between different city administration actors as well as between city administration and civil society (see Interview DE_CLC_6).

Furthermore, interviewees point out that the development of competition formats is often taking place in specific actor-arrangements, which are influenced by certain institutional structures. One

interviewee describes this as 'danger of falling into a filter bubble' of institutionally well-recognized actors who use competitions to 'showcase' their engagement (see interview DE_CLC_4). This means, that actors who engage in competition formats and contribute to shaping these formats are already well-established actors. These actors are in power to formulate indicators or to showcase their achievements. When looking at the social innovative character of competition formats, this raises the question how 'open' these formats actually are for change. Existing power relationships might rather be reproduced than changed, e.g. by formulating indicators for 'good' pathways. As one interviewee mentions: most of the municipalities that are successful in competition formats between cities are located in western Germany while eastern German cities are still dealing will structurally less advantaged situations. This is however not taken into account sufficiently in indicators that serve to measure and rank different participating municipalities (see Interview DE_CLC_7).

Ongoing changes in the outside institutional environment concern e.g. the emergence of novel forms of collaborations between political, private and scientific actors which are encourage through competition formats (see Interview DE_CLC_4). This is the case, when foundations, research institutes, private companies and federal ministries are joining forces to promote best practice examples – as it is the case in terms of the German sustainability award (Deutscher Nachhaltigkeitspreis). The institutional environment shaping the development of the SIE-field is therefore described by some interviewees as entanglement between top-down and bottom-up processes, meaning that different government levels (municipalities on the local level and ministries and governments on the national and state level) are interacting (see Interview DE_CLC_7).

Overall, the SIE-field is characterized by the actor's ambitions to promote and mainstream sustainable pathways, which are not limited to but include energy related changes. The main narrative of the field particularly refers to the growing responsibility of individual actors to engage in sustainable energy activities to overcome the slow progress in this field. Cities administrations are taking up this responsibility by developing energy related goals on the local level und competing for resources for and recognition of their activities. However, in order to reach local energy related targets, city administrations are forced to develop communicative formats, reach out to citizens and include them in this process. (Playful) competitions are one way to make the subject more attractive, raise awareness and mainstream engagement in sustainable energy pathways.

Diversity, contestations and relations between actors

SONNET is interested in understanding interactions between SIE-field-actors and/ or other field-actors. These relations can be formal or informal, take different forms (e.g. formal alliances, networks, collaborations) and might differ in their quality (e.g. conflicting, competitive, collaborative or exchange-oriented relations; Wittmayer et al. 2020b, p. 14) as well as in their content (e.g. concentrating on learning, networking, lobbying etc.). Furthermore, SIE-field contestations between SIE-field-actors and/ or other field-actors are of interest as they can 'unsettle' the existing 'outside' institutional environment (Hielscher et al. 2020, p. 19). Contestations are debates among relevant actors over SIE-field structures and processes such as disagreements about common aims or approaches to lobbying policymakers. Both, contestations and relations can provide an indication of how institutionalised (or not) the SIE-field is (e.g. are there formal networks).

The SIE-field 'city level competitions for sustainable energy' consists of quite heterogeneous actor groups such as city administrations, city networks, civil society actors, private businesses and their funding partners. The relationships between the participating actors thereby highly varies, depending on the form of competition. While competitions can facilitate knowledge sharing between cities, they often take a more competitive character, with each city seeking recognition and funding (see Interview DE_CLC_4). What characterizes these formats is the aim as well as the difficulty to create comparability and measurability between participating city administrations. These competition formats are strongly formalized and often organized by federal ministries or NGOs operating on the national or international level. This means that also the relation between SIE-actors and SIE-field actors are characterized by formalized application processes and professional roles. In contrast, competitions within cities are rather characterized by cooperation and the aim for shared learning between SIE-actors and SIE-field actors. This formats target a more personal involvement and commitment and are therefore less formal in character. Helping each other is considered an important part of the competition (see Interview DE_CLC_5). Awards in this case serve as incentives but are less relevant than in competitions between cities.

The SIE might help to overcome contestations within cities, especially between different administrational units. In the case of competitions between cities, these units are forced to closely work together in order to participate in competitions or apply for awards (see interview DE_CLC_4). Overall, the SIE-field development is not very strongly characterized by formal contestation. It rather

encourages knowledge exchanges through best practice examples. Different interests rather increase the diversification of the field, meaning that different formats are being developed and explored in different cities which then exist next to each other.

For this case study, we interviewed members of city administrations, city networks and game developers. Concerning competition formats between cities, we exemplary studied the German sustainability award (Deutscher Nachhaltigkeitspreis), established in 2013, which honours 'pioneers of sustainability' in Germany and aims for motivating key players 'to change, to network […] and to encourage partnerships' (internal document Deutscher Nachhaltigkeitspreis). As example of competition formats taking place within cities, we investigated the Climathon competition which first took place in 2015. In a one-day event, a Climathon aims for developing (technical) solutions for solving pre-defined local problems (challenges) in the context of climate change. The competition is part of a broader European initiative. It is however carried out by a local associate in close cooperation with the local city administration (first event in the city under study in 2019).

The innovation history outlined in this report is structured around three phases:

- **PHASE A)** describes the early phase of SIE-field development in the beginning of the 2000s and includes the years 2000 until 2007. This phase is characterized by the overall societal trend of resignation concerning the lack of political engagement for energy related issues and overall climate protection goals. City level competitions for sustainable energy during this phase occur rather as single activities then as an emerging SIE-field. This however changes around the year 2007.
- **PHASE B)** describes the emergence of new formats of city level competitions for sustainable energy between 2007 and 2015. This happened against the background of a new sense of responsibility towards environmental issues and the aim of civil society actors as well as local policy actors to raise attention towards sustainability. One important milestone for this development was the Leipzig Charta for sustainable development in 2007. Competition formats during this phase are mainly developed by institutionalized actors such as federal ministries or associations operating on a national scale.
- **PHASE C)** describes a time of increased environmental awareness starting in 2015 which is going along with efforts of civil society actors to engage in energy related topics and climate protection activities. Competition formats during this phase start to diffuse to different stakeholder settings. In order to involve a variety of actors in energy and climate protection

related issues, new playful formats are being developed, e.g. by city administrations on the local level.

