Article

Tensions in Urban Transitions. Conceptualizing Conflicts in Local Climate Policy Arrangements

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Abstract: Academic and political debate places great expectations on cities' potential for furthering decentralized, bottom-up climate policies. Local policy research acknowledges the role of local agency to develop and implement sustainability, but also acknowledges internal conflicts. This partly reflects tensions between different functions of the local level, and different governance models related to them. In addition, local dependency on higher level competencies, resources, and overarching strategies is discussed. This article proposes a focus on political processes and power relationships between levels of governance, and among relevant domains within cities, to understand the dynamics of policy change towards sustainability. Researching these dynamics within local climate policy arrangements (LCPAs) is proposed as an approach to understanding the complexities of local constellations and contradictions within them. It makes the distinction between "weak" and "strong" ecological modernization, and relates it to two basic rationales for local governance. The resulting typology denotes constellations characterizing policy change ambitions towards local climate policy in crucial domains, including economic development, energy infrastructures, climate change management, town planning and housing, and transportation. This article argues that this approach overcomes the limitations of the predominating conceptualizations of urban carbon control strategies as consistent, and recognises the multi-level dimension of such internal urban processes.

Keywords: local climate policy; local governance; ecological modernization; local state restructuring; urban transition

1. Introduction

Cities are increasingly identified as spheres of climate mitigation and adaptation activities [1–3], and, in a broader sense, of ecological transition [4,5], and as elements of green economy strategies [6].

Since the 1992 Rio Earth Summit (Officially entitled UN Conference on Environment and Development (UNCED), it was held in Rio de Janeiro from 3 to 14 June 1992), cities are recognised as actors for sustainable development, as arenas for negotiating contradicting development trajectories, and as platforms for establishing appropriate governance structures ensuring societal participation [7,8]. Referring to the speed of urbanization, and the role of cities (including mega-cities) in developing countries as nodes for economic and social development, their significance in mitigating global environmental change has increasingly been highlighted [9,10]. Examples include recent reports and studies on the green economy (GE) and strategies on green cities [4]. Notwithstanding economic differences, similar technologies, infrastructures, types of institutions and political instruments are, in principle, used in metropoles globally. A stocktake of activities addressing climate change includes urban infrastructures (e.g., energy), the building stock, transport, and urban development, as well as adaptation and carbon sequestration [11]. At the same time, problem structures and societal capacities differ substantially. While many 'green cities' in developing countries are still struggling with pollution control and the extension of basic urban infrastructures to the poor [4], in OECD countries and some industrializing

countries, climate change policies have emerged as a key issue, increasingly framed as urban low-carbon transition or carbon control [12–14].

The agency of local government clearly plays a key role, however the activities of other societal actors such as business and NGOs are also relevant [11]. Social science, including political science, has identified a number of factors increasing the capacity of the local level to pursue sustainable strategies. These factors include the competencies and resources of local governments within the respective political systems [15], the effects of standards for relevant sectors defined by higher political levels [16], as well as political leadership and societal support for transformative activities at the local level [17]. Furthermore, the role of network governance as an enabling approach at the local level [18], and city transnational networks in fostering learning and communication across levels, is highlighted, e.g., [19]. With regard to innovation processes, their multi-level character [20] as well as demand for the reconfiguration of technologies or social practices in specific urban contexts is researched [21].

Knowledge about the effects of these factors has provided robust explanations for local sustainability activities as well as local climate protection policies, including their transformative potential. However, despite the strengths and plurality of these perspectives, the literature on local climate and sustainability policy tends to treat the local level as a single entity, or, where conflict or power relations are addressed, as a unitary arena of action. This article assumes that differences within cities, and especially between and within different sectors of local government, local administrations, and local policy are relevant to understanding their transformative ambitions and should therefore be investigated more systematically.

Of course, these differences can be understood from existing social science approaches as consequences of sectoral multi-level networks, policy coalitions, or professional cultures, since sectors at local level are always integrated into sectoral policies of higher levels. Alternatively, such differences can be linked to conflicting interests, e.g., resulting from economic or social rationales embedded into different sectors. This article aims to link central insights of local governance research on the relevance of liberalization for state restructuring and the differences in governance constellations between sectors to research approaches that combine interpretative and institutional methods in environmental policy research. Methodologically, the article takes up the concept of policy coalitions and amends it, because it allows the integration of the multi-level and internal local dimensions of such processes as dynamic constellations. As a result, it shows how crucial domains of local climate policies are characterized by constellations of actors, norms and policy orientations. These constellations are denominated local climate policy arrangements (LCPAs). Although this article is predominantly conceptual in nature, it refers to current tensions in local policy sectors that are particularly relevant for local transformative activities in Germany, but occasionally also refers to parallel developments in other European countries. The outcome of the article is a research framework for in-depth comparative small-n studies or case studies, based on qualitative research methods.

