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Grönholm, Sam

Published in:
Current Research in Environmental Sustainability

DOI:
<https://doi.org/10.1016/j.crsust.2022.100139>

Published: 01/01/2022

Document Version
Final published version

Document License
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[Link to publication](#)

Please cite the original version:
Grönholm, S. (2022). Experimental governance and urban climate action – a mainstreaming paradox? *Current Research in Environmental Sustainability*, 4(100139), Article 100139.
<https://doi.org/10.1016/j.crsust.2022.100139>

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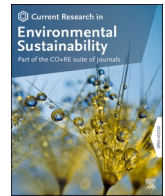
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Contents lists available at ScienceDirect

Current Research in Environmental Sustainability

journal homepage: www.sciencedirect.com/journal/current-research-in-environmental-sustainability

Experimental governance and urban climate action – a mainstreaming paradox?

Sam Grönholm*

Faculty of Social Sciences, Business and Economics, Abo Akademi University, Vänrikinkatu 3, 20500 Turku, Finland

ARTICLE INFO

Keywords:

Experimental governance
 Urban climate governance
 Urban climate action
 Upscaling
 Mission approach
 Climate change mitigation

ABSTRACT

This article reflects on experimental governance in the context of stimulating urban climate action in the European Union (EU). Experimental governance endorse and support climate action by encouraging the transfer of urban innovations by upscaling climate best practices in and across cities in the EU. Policymakers, practitioners and academics view this as increasing urban climate activities and as a path to cope with urban climate change mitigation challenges.

The article describes and analyses the complexities ingrained in experimental climate governance by studying the climate trajectory of the mid-sized city of Turku in Finland. The article increases the understanding of urban climate governance challenges and advocate for a debate regarding the norms used to incentivize innovative urban climate action. These norms do not consider urban variances and fail to contextualize exchange of innovative climate action experiences. The feasibility of experimental governance as expanding urban climate action in and across cities is dubious, as it increases short-term disjointed climate action, rises the possibilities for misaligned action routines that may desynchronize urban actor orientation, and decreases organizational transparency, ultimately complicating a mainstreaming of urban climate efforts.

1. Introduction

Urban areas, or cities, are at the forefront of combatting climate change. Cities are key in facilitating a societal transition towards a future fossil-free society, as most of the world's population live in urban areas and consume ca 75% of the global energy supply (United Nations, 2016; United Nations, 2018). The importance of cities in the societal shift in changing the climate change trajectory is emphasized by United Nations (UN) Sustainable Development Goal (SDG) 11, 'Sustainable Cities and Communities'. In Europe, the success of the endeavors introduced by the EU to combat climate change is ultimately decided by subnational action (Kern, 2019). Although large cities in EU, operating with more ambitious climate goals than the EU and its Member States (MS), have pursued effective climate actions, many small and mid-sized cities have not introduced mitigation action (Kern, 2019). The EU urban climate narrative is driven by what van der Heijden (van der Heijden, 2019) refers as a 'leadership delusion' or 'frontrunner paradox' (van der Heijden, 2019). The narrative of cities as climate saviors draws on a small number of frontrunners in climate action and not on most cities (van der Heijden, 2019). van der Heijden (van der Heijden, 2019)

denotes this to a 'gap between rhetoric and action', indicating a knowledge mismatch between what climate action city frontrunners can achieve and what the average city can deliver (van der Heijden, 2019).

In most EU MS, urban climate action is a voluntary task (Kern, 2019). The evolvement of the regulatory setting of the urban climate governance is faced with challenges and is still in its infancy. Hard mandates enforced by regulation are not an option since cities have the right to self-government and many small and mid-sized cities lack governance capacity to comply with top-down formulated EU climate initiatives. The governance options are of soft nature, encouraging experimentation and innovation via best practices, without threat of sanctions (Stephenson, 2013; Kern et al., 2021). Consequently, cities have developed as sites of experimental governance to spur on urban climate action (van der Heijden, 2019). Policymakers, practitioners, and academics view experimental based climate governance as a path to cope with urban mitigation challenges (Wolfram et al., 2019). Experimentation is introduced as a governance mode to overcome gaps between top-down led climate change policies and diffusion challenges related to upscaling urban climate innovations (Antikainen et al., 2017).

However, a challenge identified in the experimentation literature is

* Corresponding author.

E-mail address: sam.gronholm@abo.fi.

<https://doi.org/10.1016/j.crsust.2022.100139>

Received 10 December 2021; Received in revised form 8 March 2022; Accepted 20 March 2022

Available online 26 March 2022

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to generate similar innovation experiences elsewhere (Dijk et al., 2018). Upscaling urban innovations do not guarantee progress (Kern, 2019). On a voluntary basis, the replication of best practices are not usually taken up (Heidrich et al., 2016). Although policymakers refer to the transfer of best practices, there is only limited evidence that experiments stimulate governance changes in other cities at home and abroad (Kern, 2019). Experimental governance demands cautiousness about the expectations of the transfer of urban innovation (Wolfram et al., 2019). Cross-border upscaling of urban climate innovation is impeded by differences in political climate views, institutional structures, operative capacities and conditions for urban self-government (Kern et al., 2021). Upscaling is context dependent and indicates that differences in urban government capacities may constrain a mainstreaming of urban climate action via experimental governance. This is illustrated by the narrative of climate city forerunners and laggards, and point to the difficulties of upscaling urban climate innovations nationally and internationally.

The aim of this article is twofold. First, it contributes to the debate regarding the normative underpinnings of experimental governance (Antikainen et al., 2017; Heiskanen et al., 2017; Kivimaa et al., 2017; Juhola et al., 2020). This article operationalizes experimental governance as a key feature of urban climate governance and as a tool for enabling voluntary urban climate action. Experimental governance is viewed as underpinning a change in the norms for designing and implementing policy action and signifies a move away from traditional forms of command and control policy instruments. The article produces new knowledge on the general challenges of experimental climate governance on an urban level. Previous studies have analyzed the role of urban climate experiments in creating policy change and policy learning, or reviewed the conditions that support policy experiments and added new typologies of climate governance experiments (Antikainen et al., 2017; Heiskanen et al., 2017; Kivimaa et al., 2017; Juhola et al., 2020). This article adds new insights relative to the perceived usefulness of experimental governance, which is considered by policymakers as an effective tool to upscale and mainstream voluntary urban climate action in and across cities. The article develops knowledge of the complexities of linking traditional urban government processes with features proliferated by experimental governance. This article points to that experimental governance increases the complexity of urban climate action, because cities need as a result revise and adapt their policy practices, supplement and interlink new policy arrangements with traditional ones (Keskitalo et al., 2016).

