

Review

# A Decade of Climate Action and the Mission towards Climate Neutrality and Adaptation in European Cities: Delivering Urban Transformations?

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**Abstract:** Climate action in cities is increasingly recognized as of strategic importance to accomplish the global governance of climate change. In Europe, cities are adopting a “mission approach” to accelerate urban transformations and reach climate neutrality targets by 2030. While the “Mission” unfolds, it is worth acknowledging that in the last decade, cities in Europe have engaged in climate action. Through a selection of empirical case studies, this review examines the main governance approaches that have been used to analyze the implementation of transformative adaptation and mitigation measures in the Global North. This approach aims to respond to the gap between policy rhetoric of urban transformations and the realities of on-the-ground implementation. This systematic literature review asks the following question: what are the challenges and key success factors amongst the governance approaches that have informed the implementation of transformative climate agendas in cities of the Global North? The findings cover conceptual approaches to analyze the governance of urban transformations, and cases illustrate the challenges in mainstreaming climate action, even in cities that are environmental champions. The need to strengthen collaborations to deliver transformative interventions is raised, while the authors also caution about power imbalances in network governance.

**Keywords:** urban transformations; urban climate governance; urban planning policy styles; experimental governance; network governance



**Citation:** Corrêa do Lago, A.; Sánchez Chaparro, T.; Lumbreras, J. A Decade of Climate Action and the Mission towards Climate Neutrality and Adaptation in European Cities: Delivering Urban Transformations? *Sustainability* **2023**, *15*, 16665. <https://doi.org/10.3390/su152416665>

Academic Editors: Frank Othengrafen and Daniel Galland

Received: 30 October 2023  
Revised: 28 November 2023  
Accepted: 29 November 2023  
Published: 8 December 2023



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## 1. Introduction

The notion of transformative change towards sustainability has gained a growing attention in global sustainability and policy discourse in recent years to manage climate risks [1–3]. Transformational change towards sustainability is, by definition, distinguished from the notion of incremental change: “the time for short-lived, piecemeal solutions is over.” [3]. Scholars in the field of climate change agree that transformative change requires “innovative governing strategies and the development of new governance intervention repertoires” in order to deliver transformational change that is in-depth, large-scale, and rapid [4].

Cities are seen as sites of transformation and climate change action [5]. Besides growing rates of urbanization worldwide, cities account for 70% of greenhouse gas (GHG) emissions, with transport systems and buildings as important sources of emissions [6,7]. This focus on cities is not only the result of a slow pace of national and global action on climate change in recent decades, but also points to the potential that cities have to be connected, on one side, to local actors through networks and partnerships, and on the other,

across multiple governance and global scales to reach global climate goals [8,9]. Therefore, urban transformations are a concerted effort across international organizations, government officials, utility companies, developers, grassroots organizations, and universities [8,10]. A transformative urban agenda goes beyond technocentric “solutions,” and includes an approach that emphasizes integrated actions and planning across actors working in different sectors of the economy, moved by different economic interests [10].

In the European context, a “mission-oriented innovation” approach is being employed to accelerate the delivery of the continent’s climate neutrality goals (net-zero GHG emissions) by 2030 [11]. The Mission for Climate-Neutral Cities aims to bring “transformation to a Europe that is climate resilient”, and therefore, “the goal of the Mission is to transform the city” [12]. One key feature of this mission’s framework is a systems approach underpinned by deep collaboration: strengthening the connections between differing academic disciplines and across public and private sectors is the underlying tissue that enables the envisioned urban transformation.

While urban transformations are supported and adopted in policy discourse, scholars in the past decade have been raising questions about what ‘governing’ transformation towards sustainability might involve. Patterson et al. ask: “How can governance contribute to shaping or steering transformations, particularly within the real-world constraints of actual governance contexts? (e.g., fragmented institutional arrangements, contested policy processes, and tightly constrained or poorly delineated roles and capabilities of policymakers and administrators)” [1] (p. 3). Additionally, in a review of the urban climate governance literature of the last 10 years, Van der Heijden [13] calls attention to an existing gap between policy rhetoric on urban climate governance and the reality of on-the-ground implementation. In his review, he claims that the empirical base remains thin to make sense of how the enabling factors of transformation bring results on the ground [13].