The structure of the article follows the development of the conceptual argument: First, it considers the links between sustainability and the local level. The debate on ecological modernization (EM) and distinction between strong and weak EM is particularly focused on, as this helps to distinguish between different degrees of transformative ambitions. Secondly, the insights into local government and local governance highlighted in the current debate and local climate policy literature are reflected on. The article shows how these perspectives on sectoral dynamics can be combined with theories of local policy. Thirdly, it shows how the various strands of argument put forward can be integrated into the concept of LCPAs. Based on the predominant governance form and the transformative ambitions of EM elements, a typology of policy change orientations towards carbon control in LCPAs is proposed as an analytical instrument. This section also briefly addresses economic development, energy infrastructures and renewable energy use at local level, urban climate policy management, town planning and housing, and transport as local

policy sectors that tend to characterize LCPAs, as well as illustrating central tensions in these domains with regard to Germany's exemplarity.

2. Debating the Contradictions of Sustainability and Local Transitions

Framing complex attempts to address economic, social, and environmental transitions at the local level has a long tradition [8]. This article refers especially to the debate that emerged since the United Nations Environment Programme's (UNEP) Green Economy Initiative (2008). In their focus on growth, innovation, and ecological improvements in globally decisive domains, green economy strategies could be understood as cases of ecological modernization (EM), but with a stronger focus on economic development. Most studies emphasize their strong potential for economic growth and job creation [22,23], and highlight the potential of new techno-industrial regimes [24] to create a post-carbon era. Exemplary domains are thus, renewable energy and resource efficient technologies [25].

EM introduces basic distinctions for addressing these processes analytically, since economic processes leading to sustainable growth are seen as tools for substantial environmental progress, and as enhancing competitiveness. While some versions of EM identify the economy as an autonomous sphere [26], the predominant political and social science EM perspective emphasises the leading role of the state as actor [27]. Hence, types of innovations, appropriate governance patterns and instruments are of analytical interest [28,29]. The initially strong focus on technological progress and industry-state relations was criticised by some as 'weak EM', to be complemented by a stronger orientation towards broad institutional restructuring [30] and societal conflict as the engine of 'reflexive modernization' [31] and 'strong EM' [32]. In such an understanding, regional and local economic as well as social processes, including the consequences of locational competition, play an important role [33].

GE approaches range from a focus on broader socio-economic transitions to an emphasis on economic restructuring from specific sectors to the global economy. Within these interdisciplinary debates, some critics view GE as a deficient analytical (and political) concept which, they argue, suffers from the incoherence of sustainable development and the de-politicization of distributive aspects in capitalist restructuring [34]. On the other side, Bailey and Caprotti [35] provide a more differentiated stocktaking approach that identifies functional domains of, and drivers for GE strategies which allow for specific contradictions between different types of approaches and different actors, such as sectors, localities, or parts of society to exist. Regional regeneration and locational competition are considered important categories as part of an institutional dimension [35]. Thus, the way in which opportunities are interpreted by regional and local governments, business, and communities becomes relevant [36]. As a consequence, the GE is expected to be less a coherent project than a contested sphere of practices, that displays both synergistic components and dysfunctional overlaps, and leaves room for conflicting normative interpretations of diverse societal cultures. Hence, these contradictory processes need analytical attention, e.g., with regard to their effects within and between regions and localities.

The contribution of cities to innovation within the GE and climate policies is addressed by different approaches reflecting multi-level governance settings:

First, climate and environmental policy literature is relevant. Although the primacy of international, European or EU, and national policies for defining, for example, emission regimes, carbon markets, or energy systems and regulative settings is constantly underlined, the role of other actors, or levels is also of interest, not least due to the gridlock at international level [19,37–39]. Here, the role of sub-national actors is seen, e.g., in transnational networking that supports agenda-setting, learning, and the diffusion of best-practices (Important and much investigated examples include Climate Alliance, Cities for Climate Protection and Energie-Cités, see [40]), with repercussions at higher levels. In particular, the emphasis on polycentric constellations underlines the systemic value of increasingly intense sub-national activities in these areas [39].

Second, research on sustainable transitions, embracing studies from a number of disciplines, is increasingly adopting systemic views of far-reaching transformation processes of socio-technical systems [41]. Despite conceptual differences among individual scholars, large scale interactions at different levels are investigated, e.g., operationalized as landscapes, regimes, or niches [20]. Of interest in this context are intentionality, steerability and instruments, as well as conditions for path dependencies and path change. Amongst others, criticisms made include the focus on technological 'artefacts', a managerialist attitude which, at least partially, neglects power relations, and an insufficient consideration of spatial aspects [42]. As a tendency, national policies are taken as starting points. However, Geels [20] characterizes the perspective as a heuristic frame that allows for the integration of interpretative processes at different levels, such as narratives and discourses, with the learning of actors and systemic effects of institutions. Cities play a role in creating niches [5,43], or providing a 'testing ground' for innovations [44]. From this perspective, the stability of supportive frame conditions is a relevant factor. Aiming explicitly at integrating regions and cities into transition perspectives, Truffer and Coenen [45] emphasize, first, the role of green technology cluster initiatives and sustainable regions and regions and cities as transition 'managers', and second, the relevance of a relational understanding of actors' resource bases and the differential regional impacts of emerging industries. Underlining the demand for a 'politicized' interpretation of transitions further, Hodson and Marvin [46] pinpoint the role of low-carbon programmes for reinforcing the position of metropoles within urban hierarchies. With regard to inner-urban constellations, the understanding of purposive urban transitions is linked to processes of developing visions and support within cities under the specific institutional context of more or less deregulated (energy) infrastructures [46].