Second, the article answers the calls to provide more understanding of urban climate trajectories (Frey and Calderón Ramírez, 2019; Bernardo and D'Alessandro, 2019; van der Heijden et al., 2019). The scope of the article is limited to an EU endorsed experimental governance narrative and uses the mid-sized city of Turku, located in southwest of Finland, to provide insights of an urban climate governance trajectory. The study of Turku is of relevance, as the debate on urban climate governance has hitherto focused on studies of large frontrunner climate cities. The selection of Turku as a case study is motivated by that the city is a mid-sized forerunner climate city, whose work on climate mitigation is internationally acknowledged (Kern et al., 2021). In addition, Turku is a city with broad and considerable exposure to the EU promoted experimental climate governance narrative.

The article presents original empirical research collected in the Matching Forerunner Cities (MaFoCi) research project. MaFoCi evaluated climate trajectories in four European urban contexts by studying climate governance in the mid-sized cities of Turku, Rostock in Germany, Groningen, in the Netherlands and Malmö in Sweden. The reporting of these climate trajectories are presented in a final report (Kern et al., 2021). This article uses the same data sources that formed the basis of the final report. However, the data presented in this article is compiled based on specific data observations related to experimental climate governance in Turku. This has informed the data presentation and analysis to illustrate the complexities associated with experimental climate governance in Turku.

The article starts with presenting the foundation of experimental governance by using a Multi-Level Governance (MLG) perspective. Then the article discusses key features of urban experimental governance and operationalizes experimental climate governance in a Finnish context. The data is presented with the help of a descriptive and an analytical mapping of experimental governance embedded in the climate trajectory of Turku. The final part reflects on the complexity of upscaling and mainstreaming climate action in and across cities via an experimental governance approach, and offers reflections for expanding the usefulness of experimental climate governance.

2. Multi-level governance: the foundation for urban experimental governance

MLG illustrates the complexity of contemporary societal steering. MLG symbolizes a steering narrative that relies on pluralistic and dispersed policymaking activity, where multiple actors participate, at various political levels, from the supranational to the sub-national (Stephenson, 2013). MLG implies engagement and influence, no level of activity being superior to the other, underlining a mutual dependency through the intertwining of policymaking activities (Stephenson, 2013). MLG offers flexible horizontal and vertical steering arrangements, enabling policy collaboration between and across international, nation and sub-national levels of authority to augment public policymaking capacities. MLG encourages experimentation to overcome political and financial deadlocks through exposure to ideas from outside that could transform policy understanding (Zito and Schout, 2009). Experimentation is motivated by the idea of improving problem-solving capacities. Experimental governance emphasizes deliberation, learning and alternative pathways to overcome the sectoral focus of hierarchical top-down policies (Antikainen et al., 2017; Eckert and Börzel, 2012). Key in experimentation is transparency, conveying information exchange of innovative policy experiences across the MLG structures by proliferating the usage of best practice or pilot studies (Stephenson, 2013).

The rise of urban experimental governance in the MLG setting is based on the changing view and the new demands placed on cities. This originate in the 'New Regionalist' debate in 2000s that featured the territorial transformation of society (Marshall, 2005). This transformation resulted in the emergence of stronger urban identities (Keating, 2001). This spurred cities to engage in globally shared concerns, such as combatting climate change, by functioning as hubs in the MLG setting for policy innovation. However, urban experimental governance need to confront MLG complexities. A MLG setting adds complexity by linking traditional forms of urban government with new multi-level policy spaces (Bulkeley and Betsill, 2013). Complexity stems from non-hierarchical linkages connecting interdependent policy actors on different MLG levels. Complexity increases because of informal and provisional interaction pathways, linking administrative levels, which operates with varying degrees of autonomy (Kaiser and Prange, 2004). Improving public problem-solving capacities by experimental governance underlines adaptational forms of urban government. Urban experimental governance is reliant on the mediating role of key institutions operating at the local level as well as within and at different levels of the MLG setting. Urban experimental governance depends on creating horizontal and vertical action adherence and consistency to facilitate coordinative policy interventions. Fundamentally, urban experimental governance as an extension of the MLG setting requires more coordination between and across policy actors than traditional forms of urban government (Stephenson, 2013).

2.1. The modus operandi of urban experimental governance

The operational basis of urban experimental governance is illustrated by the modus operandi of Horizon Europe, a European Commission (EC) funding program that supports Europe's transformation into a greener, more inclusive and resilient continent by 2030 (EC, 2021).

Horizon Europe is of significance for urban climate action. The program aims to involve cities, regional, national authorities, citizens, businesses, and investors to deliver 100 climate neutral cities by 2030 (EC, 2021). The operational basis of Horizon Europe facilitates an expansion of urban experimental governance. Horizon Europe operates using a mission approach that is part of the mission economy aspiring to promote sustainable and inclusive growth (Mazzucato, 2018). It endorses innovation to deal with climate change, conveyed through top-down and bottom-up MLG activities, co-created via cross-disciplinary and cross-sectoral policy interactions. This approach rests on the notion that addressing climate change calls for an explorative open-ended and innovative operative setting (Mazzucato, 2018). Key features include implementing new forms of policies, practices, processes and tools to share learnings and inspirations from existing innovation activities (EC, 2021). Experiments are designed to be framed, targeted, measurable, time-bound, and impact driven (EC, 2021). Experiments are implemented as mission projects, which are utilized as tools for upscaling experiments. Experiments provide a platform for learning and testing, which adds new knowledge and understanding that can be replicated, scaled and translated using the MLG setting. The mission approach aims to produce transformative change that is societally embedded, and the approach invites societal actors from different levels into initiating, developing and scaling innovative solutions (EC, 2021).