Therefore, a better understanding about how to govern urban transformations seems relevant to inform European Missions for cities as they unfold in practice. Examining what practitioners have been doing in the last decade in Europe and in other cities of the Global North, and what governance approaches have been used to implement transformative adaptation and mitigation measures, could be useful to bring policy rhetoric and implementation closer. Therefore, this review aims to gather a better understanding of the challenges and key success factors amongst the governance approaches that have informed the implementation of transformative climate agendas in cities of the Global North. The review collects cases describing how actors from different sectors as well as governments on different levels (local, regional, national) have been managing the implementation of their local urban climate mitigation and adaptation policies in the Global North.

## 2. Materials and Methods

This study follows a systematic literature review (SLR) methodology. A systematic review aims to comprehensively locate and synthesize research that bears on a particular question, using organized, transparent, and replicable procedures at each step in the process [14]. This methodology allows us to identify the main scientific contributions on climate governance in the urban transformations literature, with a lower likelihood of bias in the review process [14,15]. This review follows the three stages outlined by Tranfield et al. [16]: planning the review; conducting the review; reporting and dissemination.

- Planning the review

The search aimed to collect case studies that analyze how cities in Europe and in the Global North have been governing urban transformations towards sustainability. This case study approach is motivated by the recurring observations of an implementation deficit of climate agendas in cities despite an intensified acknowledgement of the need for advancing sustainable urban agendas [17–19]. This point is also emphasized by Hölscher, who claims that “the zealous narrative of urban opportunities for navigating urban transformations towards desirable directions contrasts with how these opportunities are mobilized in practice” [19]. Therefore case-based research could inform, on the one hand, what ap-

proaches to governing urban transformations are employed in the literature, and on the other hand, highlight the common success factors and challenges in delivering transformations in the cases described.

Review question: What are the challenges and key success factors amongst the governance approaches that have informed the implementation of transformative climate agendas in cities of the Global North?

Answering this question implies the following actions: (1) review the main conceptual approaches that inform the governance of urban transformations in the scientific literature; (2) identify and synthesize common barriers and opportunities that are observed in the delivery of transformative urban interventions in relevant case studies; (3) identify areas for future research.

- Conducting the review

The corpus of this systematic literature review has been selected through a keyword research in the Elsevier's SCOPUS database, limited to journal article publications in English from the last 10 years. The elements of the strings searched for in title, abstracts, and keywords (TITLE-ABS-KEY) are (“urban transform\*” OR “urban transition”) AND “governance” AND “case\*”. By including (case\*) in the research string, the goal is to find case-based publications, so as to respond to the research objectives stated in the review question (see Table 1).

**Table 1.** The literature search strings.

TYPE	SEARCH STRING
Urban transformation related terms and urban transitions frameworks	(“urban transform*” OR “urban transition”)
Governance related terms	AND “governance”
Case study orientation	(case*)

Elsevier's Scopus database.

To become familiarized with the 207 articles in the database we created a spreadsheet using the Excel software package Version 16.79.1 to read through abstracts and selected the ones which explicitly addressed processes of transformation in cities as response to climate challenges. Therefore, the first step consisted of excluding articles examining digital transformation in cities (smart cities), transformation in the realm of real-estate market and land-use, or transformation resulting from urbanization processes (e.g., from rural to urban) or major events (e.g., Olympics, post-conflict areas). This filtering led to an ensemble of 93 articles.

Secondly, the research filtered case studies to include cities of the entire Global North which share a common economic context and have had in the past decade more resources to conduct experiments addressing mitigation and adaptation measures. Once we excluded studies based in cities of the Global South (India, China, Africa, and South America) to focus on the Global North, we have mainly found case studies describing urban transformation processes in European cities.

In this first research stage of our research plan, we have deliberately wished to contextualize the work in Europe, and we limited the research to the Global North. These limitations are present in our review question: “What are the challenges and key success factors amongst the governance approaches that have informed the implementation of transformative climate agendas in cities of the Global North?” This is because the practical goal of the research would be to inform European policymakers working in the Mission for Climate Neutral Cities via the following question: What have we learned in the past decade in Europe from climate experiments in cities which should be incorporated in this project?