These strands of research literature provide important insights into local policy and regional development. There is an increasing recognition of the structural conditions for climate change activities which are influenced by sectoral regulation and infrastructure policies which vary, e.g., within different countries [45]. However, despite growing recognition of broader institutional and socio-economic dynamics at local and regional level, this perspective focuses too narrowly on climate policy relevant issues of governance and regional economic development, such as specific outcomes, settings, and required mechanisms and is therefore at risk of overlooking the interaction with other significant factors shaping urban and regional politics.

3. Local Climate Policies as Content of Local Governance

The understanding of the roles played by cities (and city-regions) in GE and the transition towards low-carbon urbanism could be substantially enhanced by linking it more closely to research perspectives on local and regional processes which more systematically consider changes in the wider political landscape at the local level, and their effects.

First, as a consequence of global economic and technical transitions, cities and regions are competing for higher ranks within spatial hierarchies, resulting from their economic functions [47]. Differentiating re-interpretations of the original global cities thesis underlined that such hierarchies exist for different parts of the economy, depending on their world-market integration [48,49], and separately for each of the globally leading economic centres, resulting, e.g., in European city systems [50]. These agglomerations function as motors of the European economy, as well as prime nodes of Europe's world-market integration, inducing a 'metropolization process of the EU's urban and regional system' [51], which, at the same time, positions other cities and regions in a peripheral and structurally disadvantaged situation. Socio-economic analysis, e.g., for Germany, mirrors these basically economic arguments by reconstructing significant disparities between clusters of German cities in terms of social structure, wealth, public budgets, and institutional capacity [52]. The factors on which economic positions are based include path-dependency, the distribution of qualifications, as well as cultural aspects such as social ties, professional attitudes, and proximity [53]. Here, cluster relations, identities, and locally bound gover-

nance arrangements form the basis for endogenous potentials, mainly through learning and cooperation [48,49].

With regard to climate change and the GE, the central question resulting from this strand of reasoning is of course, whether 'low-carbon urbanism' will intensify existing spatial disparities, or allow disadvantaged cities and regions to participate in growth and economic development of GE potentials. Further, it remains open whether disadvantaged cities and regions can substantially contribute to climate protection, beyond symbolic dimensions, against a background of comparatively limited institutional, economic, and societal capacities. In recent years, scholars of critical geography, e.g., [14], have underlined the strong selectivity of environmental policy and climate protection in social and spatial terms. Here, low-carbon urbanism is assumed to become a means of locational competitiveness and metropolitan dominance within overarching strategies of neoliberal eco-state-restructuring. However, the variation between nation-states in carbon regulation may result in contrasting constellations between 'people, places, and firms [14]. At the same time, the spatial consequences of the renewable energy policies are debated, with a number of studies underlining prospects of peripheral regions in energy production (for Germany, see e.g., [54,55]) or even cases of re-industrialization (for the UK [56]; for Germany: [57]). Here, institutional factors, including design of regional development activities, regional lobbyism, and links between political levels, were important, thereby underlining a demand for empirical insights into urban or regional strategies. In particular, the stability of actor constellations across political levels seems to differ between types of political systems.

Second, comparative research on local government underlines the relevance of (national) institutional differences on local agency, thereby cautioning against overly structuralist critiques with differing accounts. This research analyzes the functions of municipalities within a dynamically changing political and institutional environment shaped by Europeanisation, liberalization of formerly municipal public tasks, as well as consequences of budgetary squeeze and new public management reforms [58,59]. Based on a widely accepted typology by Hesse and Sharpe [60], research has investigated, how, e.g., the effect of national marketisation policies on public infrastructures, social services, and local democracy undermined the initially strong functional role of local governments within different types of central–local government [61,62]. Despite some basic similarities in terms of respective pressures, such as liberalization policies, important differences resulted from the timing and extent of political reforms. Hence, divergent instead of convergent developments seemed to persist, with responses developed according to established lines of institutional traditions [61]. For example, subnational structures in the hierarchical and centralized UK system are seen as particularly fragmented, leading to strong demands for co-ordination within networks [63]. In contrast, changes in the de-centralized German local government system were often induced by shifts in frame conditions, or sectoral regulations, leaving room for municipal resistance and adaptational innovations [61,64]. For all types of local government systems, however, the ability of cities to address new societal challenges, such as climate change, at the local level, seems to be substantially reduced in many respects. Crucial issues are competencies in the field of public infrastructures, and the capacities and resources to manage complex processes as well as co-operation. Hence, the empirical breadth of existing climate activities provides an opportunity to question the assumptions of local government research regarding functions of the local level.