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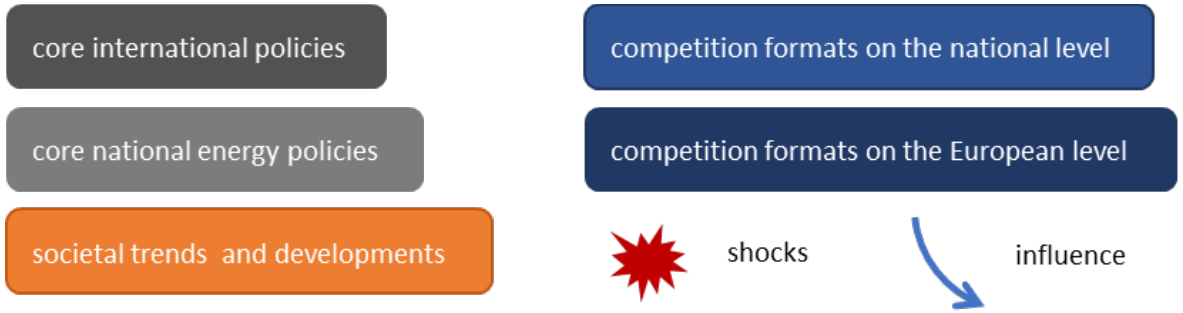

4 Timeline of city level competitions for sustainable energy in Germany

This is a visualisation of the innovation history of participatory incubation and experimentation in Germany. An overview of the listed events can also be found in the Appendix.

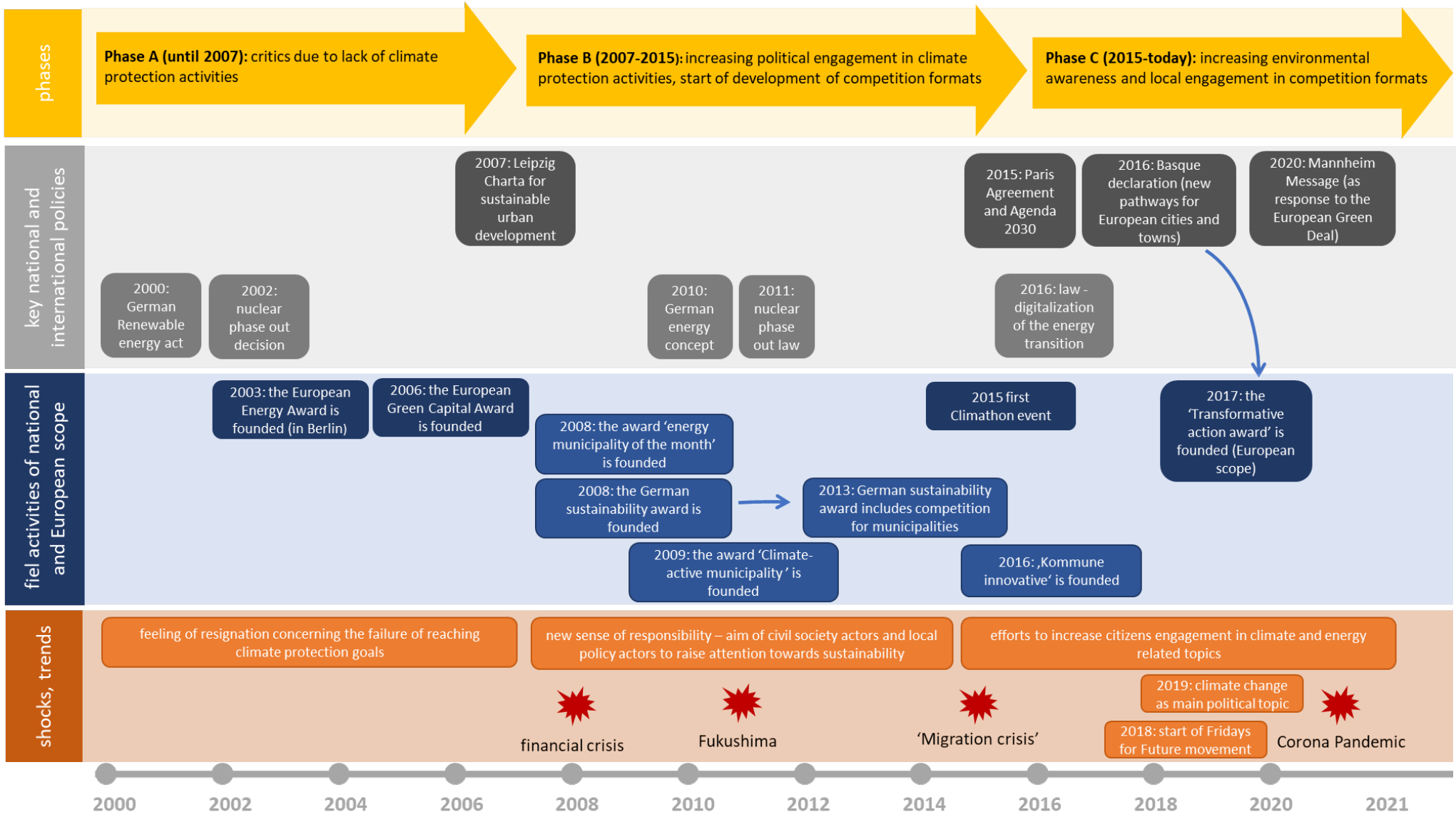

Figure 1: Timeline of City level competitions for sustainable energy in Germany

5 Emergence and development of City-level competitions for sustainable energy in Germany over time

The innovation history of the SIE-field City-level competitions for sustainable energy' in Germany is structured around three phases. Before describing these three phases more in detail, we shortly describe the broader contexts and trends, which laid the foundations for the emergence and development of the SIE-field 'City level competitions for sustainable energy' in Germany.

BROADER TRENDS: foundations and contexts of the SIE-field development

Based on the fieldwork and according to academic literature on cities roles in climate protection activities, we identified the following three broader trends that influenced the development of 'City level competitions for sustainable energy' in Germany. First, the changing role of cities in the 'urban century'. Second, the context of the German 'Energiewende' (energy transition) and third, the change in urban development politics in Germany.

