

(Self-)Governing Urban Energy Transitions: From Revolution to Evolution?

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Abstract

Governance approaches in the sustainability transitions literature portray societal transitions as purposefully pursued revolutions. Critiques of these approaches are sceptical about the potentials of steering these transformations and perceive them as social evolution processes. This article argues that governance can assume the form of purposeful coordination (revolution) as well as self-governance (evolution). The empirical exploration of two urban energy transition processes shows that both forms of governance become manifest in sustainability transitions and allow for coordinating the interplay of different actors in these transformation processes. While governance approaches tend to stress the need for purposeful coordination, the study illustrates the self-governing capacities of transitions, substituting active efforts of managing transformation processes.

Prevalent governance approaches in the field of sustainability transitions stress the potentials of actively initiating and steering transitions (Loorbach, 2010; Loorbach, Rotmans, 2010; Nevens *et al.*, 2013; Rotmans, Kemp, van Asselt, 2001; Rotmans, Loorbach, 2009; Wittmayer, Loorbach, 2016). They regard societal transformations as a revolutionary process guided by specific actors (e.g. frontrunners, transition managers). Other perspectives contrast with this view: they question the ability to purposefully design societal change and highlight that transitions are evolutionary processes (Lange, Schimank, 2004; Schimank, 2005; Shove, Walker, 2007; Shove, Walker, 2010).

This chapter propose a reading of governance that brings both perspectives together. It perceives the governance of transitions as structuring change. Governance concerns the creation of a transition order: structures that allow actors involved in the transition process to coordinate their activities. Intentional coordination efforts (revolution) as well as social self-organization (evolution) may produce this transition order. As such, governance can involve revolution and evolution. I illustrate this approach by exploring two cases of urban energy transitions: Bottrop and Emden. Bottrop constitutes an example of revolutionary governance, whereas evolutionary self-governance shapes Emden's energy transition. The example of Emden illustrates that forms of self-governance may replace deliberate efforts to steer transitions.

This chapter is structured as follows: The first section introduces the reader to prevalent notions of governance in the field of sustainability transitions. Based on these approaches and their critical receptions, the second section proposes to consider governance as structuring change and to combine revolutionary and evolutionary perspectives. The third section illustrates this approach by exploring the energy transitions of Bottrop and Emden. The chapter ends with a conclusion that summarizes the main results and suggests avenues for further research.

1. Sustainability transitions: revolution or evolution?

Numerous approaches define “governance” in diverse ways. In general terms, governance can be described as the more or less institutionalized coordination between different actors towards a collective goal (Bornemann, Sohre, Burger, 2018: 143; Kemp, Parto, Gibson, 2005; Lange *et al.*, 2013: 406). The literature frequently portrays “governance” as a more horizontal, less hierarchical form of governing than traditional forms of governing (Bingham, Nabatchi, O’Leary, 2005). Governance takes into account the fact that not only political decision makers shape societies. It seeks to integrate different types of actors such as the citizens, businesses, and NGOs into decision-making, planning, and implementation processes. Moreover, governance is often perceived as a purposeful process of shaping society in a desired way (Bornemann *et al.*, 2018: 144; Shove, Walker, 2010: 475). By contrast, broader sociological approaches also include non-intended processes and focus less on the activities of shaping society than on the structures that allow actors to coordinate their efforts to shape society (Lange, Schimank, 2004; Schimank, 2005). In this perspective, governance concerns the general problem of coordinating the exchanges between actors. To coordinate the interplay between diverse actors, these have to adapt their actions to each other. Institutionalized structures (e.g. rules, actor roles, responsibilities, social norms) facilitate the coordination. These structures may be the outcome of intended design or social evolution. Consequently, governance concerns the creation of coordination structures through purposeful design or evolutionary processes. This chapter draws upon this broader sociological understanding of governance.