2.2. The urban level as a hub for experimental climate governance

In the MLG setting, the urban level functions as a hub for innovation (Mazzucato, 2018). Pro-active climate cities also view themselves as important drivers of innovation (Kern et al., 2021). The urban climate action context is shaped by voluntary climate commitments, where cities lack budgetary means to deal with climate change challenges (Kern et al., 2021). EU climate funding offers possibilities to combat urban climate funding shortage via EU funding, distributed by for example Horizon Europe. This increases and incentivizes climate innovation action at the urban level. Expanding climate innovation action in and across cities in EU transpires through a MLG download and an upload component [Table 1]. The download component transfers experimental practices to urban decision-making and alters urban policy processes with the use of EU funding terms. These require the set-up of partnerships, bringing non-governmental organizations, representatives from the community and voluntary sectors, business leaders and other partners into urban climate governance (Marshall, 2003). These actors play a key role in urban climate governance and their EU-mandated presence alongside established urban actors catalyzes further MLG collaboration (Marshall, 2005). However, download experimental governance takes place against the backdrop of traditional urban contexts. The possibilities for urban government changes and changes in urban practices are embedded by institutional path-dependencies. This ensures that the complexity of urban governance is not subsumed into a reductionist paradigm, but rather expands an intricate urban government context (Marshall, 2005).

The upload component transfers urban innovations to EU policy-making. Urban innovations are incorporated into EU programs and frameworks (Marshall, 2005). Upload experimental governance enables cities to upload their best practices to an EU level to adjust pan-

Table 1
Different components of urban experimental climate governance. Based on Marshall (Marshall, 2005).

Download experimental governance	Upload experimental governance
Changes in policies, practices, preferences, or participants within urban systems of governance, arising from the negotiation and implementation of EU programs	The transfer of innovative urban practices via pilot studies or best practices to an EU arena, resulting in the incorporation of urban initiatives in pan-European policies or programs

European urban programs. Transnational urban networks are key in uploading innovations by proliferating knowledge exchange via best practice studies. The most important climate network is EC's Covenant of Mayors (CoM), an EU initiative for urban climate action. CoM cities voluntarily commits to implement EU climate objectives and ca 10,000 EU cities are signatories (Covenant of Mayors, 2021). CoM facilitates experimental governance as signatories accept to share knowledge with other cities to enable the sharing of scalable climate solutions (Covenant of Mayors, 2021).

Experimental climate governance in an urban setting is supported by the idea to test and assess the performance of experimentation for a limited time using projects to draw lessons regarding further replication (Kivimaa et al., 2017; Castán Broto and Bulkeley, 2013; Evans et al., 2016). Upscaling urban climate experiments refers to 'expanding, adapting and sustaining successful policies, programs or projects in different places and over time to reach a greater number of people' (World Bank, 2005). The scope of upscaling urban climate experiments differs and may enable action internally in a city, externally across cities and result in a gradual transformation of urban governance [Table 2]. Upscaling of a single experiment does not lead to a change, but together with other experiments and interventions, may influence regime change (Antikainen et al., 2017).

2.3. Experimental urban climate governance in Finland

Urban climate experiments is widely acknowledged (Cloutier et al., 2015; McGuirk et al., 2015; van der Heijden, 2016). In Finland, urban experimental governance is advocated by policymakers as allowing a renewal of steering processes (Heiskanen et al., 2017). The Finnish urban setting is influenced by experimental governance, which cuts across cities climate action by linking EU and national climate agendas with aims of upscaling voluntary urban climate action. The primary aim is to develop innovative solutions to urban climate mitigation problems (Heiskanen et al., 2017). National climate programs support urban climate activities by offering funding for projects that drive policy innovation. These incentivize innovation by using project financing to create new solutions scalable to other Finnish cities (Ministry of Environment, 2021). The program Cities Climate Solutions, a government supported funding program for 2018–2023 has hitherto financed 134 projects in Finland (Ministry of Environment, 2021). Urban climate experiments are viewed as an alternative to overcome the sectoral focus of top-down steered climate change policies (Antikainen et al., 2017; Kivimaa et al., 2017). Experimentations deploy new low-energy solutions, renewable energy in the built environment and in transport, and combine new low-carbon technologies and practices in residential districts (Heiskanen et al., 2017). Pro-active Finnish cities are also active in pursuing innovation through urban climate networks, Finnish Sustainable Communities (FISU) and Towards Carbon Neutral Municipalities (HINKU) (Fisu, 2021; Hinku, 2021). These networks share innovative solutions across members to upscale urban climate experiments in Finland.

Table 2
Different traits of urban upscaling. Based on Kern (Kern, 2019).

Different traits of urban upscaling	Scope
Internal diffusion	Upscaling is limited to the city in which the experiment was conducted, for example, the roll-out of a place-based project from one neighborhood to other neighborhoods, driven by project-to-project learning processes
External diffusion	Upscaling between cities on a voluntary basis, based on various forms of networking, ranging from twinning to global city networks
Governance transformation	Upscaling that leads to a transformation in a specific territory, such as a nation state, and requires action in all cities within that territory

The research on upscaling urban climate experiments in Finland has identified some enabling and constraining factors [Table 3]. The scope of this research (Antikainen et al., 2017; Heiskanen et al., 2017; Kivimaa et al., 2017) has ranged from internal diffusion in city departments, to external diffusion on a regional and on a national level in Finland. Hitherto, the success of experimental urban governance in Finland is ambivalent, as upscaling urban experiments externally across cities is sporadic at best (Heiskanen et al., 2017). These experiences are comparable to European results that show that upscaling or replication of urban experiments is often an exception (Kern, 2019; Nagorny-Koring, 2018).

3. Turku as a case study of experimental urban climate governance

The case study of Turku provides an opportunity to add new perspectives on the research on urban experimental governance in Finland. The case study describes and analyses Turku's climate trajectory in the context of experimental climate governance. Generally, the case study aspires to inform and expand the debate on the perceived usefulness of experimental governance, which is considered by policymakers as an effective governance instrument to upscale and mainstream voluntary urban climate action in and across EU cities. The suitability of Turku as a case study to provide contextual insights of experimental urban climate governance is based on that Turku a mid-sized climate city, whose work on climate mitigation is internationally acknowledged (Kern et al., 2021). Turku has considerable exposure to an EU promoted experimental climate governance narrative. Describing and analyzing Turku's climate governance trajectory is motivated by that the city been active in the MLG setting since the 1990s, and has extensive MLG climate policy experience. Turku is a member of the national FISU and HINKU climate networks, and of transnational networks, CoM, Local Governments for Sustainability, Eurocities, Union of the Baltic Cities (UBC), Disclosure Insight Action Network, is part of the Green City Accord and of the EU Strategy for the Baltic Sea region, and is committed to implementing the 2030 UN SDGs agenda by functioning as a city that solves global sustainability challenges [Interview 2,4,5,7]. Turku's climate action is guided by EU climate documents: the European Green Deal, the EU action plan for Circular Economy, and the European Plastic Strategy [Interview 1,2]. In addition, Turku's climate strategy (Turku, 2021a) is designed based on reporting and monitoring framework developed and validated by the CoM [Interview 1,2,4].