Corfee–Morlot et al. [22], and Bulkeley and Betsill [19] emphasize transnational networks as elements of multi-level governance, transcending a classical hierarchical relationship between levels. Here, assumptions of multi-level theory, expecting the proliferation of new forms of activities across levels and the public-private divide as well as the increasing role of subnational units in higher political arenas seem to be confirmed [65,66]. At the same time, however, Azevedo et al. [67] identify different forms of national styles for fostering local climate activities, seemingly fitting their type of central–local relation, highlighting for Germany, e.g., an incentive-based indirect style. Bulkeley and Betsill's [1,19] distinction

between voluntary and strategic climate activism underlined that many local approaches were, for a long time, characterized by selectivity and fragmentation of individual cities' strategies, as well as by a divide between forerunners and followers. Factors explaining local activities include partisanship (particularly for Germany), local societal pressures, and capacities of non-governmental organizations (NGOs), media, and leadership of individuals [17,18,68]. Often, measures are justified on cost-savings grounds [69]. Although the dependence of municipalities on central resources is often underlined, e.g., [18], its impact on the shape of climate change activities within cities with severe socio-economic problems has hardly been investigated yet (for the UK, however, see [70]). Here, the extent to which different national climate change policies support or undermine the ability of resource-weak cities to develop innovation, or to ensure a diffusion of existing approaches remains open to question.

The role of municipalities in the context of recent energy policies is becoming increasingly relevant. In different countries, such as Denmark [71], the Netherlands [72], or Germany [73], a number of local governments have considerably expanded their engagement in renewable energy production, not least as a response to climate change. For Germany, these examples disproved overly pessimist views on the ability of local government to act strategically in this liberalized sector.

Third, bargaining processes and power relations within cities on climate policy issues and GE based strategies need to be investigated, too. Here, the new urban politics (NUP) perspective [74], which synthesized insights from pluralism and elitism [75,76] with the urban regime approach [77], established a basis for this investigation by proposing distinguishable types of regimes as alliances between local actors. Reflecting the bias of NUP towards the societal and institutional trajectories of US urban politics, different authors have attempted to adapt it to European conditions, e.g., by recognising the relevance of public–public instead of public–private relations [75,78]. Hence, relations between different sectors or functions within municipalities become decisive. Here, Pierre's [79] combination of NUP with recent governance theory proposed the use of four types of governance in cities that shaped urban policies in Western states during the last decades. These types include the pro-growth model, the managerial model, the corporatist model, and the welfare model. Each of them shows distinct mixtures of participants, objectives, instruments, normative frames, and outcomes. Its most important analytical advantage is that it offers an analytical link between local and overarching governance processes, and recognises the multi-level character of institutional settings for different sectors and functions, including associated alignments between political, administrative, business, and civil society actors, and tensions between them. Furthermore, this approach provides an interface between normative and symbolic aspects, as emphasized by Jones [74].

Addressing the issue of conflict over low-carbon strategies within cities could involve the following considerations: Jonas et al. [80] proposed the adoption of carbon-control regimes within new environmental protection urban politics (NEPUD). However, they did not investigate the various relationships between sectors or parts of society. The literature on urban climate policy or green cities provides rich evidence about governance approaches [18], the relevance of societal factors in determining capacity for climate activities [11,17,68], and integrative mechanisms [1]. This makes a differentiation according to functional domains or sectors not only feasible, as it could be linked to a distinction between weak and strong EM at the urban level, but urgently necessary for a better understanding of the ambivalences in carbon-control or GE activities within cities, and for the empirical investigation of the conflicts and multiculturalism of the GE [35], thereby challenging the predominant conceptualization of urban carbon control strategies as consistent. Moreover, such a conceptualization should be able to recognise the multi-level dimension of such inner urban processes, since sectors at city level are always integrated into sectoral policies at higher levels [81], and actors within sectors at city level are part of wider professional arenas [82].

Hence, there is a need for research on urban carbon control and GE strategies that considers the orientation of respective urban policies as a reflection of the balance of internal power and bargaining relations between sectors, or functional domains, that are characterized by ambivalences and contradictions, resulting from divergent rationales, institutional settings and norms, as well as by different internal actor compositions. Further, these urban strategies should be related to climate and energy policies as state restructuring and rescaling.

4. Local Climate Policy Arrangements

The objective of this article is to link a multi-dimensional understanding of local constellations to the concept of policy coalitions that seek to integrate interpretative and institutional dimensions of political processes. This methodological approach, developed in detail below, will be called Local Climate Policy Arrangement. The aim of the review of local policy and local governance research above was to consider the crucial distinctions developed by these bodies of literature, in particular an emphasis on the effects of different local government systems and of differences between functional domains, or sectors with respect to actor constellations, norms, and perceptions.

A seminal starting point is provided by Sabatier's very pragmatic concept of advocacy coalitions [83]. This approach sought to explain controversies about public policies by looking at the activities of opposing policy coalitions, formed by administrations, scientists, civil society, interest groups, and politicians. Thereby, it recognised contradictions within "the administration", and especially between different sectoral administrations, as well as their relations to different societal actors. Further, it introduced belief systems as organising elements of these processes. Thus, it underlined the relevance of communicative processes and perceptions for structuring political alliances, and for stimulating institutional change. The political science versions of discourse analysis, e.g., [84,85] took up the concept of policy coalitions that comprise very different societal actors, including public administrations or agencies, and which are based on shared world views. Here, the concept of discourse refers to the views and narratives of the actors involved, in terms of norms and values, definitions of problems and approaches to solutions. While Hajer [84] focused on argumentative elements of legitimacy struggles, Keller [85] emphasized more strongly fundamental societal value conflicts, such as environmental policy conflicts. Further, he identified different "discursive orders" in different countries, as the effect of political cultures and political systems, and thereby provided a strong link to institutional perspectives as well as to categories of comparative research. In all these concepts, both actor coalitions and argumentative struggles were seen as ranging across levels, with crucial relevance to the national level, not least due to media structure.