Different approaches to the governance of transitions have emerged in sustainability transitions literature. The most prominent approaches are transitions management and strategic

niche management (Markard, Raven, Truffer, 2012). These approaches are related to the multi-level-perspective (MLP) which draws upon insights from evolutionary economics and innovation studies. MLP distinguishes between three levels: niches, regimes, and landscapes (Geels 2002). While the regime constitutes the dominant socio-technological structures and processes (e.g. carbon-based energy production), niches are spaces where actors experiment with new solutions (e.g. non-carbon-based technologies for producing energy). Transitions occur when niches manage to alter the regime with their innovations: the expansion of niches (e.g. growing community of developers and users) and the adaptation of its solutions to the regime may allow for the upscaling of niche innovations. Moreover, changes on the level of landscape can facilitate a regime change. The landscape constitutes the institutional context in which the regime and niche are embedded.

By contrast with MLP, transitions management and strategic niche management place an emphasis on the governance of sustainability transitions. As they seek to provide tools for initiating and steering sustainability transitions, they assume that specific actors (e.g. transition managers) can purposefully plan and shape societal transformations processes. The following illustrations focus on the example of transitions management.

Jan Rotmans and Derk Loorbach (2010: 239) describe transition management as “a deliberative process to influence governance activities in such a way that they lead to accelerated change directed towards sustainability ambitions”. The approach regards transitions as complex processes in which different social spheres interact and individual change processes in these subsystems reinforce each other (Rotmans *et al.*, 2001: 16; Rotmans, Loorbach, 2009: 189–190). The role of the government is to stimulate the transition process by inspiring change and encouraging other actors (Rotmans *et al.*, 2001: 25). Transition management pursues a structural change in gradual, incremental manner, not radical instantaneous change. As such, it tries to exploit existing opportunities for change in the system (Rotmans *et al.*, 2001: 25; Rotmans, Loorbach, 2009: 189–190).

Central to transition management is the transition arena (Loorbach, Rotmans, 2010: 243). The transition arena is a network of frontrunners that seeks to influence the regime. The transition arena generates a joint transition narrative that guides and stimulates the transformation process (Wittmayer, Loorbach, 2016: 20). The frontrunners come from different social spheres (e.g. policy, science, business) and should be well selected (e.g. through psychological tests) (Wittmayer, 2016: 165; Wittmayer, Loorbach, 2016: 13): while most actors should be niche players remote from the regime, there is also the need to integrate actors related to the regime into the transition arena. To create shared visions, develop an agenda, undertake action, and finally influence the regime, transition arenas need protection, support and resources (Loorbach, Rotmans, 2010: 244–245; Rotmans, Loorbach, 2009: 189–190).

In effect, transition management comes down to creating space for frontrunners (niche players and change-inclined regime players in transition arenas), forming new coalitions around these arenas, driving the activities in a shared and desired direction, and developing coalitions and networks into a movement that puts societal pressure on regular policy (Rotmans, Loorbach, 2009: 191).

Transition management is a cyclical process split into different development phases (Rotmans, Loorbach, 2009: 191): these include (a) problem structuring and envisioning (e.g. establishing a transition arena), (b) development of sustainability images and transition agenda, (c) initiation and execution of the transition, and (d) monitoring and evaluating the transition process. The latest phase involves adjusting the vision and agenda, based on the previous experience.

Although Jan Rotmans and Derk Loorbach (2010: 244; 2009: 188) acknowledge the difficulties of steering complex social systems, they suppose that the system becomes increasingly manageable as “managers” gain knowledge about the system and experiences in

handling it over time. Analytical tools such as splitting the change process into different phases and levels facilitate the management, as they identify typical patterns of transitions.

Transition management has also been developed into a specific approach for cities: Urban Transition Labs (Wittmayer, Loorbach, 2016: 21). Urban Transition Labs are living labs that create places for experimentation and involve research and innovation processes (Neuens *et al.*, 2013). In this approach, a transition team designs, accompanies and guides the process. This team is closely related to the transition arena: “The main task of the transition team is to facilitate the interaction, to unveil lock-ins, to discover innovation opportunities, to assure transparency and to nurture the social learning environment” (Neuens *et al.*, 2013: 116).