The description and analysis of the climate governance trajectory of Turku is based on data collected in the MaFoCi – research project. The MaFoCi data collection is based on a qualitative approach, using both

Table 3

Upscaling of urban climate experiments in Finland: enabling and restricting factors. Based on Antikainen et al. 2017 (Antikainen et al., 2017), and Heiskanen et al. 2017 (Heiskanen et al., 2017).

Enabling factors	Restricting factors
Internal government capacity, informed actors who have coordinating readiness to navigate complex governance linkages, supportive internal culture	Lack of internal commitment, strong path-dependency enforced by traditional top-down forms of government
Long term commitment by key actors, realistic timeframe and expectations	Lack of support from decision-makers, limited timeframe, unrealistic expectations
Long-term funding	Short-term or lack of funding
Networking and interaction with actors representing the existing regime	Networking restricted by internal departmental silos, failing to network across departments
Participatory mechanisms for frequent and continuous communication	One-sided, sporadic or lack of communication
Plurality of actors, wide goal-oriented engagement strategies	Absence of inclusive engagement of citizens

primary and secondary data sources designed to seek to understand phenomena in context-specific setting (Golafshani, 2003). The primary data is collected with the help of semi-structured interviews with urban climate experts, and a focus group session, offering insights of the contextual setting for experimental based urban climate action. A review of written sources are used as secondary data sources. The review is guided by discourse analysis, which assists in identifying and reporting patterns in data (Braun and Clarke, 2006). The discourse analysis in this article is guided by the key features defining urban experimental governance, operationalized using the MLG climate setting as a basis.

The original MaFoCi data was collected in a following manner. First, the data collection included analysis of Turku's climate activities, comprising discourse analysis of the climate strategy, plans, research documents, statistical and information databases, upheld by public entities. This informed the semi-structured interviews with key climate actors in the city. Seven interviews were conducted during 2020; some of the interviews were conducted in person, others online due to the Covid-19 pandemic. The content of the interviews was summarized. Data from the document analysis and interviews were condensed into a climate governance profile of Turku. In June 2020, this profile was discussed in a focus group session, convening civil servants, city politicians and other urban climate actors, collectively representing the actors engaged in the climate governance of Turku [Fig. 1]. This informed the creation of a final climate governance profile of Turku. This profile along with document and interview data is used as a basis for studying experimental climate governance in Turku. Table 5 provides a descriptive overview of Turku's climate trajectory from an experimental climate governance viewpoint, while Table 6 presents analytical insights of experimental governance concerning this trajectory. Tables 5 and 6 have been compiled based on inductive reasoning, implying that the tables have been created based on broad generalizations from specific observations originating in the MaFoCi data sources and in the climate governance profile of Turku.

3.1. Framework for evaluating the urban climate governance trajectory

Fig. 1 provides an overview of the different actors involved in the climate governance of Turku. It includes four groups: internal city government; city subsidiaries and regional cooperation partners; urban societal actors, and urban MLG climate actors. The latter group represent actors operating in the internal city government and of a regional cooperation partner [Table 5]. Fig. 1 offers an actor framework for describing and analyzing Turku's climate trajectory from an experimental climate governance viewpoint.

The components that guide the description and analysis of Turku's climate trajectory are outlined in Table 4. Table 4 is constructed based on urban climate action contextual insights from the MaFoCi research project (Kern et al., 2021). These components broadens the understanding of the urban climate trajectory of Turku from an experimental governance viewpoint in two ways. First, they are used to describe the operating logic of Turku's climate activities relative to how experimental governance interlink with traditional government, and second they are used to analyze the difficulties in linking experimental climate governance with traditional forms of government. Fig. 1 and Table 4 function as basis for creating the horizontal [Table 4] and vertical [Fig. 1] columns of Table 5. Table 6 condenses the analytical findings into two columns identifying the opportunities and the difficulties of the climate trajectory of Turku regarding experimental climate governance.

4. The climate governance trajectory of Turku

Turku is the provincial capital of Southwest Finland and of the city region of Turku that includes the neighbouring cities of Kaarina, Raisio and Naantali, which is the third largest urban area after Greater Helsinki and Tampere region. Turku is a city with ca 193.000 inhabitants, covering an area of 245 km² of land near the Baltic Sea coast. Turku is

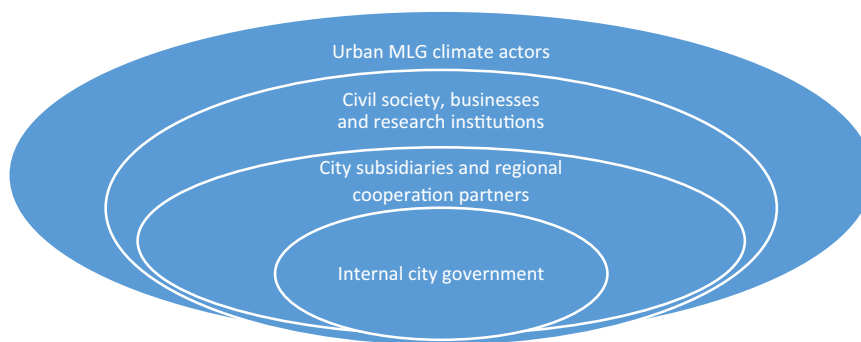


Fig. 1. Different actors involved in the climate governance in Turku. Compiled using MaFoCi data.

Table 4
Urban climate governance components. Compiled using MaFoCi data.

Ambitions	Role	Actors	Structures	Processes	Tools
Defines the broader scope and target of urban climate action	Defines the roles of the actors involved in urban climate action	Identifies the key actors involved	Describes different forms of operating structures	Describes different forms of operating processes	Lists the used tools to develop, implement and monitor climate activities
These entail short-term or long-term targets and/or sector wide goals	Actors have different tasks: steering, coordinator and implementer	Urban climate activities engages different forms of actors	These include formalized and structures aspiring to introduce climate innovation	These entail traditional and processes that aims to facilitate urban climate innovation	These include programs and projects seeking to promote urban climate innovation

Table 5
Experimental climate governance within Turku's climate trajectory. Compiled using MaFoCi data.