Referring explicitly to urban climate policies, Benz et al. [82] proposed the use of (urban) knowledge orders, legitimating action and resource use, as concept. This interpretative approach is explicitly chosen to overcome the shortcomings of actor-oriented institutionalism [86] in explaining the action orientation of actors [87]. This allows for spheres of action (e.g., sectors) to be better conceptualized as fragile constellations framed by norms that need constant reinterpretation.

A research perspective linking Sabatier's conceptual achievements to more recent social science literature, and disassociate them from their strong ties to US specifics, is the policy arrangement approach (PAA) [32,88]. The PAA has been developed to analyse policy activities, policy change, and political power within a research framework that also identifies interdependencies between structure and agency. Policy arrangements are defined as the temporary stabilization of the content and organisation of a policy domain [89]. The concept refers explicitly to the dynamics of modern western societies, including the relevance of societal processes such as individualization, globalization, and Europeanization. Drawing, amongst others, on Beck's concept of reflexive modernization [31], it assumes that conflicts resulting from these processes create dynamics leading to political modernization, e.g., in terms of resolving threatening environmental problems.

Here, the reactions to environmental problems constitute particularly relevant cases [89]. From this perspective, EM can be understood as part of an overarching societal dynamic, if it is not narrowly conceptualized as a purely technical, economic or governance process, but as multi-dimensional cultural and social change.

Institutional change is thus to be investigated with regard to norms, social practices, resource distribution, actor positions embedded in institutions, and their re-actualization or erosion. Furthermore, the approach recognises the temporal dimensions of interactions between actors and institutions. Methodologically, it calls for a multi-dimensional institutional analysis, that contains discourse analysis as one element of its analytical tool kit. However, while the PAA acknowledges that structures are shaped through interaction, the approach does not reduce action to discursive interaction, since interactions in turn are also seen as being structured by institutional settings [89]. Dimensions to be addressed empirically for investigating the strategies of policy coalitions include: (a) actors and their coalitions involved in a policy domain; (b) the rules of the game in operation, both in terms of actual rules for political and other forms of interaction, and in terms of formal procedures for the pursuit of policy and decision-making; and (c) current policy discourses and programmes [32,88].

In the light of these categories, it is possible to take up the current demands of urban climate policy research, and integrate them into a framework that allows competing policy coalitions to be seen from a multi-dimensional perspective. Above all, it allows the following arguments about local government and urban politics to be addressed: recently, classical local governance research has acknowledged the demand for changing central–local relations to be captured as political processes of state restructuring, as, e.g., proposed by regulation theory. Hence, power relations at the local level and between levels have to be considered stronger than steering efficiency [90]. Here, the integration of discourse analysis and urban regime research with the concept of politics of scale [91] has been proposed as a basis for an institutionalist multi-level analysis [92] (Similarly, from an institutionalist point of view, complex configurations across levels are seen as creating opportunities for actors to redefine institutions at individual levels, as well as relations between levels [93,94]). Moreover, local governance research has called for the recognition of competing rationales of functional domains, or sectors at the local level [63,79,90].

In order to address these demands, this article conceptualizes research on such local climate policy and urban carbon control strategies as Local Climate Policy Arrangements (LCPAs). These general categories, developed for case studies or comparative studies in the Western European context, are used here as examples to illustrate the tensions within domains of German local climate policies.

LCPAs consist of a number of separate policy domains at local level that are characterized by differences between actors from administrations, society, business, or science, based on their formal and informal kinds of collaboration, local as well as national and European regulations, policy instruments structuring the domain, available resources, and distinct discourses that contain problem perceptions, appropriate responses, and legitimate activities. At the local level, relations between the LCPA's domains may take different forms, ranging from mutually reinforcing to conflictual. These domains further belong to separate policy coalitions ranging across levels that may support or weaken the position of individual domains within the LCPAs. Policy change is thereby conceptually related to the dynamics of power relations between identifiable actors and activities, and their learning processes [83]. Further, sectoral or functional structures are understood as relatively independent arenas providing strongholds for societal actors within transformation processes.

The concept identifies (a) whether domains develop in terms of strong or weak EM, and (b) if the constellation in the city resulting from the developments within relevant domains leads to a coherent carbon-control policy at city level.

To qualify as strong EM in the sense of the reviewed literature, elements of climate change activities would, for example, have to refer normatively to far-reaching under-

standings of socio-cultural transformation (e.g., negative growth or changing lifestyles), propose strong instruments of environmental or climate policy integration, and include a high level of civic engagement or public participation. Since activities of strong EM as defined in this form are still exceptional, sectoral initiatives considering transformation to strict (sectoral) carbon neutrality, or sectoral de-growth, are treated as cases of strong EM, too. Weak EM, on the contrary, can be expected to focus narrowly on technological innovations, take place in isolation within industries, have professional public–private relations orientated towards economic development or individual public utilities, while failing to recognise additional aspects of sustainability (e.g., biodiversity, social justice).