Concerning the changing role of cities, this development first derived out of a strong economic focus (Häußermann et al. 2008) leading to a new form of entrepreneurial agency of cities (Harvey 1989). Cities, in the course of this development, started to 'act' or engage in global contexts (Sassen 2001). This post-modern development is described as an decreasing engagement of the nation state, going hand in hand with the increase and strengthening of local responsibilities (Häußermann et al. 2008). In the course of this development, the role of cities moved towards a stronger engagement in climate protection activities. One of the first starting points for this development was the Agenda 21, adopted at the United Nations Conference for Environment and Development in Rio in 1992. It increased the global awareness for the need to take action towards sustainability and identified the local level as key to address activities for sustainable change (United Nations 1992). As Wolfram (2016, p. 4) points out, the new acknowledgement of cities as nodes in global processes is accompanied with a 'broader engagement with the normative concept of sustainability' (Wolfram 2016, p. 4). Cities and local governments are thereby taking new forms of responsibility for global problems (Rode 2019). The transformation into a 'green city' in this context also serves as a form of city branding (Andersson 2016) which leads to a 'new dimension of cities' competitive positioning' (Hodson and Marvin 2010, p. 478).

Looking at the German energy system, the increasing engagement of cities is supported by the aim of decentralizing the energy system. 'Federal states and municipalities' in the course of this attempt, are described as 'new strengthened levels of energy policy' (Agora Energiewende 2017, p. 37).

Decentralization can thereby take different dimensions such as local electricity production and direct delivery as well as energy models and local heating networks (Zuber et al. 2018, p. 6). Furthermore this includes new forms of urban governance (Bulkeley and Kern 2006; Bulkeley and Castán Broto 2013) which especially takes a experimental and project-based form. These governance approaches involve‘ competing (discourses) coalitions, and are structured by relations of power and strategic practices’ (Bulkeley and Castán Broto 2013, p. 366).

These new forms of experimental and participatory governance are part of the change in the politics of urban planning (Gribat et al. 2017). Approaches are taking project-based and ‘festivalized’ formats and thereby become rather ‘educational’. ‘It tries to change ways of thinking and behaviour; it focuses on values, attitudes and mentalities’ (Häußermann et al. 2008, p. 260; own translation). Cites, in the course of these developments, are playing ‘a crucial role blurring the line between social movements and governments’ (Rode 2019, p. 9).

Regulative, normative and/ or cultural cognitive institutions

SONNET draws on Scott’s conceptualisation of institutions, which consist of regulative, normative and cultural-cognitive elements (Scott 2014). Regulative institutions include laws, rules, standards and policies while normative institutions describe social norms, duties, and value systems (Wittmayer et al. 2020b, p. 21). The third element is referred to as cultural-cognitive institutions such as shared expectations and common beliefs (Wittmayer et al. 2020b, p. 22). In SONNET, we assume that SIE have the potential to transform existing institutions while they will also maintain parts of existing institutions (Wittmayer et al. 2020b, p. 20). We are therefore interested in understanding existing regulative, normative and cultural-cognitive elements that shape the SIE and its SIE-field.

The formation of city level competitions for sustainable energy is influenced by normative and cultural institutions, such as the changing urban planning approaches and the role of cities in the global context as previously indicated. Regulative institutions such as laws and policies are in the course of the early SIE-field development criticized for their insufficient engagement to prevent climate change. On the other hand – and, in a rather discursive and normative sense – institutions are starting to manifest in political declarations. Especially the Leipzig Charta for sustainable development can be seen as one milestone for activities on the city level. Furthermore, concerning normative institutions, city level competitions for sustainable energies are encouraged by a new

sense of duty and responsibility of civil society actors to get engage and motivate others to rethink their behaviour and fight the weaker self. Here competition formats, with more playful approaches, purposefully aim for developing scenarios 'outside cognitive routines' (see Interview DE_CLC_1). This means that these (playful) competition formats often target behaviour changes and encourage to change existing behavioural patterns. Concerning cultural institutions, SIE-actors are criticizing the discouraged mood of political actors, the lack of holistic concepts and the strong focus on economic aspects. SIE-actors are therefore pressuring shifts in discourse and aim for motivating others.

PHASE A: foundations for the field development and critical mood in the early 2000s due to insufficient political measures in the area of climate protection activities (2000-2007)

A feeling of frustration and slow progress is often described as the starting point for the development of city competition formats. Interviewees e.g. mention an overall discouraged mood at the beginning of the 2000s: "*The 2000s started out very, very discouraged. Somehow, everyone thought: My God, we have just missed the Millennium Development Goals. How is all of this supposed to continue? Climate change is advancing. We overuse our resources. We experience increasing social problems and so on and so on. It was a very discouraged mood [...]*" (Interview DE_CLC_7). On the city level, especially the slow progress within city administrations and in coordination between different administrational units is describe as a key problem: "*Energetic renovation of urban properties can often take years. It's really frustrating. It's just not like in the free economy, it that doesn't happen that quickly. It is really difficult*"" (Interview DE_CLC_6). Also civil society actors are claiming that they are missing a clear political goal and therefore describe a discourage situation: "*I am missing the narrative from above: There is a goal and we know how to achieve it. And we know what measures need to be taken. But it's this mood of, oh, we only do what is absolutely necessary*" (Interview DE_CLC_5).

Out of this overall feeling of political discouragement, civil society initiatives started to develop a new sense of responsibility: *"[...] It was a very discouraged mood. And then some got up and decided: Okay, we have to do something about it now*" (Interview DE_CLC_7). This change led to the development of new competition formats later on. (Playful) competition formats especially target a new sense of motivation in opposite to the resignation described above.

Key changes over time

One of the central research questions and empirical foci within the SONNET case studies is to understand the development of the SIE and its SIE-field over time (Hielscher et al. 2020, pp. 15–18). We therefore take a 'process perspective' and investigate change through focusing on the emergence of the SIE-field and the activities of SIE-actors shaping them (Wittmayer et al. 2020b, p. 33). For example, we look at external shocks, internal field events and key changes in the development of the SIE-field and its relationship with the 'outside' institutional environment (Wittmayer et al. 2020b, pp. 29–30). Moreover, changes in the SIE-field also concern changed narratives and societal trends that enable or impede the development of the SIE and its SIE-field.

In the key of the SIE-field 'city level competitions for renewable energy', we observed two key changes over time. As a more recent influence on the SIE-field development, several interviewees named the 'Fridays for Future' movement as an important cause of change. This is especially the case because 'Fridays for Future' triggered a new sense of individual responsibility and new pressure on topics around sustainable change (see Interview DE_CLC_5 and DE_CLC_7). The social movement is thereby part of a broader socio-cultural institutional shift but also directly caused concrete activities. For one initiative, Fridays for Future was the starting point for getting engaged in a local Climathon competition – a hackathon that aims for developing solutions for climate related problems. The initiative engaged as local organizers of this competition and promoted the format in their city (see Box on page 27). For another initiative, the German sustainability award (Deutscher Nachhaltigkeitspreis), the Fridays for Future movement caused a significantly higher engagement of actors in their competition formats. The willingness of the participating municipalities to invest in activities around sustainable energy since then significantly increased (see interview DE_CLC_7).