	Ambitions	Role	Actors	Structures	Processes	Tools
Internal city climate government	Climate neutrality by 2029	Steering entity Financial authority Developer and coordinator	City development group, central administration, environmental office, UBC city commission, city council, city board, mayor	Traditional structures based on sectorial departments <i>Transitory structures arising from an urban innovation demand</i>	Institutionalized processes based on hierarchical processes <i>Non-institutionalized processes formed by climate innovation agendas</i>	One overarching climate strategy <i>Strategy implemented via spatial or short-term innovation programs and projects</i>
City climate government and city subsidiaries and regional cooperation partners	Circular economy Carbon neutral Southwest Finland	Implementer of climate action	Turku has ca 30 different city subsidiaries; most important Turku Energia RC of Southwest Finland	Structures formalized through the Finnish model for intercity cooperation	Formalized processes with city subsidiaries Processes steered by Turku's role as the main financier of the city subsidiaries and the regional cooperation partners	Climate agreements with city subsidiaries to support Turku's ambitions <i>Investment programs supporting innovation</i>
City climate government and civil society, business, and local research institutions	Safe and pleasant living environment for the citizens A sustainable way of life Establish Turku as a center for urban climate expertise	Mainstreaming action Facilitator of action Knowledge provider	Private companies engaged in circular economy TURP	Specified structures to serve the annual climate forum to societally embed activities Institutionalized structures linking the city with local universities	<i>Non-institutionalized processes with companies tied to developing economically viable climate innovative solutions</i>	Turku's action plan for climate neutrality <i>Innovative business climate programs and projects</i> Research projects on climate change
Urban climate MLG	International forerunner in climate work International pioneer of climate solutions	Facilitator and informer of climate monitoring <i>Accumulator of external funding</i> <i>Capacity builder among civil servants and local politicians</i>	Central administration UBC City Commission RC of Southwest Finland	<i>Structures based on adaptive efforts seeking to enable innovative problem-solving</i> <i>Voluntary memberships in urban networks</i>	<i>Networking processes to support climate activities MLG and short-cycled processes designed to secure finance and to enable innovative progress</i>	<i>Geographically defined projects intended to induce broader innovative urban transformation</i> Monitoring programs

defined based on locally defined democratic structures and is steered through a city council, elected every four years, which is the highest decision-making authority. The city board, appointed by the city council, is responsible for the practical running of the city. Turku has considerable institutional and financial autonomy since local self-government is safeguarded in the Finnish constitution. Turku has

authoritative rights towards its inhabitants and relative to the state. Cities in Finland operate based on a general local mandate that allows Turku to engage in areas that are not defined in legislation or mandated by law. This institutional autonomy of Turku has granted ownership of key climate policy areas (Kern et al., 2021). Turku exercises decision-making authority in areas of land-use, traffic planning, transportation,

Table 6
Analytical insights of Turku's climate governance trajectory. Compiled using MaFoCi data.

	Opportunities	Difficulties
Internal city climate government	Central administration has the responsibility for coordinating, steering, and developing climate action with help of the climate strategy. This provides a solid foundation for urban climate government. Politically and administratively, the organization is committed to climate action. The UBC Commission acts as a pivot linking traditional forms of government with experimental climate governance. The Commission is institutionalized in the city	Turku's climate action transpires in a setting that has been for decades formed by traditional government protocols. These do not interlink properly with experimental climate governance. There are challenges of coordinating and integrating a vast number of actors that operate in different sectors, with varying timeframes: short-term projects – medium-term investment programs – relative to the long-term climate ambitions. There is need of operational routines that accentuate similarity across sectors to create coherence, linking traditional forms of government with experimental climate governance. Upscaling of innovative climate action is challenged by problems of unsynchronized activities across sectors that operate by different logics. This complicates knowledge transfer across sectors engaged in climate work and sectors that are less engaged in climate work.
City climate government and city subsidiaries and regional cooperation partners	The autonomy of Turku enables the city to develop regionally defined climate solutions, with the help of regionally based city subsidiaries and cooperation partners. Turku steers the operations of climate action implementers at a regional level.	Implementation of climate action is outsourced to city subsidiaries, which accentuates the need of coherent innovative knowledge transfer. Cooperation patterns with implementers have been formed based on hierarchical defined operational procedures. Yet short-term and spatially defined innovation projects are used to implement climate activities. This underlines the need for supportive functions to mainstream climate activities across hierarchically organized sectors.
City climate government and civil society, business and local research institutions	There is societal support for climate activities. Citizens, local businesses, and local universities validate Turku's climate mitigation targets. The city has a program for anchoring the climate work in the city through a societal perspective, asking for societal commitment. The city is informed by local knowledge production enabled by TURP.	Climate related efforts are pursued thru a hierarchical government approach. The participatory mechanisms to enable citizen engagement is underdeveloped relative to embedding experimental climate action societally. The participatory program is based on an annual climate forum and news update on the city webpage, but its linkages

Table 6 (continued)

	Opportunities	Difficulties
Urban climate MLG	Climate MLG improves action capacity by informing civil servants and politicians via network memberships. Climate MLG setting generates economic funds to pursue voluntary innovative climate activities. Introduces innovative action development and implementation features to serve the climate mitigation ambitions.	does not fully enable targeted information on experimental climate action. MLG climate activities changes urban action behavior by increasing short-cycled policy routines. Projects expands short-term activities and alters the relational policy action basics. This may desynchronize actor orientation and decrease organizational transparency. Short-term activities may impede an effective integration of innovative action with traditional urban government processes. This may result in an expansion of short-lived and disjointed climate activity.

waste management, energy issues, zoning and building regulation, though the latter need to abide by national regulation.

Turku aspires to become climate neutral by 2029, an ambition that succeeds Finland's climate ambitions (Turku, 2021a). The work towards climate neutrality is supported by unanimous local political support [Interview 1,2]. The city council, the city board and the mayor validate Turku's climate ambitions (Kern et al., 2021). Turku's climate target is reflective of the aspiration to become a recognized international pioneer in developing urban climate mitigation solutions (Turku, 2021a). Turku's work on developing climate solutions that reduces carbon dioxide received global attention in June 2020, when the CoM awarded Turku with a climate prize (Turku, 2021b). Turku was selected as the best climate city in Europe in the category of mid-sized cities in 2020. Turku has a history as a national forerunner in environmental affairs. Turku's environmental awareness traces back to the early 1980s, when local universities created foresight relative to the arising environmental problems in the city [Interview 6]. Today, Turku's collaboration with the local universities is formalized via the Turku Urban Research Program (TURP) (Turku, 2021c). This program informs civil servants and local politicians with locally produced scientific knowledge, for example to navigate the city's work on urban climate action.