The aforementioned governance approaches have become subject to tough criticism. Based on practice theory, Elizabeth Shove and Gordon Walker (2007; 2010) question their ambitions of steering societal transformations. With regard to transitions management, they diagnose a lack of attention to the political dimension of transitions: transitions management disregards questions of power and the positioning of transitions managers in the systems. Moreover, although referring to complex socio-technological theories, transition management relies on simplistic management models and policy recommendations. Finally, Elizabeth Shove and Gordon Walker stress the emergent nature of social structures and practices: “systems of practice have lives of their own” (Shove, Walker, 2010: 475). Although policy-makers can intervene in the system, the outcome of these interventions depends on consumers and other actors as well as on their complex interactions. Consequently, there are no reliable ways of steering a social system. Similarly, sociological system-theory approaches to governance point to the difficulties of steering societal transformation processes (Lange, Schimank, 2004; Schimank, 2005): numerous actors seek to intervene in social structures with different intentions. The intermingling of actions from different actors create new structures that will usually not match with the intentions of the individual actors. The social complexity that derives from the interdependence of actions thwarts the intentional steering of social systems. Coordination may take place, but the structures that coordinate the actions are not necessarily the product of intentional design, as they evolve in the course of the interactions between the actors.

These critical perspectives highlight the unintended evolution of social order and question the potentials of purposefully transforming and designing the societal order (revolution). The next section elaborates on these ideas and brings both perspectives – evolution and revolution – together.

2. Governance as structuring change

This section proposes a particular approach to governance, which perceives it as structuring change. The governance of transitions concerns the creation of a social order that enables and guides complex societal transformation processes. Processes of revolution as well as evolution can produce this social order.

Transitions are related to three types of social order: (1) the changing structures, (2) the transition order, and (3) the institutional landscape. The first type of social order concerns the structures that are subject to transformation efforts: the *changing structures*. Intended societal transitions processes seek to alter the existing order of a society. In the case of sustainability transitions, the transformation concerns those structures that are perceived of as contributing to the unsustainability of a society (e.g. carbon-based production of energy). Sustainability transitions aim to replace these structures with alternative structures that create more sustainable forms of production, supply, and consumption (Markard *et al.*, 2012).

The second and third type of order refer to the structures that make it possible to undertake the aforementioned changes. Given the encompassing character of sustainability

transitions, the transformations span different spheres of modern societies such as the business and market sector, politics, education, civil society (Blanchet, 2015; Bulkeley, Kern, 2006; Busch, McCormick, 2014; Dowling, McGuirk, Bulkeley, 2014; Mattes, Huber, Koehrsen, 2015; Späth, Rohrer, 2013). Therefore, the transformation processes involve actors (e.g. politicians, public administrators, private companies, NGOs, researchers) and activities from these spheres. The coordination of their activities is challenging, as actors from diverse backgrounds, holding different intentions and perspectives, interact in the transformations and have little or no experience in the given transition process. To allow for their coordination, there is need for structures that guide their activities and exchanges. Actors will partly orientate their actions along the *institutional landscape*: the existing basic social order of a society such as, for instance, legal frameworks and general behavioural norms facilitates their basic coordination. However, complex societal transitions involve the generation of additional structures that focus on the coordination of the transition activities: the *transition order*. This is the social order that guides the transformation process. The transition order are structures built for arranging complex societal transformation processes. It is an order to change the social order: a second-level order.

The aforementioned types of social order are interconnected: for instance, the landscapes frame the potentials of transforming the unsustainable structures and predefine what transition order is appropriate to undertake these changes. Moreover, the transformation of unsustainable structures may, in the end, alter the institutional landscape. As the three types of order closely interrelate, the distinction between them serves primarily as a heuristic tool for exploring the governance of sustainability transitions.

The governance of transitions concerns the development of the transition order. The transition order structures exchanges between diverse actors by generating arrangements that guide their activities. These may consist, for instance, in rules, attribution of responsibilities, joint visions, goals, networks, institutionalized procedures, and hierarchies (Hodson, Marvin, 2009, 2010, 2012; Hoffman *et al.*, 2013; Hoppe *et al.*, 2015; Späth, Rohrer, 2010, 2013). Rather than referring to individual decisions and activities, governance deals with the social arrangements that structure the interactions in the course of the transition process.

The transition order does not only enable and facilitate the transformation; it also has a constraining impact on it by limiting the potential pathways of change (Scott, 2008). Its structures create a leeway for the transformation process: they define what types of change are possible, who participates in what way and with what potentials of influencing the process, etc. Consequently, the transition order shapes the transition process by creating proscriptive transition pathways.