Moreover, from a purely research perspective, we think that it is interesting to focus at this stage on “leading” players. Indeed, European cities have tried to implement climate mitigation and adaptation strategies for a number of years now, and it is intriguing to

observe that actual results are still modest even in this privileged part of the world. So, our intention is then, at this point in the research, to answer the following question: What can we learn from these frontrunners?

Finally, proceeding to a citation-based sampling would allow us to examine the most relevant contributions in different periods within the 10-year time frame. The criteria of selection leading to the final 23 articles of this sample comprised the number of citations in each of the following periods: (1) In the period 2013–2016: we selected 8 articles with more than 50 citations to capture the more prominent scientific publications in the field; (2) In the period 2017–2021: we selected articles ranking between 10 and 40 citations; (3) Lastly, we selected 4 articles published in 2022 with at least one citation to capture the more recent publications that responded to the keywords of the review question (see Table 2).

**Table 2.** The sample of publications examined in this review.

Authors	Title	Year	Source Title	Reference
McCormick K., Anderberg S., Coenen L., Neij L.	Advancing sustainable urban transformation	2013	Journal of Cleaner Production	[8]
Wolfram M.	Conceptualizing urban transformative capacity: A framework for research and policy	2016	Cities	[20]
Eames M., Dixon T., May T., Hunt M.	City futures: Exploring urban retrofit and sustainable transitions	2013	Building Research and Information	[21]
Wamsler C.	Mainstreaming ecosystem-based adaptation: Transformation toward sustainability in urban governance and planning	2015	Ecology and Society	[22]
Khan J.	What role for network governance in urban low carbon transitions?	2013	Journal of Cleaner Production	[23]
Hamann R., April K.	On the role and capabilities of collaborative intermediary organizations in urban sustainability transitions	2013	Journal of Cleaner Production	[24]
Boyd E., Juhola S.	Adaptive climate change governance for urban resilience	2015	Urban Studies	[9]
Uyarra E., Gee S.	Transforming urban waste into sustainable material and energy usage: The case of Greater Manchester (UK)	2013	Journal of Cleaner Production	[25]
Hölscher K., Frantzeskaki N., McPhearson T., Loorbach D.	Tales of transforming cities: Transformative climate governance capacities in New York City, U.S. and Rotterdam, Netherlands	2019	Journal of Environmental Management	[5]
Frantzeskaki N., van Steenbergen F., Stedman R.C.	Sense of place and experimentation in urban sustainability transitions: the Resilience Lab in Carnisse, Rotterdam, The Netherlands	2018	Sustainability Science	[26]
Wolfram M., Borgström S., Farrelly M.	Urban transformative capacity: From concept to practice	2019	Ambio	[18]
Zografos C., Klause K.A., Connolly J.J.T., Anguelovski I.	The everyday politics of urban transformational adaptation: Struggles for authority and the Barcelona superblock project	2020	Cities	[27]
Borgström S.	Balancing diversity and connectivity in multi-level governance settings for urban transformative capacity	2019	Ambio	[28]
Nagorny-Koring N.C., Nochta T.	Managing urban transitions in theory and practice—The case of the Pioneer Cities and Transition Cities projects	2018	Journal of Cleaner Production	[29]

Table 2. Cont.

Authors	Title	Year	Source Title	Reference
Carriquiry A.N., Sauri D., March H.	Community involvement in the implementation of sustainable urban drainage systems (SUDS): The case of Bon Pastor, Barcelona	2020	Sustainability (Switzerland)	[30]
Thomson G., Newman P.	Cities and the Anthropocene: Urban governance for the new era of regenerative cities	2020	Urban Studies	[31]
Frantzeskaki N., Bush J.	Governance of nature-based solutions through intermediaries for urban transitions—A case study from Melbourne, Australia	2021	Urban Forestry and Urban Greening	[17]
Hölscher K., Frantzeskaki N., McPhearson T., Loorbach D.	Capacities for urban transformations governance and the case of New York City	2019	Cities	[19]
Peris-Blanes J., Segura-Calero S., Sarabia N., Ribó-Pérez D.	The role of place in shaping urban transformative capacity. The case of València (Spain)	2022	Environmental Innovation and Societal Transitions	[32]
Glaas E., Hjerpe M., Wahlborg E., Storbjörk S.	Disentangling municipal capacities for citizen participation in transformative climate adaptation	2022	Environmental Policy and Governance	[33]
Wickenberg B., Kiss B., McCormick K., Palgan Y.V.	Seeds of Transformative Learning: Investigating Past Experiences From Implementing Nature-Based Solutions	2022	Frontiers in Sustainable Cities	[34]
Sareen S., Waagsaether K.L.	New municipalism and the governance of urban transitions to sustainability	2022	Urban Studies	[35]
Ehnert F., Egermann M., Betsch A.	The role of niche and regime intermediaries in building partnerships for urban transitions towards sustainability	2022	Journal of Environmental Policy and Planning	[36]