Besides the broader development and awareness, focusing on the energy system in Germany, a decentralized approach is supplementing the increasing responsibility of single municipalities to engage in sustainable energy. Municipalities are engaging in different ways in energy transitions, however, the engagement in the context of competition, games and awards takes a highly project-based form. Changes thereby happens in phases, structured by different temporal limited projects (see interview DE_CLC_6). Even if competitions for sustainable energy are part of this development, they however do not play a major role in this broader process of change.

PHASE B: increasing political engagement in climate protection activities and start of the development of new city-level competition formats (2007-2015)

The 'vacuum situation' of lacking political engagement in climate protection activities, as described above, serves as starting point for different forms of engagement by individual actors. The local level (e.g. local governments) thereby plays a crucial role. Since the Agenda 21 in 1992, there is an increasing focus on local governments to address sustainability related activities. One further milestone in this process is the Leipzig Charta on Sustainable European Cities in 2007. This initiative by the ministers responsible for urban development in the EU Member States highlighted the role of local engagement for sustainability and the role of knowledge exchange in and between cities (BMU 2007). After 2007, also new formats emerged that aimed for encouraging cities engagement in sustainable energy. The focus of formats in this phase first of all is to encourage competitions between cities. In competitions between cities, cities are acting as participants where they promote their local sustainable energy pathways and compete for recognition and financial support. These competitions can take place on the national level such as in the case of the German Sustainability Award (Deutscher Nachhaltigkeitspreis)[4] or in the case of the award climate active municipality (Klimaaktive Kommune)[5]. However, competitions are also taking place between cities on the European level such as the European Green Capital Award[6] or the Transformative Action Award[7].

These awards might largely differ in their organizational structures, their degree of formalization and stakeholders involved. As an example, the award 'Energie-Kommune des Monats' (energy-municipality of the month) is organized by the German wide operating 'renewable energy agency' (Agentur für erneuerbare Energien). This award is directed to municipalities with a high engagement in renewable energies, e.g. through investments in energy production or the development of local energy concepts. The award helps to gain recognition and identify best-practice examples. However, the event is not embedded in a larger event or a broader network of stakeholders. In contrast, the German sustainability award (Deutscher Nachhaltigkeitspreis) is organized by a large amount of cooperating partners. These partners include among others research institutes like the Wuppertal

[4] organized by the foundation ‚Stiftungdetscher Nachhaltigkeitspreis e.V.' in cooperation with a large number of different institutions as well as federal ministries; see https://www.nachhaltigkeitspreis.de/en/

[5] Organized by the German Federal ministry for the Environment, Nature Conservation and Nuclear Safety oin cooperation with the German institute of Urban Affairs (difu); See: https://www.klimaschutz.de/wettbewerb2009-2019

[6] Organized by the EU commission; see: https://ec.europa.eu/environment/europeangreencapital/

[7] Co-organized by ICLEI – Local Governments for Sustainability, the Basque Country, the City of Aalborg, supported by the European Committee oft he Regions and the European Investment Bank; see: https://sustainablecities.eu/transformative-action-award/

institute or the German institute for urban Affairs, which help developing indicators and designing the process of selecting winners. Further partners such as federal ministries or private business are involved as supporting partners which increases the amount of stakeholders involved in the process. Participating successfully in the competition therefore guarantees greater visibility and recognition – not only from other cities but also within the city. As one of the interviewees describes it: "*We often get the feedback from cities where they say that like, lots of citizens in our city weren't really fully aware of what we were doing, but then we won this award. And then there were like hundreds of news articles looking at our work. And it opened up a new conversation in this city*" (Interview DE_CLC_4)

Introduction to the initiative 'Deutscher Nachhaltigkeitspreis'

In 2008, lawyer and journalist Stefan Schulze-Hausmann founded the foundation 'German Sustainability Award', which since then organizes the German sustainability Award. The award honours '*pioneers of sustainability and aims for motivating key players 'to change, to network […] and to encourage partnership'* (see: https://www.nachhaltigkeitspreis.de/en/dnp/award/). The foundation organizes different competitions for different stakeholder groups, such as competitions for design, architecture, Start-ups etc. Since 2013, also a competition for municipalities is organized. In the course of this case study, we only observed the competition for municipalities, which is organized by the foundation in close cooperation with partners from the field of research, federal ministries and private companies. The winning municipalities are selected in a twostep application process, which includes a questionnaire and self-evaluation of the participants in the first step and personal interviews with city administrations in the second step. Municipalities in three different categories, according to the size of the municipality, can win up to 30.000 € which can be invested for further projects in the field of sustainable activities. The award is presented at a festive award ceremony. This is considered as a glamourous event that offers good visibility and recognition to the winners.

Competitions between cities are mainly aiming to create comparability between cities, which position themselves in concurrence to each other. Therefore, competitions between cities require to develop indicators, which allow for comparison 'such as green space, green entrepreneurships, consumption, waste, chemicals, transports and biodiversity' (Andersson 2016). In the context of the German Sustainability Award, energy related indicators are included in terms of the investments in

renewable energy production and the measurement of carbon emissions (see interview DE_CLC_7). In the course of the development of competition formats and cities engagement in sustainability transitions, these indicators are however changing. As one interviewee describes it: "*This is a trend that I am watching. That we are increasingly moving away from saying: Show us the great structures that you have created. But rather move in the direction of saying: Show, what you have really already implemented and provide facts and figures about that. More in the direction of monitoring and not just about creating structures.*" (Interview DE_CLC_7). While it was sufficient in earlier competitions to award city administrations for their intentions and political goals to engage in sustainable energy pathways, activities now have to be measureable in a way that they can be proved with facts and figures.

Besides the competitive element, award ceremonies and competition events also serve as networking platforms, where "*a lot of people who wouldn't meet otherwise*" (Interview DE_CLC_4) are getting together. Competitions between cities also allow for a shared sense of responsibility, shared learning and networking insofar as cities "*inspire one another*" and are "*very much guided by other cities and what they've done in the past*" (Interview DE_CLC_4). Participating in competition formats or awards brings recognition on the national or even international level: "*The activities themselves are local activities [...]. But then through participating in the award, [cities] gain European recognition*" (interview DE_CLC_4).