The leadership for urban climate action resides with local politicians. Their work is grounded in the formalized local government arrangements in Finland, which grant them the autonomy to voluntarily engage in urban climate activities. The political leadership formally steers the formation of climate policy, by managing the development, coordination and the implementation of climate action [Table 5]. Turku's MLG activities are at the core of shaping and supporting urban climate action (Kern et al., 2021). Turku has institutionalized the MLG activities and operates with broad MLG engagement that builds institutional climate capacity among civil servants and local politicians [Table 5]. MLG activities helps Turku to amass critical urban climate knowledge, and to generate external economic funds to pursue climate action in the city.

Turku's climate activities is steered and implemented based on a climate strategy that was adopted in 2018 (Turku, 2021a). The strategy links the different actors that are involved in the climate governance in Turku via a subset of sub-ordinated plans and objectives that steer their climate activities [Table 5]. Turku's climate work is arranged by an organization that links the city development group, the central administration, the environmental office, and the UBC Sustainable City Commission, located in Turku [Table 5]. The UBC Commission,

established in 1997, is one of seven commissions that upholds the UBC network. Generally, Turku's organization is aligned with the city's ambition to become a forerunner in climate mitigation solutions, reflective of a strong mitigation narrative defining the climate strategy (Kern et al., 2021).

Turku aspires to embed its climate activities across the urban society. Turku engages with local businesses and societal actors by creating a vision of a carbon free society (Turku, 2021d). This is also linked to the potential to develop economically viable climate mitigation solutions, which could assist in Turku becoming an international climate pioneer. Turku makes use of TURP to inform climate governance. For example, the MaFoCi research project was financed by TURP, to provide a comparative perspective of Turku's climate action. Key climate actors in Turku were on two occasions informed of the MaFoCi findings and the final report is available on Turku's web portal.

4.1. Description of experimental climate governance in Turku

Climate action in Turku is based on formalized urban government structures and processes. Turku utilizes the Finnish model for intercity cooperation to develop regionally defined mitigation solutions with implementation outsourced to city subsidiaries and regional cooperation partners [Table 5]. There is extensive formalized cooperation between cities in Finland due to their mandatory task to produce welfare, such as healthcare and education. This cooperation transpires with the help of Joint Municipal Authorities (JMA). This cooperation can be extended to include urban climate action, as cooperation is based on cities' general local mandate. Key actors in Turku's successful climate work are the JMA of Regional Council of Southwest of Finland (RC) and the regional energy company, Turku Energia. Turku is part owner of the company and steers it in accordance with actions that are foreseen to enable a carbon free energy production [Interview 1,2,4,7].

Experimental climate governance is introduced to Turku's climate trajectory via the urban MLG group of actors [Table 5]. These actors comprise: (I) the central administration, i.e. civil servants and local politicians representing Turku in national and international urban climate networks, (II) the UBC Commission, acting as a general project developer and manager in the city and (III) the RC pursuing the interest of Turku in EU via its Brussels office [Interview 1,2,4,5]. These act as intermediaries and introduces new forms of practices, processes and tools to share experimentation in and across the city [Table 5]. They introduce transitory and short-lived structures, proliferate non-institutionalized processes, expand the usage of projects, which function as innovation tools, designed to be targeted, measurable and impact driven. Experimental governance introduces structures and processes in Turku that are project driven, adaptive, informal, short-cycled and non-hierarchical relative to formal and hierarchically determined features associated with urban government [Table 5].

Experimental climate governance influences climate action in Turku. This is enabled by the stipulations of EU and national project funding schemes enabling urban climate innovation. The climate strategy is partly implemented with the use of innovative projects [Interview 4]. For instance, Turku is part of RESPONSE (Integrated Solutions for Energy Positive and Resilient Neighborhoods and Cities), a Horizon 2020 project (Turku, 2021e). In RESPONSE Turku functions as a hub for climate innovation, demonstrating 10 integrated energy solutions implemented in the student village, a city district area. The expected outcome of RESPONSE is to upscale these innovations in Turku as a part of the climate strategy, but also across Europe (Turku, 2021e). RESPONSE maintains an innovation hub that enables cooperation during the project, and comprises of 18 partners ranging from city-affiliated companies, national research institutions to innovative technology providers from Finland and abroad (Turku, 2021e). The RESPONSE project is one of ca 40–50 ongoing projects in Turku [Interview 4], of which most are related to supporting a green transformation of urban society. These projects operate in parallel, but not in conjunction with

traditional forms of urban government. Collectively, these projects expand the number of actors involved in innovative climate action, and facilitate the proliferation of time-based and geographically defined climate action in Turku [Table 5].

4.2. Experimental governance expands transitory urban climate action practices

The formation of climate action in Turku transpires in a setting that is shaped by traditional structures, based on sectoral divisions, and hierarchically defined operational procedures [Table 6]. Turku's climate ambition expedite an internal organizational transformation process that is proliferated and shaped by the key features defining experimental governance. These expands a project based urban climate governance, ultimately shaping the base of climate action [Table 5,6]. It proliferates adaptive and short-term climate action, motivated by the idea of augmenting innovative problem-solving and policy-making capacities. It transforms the basis of urban climate government, as it advances the rise of transitory processes relative to developing and implementing climate action [Table 6]. This result in an expansion of time-bound, disjointed climate activities that complicates the efforts to identify what has been accomplished and what should be planned for in the future [Interview 4]. Transitory practices decreases organizational transparency of urban government and demands additional coordination efforts to ensure the continuity and the coherence of climate action in Turku.

Turku's climate action is steered based on a strategy that is implemented across sectors, areas, involving a range of actors. These operate in different sectors and varying operational contexts, steered by disjointed timeframes and reporting systems. The climate actors are steered by varying operational logics, exemplified by short-term project funding – medium-term investment programs – relative to the long-term climate ambitions [Table 6]. This an outcome of the voluntary nature of urban climate action and it does not automatically produce coherent and integrated climate action [Table 6]. Moreover, the voluntary climate action is usually confined to pro-active city departments [Interview 4]. The desynchronized timeframes and orientations of urban climate actors increases the possibility for misaligned climate action routines in Turku. This complicates the upscaling and the ensuing mainstreaming of innovative climate action, particularly from sectors engaged in climate work to sectors that are less engaged in climate work [Interview 4].