The “reporting and dissemination phase” is developed in the results and discussion section of the article where we describe the conceptual lenses and thematic analysis of the selected work.

### 3. Main Conceptual Approaches That Inform the Governance of Urban Transformations

Sustainable urban transformation is characterized as “radical” change in the ways we manage urban development towards sustainability [8]. Key areas of intervention include shifting energy systems, increasing energy and material efficiency, and ensuring the safety of water supply and waste management [8]. Thus, to achieve these “shifts”, transformations in urban systems fundamentally embed a long-term perspective [19]. Additionally, transformations do not occur “as one major step” but unfold in “phases,” both organizationally and in terms of the built environment [18] (p. 440). A few theoretical approaches have been identified in the articles selected in this review.

#### 3.1. Urban Sustainability Transitions and the Multi-Level Perspective

The literature that describes processes of urban transformation draws mainly from transitions theory, and how it applies in urban contexts. The literature of transitions conceptualizes cities as complex systems in which different socio-technical systems interact across multiple domains, actors, and scales [21,32]. The “city system” therefore integrates an ensemble of inter-related socio-technical systems (STS), or “sub-systems”, that provide essential city services such as water, energy, and transportation [24].

Transitions scholarship suggests that long-term societal change is achieved through transitions occurring within socio-technical regimes that need to work in conjunction in order to keep the larger “city system” functioning. Therefore, the ways in which actors, institutions, and technology interact within and across socio-technical systems fundamentally shapes the city’s built environment. According to the multi-level perspective, three levels influencing a socio-technical system are identified: niches, regimes, and landscape [37]. A



socio-technical regime is both influenced by the contextual landscape, “from above”, and from niches, “from below” [24]. Thus, actors and intermediary organizations can nurture change within socio-technical regimes towards a systems transition. Therefore, transitions happen when one socio-technical regime is replaced by a new regime [37]; [23] (p. 135).

Intermediaries act as translators between scientists, policymakers, and spatial planners to implement diverse sustainability visions [36]. Such transformations can be pushed either by “regime intermediaries,” that is, those who are given the mandate by dominant regime actors to enable transformations towards sustainability, or by “niche intermediaries” who work towards developing networks with local communities and further establish partnerships with government [36]. Finally, regime transitions occur not only as a result of the emergence of new technologies, but the directionality in which regimes are redesigned is determined by actors that work as facilitators to push for changes in institutions, business models, and regulatory processes [24].

### 3.2. Capacities for Urban Transformation Governance

This framework supports the examination for how new forms of multilevel governance, and alternative configurations in the networks of state and non-state actors have influenced a more integrated approach to urban planning. According to Hölscher (2019), transformative climate governance “creates the conditions for developing integrated and innovative climate mitigation and adaptation policies and interventions that respond to and shape urban transformation dynamics and contribute to sustainability and resilience” [19]. Hölscher observes that more effective alignment across government levels (at national and regional level) as well as partnerships and collaborations with non-state actors are needed to deliver climate mitigation and adaptation measures. This approach draws from work found in Boyd’s discussion of Anguelovski and Carmin (2011), who define urban climate governance as “the ways in which public, private and civil-society actors and institutions articulate climate goals, by exercising their influence and authority and by managing climate planning and implementation processes [38].” Boyd expands this definition beyond articulating climate goals, and factors in the notion of “uncertainty” in the definition of urban climate governance [9] (p. 1235). Factoring uncertainty in the planning of transformative urban interventions echoes with the long-term feature embedded in the definition of urban transformation.