Policies and policy making

One important cross-cutting theme addressed in SONNET are the socio-political aspects and conditions of social innovation in energy. In SONNET, we are in particularly interested in identifying enabling or impeding factors and how they influence social innovation processes. This case study therefore aims for identifying important policy events and policy making processes (Wittmayer et al. 2020b, p. 43). This includes asking about broader political debates, the role of different government levels involved in policymaking, particular policy strategies and instruments used and how they enable or impede the development of SIEs.

Cities are increasingly developing policy goals that target change towards sustainability. Competitions thereby serve as a way to promote these targets and encourage engagement, knowledge exchange and best practice learning. Competitions between cities, supported by national ministries and national associations especially highlight best practices. Thereby, they do

however also contribute to developing indicators and standards. E.g. the local production on renewable energies might be compared but also the implementation of local policies is part of the assessment, e.g. whether the municipality develop local energy and climate protection concepts. In competitions within cities, the focus is mainly on locally promoting pathways for renewable energies. Citizens might be encourage to and reward for taking their bikes to work and dispense their car for a certain time (see city of Mannheim; https://www.klima-ma.de/spardirdeinauto.html) or to save energy in schools (see project fifty/fifty; https://www.fifty-fifty.eu/).

Some interviewees state however, that policy goals and regulations are not strong enough linked to each other. City administrations would e.g. favour stricter regulations, e.g. when it comes to standards on energy efficient buildings (see Interview DE_CLC_6). Because these regulations are often missing, local administrations are under pressure to open up new fields of activities and reach sustainability targets by increasing the awareness and encourage local stakeholders to support transition pathways voluntarily. Overall, competitions fulfil a reverse function when policymakers use these formats to search for new instruments or transfer responsibilities to civil society actors.

What furthermore characterizes competitions between cities is that they are in many cases strongly embedded in and supported by existing institutional structures and organized in close cooperation with state actors (such as federal ministries). Also research institutes (e.g. German Institute of Urban Affairs which organizes the award Klimaaktive Kommune) and city networks or intermediary organizations (e.g. ICLEI – Local Governments for Sustainability) are involved as organizers. This, however might also contribute to reproducing existing power relations by these formats rather than transformed. Interviewees e.g. mention an existing gap between municipalities' engagement in competition formats between the municipalities located in former eastern German states and western German states (see Interview DE_CLC_7). Competitive cities might therefore still increase their recognition through winning awards while less competitive cities feel discouraged to participate. One interviewee describes the situation as follows: "*These kind of smaller cities that you perhaps wouldn't have heard of [...] perhaps wouldn't necessarily see themselves competing against these larger players that are kind of well known within the sustainability field.*" (Interview DE_CLC_4).

Power and power relations (power to + power over + power with)

Shifting power relations is often considered as an important aspect, which defines social innovation processes (Wittmayer et al. 2020b, p. 47). The term 'power' thereby refers to actors capacities to mobilise resources and institutions (Avelino 2017). In the context of this case study, we aim for analysing which power relations are enabling or impeding SIEs and how they do so (Wittmayer et al. 2020b, p. 48). It is important to distinguish between different types of power. Actors might have power to. for example, to do certain things and push their interests (e.g. political power, economic power, innovative power), power over others or power with other to achieve collective goals (Wittmayer et al. 2020b, p. 48).

As described above (see analytical boy: SIE changing social relations), city level competitions for sustainable energy change social relations insofar, as they aim for encouraging different stakeholder groups such as citizens, different administrational units or private business to engage in energy transitions on the local level. However, the shaping of competition formats and the decision about the 'rules of the game' (**power over**) do take place within existing structures and power relations, e.g. inside the academic 'filter bubble' as described by one interviewee (see interview DE_CLC_4). This is described as participation-dilemma, when seemingly open formats rather reproduce existing power relations between top-down decision makers and the bottom-up initiatives participating in competitions, which are then judged according to these criteria or when municipalities in the eastern parts of Germany are represented less in competitions.

Even if competition formats are encouraging the development of new ideas and the engagement of different stakeholders (**power with**), the adaption of new ideas still strongly depends on political will and government support (see interview DE_CLC_4). An example for this is the Hackathon event Climathon. It aims for developing ideas for concrete problems related to climate change on the local level. The implementation of these ideas (such as local platforms to organize bike-sharing, or to measure energy consumption in local buildings or many more) however depends on formal policy-makers to decide over them and implement concrete activities (**power to**).

During this phase between 2007 and 2015, competition formats such as the German Sustainability award (Deutscher Nachhaltigkeitspreis) or the award 'climate-active municipality' (klimaaktive Kommune) are institutionalizing as important and relatively well-recognized yearly events. They challenge cities engagement in transitions towards sustainable energy systems and thereby contribute to re-structuring inner-administrational processes. Climate activities (just as application processes for competitions between cities) require cooperation between cities' different

administrational units. Out of the need to encourage the cooperation between different inner-city apartments, competitions within city administrations are developing during the following years.

PHASE C: increasing citizen engagement in local energy transitions and development of competition formats within cities (2015-today)

With the German energy concept and the nuclear phase out decision after the Fukushima nuclear catastrophe, the years 2010 and 2011 mark a milestone for the German energy transition. Energy moved further into focus of policy agendas – on the national level as well as the local level. Linked to the nuclear phase out and the promotion of renewable energies, the local level further gained importance in the course of attempts to decentralize the energy system (Agora Energiewende 2017). Not least since the Fridays for Future movement started off in 2018, the power of citizens engagement in climate protection and sustainability transitions got visible. As one interviewee describes the situation: "*You have the feeling that there is currently really pressure on the topic. Also through the Fridays for Future movement. [...] A lot is happening there at the moment.*" (Interview DE_CLC_7).

As a consequence cities are increasingly under pressure to find new and innovative ways of addressing change in the energy system on the local level. Therefore, it is crucial for local governments to involve and motivate local stakeholders (such as city administration employees of different departments, companies, local and civil society initiatives, residents or more broadly speaking: local citizens) to get engaged in energy related activities. Playful competitions formats such as hackathons, energy saving competitions, board games or digital applications allow citizens to engage in energy related topics in an entertaining way, which makes the topic more fun. Even if energy related matters are presented in a more subtle way, competitions within cities still allow for shared learning and encourage awareness raising. The main actors involved in these activities are city administration (as organizers of competitions but also as target group and role model for inner-city change process), local civil society initiatives, citizens and companies as partners and sponsors in competitions.