Although Turku operates with institutional climate autonomy, informed civil servants and politicians, efficient context for mitigating climate change and the ability of UBC Commission (Kern et al., 2021), there is embedded complexity in steering, coordinating, and implementing urban climate action [Table 6]. Turku is confronted with navigating the intricacies induced by the attempts to link experimental governance with urban government. Experimental governance adds complexity by introducing short-cycled action practices into hierarchical formed procedures [Table 6]. Turku lacks clear processes that can maintain short-cycled climate action practices, i.e. amassing new information, obtained by experimental conditioned processes of developing, implementing, evaluating, and informing urban government by upscaling and best practice project learning. Institutional learning in Turku, with the view to learn from city demonstration projects failures and barriers, are challenged by the short-cycled action practices. This impedes the full integration of best practice climate action and the institutional impact of project innovations are usually confined to a pre-determined spatial space, such as a city district. Turku lacks iterative processes and dedicated actors tasked to systematically sustain and coordinate innovative climate action and expand project-based climate experimentation beyond the project's geographical scope and duration.

Climate action in Turku is designed to generate measurable and tangible results. Turku uses a mission approach to support the expansion of innovative urban climate solutions to facilitate a green urban societal transformation. However, the conditions in Turku to societally embed innovative climate action are impeded by underdeveloped citizen

engagement (Kern et al., 2021). An institutionalized urban government premise results in one-sided interplay and does not allow for reciprocal climate action, which constitutes the foundation for a green societal transformation. Formalized urban government structures obstruct the progression of upscaling societally embedded climate action [Table 6]. The transformation of urban government is motivated by the idea of improving problem-solving and policy-making capacities. However, the transformation towards innovative forms of experimental climate governance needs to be societally validated and legitimized to support the city in its mission to become an inclusive carbon neutral city.

5. Discussion: the difficulties of upscaling and mainstreaming urban climate action

The article uses Turku as a case study to generate insights of an urban climate trajectory from an experimental governance perspective. This study increases the understanding of urban climate governance and experimental based urban climate action. The article produces new knowledge on the embedded challenges of experimental climate governance on an urban level relative to the perceived usefulness of experimental governance in this context. Experimental governance is advocated by policymakers as a tool for expanding urban voluntary climate action by the transfer of urban climate innovations by upscaling best practice studies within and across cities. Urban experimental climate governance is inspired by the idea of improving problem-solving and policymaking capacities in the context of mitigating climate change.

The article provides contextually derived knowledge of the complexities of linking traditional urban government processes with features proliferated by experimental governance in the context of urban climate action. It shows how urban experimental climate governance introduces a transitory element in the design and implementation of urban climate action. It introduces a complex, temporal policy dimension into urban climate governance that traditional urban government structures and processes are ill prepared for. Traditional forms of government, which relies on command and control policy instruments, are not suited for non-hierarchical and time-bound policy instruments emphasized by experimental governance. The outcome is that the overall urban climate policy action coordination and steering becomes more complex. The upscaling of voluntary urban climate action within and across cities is exposed to these complexities, which makes the expansion and integration of voluntary urban climate innovations difficult in and across cities. This article points to that experimental governance increases the underlying complexity of urban climate action. Previous studies has underlined that cities, as a result, need to have capacity, competence and commitment to revise and adapt their policy practices, supplement and interlink new policy arrangements with traditional ones (Antikainen et al., 2017; Heiskanen et al., 2017; Keskitalo et al., 2016).

The study of Turku suggests that even a city with climate governance capacity, competence and commitment has problems in navigating the difficulties associated with upscaling and mainstreaming innovative climate action in and across the city. Turku's difficulties originate in the underlying premise defining experimental governance. This premise builds on the application and proliferation of cross-disciplinary and cross-sectoral policy innovation tools in urban contexts to augment problem-solving capacities. An EU endorsed experimental governance, operationalized by the mission approach, advocates projects to share and replicate climate policy innovation in and across cities. In Turku experimental governance expands a project based urban climate governance, which promotes a policy design that relies on transitory processes relative to developing and implementing urban climate action.

The Turku case study illustrates that experimental climate governance is undermined by path dependencies of urban government structures, which impedes a full integration of innovative urban climate action in and across the city. Innovative climate action is time-framed and of transient nature, restricting its ability to intervene and induce long-lasting impacts in urban government beyond the duration of the

climate projects in city districts. Translating lessons from climate experiments into institutionalized climate knowledge across policy sectors in Turku is impeded by unsynchronized and disjointed actors that operate by different steering logics. Some operate based on traditional urban governmental processes; others are navigated by the novelty of experimental climate action. Upscaling and mainstreaming climate action via experimental governance in Turku is delineated by the limited actor scope engaged in stimulating urban climate innovation. Climate innovation activities enable limited representativeness of city departments, usually engaging pro-active climate city sectors. Many city departments in Turku are not engaged, or have limited degrees of experiences with innovative urban action approaches. There is also a time-limitation attached to climate innovation, as innovation is defined by a clear start and end date. This weakens the transferability of innovation outcomes, and the potential of using the outcomes in new situations declines (Dijk et al., 2018). This complicates the upscaling of innovative climate action practices and constitutes a barrier for societally embedding innovation with the view to mainstream climate action across the entire city.

The external diffusion of Turku's successful climate mitigation practices is difficult in a Finnish context. Upscaling especially urban energy transformation experiments from Turku to other Finnish cities is challenging. Turku is among the few cities in Finland that has the ability to steer its energy production in accordance with city climate ambitions. Turku's success in mitigating climate change is not only based on a favorable contextual urban setting but also based on climate governance competence. The city has since the 1990s been a member of transnational urban networks, which have allowed a gradual buildup of urban climate competence and also helped transform the internal operative setting of selected few, key city departments. The MLG network setting has expanded the authority of a climate actor pioneers in the city, empowering other urban actors and motivating the pursuit of ambitious climate aims [Interview 5]. City departments involved in climate activities show an open willingness to explore open-ended and innovative urban mitigation solutions. Innovation is supported by key civil servants and politicians, including the mayor, utilizing the UBC Commission to add novel insights of the urban MLG climate project setting. The UBC Commission's expertise contributes to a successful development and implementation of climate mitigation solutions in selected city districts.