Prescriptive governance approaches such as transition management provide tools for designing the transition order. Here, governance appears as a practice of purposefully conceiving the transition order: governance serves to develop a structural framework for the change process through predefined roles (e.g. transition manager, frontrunners), processes (e.g. choosing frontrunners, compiling a transition arena), transition steps (e.g. envisioning change). These approaches proclaim a vision of governance that tends towards the revolution-pole: decision makers create the order that structures the transition process. Governance appears as a structuration technique to steer societal change.

However, the structures of the transition order can also evolve without intentional efforts to create them. They may develop in the course of the transition process out of the activities of the involved actors in the form of emergent rules, hierarchies, actors' roles, narratives, visions, etc. This perspective contrasts with the aforementioned prescriptive approaches. It highlights social evolution processes: the order that structures the transition evolves in the course of transition processes and cannot be fully controlled by decision makers. Governance appears as self-governance of self-organizing social systems (Luhmann, 1997, 2001).

To sum up, the transition order can develop in different ways: governance as revolution involves intentional design of coordination structures whereas evolution refers to the self-governance of social systems and stresses the emergence of growing structures. The following section explores to what extent both forms of governance – evolution and revolution – become manifest in urban energy transitions.

3. Evolution and revolution in two urban energy transitions

This section illustrates the theoretical reflections based on two case studies of urban energy transitions: Emden and Bottrop (Koehrsen, 2017, 2018; Mattes *et al.*, 2015). Emden is a harbour-city of approximately 50,000 inhabitants located in Northern Germany whereas Bottrop is located in Germany’s Midwest, in the Ruhr area, and has approximately 117,000 inhabitants. Both cities have the reputation of being strongly engaged in the energy transition.

To explore the energy transition processes in the two cities, semi-structured qualitative interviews and documents (e.g. reports, flyers, press statements, webpages) have been gathered and analysed. In particular, the interviews helped to explore the coordination of local actors. A total of 68 interviews with actors from different social spheres (e.g. politics, city administration, business sector, NGOs, science) who are involved in the given urban energy transition were conducted: 31 interviews in Bottrop and 37 interviews in Emden. Interviews were transcribed and analysed via the qualitative data analysis programme MAXQDA and the main results summarized in two case-study reports.

Both cases are embedded in the German institutional context. This context is marked by an increasing public concern about climate change and by political measures furthering the energy transition with public and private investments in renewables and energy efficiency (Beveridge, Kern, 2013; Jacobsson, Lauber, 2006; Nordensvärd, Urban, 2015). With regard to the regional landscape, the loss of historic sources of employment and economic revenue characterizes both cities: Bottrop is affected by the disappearance of the coal-mining industry that historically constituted the principal employer in the Ruhr region. In Emden, the shipbuilding sector has suffered from a strong decline. Against this background, the growing sector of sustainable energy production, supply and consumption constitutes a potential field for creating new employment and revenue. Table 1 provides an overview of the main characteristics of the two cases with regard to their governance of the energy transition.

| | Bottrop | Emden |
|----------------------------------|--|---------------------------------------|
| Population size | 117,000 | 50,000 |
| Background | Disappearing coal-mining | Decline of ship building |
| Transition governance | Revolutionary | Evolutionary |
| Governance mechanism | Central coordination via boundary organization | Self-governing transition field |
| Elements of the transition order | Contact persons, round tables, shared rules | Hierarchy, networks, prevalent vision |

Table 1: Transition Governance of Bottrop and Emden

3.1. Bottrop: energy transition as revolution?

In the mid-1990s, Bottrop's city administration started its first energy saving activities for municipal buildings while private initiatives started to undertake renewable energy projects. In the following years, the general commitment to the transition increased. The year 2010 marked a breaking point for the local energy transition: Bottrop received the Innovation Ruhr Award, a prize sponsored by the industry association *Initiativkreis Ruhr*. The award application form envisioned the transformation of a city district of approx. 70.000 inhabitants to cut CO₂ emissions by 50% by 2020 (based on the 2010 level). The transformation encompasses approximately 350 individual projects that cover different areas such as transportation, living, working, etc. Moreover, it involves various types of actors such as international industry companies, research institutions, public administrators, local craft businesses, banks, and politicians.