One example for this development is the competition format Climathon that first took place in 2015 and was an initiative of the European Institute of Innovation and Technology (EIT) and its Knowledge and Innovation community for climate action (Climate-KIC). It introduces a Hackathon format – in which participant collaboratively work on 'challenges' related to hardware or software development – to the context of action against climate change. These activities are quite strongly linked to local contexts. Climathons are carried out locally in cities and organized by the local city administration in cooperation with other partners such as universities, associations, local companies and so on.

Introduction to the 'Climathon' competition, organized locally in Mannheim by the association 'Hackerstolz e.V.'

Climathon is a hackathon (a collaborative software and hardware development event) for problems related to climate change. It is an open format initiated by the European Institute of Innovation and Technology (EIT) and its Knowledge and Innovation community for climate action (Climate-KIC). The aim behind the development of this competition format is to develop (technical) solutions for solving pre-defined problems (challenges) in the context of climate change. In a one-day event, teams that consists of actors from different disciplines and backgrounds (such is informatics, experts in the field of sustainability and designers) work jointly together on developing an idea that helps to solve the challenge. The event takes place globally, in different cities around the world on the same day. However, each event is organized by a local organizing team which works closely together with the local city administration as well as with other stakeholders such as private companies and volunteers who participate in the event. The overall aim of the event is that 'together, cities and their citizens are forming a global wave of change-makers (see brochure Climathon).

For this report, we studied one local organizing initiative – the registered association Hackerstolz with about 100 members – that organized a Climathon event in Mannheim in 2019. The overall aim of the association is to support digital culture and does so, e.g. by organizing hackathons which are not limited to topics related to renewable energies. However, when a larger amount of members got engaged in sustainability debates, the association decided to organize a local Climathon event together with the City of Mannheim. During an 40 hour event, 16 local teams developed prototypes of (digital) solutions for sustainability related challenges. One energy related challenge was e.g. formulated as follows: "How quickly can power generation by rooftop solar panels be doubled?". As a result of the competition, the winning team can get support for developing their idea or found a start-up.

In contrast to competitions between cities, on the inner-city level, competitions are rather characterized by a cooperative and playful mood than by competitiveness between participants. Overall, they are described as an occasion to bring different actors together, create a sense of togetherness and stimulate learning (see Interview DE_CLC_5). Here the event is in focus, rather than the aim to win something and awards mainly serve as incentives to engage in the event. Social

relations are thereby changed by actively trying to include actors, which were formerly not part of energy discourses, e.g. by developing formats especially for schools, city administration employees or start-ups. Furthermore, the relations between city administration and citizens change in a way, that these formats allow for a new entanglement between governments and civil society actors (see Interview DE_CLC_7). While cities are experience a new form of responsibility, citizens develop a new form of confidence to engage in political questions and claim their right to have a say.

Institutional work conducted by SIE-field actors and other field-actors

SONNET investigates how SIE-initiatives, SIE-field-actors and other field-actors 'perform institutional work – meaning they engage in creating, maintaining and transforming institutions to be able to work on, enable and/or impede SIE developments' (Hielscher et al. 2020, p. 20). This analytical focus emphasises that institutional changes are actively influenced by actors within the SIE-field (Wittmayer et al. 2020b, p. 31). The term 'institutional work' refers to these activities of creating, maintaining and transforming institutions and can include diverse types of institutional work, such as material, relational and symbolic work. Examples might be attempts to influence policy makers or the general public through lobbying activities or to influence informal institutions such as norms and values.

City administrations, associations, civil society actors engaged in the SIE-field of 'city level competitions for sustainable energy' are working towards transforming institutions by developing and testing new scenarios in playful competition formats, which allow for thinking 'out of the box' (see interview DE_CLC_1). Fun formats are encouraging engagement and promoting change in a motivational way. Competition formats furthermore are allowing for dialogues between different stakeholder groups. The formats developed by SIE-actors are aiming for taking the topic of sustainable energy out of the niche, making it 'glamorous' and therefore allow for mainstreaming it (see interview DE_CLC_4). The focus of institutional work within the SIE-field under study therefore lies in activities of relational work like networking and knowledge exchange: In many cases, participating in a city-to-city competition requires new forms of cooperation on the inner-city level. Competitions serve as networking platforms, connect projects and people and inspire learning. Furthermore, participating in a competition allows for transforming the self-perception of cities. City administrations start perceiving themselves in role models and thereby also conduct symbolic institutional work, meaning that they contribute to shaping new discourses about cities

abilities to react to climate change or reframe the relationship between city administrations and citizens.

In developing new formats such as hackathons or energy saving competitions, cities are however well aware of the need to address different groups of stakeholder in more targeted formats (see Interview DE_CLC_7). Especially the slow changes in inner-city administration processes and the functioning as a role model requires involving city administration employees as a stakeholders in urban energy transitions. Energy savings, especially in in municipal properties, often date back to a lack of attention, responsibilities and incentives to encourage energy savings (Böhm et al. 2019). Furthermore, many municipalities have still not yet installed energy management systems which allow for a detailed measurement of energy consumption and show saving possibilities (see Interview DE_CLC_6). Against this background, inner-administration competitions are one way to reach out to 'hard to reach' stakeholders, who are not intrinsically motivated to engage in energy related subjects and therefore can't be reached with 'pure information' (See Interview DE_CLC_7). These competitions are part of information campaigns and aim for awareness raising as well as recognition for successful project.

The experiences of the SIE-actors indicate, that competition formats are often supported by local actors such as companies, volunteers and city administration actors: "*When we look back, we were very pleasantly surprised at how well our project was received. We got a lot of support, not only from volunteers, but also on the financial side from sponsors.*" (Interview DE_CLC_5). While competitions on the city level In Germany are so far rarely taking the form of games or gamified apps, some formats by start-ups, association or local businesses are starting to explore diverse formats which aim for promoting sustainable energy as a 'fun topic' and thereby also inspire cities. E.g. the start-up 'Pitch your Green idea' developed a board game which allows to learn about sustainable organizational change process and especially stresses the importance of the fun-aspect: "*This aspect of fun is very important. It promotes learning processes and generates ideas*" (see Interview DE_CLC_1).