To relate distinct forms of EM to local governance constellations, the concept takes up the governance models Pierre [79] considered as dominant for the local in Western societies, but reduces them to two basic overarching types that capture their central policy orientation, despite their characteristic differences, in order to develop a basic typology of local climate policy constellations and dynamics. Here, the pro-growth and managerial governance constellations are looked at as market-oriented governance models, while the corporatist and welfare governance constellations are grouped together as provision-oriented governance models.

The combination of these two dimensions allows the development of a basic typology of orientations through which LCPAs can be characterized along two axes with four potential constellations. Each of these constellations refers to the basic dynamic of policy change without, however, prescribing whether the relationships between policy coalitions are determined by conflict, compromise, or more or less gradual learning, e.g., within cooperative networks. Relating EM to market-oriented and provision-oriented governance links the political and societal process of seriously addressing sustainability to the older controversial process of fundamentally re-shaping the balance between free market-dynamics and welfare state and general public service provision. Regarding the relationship between market-orientation and EM, the decisive distinction to be made is in identifying whether and how domains characterized by market-orientation take up EM elements to generate 'green growth', or if transitions towards carbon-neutrality and de-growth emerge, at least in some niches. Regarding the relationship of provision-oriented domains to EM, the demands of carbon-neutrality tend to challenge two basic principles legitimizing Western societies at all levels, namely the individual freedom of consumption, and the general accessibility of public services and welfare. Hence, the crucial question is if and how these underlying principles, predominantly addressed by provision-oriented governance, are transformed. While weak EM can be expected to be based on incentives and voluntariness, strong EM will demand solutions establishing forms of climate justice, to gain acceptance within society.

While the resulting typology, described in Table 1, allows the predominant dynamic within an individual city case to be identified, empirically cases can regularly be expected to show ambivalences, contrasting constellations, or mixes of pure types as a consequence of their internal actor relations and power balances between and across the selected domains, thereby requiring a substantial differentiation to be made in the findings on the orientation of LCPAs.

Table 1. Policy change dynamics in Local Climate Policy Arrangements (LCPAs).

	Impact of Weak EM Elements	Impact of Strong EM Elements
Dominance of market-oriented governance models	'Green' growth and (Re-)Industrialization	Carbon-neutral and de-growth oriented niches
Dominance of provision-oriented governance models	Incentives for voluntary individual choices of citizens	Climate justice oriented social experimentation

Related to the central question of the study, the typology allows for the identification of cases and constellations in which cities contribute to ambitious climate policies or carbon control strategies by having strong forms of EM, and in which sustainability oriented transitions at least lead to economic niches or social experiments on a more or less substantial scale.

In particular, weak EM strategies, which focus on insulated technical and economic development, or strong EM strategies, which aim at socio-cultural transformation or at least at ambitious sectoral change, depend on specific factors. Of particular interest is the interplay between different dimensions shaping carbon-control strategies in cities. Constellations resulting in stronger policy change, for example, would require a high variety of supportive actors, a high involvement of different actors in relevant activities, mobilization of substantial resources, the development of substantially new or ambitious strategies, and a dynamic process resulting in the implementation of new measures, projects or instruments. Moreover, standards, incentives, or resources provided by higher levels, or sectoral networks and learning processes supported by them, are crucial, too.

Therefore, a distinction will be made between vertical and horizontal processes within domains central to the LCPAs. The vertical dimension includes sectoral interactions between local (or regional) activities and overarching policies within the respective political system, whilst the horizontal dimension is concerned with the balance between different domains with partially contrasting rationales, normative orientations, actor constellations, and resources within the individual local political setting. The approach would also consider how patterns of central–local government relations and sectoral policies in distinguishable political systems contribute to distinct balances between these vertical and horizontal dimensions of LCPAs. To understand these balances, LCPAs are not considered as unitary, consolidated or coherent settings, but as dynamic equilibriums characterized by interpretational processes and institutional factors.

With regard to the vertical dimension of sectoral approaches of cities, research should investigate a limited set of domains simultaneously relevant for local climate protection, for local social and economic development as well as for the structure of local political management. These include (1) economic development, (2) energy infrastructures and renewable energy use at local level, (3) urban climate policy management, and (4) town planning and housing. The latter covers fields such as public buildings, general building standards, and social housing. Further, (5) transport is relevant. The following aspects are relevant for these domains:

1. With regard to economic development, the orientation to locational competitiveness, and the position of individual cities in spatial hierarchies is expected to result in tensions between competing demands resulting from domains seeking carbon-control. In terms of governance models, this domain is supposed to follow a market-oriented pattern. With regard to the vertical dimension, the access of economic actors to higher level policies such as emission trading, innovation policy, or trade policy is significant. The crucial question is, of course, whether and to what extent economic rationales result in a confrontational stance towards climate protection strategies, and which elements of EM are accepted. Important aspects in this context are collective learning processes, legitimating strategic decisions, shared problem perceptions, and discourses within the sectoral communities across levels. In this domain, many cities and city-regions in Germany try to foster the emergence of enterprises from the "green economy" in a wide sense, as a means to maintain or strengthen their position in spatial hierarchies [95].