### 3.3. Urban Transformative Capacity

This approach draws from how the ideas of transformative capacity in business organizations apply to urban contexts in industrialized nations [20]. However, understanding cities as complex systems is also acknowledging that cities exhibit non-linear and “fuzzy patterns” of change [21] (p. 513). Urban transformative capacity is defined as “the collective ability of the stakeholders involved in urban development to conceive of, prepare for, initiate, and perform path-deviant change towards sustainability within and across multiple complex systems that constitute the cities they relate to” [20] (p. 126).

The role that power plays in multi-stakeholder processes that are reshaping cities’ spatial and material configurations is emphasized in Wolfram’s definition of urban transformative capacity: “urban transformative capacity corresponds to the type of power that is capable of articulating urban changes (. . .) whose urban future will become reality is mediated through urban transformative capacity [18] (p. 439).” Therefore, Wolfram cautions that the limitations of socio-technical systems and transition management frameworks underplay how power imbalances that exist amongst actors participating in processes of urban change and decision-making influence different trajectories of urban development [21] (p. 440). As Khan quoting Meadowcroft [23] (p. 135) states, “long-term change will be messier and more conflicted than transition management intimates [39].”

### 3.4. Modes of Analysis

The empirical cases in this review highlight the potential for strengthening connections to achieve more effective environmental transformation in urban areas. The different levels in which stakeholder connections can take place in order to enhance transition processes are studied through three different modes of analysis: Section 3.4.1 focuses on how networks of actors mobilize around a particular socio-technical system (infrastructure) that is undergoing a transformation and the potential for this process to strengthen social cohesion and influence more sustainable pathways in the way that system is managed (such as the management of local waste and storm management in Greater Manchester, Barcelona, or Norrköping); Section 3.4.2 discusses the need to strengthen cross-domain connections of complementary socio-technical systems in the ways they are planned and managed at the city scale (such as agri-food and energy systems in Valencia); Section 3.4.3 highlights the necessity to overcome the disconnect between actors across sectors and territorial levels and deliver successfully a “networked governance” [23].

#### 3.4.1. Infrastructure Networks Analysis

Carriquiry [30] argues that technical expertise and discourse around infrastructure tend to relegate the social dimension of infrastructure, and the potential of infrastructure as a site that strengthens social cohesion, towards shifting business-as-usual pathways towards more sustainable ones. In addition, infrastructure is “durable, highly path dependent, and resistant to rapid system change” [25] (p. 109), and therefore an interesting site for examining change. A few examples of infrastructure network analysis are waste management in the Greater Manchester region, UK, the superbloc pilot in the district of Poblenou, Barcelona, and stormwater management transformation in the Bon Pastor neighborhood in Barcelona, and in Norrköping, Sweden.

Uyarra et al. [25] (p. 102) claim that “socio-technical systems comprise not merely physical artifacts and technologies, but also organizational, institutional, social and cultural values that govern how they are operated”. Thus, the values of actors involved in the process of change shape how material resources within specific socio-technical systems in the city are managed and distributed (such as waste, energy, or transport, for example). In the case of Manchester, actor networks formed by environmental groups, local councilors and the public successfully joined together in opposition to the installation of a waste incineration plan in the Greater Manchester region. Further, this mobilization influenced broader UK waste policy and regulations [25] (p. 109). In the case of water infrastructure, the implementation of Sustainable Urban Drainage Systems (SUDS) in the neighborhood of Bon Pastor, Barcelona, offered more than a technical solution to manage stormwater. The neighborhood community of Bon Pastor, despite having little knowledge about what SUDS were, participated in the project, raising new conversations in the community over the challenges of changing behaviors and how to manage the maintenance of public spaces collectively. Similarly, in a study in the neighborhood of Carnisse, Rotterdam, Frantzeskaki [26] (p. 1057) emphasizes the transformative potential of local social cohesion, where community agency can be fostered through networks that help establish a “sense of place (meaning and attachment)” where “symbolic meanings strengthen ties in the community and can mobilize action to transform the place into the place imagined/aspired to.” The approach suggests the potential for strengthening actor networks and change when the transformation is situated in one infrastructure network.