So far, digital competition formats are not very far diffused as competition formats on the city level and city administrations so far don't recognize themselves as the drivers of the development in the direction of gamified digital competition formats. Here, city administrations rather depend on the cooperation with start-ups and research institutes to pick up these developments. Looking at the furtehr development of competition formats, it is likely that these pathways will play a stronger role in the future (see interview DE_CLC_2).

6 Summary, synthesis and conclusions

To conclude this report, the following section summarizes the key findings in relation to the three central research questions:

How do SIEs and SIE-fields emerge, develop and institutionalise over time?

Competitive formats between cities first emerged out of the increasing sense of responsibility of city administrations to push sustainable change. With the Agenda 21 and later, in 2007, the Leipzig Charte for sustainable urban development, the local level and especially cities were identified as important arenas to address sustainability targets. National or European associations started to develope competition formats directed towards city administrations in order to promote best parctice examples. In the following years, this trend also inspired competition formats within cities, carried out by local administrations. These formats are developed to make the topic more attractive to a broader audience and include citizens.

It is however noteworthy to mention, that the SIE-field of 'city level competitions for sustainable energy' is still a highly heterogenous and fragmented field in Germany. It consists of a larger variety of different actors such as city administrations, civil society actors, associations or private businesses. Overall, the SIE-field is not very strongly institutionalized in the sense, that actors work together to reach joint goals. However, the SIE-fiel is embedded in stronger administrational structrues that shape the outside institutional environment. This especially concerns the positioning of cities in the federal system and their ability as well as pressure to engage in transitions towards more sustainable energy systems. City administration actors are connected to clear roles and positions from where they act on the behalf of 'their city'. Therefore, it is easier for SIE-field actors to recognize each other. As the member of a city networks, involved in organizing competitions on the national level, describes it: "*If you're long enough in that business, you know the usual suspects, you know who might apply and who might get nominated*" (Interview DE_CLC_4). It is, however, hard to draw clear boundaries between the institutional structures (formed e.g. by intermediary actors such as city networks and national or European funding programs) around city networks and the specific formats of city-level competitions. This is especially the case because city-level competitions are rather recognized as one aspect of a broader activities carried out by municpalities and does not necessarily stand on its own (yet).

How do SIE-field-actors and other field-actors interact with the 'outside' institutional environment and thereby co-shape the SIE-field over time?

As the SIE-field under study focuses on competition formats related to city actors, the SIE is by definition strongly embedded in existing structures of city administrations. In Germany, these structures are characterized by the German federal political systems that forms formal institutions, which shape the outside institutional environment of the SIE-field under study.

In some cases, this situation is described as an 'institutional bubble', meaning that it consists of actors who work along the institutional logics of e.g. of city administrations (often also reffered to as 'silo thinking' in different administrational units). This rather reproduces existing power relationships than changing them. Competition formats are directly addressing the need to change social relations and include new 'players in the game'. In competitions between cities, these 'new players' are cities that just started developing activities in the field on sustainable energy transitions. In competition formats within cities, especially reaching a broader audience and encourage citizens to engage in sustainable energy transitions is in focus. The changing role of cities thereby also encourages the development of new competition formats (such as digital platforms, competitions that are carried out on social media, awards for certain activities). The situation can therefore be described as entanglement between top-down and bottom-up processe, meaning that competitions encourage exchange between (local) governments and (local) initiatives.

What are the enabling and impeding factors for SIE-field-actors and other field-actors to conduct institutional work and change the 'outside' institutional environment?

The main aspect of institutional work conducted by SIE-field-actors and other field-actors is their relational working that consists of networking and knowledge exchange. By taking part in competitions or organizing competitions, city administrations are gaining insights in best-practice activities and interact with other field-actors.

Technical as well as social factors are impeding the work of SIE-field-actors. Concerning technical aspects, mainly the lack of smart energy infrastructures, which allow for real-time energy measurement lowers the possibilities to develop energy targeted competitions. Competition formats so far are taking broader approaches, where energy in many cases is one topic among others. Concerning social aspects, some target groups are hard to reach and involve in energy related topics. City-administrations are often concerned with a strong 'silo thinking' and slow process of change. This makes it hard to encourage change within the city administration. Even if competitions are addressing this difficulty with playful formats, the engagement is sometimes rather low. Furthermore, for citizens, energy related questions feel quite technical and abstract, which makes it harder to engage them in energy related competitions.

Enabling factors influence the SIE-field under study on a local and on a global level: On the local level, supporting local partners and network relationships are often a major factor to establish the SIE locally. Here, the cooperation between city actors and local initiatives are often the key for encouraging change. On the global level, the changing discourse around the role of cities and their responsibility in developing sustainable pathways encourages the engagement in energy related competitions.

7 Recommendations for our city partners, national and EU policy makers and SIE practitioners

From the findings outlined above, the following recommendations can be given to practitioners, cities, policy-makers on the national and EU-level

SIE practitioners

- Cooperate: Looking out for possibly partners can provide funding as well as knowledge exchange. Look out for partners, which support your idea and increase your visibility.
- Put ideas into practice: While many competitions aim for collecting new ideas for energy related problems, it is often harder to implement them in practice. When developing your competition, make sure that you have resources to follow up these ideas and put them into practice.

SONNET city partners

- Measure energy behaviour: Energy measurements and energy management systems are the basis to know in which sectors or properties the involvement of users is most efficient. This allows to target more explicitly topics that can be addressed in competition formats.
- Visualize energy behaviour: Competitions are much more attractive when success gets visible. Visualizing (real-time) energy behaviour can therefore be a big motivating factor in energy saving campaigns, especially in non-residential where users can't visualize their energy consumption on the electricity bill.
- Create incentives which are really attractive: When involving target groups, think about which incentives are really attractive for this group of people. Here different groups might be addressed differently. Consider reducing the number of competitions to an amount, in which you really can and want to invest your time and resources.

National and EU policy makers

- Engage in developing narratives: While it is necessary to develop clear energy related goals, energy pathways should also include a narrative about the role of local actors in shaping change. This should not be understood in a way that socially innovative actors are filling a gap of missing engagement but involve a sense of cooperation between stakeholders form different levels.

- Think integrated about decentralization: The progressing decentralization of the energy system not only requires decentral energy production facilities. Decentralisation also involves aspects such as citizen energy, local knowledge production and decision-making.