2. For the domain of energy infrastructures and renewable energy use the question is whether the cities have the ability to influence energy production and consumption according to climate policy aims under the condition of nationally regulated and at least partially liberalized markets. Here, the respective national energy policies, with particular reference to major policy shifts during the last decade, constitute the central institutional frame. Depending on the specific constellations and niches, market-

oriented or provision-oriented governance models are both important within this domain. Besides electricity, heat production should also be considered. Of relevance is how do the cities interpret their scope of action, formulate their strategic aims, and justify their measures discursively within the respective (e.g., centralized or decentralized) political system. Another key question is whether different alignments between public units, energy providers, the wider economy, and society can be linked to different countries' specific policies and sectoral dynamics. While frame conditions for the extension of renewable electricity capacity, and the phasing out of coal-based power stations are in Germany regulated at Federal level, regional and local level actors engage in lobbying for the form of energy considered favorable for the region, e.g., with regard to employment [56]. As a consequence, subnational actors, including local governments try to become part of the policy coalitions shaping the Energiewende.

3. For urban climate change management the study aims to understand how higher level policies, networks, or resources shape climate change related activities within cities. Here, both the discursive and the institutional aspect of this relationship, e.g., supporting learning or legitimating measures at city level, are assumed to matter. Due to the cooperation of public, economic, and societal actors, provision-oriented governance characteristics can be expected to be dominant. Since climate management can be assumed to be normatively shaped by environmental policy problem perceptions, identifying which actors are part of the actor constellation within the domain is particularly interesting along with the question of whether attempts to sustain strong EM can be found. At the same time, the extent of activities which are contrary to national policies would demonstrate independent priorities at local level. Moreover, reactions within the cities' approach to major policy shifts in this domain during the last decade are relevant. Empirically, climate management units have become introduced in most German cities as result of funding programmes of the Federal Ministry of the Environment (BMU) after 2007, established with the clear aim to strengthen and professionalize the local administrations working on climate issues. Although the average climate management units are small, they nevertheless function as a nucleus for climate policy integration at local level in the medium term and create tensions with sectors pursuing resource intensive projects [96].

4. For the domain of town planning and housing, the interaction between national planning and housing policies, local housing strategies and instruments (including social housing), and sectoral frameworks, such as building codes and funding programmes, are relevant. For EU-member-states, the present wave of building standards is supporting the emergence of more ambitious national and regional building and planning regulations. Of interest is which actors collaborate, which capacities they contribute, and which problem perceptions and frameworks characterise this domain. Due to the prevalence of public functions and its relevance for public services, this domain can be expected to be dominated by the provision-oriented governance model. However, as a consequence of public–private partnerships in urban development, and in facility management, as well as a market based housing policy in many countries, market-oriented governance constellations are relevant, too. For this domain, one central objective is to understand how the rationale of maintaining social cohesion and supporting weaker parts of the local society in cities is balanced against the demands of climate mitigation. During the last decade, German cities experienced rising housing costs, leading both to a construction boom and substantially rising rents. In this context, demands to improve building standards compatible with the aim of a climate-neutral housing stock in the coming years have led to controversies at all political levels about the contradiction between climate policy ambitions and social issues, such as affordable housing [97]. The second objective is to investigate whether and how changes in functions considered crucial for individual freedom, such as housing and the use of public services, become acceptable.

5.   For the domain of transportation, regulation and provision of the various infrastructures across different levels, as well as relevant industries such as the car industry is relevant. Here, the degree of liberalization of railroad and local public transports defines important elements of the institutional setting. Due to the dominance of private car use, the ongoing transformation of the automobile sector, including its relation to politically defined targets, is a crucial process as well. The domain is regulated by both market-oriented and provision-oriented governance structures. Changing the modality mix of mobility at local level towards a stronger role for public transportation and non-motorized mobility thus inevitably requires coordination with higher levels policies. In addition, climate policies again touch upon decisive normative societal principles, including individual freedom of choice and of equal access to public services. In Germany, the Federal Agency of the Environment (UBA) has become an important promoter of concepts of sustainable mobility, including the organisation of fora on urban transport transition. As a result, strong professional and political controversy has emerged in a number of German cities between actors demanding steps towards an urban mobility transformation and actors insisting on the continuity of "conventional", mainly car-based, organisation of transport [98].

With regard to the horizontal dimension of LCPAs, the central objective of research would be to investigate how and to what extent the discourses and approaches of the individual domains relevant for urban climate policy interact, and if they are integrated into a comprehensive urban EM or carbon control regime. For example, it is of interest to understand how rationales and projects developed by the economic development domain are related to rationales and projects of the climate management domain, as the latter can be supposed to address much broader sustainability issues, to act in networks with civil society and environmental groups, and to develop a demand for environmental policy integration instruments at city level, potentially in conflict with economic rationales. With respect to the relationship between the social housing and the climate management domain, the aim is to understand how potentially contrasting perceptions, for example, of building standards and development projects, are addressed, and if integrated and shared perceptions and activities have emerged. Although in a number of German cities, climate mitigation has become one of the major political issues, its relation to established priorities of local politics such as economic development and social integration is still far from being settled. In some cities, political actors, including decision makers, have proposed the introduction of a Klimanotstand (climate emergency state) that would demand strict climate policy integration procedures within the city. Until now, the real impact on the rationales and projects of the various policies has been unclear [99].