#### 3.4.2. Cross-Domain Analysis

Going beyond the lens of analysis of one infrastructure network under transformation, Peris-Blanes [32] examines connections across key infrastructural systems in the city of Valencia, and in what ways actors within each system collaborate together. He observes a “missing nexus” between the two socio-technical systems he focuses on: the energy and agri-food systems. As a result, processes of urban transitions remain fragmented and sectorially addressed, despite interactions between socio-technical systems being crucial

to achieve urban transformations (Peris-Blanes references the work of Frantzeskaki et al. 2019) [32,40]. He raises challenges within socio-technical systems, in which actors in each system have different interpretations of what transitioning to sustainability means in their own sector, and as a result, the pathways of what urban transformations can look like do not necessarily converge. More importantly, he claims that the ability of actors to drive systemic responses to transitions is limited because of the siloes between the planning and management of different urban systems. This disconnect across socio-technical systems (domains) in a city limits urban transformative capacity.

### 3.4.3. Network Governance

The concept of “network governance” has gained ground in urban climate politics as an organizational approach that differs from more hierarchical ones [23]. Network governance can be public–private partnerships and the establishment of working groups that foster interactions amongst local actors in the city. For example, in Växjö, Sweden, the need was identified to bring together actors from different fields of expertise and economic sectors—public, business, and civil-society organizations, and university staff—to take part in urban planning policy formation and implementation of their municipal climate strategy. The need was identified in Sweden because municipalities “lack full implementation capacity and the authority to enforce other actors to comply with policies in areas such as transportation, energy efficiency, housing and energy [23] (p. 136).” Therefore, a successful coordination of such networks should allow cities to increase their legitimacy and implementation capacity.

## 4. Discussion: Barriers and Success Factors in Urban Transformation Processes

### 4.1. *Mainstreaming Climate Action: Governing beyond Experiments?*

Mainstreaming climate policies in municipal planning in ways which produce enduring effects remains limited even in cities pioneering a climate agenda [5] (p. 844); Ref. [22]. Hölscher claims that “despite some experimentation with innovative and multi-functional solutions, these often remain isolated and stand-alone initiatives which indicates gaps in transformative capacity [19] (p. 196)”.

Hölscher [5] studies the organizational efforts made by the cities New York City and Rotterdam to foster innovation in climate governance. Efforts included establishing strategic and operational innovations such as creating cross-departmental structures, and fostering formal and informal spaces of facilitation amongst different actors to promote integrated thinking across sectors (e.g., the cross-departmental Climate Adaptation and Sustainability offices in Rotterdam, the Mayor’s Office of Sustainability and Recovery and Resilience in NYC). However, Hölscher argues that while these integrative governance measures have successfully promoted cross-sectoral and cross-scale collaboration, mitigation and adaptation needs are still considered “as doing something extra”, and these strategic agendas “remain patches within overall city policy and planning” [5] (p. 853).

Similarly, while Germany portrays itself as pioneer in environmental governance, Wamsler [22] (p. 2) observes that they still struggle to “change the dominant paradigm,” limiting their ability to foster transformative adaptation in urban planning. He illustrates this point in a case study in Germany where he examines how an ecosystem-based adaptation approach promoted by national government translates into municipal planning practice.

Finally, Nagorny-Korning [29] (p. 20) observes a gap between projects conceptualized with a systems approach and the actual outcome, which resulted in fragmented delivery. When examining EU-funded projects in eight cities pursuing local low-carbon agendas, she explains that managing climate challenges through isolated projects is “a key characteristic of urban responses to climate change”. She argues that this “project-based governing mode” favors a “piecemeal approach to urban climate governance consisting of isolated, stand-alone transition initiatives” instead of a system-wide change [29] (p. 17). Similarly, when examining LSIs in Stockholm, Borgström speaks of a “projectification trap,” in which



“a lot of resources are wasted in short-term projects without a clear strategy for how to bring the knowledge further (. . .)” [28] (p. 471).