An essential function of the transition order is the coordination and mediation of knowledge-flows and activities between the involved actors. In the case of Bottrop, this is undertaken through a boundary organization (Guston, 1999, 2001; Koehrsen, 2017): the public-private company Innovation City GmbH (IC) is in charge of governing Bottrop's energy transition. This organization was set up to coordinate the transformation process after the successful application for the award.

IC centrally coordinates the activities of the involved actors by bringing together stakeholders from various social spheres, monitoring projects, hosting steering committees and advisory boards, attributing responsibilities, setting goals, and designing action plans. Thereby, the organization purposefully designs the transition order: it creates the structures for the transformation process, serving as a connecting interface that arranges the exchanges between the intervening actors. Given its mediating character, IC constitutes a boundary organization (Koehrsen, 2017) that manages the boundaries between different social spheres (Guston, 1999, 2001): it allows for the translation, coordination, and joint knowledge production between actors from different social spheres (e.g. politics, business and market sphere, research, city administration). To fulfil this role, it has to carefully balance the differing standards and expectations of the actors from these spheres. For this purpose, it is staffed with actors from diverse private and public sector backgrounds and has specific access-points for actors from different spheres. As such, the stakeholders have a fixed contact person at IC that is responsible for their sphere and its specific needs (e.g. caretakers for the industry and city administration).

An important coordination structure hosted by IC is the Friday project round table that brings together project-leaders from different social spheres to discuss ongoing and future projects: employees of IC, private companies, city administration, researchers, etc. The round table allows them to supervise ongoing projects, exchange information about their progress, consult each other, provide support, generate new impulses, and identify opportunities.

Moreover, IC has also generated shared rules for action. This becomes manifest in the standardization for projects related to Bottrop's energy transition: IC has created an ad-hoc assessment tool for new projects and shared standards of qualification, advice services, and tariffing systems for craft businesses, energy advisers, and architects. Projects participating in the IC framework have to adhere to these standards to guarantee a joint level of quality.

Focusing on the efforts of IC to steer the energy transition process, the case of Bottrop conveys a textbook example of a purposefully governed transition: the transition order appears to be the outcome of a well-planned revolution endeavour.

3.2. Emden: energy transition as evolution?

Emden's energy transition started in the 1980 with the construction of the first windmill and has gained increasing momentum since the 1990s with a rising number of actors and projects engaging in renewables and energy efficiency. In particular, the wind energy sector has

experienced vast growth. The changes become visible in the vast wind-farms around the city, PV-installations in the city (e.g. a massive WW2-bunker vested with PV-panels in the heart of the city), and energy efficiency campaigns (e.g. boot camps for children in schools, energy exhibitions for citizens, publicity on big screens in the city). Important frontrunners in these processes come from the political and economic sphere as well as from the city administration. Crucial actors are a business entrepreneur in renewables and Emden's public utility: Stadtwerke Emden (SWE).

In contrast to Bottrop, Emden has no organization, steering committee, or any other type of purposefully arranged structure that centrally manages the transition. As such, its transition order is less palpable. The individual projects of the involved actors appear to flow in an almost chaotic manner in the space of this transition. There is no direct coordination between all of the involved actors and projects. Nevertheless, some structures have grown over time that facilitate the coordination of local actors: networks, prevalent actors and hierarchies, dominant visions and rules, paradigmatic camps, and a general pathway for the transition. These form part of a local energy transition field that constitutes a self-governing mechanism facilitating the interplay between different actors (Koehrsen, 2018).

Emden's energy transition has evolved out of a network of loosely coupled local actors. In this network, some actors have assumed core functions: strongly engaged employees of the city administration prepared decisions and facilitated processes. The former mayor placed this topic on the political agenda to generate employment. A newly appointed CEO of the SWE orientated the utility towards renewables and energy efficiency. A business entrepreneur in the field of renewables coordinated the private construction of wind farms and became a public figure struggling for the local transformation. Apart from these core actors, numerous other actors such as NGOs, local banks, research institutes of the local university for applied sciences, and an ecology centre have strongly contributed with individual projects to the local energy transition. These actors and their transition activities appear at first sight to be fragmented. However, there is contact between many of these actors who sometimes collaborate in joint projects. Also, there seems to exist a general knowledge about what is going on: important actors know each other and have general understanding about what the others are doing. Interviewees describe Emden as a city of short ways in which it is easy to contact other actors.