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9 Annex

Methodology:

Due to the heterogeneous character of the field, the case study followed an explorative approach and aimed for exploring the most relevant SIE-actors and SIE-field actors as well as the diversity of the SIE-field. Especially the attempt to include digital competition formats taking place on the city level was not possible. An early interview with a researcher who previously worked on games design showed that gamified competitions so far are hardly taking place on the city level in Germany because city administrations in many cases are lagging behind in terms of digitalizing systems. The few existing examples took place in the course of research projects, however, none of them developed an app in German language which made it impossible to relate the findings to the national context. We focused on the two levels of competitions within and between cities.

Following the explorative approach, the studied initiatives depict the heterogeneous character of the SIE-field were selected in their contrast to each other. Two early interviews, one with the member of a city administration and one with the member of a city network, offered the contacts to SIE-initiatives, which were interviewed in the next step. One difficulty thereby was to identify initiatives with a specific energy related focus as the activities in the SIE-field are taking place in a broader context of sustainability. Time constrictions complicated follow-up interviews with other members of the already interviewed initiatives. Document research and the collection of empirical interview data took place in a parallel process with the early interviews influencing the direction of the research. The reviewed primary source documents mainly related to the initiatives under study while secondary literature complemented the city approach with studies on urban sustainability transitions. These documents were selected in order to deepen the information on different initiatives and followed a snowballing processes that followed the selection process of relevant interviewees.

Interview recordings were transcribed, using the automatic transcription service offered by Nvivio and coded with the Nvivo coding software. We therefore used a deductive coding process, which allows for cross-country analysis. The data was reflected against the theoretical background of the SONNET projects and studies on urban sustainability transitions. Next to the tight timeframe of the study, one major limit was the lack of possibilities to personally attend meetings and conduct participant observations due to the corona pandemic.

List of interviewees:

Code Interview	Role of interviewee	Date	duration of the interview
DE_CLC_1	Interview with founder of a start-up, which is developing a board game	2020-06-23	51 minutes
DE_CLC_2	Interview with a researcher who previously worked on game development	2020-06-25	Approximatly 40 min (unrecorded)
DE_CLC_3	Interview with member of a city administration	2020-06-26	46 minutes
DE_CLC_4	Interview with two members of a city network	2020-07-01	47 minutes
DE_CLC_5	Interview with local organizer of a competition within a city	2020-07-16	90 minutes
DE_CLC_6	Interview with organizer of a energy saving competition within a city administration	2020-08-05	75 minutes
DE_CLC_7	Interview with project manager of a national wide competition between cities	2020-08-06	63 minutes
DE_CLC_8	Interview with member of a city administration	2020-08-10	96 minutes

Documents reviewed:

Besides the secondary sources listed in the bibliography section, we reviewed the following primary and secondary sources:

Author name	Document name	Document type	Year
Ampatzidou, Cristina; Bouw, Matthijs; van de Klundert, Froukje; Lange, Michiel de; Waal, Martijn de	The hackable city. A research manifesto and design toolkit.	Report	2014
difu	Wettbewerb "Kommunaler Klimaschutz 2015"	Press release	2015
difu	Wettbewerb - Klimaaktive Kommune 2020	Broschure	2020

Stenitzer, Grim	The “European Energy Award” for sustainable communities	Article	2005
Antonia Bartning, Caroline Frumert	Pitch your green idea	Leaflet	unknown
Climate-KIC	Climathon Playbook	Brochure	2020
Climate-KIC	Climathon	Leaflet	unknown
Stiftung Deutscher Nachhaltigkeitspreis e.V.	Vorreiter der Transformation unter Deutschlands Kommunen gesucht	Press release	2020
Stiftung Deutscher Nachhaltigkeitspreis e.V.	Wettbewerb Städte und Gemeinden	Leaflet	2020
City of Mannheim	Aktionsprogramm 2015 „Energie und Klimaschutz“ für Mitarbeiterinnen und Mitarbeiter	Brochure	2015
City of Mannheim	Leitbild Mannheim 2030	Brochure	2019

List of meetings and events attended:

Due to the current corona pandemic, it was impossible to attend meetings personally.

Detailed List of events (Timeline):

PHASE 1: Resignation Rules			
2000s	Trend	frustration of civil society actors about the failing of national state actors in the early 2000ies	Interview DE_CLC_7
2000	Policy event	Renewable Energy Sources Act: generation of renewable electricity encouraged through feed-in-tariffs	(see Agora Energiewende 2015)
2002	Policy event	Decision on nuclear phase out (nuclear consensus)	(see Agora Energiewende 2015)
PHASE 2: A new sense of responsibility			
	Trend	aim of civil society actors and local policy actors to raise attention towards sustainability	
2007	Policy event	Leipzig Charta (on sustainable urban development goals)	(BMU 2007)
2008	SIE-field event	German Sustainability Award is founded	Interview DE_CLC_7
2008	SIE-field event	The award 'Energiekommune des Monats' (energy municipality of the month) is founded (German Institute of Urban Affairs)	Online
2010	Policy event	Energy concept of the German government (for an environmentally friendly, reliable and affordable energy supply)	(BMWi 2010)
2011	Shock	Fukushima nuclear catastrophy	
2011	Policy event	Second nuclear phase out Law	(BGBl 2011 I 43 S. 1704-1705)
2014	Policy event	Renewable Energy Sources Act (EEG 2.0): from specified feed-in tariffs to system of tendering	(BGBl 2014 I 33 S. 1066–1147)

PHASE 3: Fun Formats			
	Trend	Cities are increasingly under pressure to develop formats (e.g. prizes, awards) to engage citizens and provide space for bottom-up Initiatives	
2015	Policy event	Paris Agreement (UN Framework Convention on Climate Change with long-term temperature goal)	
2015	SIE-field event	First *Climathon* event	Interview DE_CLC_5
2016	SIE-field event	'Kommune innovative' is founded (by FONA – research for sustainable development)	Online
2016	Policy event	Basque declaration (New Pathways for European Cities and Towns)	Online
2016	Policy event	Smart metering and the Energy Transition Digitisation Act	(BGBl 2016 I 43 S. 2034-2064)
2019	Policy event	Climate protection plan 2050 (for the implementation of the Paris Agreement)	(BMU 2016)
2019	Trend	Climate change for the first time as number one political topic	(Agora Energiewende 2020)
2020	SIE-field event	Mannheim Message (as response of Mayors, organisations, and individuals from across Europe to the European Green Deal; it calls for „local authorities to be key partners in the development of Local Green Deals")	Online