#### 4.2. Power Imbalances in Multi-Actor Networks and Citizen Participation

The cases describing the implementation of adaptation and mitigation interventions also expose the strong influence of local politics and existing relations of economic power in collaborative efforts: this constitutes a barrier to transformation. In fact, Hölscher argues that regulatory and incentive structures continue to favor “short-term economic interests and investments [19] (p. 196)” hampering more enduring urban transformations. A few case studies in this section describe how power imbalances and participation influence the delivery of transformations.

The city of Växjö is a forerunner in urban climate governance and they established in 1996 a long-term goal of becoming a fossil fuel-free city [23]. Khan describes the process and notes that their goal of “becoming a fossil fuel-free city” was limited to housing, resulting in narrow interpretations of environmental problems within these multi-actor networks. For example, little progress was made in expanding low-carbon transport (e.g., favoring walking, cycling, and public transport) since it faced resistance from already established market actors’ economic interests [23] (p. 137).

Zografos [27] argues that urban planning interventions entail disputes of political and economic power, and as a result, even when interventions aim to be transformational, they are more likely incremental. He examines the implementation of the superblock project in the Poblenou district, Barcelona (one of the main urban interventions in Barcelona’s Climate Action Plan). The superblock program aims to reduce car traffic, thereby reducing air pollution levels and promote public spaces with fewer cars in order to foster neighbor interactions. He concludes: “Because of the scope of changes needed, transformational adaptation is a fight involving political ideology, urban development, market forces and globalization, (. . .) more than it is a fight over different visions for environmental policy and planning” [27] (p. 9).

Glaas et al. [33] observe that citizen participation in climate adaptation activities is not leading to effective results even when local citizen participation is present and enforced by national legislation in Sweden. In Norrköping, Sweden, Glaas et al. [33] examine participatory dynamics in a climate adaptation project focused on stormwater management. The authors argue that planning professionals’ narrow definitions of citizen participation not only reduce the legitimacy of citizen input, but underestimate the knowledges they can bring of local climate risks and pathways for adaptation: “There is a need to shift the focus to citizens who (. . .) have important roles in clarifying climate risks or enabling sustainable climate adaptation measures [33] (p. 12).” Similarly, when examining the implementation of nature-based solution (NBS) interventions in Malmö, Sweden, Wickenberg et al. [34] observe that citizen participation and learning is still lacking.

The risk for business-as-usual interests to prevail despite organizational efforts in building participatory modes of governance, may lead to contested interpretations of who determines what low-carbon transitions should look like in practice. Sareen, S. et al. [35] (p. 5) summarize this tension when concluding that the “relationship between participatory decision-making and urban sustainability outcomes is ambiguous” and they ask whether participatory decision-making “fosters plural voices when advancing urban change agendas in practice” or if it favors those who already have economic and political power.

#### 4.3. Scattered Sustainability Efforts and the Role of Intermediaries

Borgström [28] argues that multilevel alignment (at the city, region, and international level) is crucial to provide consistency and directionality to independent dispersed initiatives aiming to address local environmental challenges. In a case study in Stockholm, Borgström observes a disconnect when mapping the landscape of local sustainability initiatives (LSIs) active in the region—either municipally led or led by other local actors. She claims that governance is transformational when environmental initiatives are well con-

nected across scales, sectors, and actors. However, this is not the case for Stockholm, where city-wide transformation towards sustainable development is “hampered by a disconnect between actors, levels, sectors and short-term funding structures” [28] (p. 463).

Wolfram [18] (p. 443) agrees that actors working within “disjointed” environmental initiatives in a city (like LSIs in Stockholm) and actors working in different socio-technical domains (like in the case of Valencia) should be more connected to deliver transformations. He argues that a more effective “intermediation” could enhance the potential of urban transformative capacity (UTC).

In fact, intermediaries have been proposed to establish and nurture spaces of connection with otherwise disconnected actors to bring together expertise from different sectors and fields of knowledge to think about complex system changes [17,23]. One suggestion Wolfram [18] (p. 442) raises to address this intermediation gap is unlocking the potential for universities to invest in partnerships with local urban actors to facilitate dialogue, and therefore contribute to developing spaces of interaction that can provide a “governance backbone for coping with long-term transformation challenges.” However, this argument presupposes that all actors involved, including intermediaries themselves, are neutral and not politically or financially influenced.