Moreover, some networks have grown among key-actors during the transition. The entrepreneur, the CEO of the SWE, and the ex-mayor thus form a network of influential key-actors who occasionally coordinate their activities, thereby helping to initiate and spur the transformation process. In particular, the SWE has assumed over time the leading role in Emden's energy transition: it has become the most visible actor and the actor with the highest amount of network ties to other players in the local energy transition. Moreover, the vast majority of interview partners describe the SWE with its CEO as the key actor in Emden's energy transition. Although no single actor can determine the transition or define its direction, the SWE is perceived as a leader and carefully manages this image through public campaigning (e.g. public advertisement about energy efficiency all over the city), front-running initiatives, and collaborations with other key actors (e.g. local university). Its dominant position allows it to influence the local energy transition together with its allies in a more efficient way than less present actors.



Picture 1: "Green Energy" Advertisement of the SWE; source: own.

Apart from hierarchies and networks, a prevalent vision of what the energy transition is about has emerged. Dominant narratives place an emphasis on renewables (in particular wind energy) and energy efficiency and regard the energy transition as a process that should lead to the reduction of CO₂ emissions and is beneficial for the environment as well as for the locality (employment, revenues, etc.). This general understanding facilitates the interaction among local actors from different backgrounds and predefines a general transition pathway with strong investments in wind energy. Moreover, among circles of engaged actors the vision assumes a rule character condemning actions that involve an increase in CO₂ emissions. For instance, an interviewee reports that the CEO of a local renewable business hides his brand new SUV, as he is afraid of social sanctions from other actors in the field. The prescriptive rule provides a general orientation that helps evaluate the appropriateness of individual actions in the context of an apparently uncoordinated energy transition. The shared vision, networks, and hierarchies facilitate the coordination but are, at the same time, subject to struggles among actors and may change over time.

Indeed, many actors hold specific interests that do not necessarily match the dominant vision. On the one extreme, some actors have a more radical environmentalist vision (e.g. environmental NGOs, green party). On the other extreme, many other actors have a pragmatic approach (e.g. businesses that shifted towards the field of renewables): they regard the energy transition as an opportunity to generate profits for their primary field of engagement (e.g. votes, research projects, economic revenue) and are likely to commit to other transition pathways if they become more profitable for them. These groups of actors constitute different camps within the local field of energy transition. Actors usually know what camps other actors represent and are unlikely to collaborate if they are from opposed camps.

Struggling for profits and impact in the field, actors may challenge the prevalent vision and try to establish an alternative transition pathway. However, what vision emerges as

dominant depends on the interplay of local actors. Moreover, previous engagement and public commitment somehow limit the leeway for action: for instance, in 2008, an international energy company planned to build a coal power plant in Emden. Although strongly attracted to this project, some actors from the pragmatic camp refrained from openly showing their commitment, as it would have damaged their credibility given their previously stated commitment to the existing vision. Moreover, the environmental camp managed to massively mobilize the population against the power plant.

In sum, Emden offers an example of a transition order that emerged out of evolutionary processes. Although some key-actors have pushed the topic in the city, there is no central actor coordinating the activities. Nevertheless, coordinating mechanisms such as hierarchies, networks, and prevalent vision have emerged. These form part of a self-governing process of energy transition.

3.3. Evolving revolutions and revolutionized evolutions

Bottrop and Emden strongly differ in their governance of the local energy transition. While Bottrop represents the revolutionary approach of a purposefully steered energy transition, Emden's energy transition emerged out of evolutionary processes and shows characteristics of self-governance. However, in both cases one can also find features of the other governance mechanism.