With regard to the formation of a comprehensive urban EM and carbon control regime, the objective is to clarify how contradictions between domain-specific approaches, claims, perceptions and projects are assessed and handled by decisive local government decision-makers. Regarding the overall stance towards carbon-control policies, the approach in the domain of energy infrastructures is considered relevant. For the other domains, the degree of independence or interdependence of the sectors is of interest.

Addressing these domains and dimensions with the concept of local climate policy arrangements allows a high degree of flexibility for the investigation of central challenges to urban climate or sustainability transitions. The central characteristic of this approach is that it allows investigation of how domain specific projects and perceptions are maintained over time, and how they influence the overall strategies adopted by cities. In addition, the question of whether distinct patterns of actor alignments coexist within the different domains, leading to a particular profile of LCPAs, characterized by a mix of strong and weak EM elements, and by high or low capacities and ambitions for policy change can be addressed. Due to the complexity of aspects addressed, the approach calls for the application of qualitative research methods, used as the foundation of case studies and small-n comparative studies as research design [100,101]. To address specific constellations or dynamics, the selection of domains or policies may be adapted. Further, research interest

may focus more strongly on relations within local government, and local administrations, or on processes and actors within the urban society. In a comparative perspective, different forms or phases of transitions within one country, or the effects of differences in the position of local government within their political system, or capacities of particular types of cities, such as structurally disadvantaged cities, may be of interest. A common denominator in all these topics is that they are considered important spatial or temporal aspects of state restructuring.

5. Conclusions

This article has reviewed the literature on urban climate policies and sustainability transitions, and related it to the debates on local governance and state restructuring.

The literature on sustainability discussed if, and to what extent, the persistence of growth-oriented strategies is compatible with central demands of sustainability, and successive concepts, such as ecological modernization (EM) or green economy. A central outcome of the debate applicable to urban climate policies is the distinction between weak, or growth oriented versions of EM, and strong, or transition oriented versions of EM. The debate on local green economy strategies underlined that such differences and contradictions may also shape projects of urban sustainability transition, including climate policies, thereby generating counterproductive effects.

The literature on local governance highlighted that globalization intensifies locational competition, and economic inequalities between cities, resulting in global and national spatial hierarchies. This reinforced the demand for market-oriented state restructuring in recent decades. At the same time, local policies are shaped by different governance models, which further can be related to different sectors or domains. Thus, differences between actor constellations, normative frameworks and policy orientations can be expected to be relevant in these arenas. Moreover, they are regularly integrated in multi-level relations. Here, a strong overlap with versions of policy analysis such as *Sabatier's* [83] advocacy coalition approach, and successive concepts such as the policy arrangement approach [89] exists. Amongst others, policy change is related to discursive struggles between actor coalitions. This supports a perspective on actor relations that, first, links normative and institutional dimensions, and second, acknowledges that different administrations form different alliances with societal actors, including parts of the environmental movement.

Based on these considerations, this article proposes that research on local climate policy and urban carbon control strategies is conceptualized as Local Climate Policy Arrangements (LCPAs) that consist of a number of separate policy domains at local level. Due to their relevance for urban carbon control policies and the general orientation of LCPAs, economic development, energy infrastructures and renewable energy use, urban climate change management, town planning and housing, and transportation are seen as particularly important domains. Investigating them allows the identification of how domain specific projects and perceptions are maintained over time, and how they influence the overall strategies adopted by cities. In addition, it can be researched whether distinct patterns of actor constellations coexist among the different domains, leading to a particular profile of LCPAs. Here, the distinction between market-oriented and provision-oriented forms of governance allows identification of the most critical constellations and rationales for actor constellations at the local level (horizontal dimension), and across different levels (vertical dimension). Their reaction to strong and weak EM elements, or mixes of them, allows for different types of policy change dynamics in local climate policies to be distinguished.

With regard to Germany, substantial tensions concerning the form and degree of carbon control have developed in these domains. Here, policy coalitions favouring stronger EM solutions, often supported by the Environmental administrations of the federal level, have begun to influence the practices in these domains. Controversies about problem definitions, regulation of standards, and distribution of resources reach across all political levels, from the local to national, and in some cases even to the European. In the face of impending deadlines for global climate mitigation and a diminishing global greenhouse

emission carrying capacity, pressure at least by a part of society in favour of tightening climate targets will remain high in the coming decades.

Possible constellations resulting from these tensions include antagonistic blockades of EM solutions, a fragmented situation with multiple EM "cultures", or a cultural transformation towards an EM version with strong elements within some domains, such as town planning and housing, and urban transportation, or even across these domains in individual cities. The latter case would constitute a reduced, but pragmatic and nevertheless ambitious type of urban sustainability transition.

The concept of LCPAs seeks to improve the understanding of the societal processes resulting in these various constellations. Future research could focus on comparative studies between the constellations within the mentioned domains in different countries, to improve our understanding of the effects of different national approaches towards sectoral EM. Further, case studies of particularly progressive individual cities could shed light on processes across different domains, and the dynamics within a Local Climate Policy Arrangement.

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