Ehnert et al. [36] indeed caution to the fact that intermediaries are themselves influenced by the political dynamics at play in their local governance contexts; as a result, the urban sustainability projects they support will likely accomplish limited transformational objectives. Their case study examines partnerships between municipalities in four German cities and Transition Town Initiative (TTI) intermediaries that aim to influence their communities towards more sustainable habits through local projects addressing environmental issues such as urban agriculture, sustainable consumption, and sharing and repairing practices. Yet, Ehnert et al. argue that the transformative potential of these intermediaries (TTIs) vary in each municipality, and their influence is often determined by their own local governance context, where “incumbents of the regime [36] (p. 17)” have certain political priorities that also influence the funding streams that sustain such initiatives. They reference Kivimaa, Boon et al. 2019 when stating that “the political dynamics inherent to urban sustainability transitions play out remains a research gap” [41] (p. 1073).

## 5. Conclusion and Further Research Opportunities

Urban transformation is proceeding much more slowly than necessary. Despite the consensus across academics and policymakers that transformation in cities must be simultaneously large-scale, rapid, and in-depth [4], case studies in this review reveal hurdles in the phase of implementation.

Progress, however, has been made thanks to key factors of governance success such as organizational efforts in municipalities to foster cross-sector and cross-departmental collaborations (such as in NYC and Rotterdam). These are interorganizational steps that need to happen to overcome silos and gradually raise integrated policy responses from city governments. In addition, the establishment of intermediary organizations and partnerships that map and connect dispersed environmental initiatives is also a key factor of governance success. Universities are one example of such intermediary organizations, capable of bringing closer government action to citizen engagement. These organizational efforts are therefore relevant in the response to climate change even if they also presuppose a longer time frame to deliver transformational results. What is the value and the implications of such *interim transformations* occurring both organizationally and also in terms of the built environment? Further research could pay attention to such *interim transformations* which are happening along with the slower delivery of a change in paradigm (“transformation in depth, rapid and in scale [4]”).

Secondly, the cases throughout the review repeatedly state that networked governance (multi-actor networks) can be constrained by market forces and powerful actors involved in multilevel climate action. One key success factor for mainstreaming climate action would therefore be to promote wider citizen participation in the multi-actor networks

and recalibrate power imbalances in decision making. This raises questions such as the following: How can civil society, NGOs, and the general public be better mobilized to participate in decision making? What steps need to be taken to raise citizen interest and sense of ownership to engage in transformative interventions? The lens of infrastructure networks analysis (see Section 3.4.1) suggests that when the material transformation is rooted in a particular place or infrastructure system, it becomes more tangible to mobilize people's values and their attachment to place. Further research could ground the discussion of power and participation to the physical structure of the things that are undergoing transformation. This approach could contextualize the stakes at play for the specific actors and regulatory structures that will be impacted by that material transformation—and to what extent actors are driven (or not) to deviate from business as usual.

Transformation has not been achieved even in European cities that have been champions of climate action in the past decade. The successes and barriers identified in the case studies examining the governance of transformations in European cities in the last decade can inform practitioners managing the transformational “EU Missions” which are currently under implementation. Finally, it is worth noting that by focusing on the Global North, this review has a limited geographical scope when analyzing the governance of transformations. More research could explore urban transformational processes in other regions, particularly in the Global South. This would be of great relevance to expand the scope of cases of transformations, and could provide more insights to explore contrasting conditions and dilemmas that appear in the implementation phase of global urban transformational processes.

**Author Contributions:** Conceptualization, A.C.d.L., J.L. and T.S.C.; methodology, T.S.C.; formal analysis, A.C.d.L.; investigation, A.C.d.L.; data curation, A.C.d.L. and T.S.C.; writing original draft preparation, A.C.d.L. All authors have read and agreed to the published version of the manuscript.

**Funding:** This project has received funding from the European Union's Horizon 2020 research and innovation program under the Marie Skłodowska-Curie grant agreement No. 945139.

**Institutional Review Board Statement:** Not applicable.

**Informed Consent Statement:** Not applicable.

**Data Availability Statement:** Data is contained within the article.

**Conflicts of Interest:** The authors declare no conflict of interest.

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