Although the activities of IC in Bottrop represent a textbook example of steering a transition, there is also activity beyond IC indicating processes of uncontrolled evolution. IC's dominance with its close links to industrial companies has created a focus on technology-driven projects in Bottrop's energy transition. A technology-driven industry perspective and big showcase projects dominate the local energy transition while there is less focus on affordable solutions and a perceived distance to the needs of the local population. Actors from the city administration and civil society criticize the industrial and technological focus and state there is a need to include questions of life quality and place a stronger focus on softer factors. Although the technological and industry focus fits the institutional landscape in which there is a perceived need to boost regional companies, it has led to division between different camps in Bottrop's energy transition. As in Emden, a transition field with power inequalities has evolved: actors hold different perspectives and power positions. While the boundary organization IC assumes the most powerful position, some actors challenge its vision and activities. Although these divisions and competition are part of the transition order, they are not the outcome of purposeful design (revolution).

Although Emden's transition is marked by evolutionary dynamics, there are also revolutionary efforts to actively manage the process. The municipality has thus set the goal to reduce its CO₂ emission by 50% by 2030, as compared to 1990 levels. To achieve this goal, the city has appointed a climate manager who is in charge of networking local actors and coordinating activities. Additionally, the municipality engages in the programs Climate Municipality and the European Energy Award. Both constitute awards and management systems for reducing CO₂. These programs suggest specific measures, involve different departments and municipal companies, and help to coordinate their efforts in different areas of the municipality such as mobility, private households, industry, and public relations. Based on these programs, the municipality has developed, for instance, an integrated climate protection plan (Stadt Emden, 2010). However, the aforementioned goal and structures primarily concern the municipal administration and political actors who are involved in these activities, but do not cover relevant actors from the business sector, research institutions, and NGOs.

In sum, each case shows a strong tendency to one of the extreme poles of transition governance: revolution or evolution. However, rather than constituting pure examples of

revolution or evolution, they involve features of the other governance mechanism. Consequently, transition governance moves on a spectrum between revolution and evolution. Transition processes will move within this spectrum and involve both governance mechanisms.

4. Conclusion

Governance approaches such as transition management place an emphasis on the purposeful steering of transitions. Contrasting with this perspective, this chapter has argued that transition governance can assume the form of intentional coordination (revolution) as well as self-governance (evolution). The case studies of Bottrop's and Emden's energy transitions illustrated this argument by exploring the two governance mechanisms: the boundary organization IC purposefully steers Bottrop's transition whereas a self-governing social field coordinates Emden's transformation process. The case of Emden shows that arrangements for the coordination of transitions may evolve in the course of a transition: a central management of the transition is not necessary to create a transition order.

Despite their differences, both cases showed that transitions need a structure: the transition order coordinates the activities of the involved actors. It orientates the transition process and thereby has an impact on what and how changes will be undertaken. The differences observed in these two cases are likely to be visible in other cases: we are likely to find forms of evolutionary and revolutionary transition governance in different urban energy transitions. Nevertheless, these forms will not be exclusive but feature elements of the other governance mechanism. Sometimes revolutionary narratives and efforts prevail over evolutionary dynamics, whereas in other cases revolutionary activities are barely visible and the process assumes a stronger evolutionary character.

The two case studies indicate that power inequalities and conflicts play a crucial role in the governance of transitions. This is valid for both types of governance. In revolutionary governance, formal power over the process tends to be concentrated in one or several actors (e.g. boundary organization, a transition arena, transition manager). In contrast, in evolutionary governance, power is subject to open struggle in a field and not formally attributed to specific actors. In the course of the transition process, some actors will manage to become more powerful than others and have a higher impact on the configuration of the transition. However, even in the revolutionary mode of governance, the formal power positions of those steering the process are not set in stone and can be subject to struggles. Actors that do not feel well represented in the ongoing transition process (e.g. citizens, NGOs) may challenge the power position of the leading actors. The revolutionary transition agents thus also move within social fields and are exposed to its cycles.

While the literature has originally placed an emphasis on the conflicts between those struggling for the transition and those against it, governance approaches should place a stronger emphasis on power inequalities and conflict among those engaging for transitions. Moreover, the governance literature emphasizes the steering of transitions and, based on this management perspective, tends to regard the loss of control as a problem. Nevertheless, transitions may evolve self-governing capacities that supplant active efforts to manage the transformation processes. Further studies might explore the potentials and challenges of self-governance.

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