Cross-border upscaling of Turku's success in mitigating climate change is impeded by variances in political climate views, urban institutional structures, operative climate governance capacities, and conditions for urban self-government (Kern et al., 2021). The applicability and suitability of experimental governance as a climate steering instrument enabling and expanding voluntary urban climate action within and cross EU cities is ambivalent and needs further scholarly attention. The narrative of cities as climate saviors in Europe is dependent on supporting the thousands of small- and mid-sized EU cities in expanding their voluntary climate action. The replicating of Turku's success in mitigating climate change across small- and mid-sized EU cities is challenged not only by the difficulties in recreating Turku's efficient operational urban context, but also by the fact that most cities in EU are not part-owners of an energy company.

6. Conclusion

Expanding the usefulness of experimental climate governance is important for maintaining and supporting the voluntary urban climate action in and across cities in Europe, however. Voluntary urban climate action is largely enabled by external funding bodies advocating the use of experimental forms of governance. In Turku urban experimental climate action is funded by external national and international programs. There are no budgetary means allocated for urban climate action. External funding is thus pivotal for voluntary urban action in mitigating climate change. Central to the stipulations of the allocation of external

funding in Europe is Horizon Europe and its mission approach. The mission approach expands and transfers experimental governance norms to and across EU cities. The importance of the mission approach to the urban climate setting is highlighted by its ambition to deliver 100 climate neutral EU cities by 2030.

The usefulness of experimental climate governance as an instrument to enable and expand urban climate action in and across EU cities relies on recognizing the discrepancies in urban climate government capacities and contextual differences (Kern et al., 2021). However, the operational norms that define experimental climate governance in Turku are guided by a generic approach, largely ignoring urban variances and placing too little emphasis on the importance to contextualize the exchange of innovative climate action experiences in the city. The focus of urban experimental climate action is on a measurable economic approach promoting sustainable and inclusive growth (Mazzucato, 2018). This approach generally neglects how the tools used for upscaling and mainstreaming innovation aligns with urban institutional structures and different socio-cultural contexts. The case study of Turku illustrates that even an award winning climate city has problems in navigating the difficulties of upscaling and mainstreaming innovative climate action internally across the city, because of different internal operative cultures and logics. The case study pinpoints to that experimental governance as an instrument designed to proliferate urban climate action is impeded by embedded institutional path dependencies. Experimental governance as an instrument typically facilitates the transfer of isolated innovative improvements, which do not properly consider underlying socio-cultural urban factors critical for transformative urban climate action.

A gradual transformation of urban areas supporting Europe in its mission to deliver 100 climate neutral cities by 2030 is reliant on discussing possible pathways to navigate the challenges in applying experimental governance as a tool in supporting and enabling urban climate action. This article suggests three discussion points based on the findings of the case study of Turku that could improve the usage of experimental governance. First, expanding the general efficacy of experimental governance is reliant on problematizing the suitability of the tools used for experimentation, and debating the norms used to incentivize urban experimentation. These should not be in conflicting regarding upscaling. Existing tools are supported by an accepted premise that these enable successful diffusion of innovative urban solutions in spatially restricted areas (Nagorny-Koring, 2018). Yet, the impact of climate experiments remains marginal and suggested new solutions cannot bypass existing regulations and standards, closing the opportunity for experimentation to change climate action practices (Juhola et al., 2020).

Second, expanding the usefulness of experimental governance as an instrument for supporting urban climate action in and across EU cities using the MLG climate setting need to consider the intricate features defining this setting. Experimental governance face challenges when seeking to expand their actions beyond their spatially determined scope (Wessberg et al., 2015). For experiments to create change, alignments are required (Bulkeley and Castán Broto, 2013). Transformations are required in the norms, structures and practices defining urban systems and their climate activities (Wolfram et al., 2019). To enable a green urban transformation there is a need for expanding MLG based urban climate coordination efforts since experimental climate governance is an outcome of the MLG non-hierarchical climate arrangements. A key deficit of the MLG setting is that there is lack of dedicated actors that ensures action continuity, coherence, and convergence on the urban level. The MLG non-hierarchical linkages creates inefficiencies that does not properly convey and contextualize information exchange of innovative urban climate experiences, relative to the dispersed urban climate action and the differences among cities in terms of urban climate autonomy and competencies. More emphasis should be placed on a pan-European urban coordinative system that supports the integration of innovative climate action outcomes with urban government to facilitate Europe's transformation into a green, inclusive and resilient continent.

This coordinative system should be steered by intermediary actors that aggregates new urban climate knowledge, considers contextual differences, and translates lessons from experiments into more specified climate knowledge. These actors could enable learning between urban climate experiments, amassing data with the view to learn from best practice failures, barriers, and ways to overcome these.

Third, urban experimental climate governance also requires the adaptability of urban government to ensure the coherency and the continuity of innovation climate action. This is highlighted by the Turku case study and by the MaFoCi final report, which studied besides Turku three other EU cities (Kern et al., 2021). Adaptability is warranted to navigate the complexities in maintaining and integrating short-term innovative climate action into traditional operative urban government routines. A requirement for mainstreaming climate action is to create urban climate action enablers. These enablers need to have the capacity to ensure continuous participatory mechanisms for frequent communication with a plurality of actors to embed societally urban climate action (Antikainen et al., 2017; Heiskanen et al., 2017). Urban climate action enablers need to operate at the nexus that links innovative processes with traditional procedures by creating, maintaining, and coordinating action collaboration across city departments. Urban action enablers are critical to safeguard that experimental governance does not result in only short-term action interventions, but supports the implementation of the urban transformative visions designed to combat climate change.

The multiple ways of urban climate governance in Europe opens the debate whether there is a need for stronger regulation in terms of urban climate action or whether non-mandatory measures are sufficient (Keskitalo et al., 2016). Hitherto, research has shown that multi-sectoral strategies for mitigation in the EU context have been unsuccessful, due to the complexity of integrating these into the existing urban settings (Casado-Asensio and Steurer, 2014). Urban climate governance may self-govern; however, this requires urban climate leadership to compensate for a lack of guidance or supporting legislation from higher decision-making levels (Wamsler et al., 2014). Turku demonstrates climate mitigation leadership but constitutes an exception among the thousands of other small- and mid-sized cities in Europe.

Funding

The writing of this article was enabled by a grant provided by the Finnish section of the Nordic federation of public administration.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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List of interviews

- [1] Interview 04.02.2020.
- [2] Interview 04.02.2020.
- [3] Interview 04.02.2020.
- [4] Interview 05.02.2020.
- [5] Interview 24.03.2020.
- [6] Interview 30.03.2020.
- [7] Interview 03.06.2020.