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Urban climate governance and co-creation

In Cape Town, Copenhagen, Gothenburg and Oslo

Edited by Hege Hofstad and Trond Vedeld

OSLO METROPOLITAN UNIVERSITY
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Abstract: The study provides an outline and comparative analysis of the evolution in climate policies and governance systems of four cities with ambitious climate goals and strategies; three Scandinavian cities, Copenhagen, Gothenburg and Oslo; and one South African city; Cape Town. In each city, we explore the evolution in climate goals, strategies, policy and institutional designs over two decades and how these materialize in distinct approaches to urban climate governance and co-creation. Our aim is to shed light on different – and similar - paths to urban climate governance among forerunning cities with bold climate goals i.e. in terms of embracing a coherent climate policy for mitigation, adaptation, climate equity and sustainable urban futures. The study adopts a polycentric governing perspective (multilevel and multi-actor). The empirical findings from the four city case studies are based on reviews of key climate change-relevant policy documents and websites (through 2019) and a set of key informant interviews. In each of the cities, we find that urban climate governance is manifest in a mix of traditional governance mechanisms, and new, more innovative co-creational instruments through hybrid forms of governance. The study brings up some distinctive and important differences in the urban climate policies and governing approaches between the three Scandinavian cities and Cape Town, but the study also reveals many similarities in approaches across all the four cities. All the cities engage in diverse networks and co-creational arenas for shared climate responses at different levels and scales. Drawing upon the comparative experiences of urban climate governance all these forerunning cities, *'eight essentials for effective, sustainable and fair urban climate governance and leadership'* are suggested that might bring cities onto pathways towards climate transformation.

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Preface

This study provides an outline and comparative analysis of the evolution in climate goals, policies and governance systems of four cities with ambitious climate goals and strategies; three Scandinavian cities, Copenhagen, Gothenburg and Oslo; and one South African city; Cape Town. The study explores changes in urban climate responses over two decades and how these materialize in distinct approaches to urban climate governance and co-creation.

The study reveals that the cities exhibit varying outcomes in terms of changes in climate goals, policies, organization, and interactional relationships related to national and transnational city networks and arenas. There are, however, both some common, distinct features of a 'Scandinavian model' of urban climate governance as well as several general features across all the four cities which provides specific lessons for urban climate governance.

Drawing upon the observations from the four cities, the authors suggest *'eight essentials for effective, sustainable and fair urban climate governance and leadership'* that can bring cities on to pathways towards climate transformation.

The study is a product of the four years project: Governing the Green Shift in Oslo, Gothenburg, Copenhagen and Cape Town through Leadership of Co-creation (GreenGov) (2017-2021). The project is led by NIBR-OsloMet. The project is funded by the Research Council of Norway (Grant 270668).[1] GreenGov is a partnership between NIBR-Oslo Metropolitan University, Roskilde School of Governance/Roskilde University, Mistra Urban Future/Chalmers University of Technology, and the University of Cape Town/Energy Research Centre/African Centre for Cities.

The authors greatly acknowledge the contributions from the many key informants in each of the cities, and the financial support provided by the Research Council of Norway.

The name and affiliation of the contributing authors are provided below.

Oslo, June 2020

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Research Director

[1] https://blogg.hioa.no/greengov/

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The analytical approach of the study is inspired by theories of city climate governance and theories of collaborative and polycentric governance (multilevel/multi-actor). The basic hypothesis for the study was that new forms of urban climate governance and capacity for climate action emerge from the choice of institutional and policy design by city leadership in response to certain contextual factors inherent in politico-institutional, socio-economic and climate-environment factors.

The empirical findings from the four city case studies are based on reviews of key climate change-relevant policy documents and websites (through 2019), institutional analysis, and a set of key informant interviews.

In each of the cities, we find that urban climate governance is manifest in a mix of traditional governance mechanisms, and new, more innovative co-creational instruments through hybrid forms of governance. Various tools and instruments are employed in order to mobilize and align both internal departments and entities and a multitude of external non-state actors for shared approaches to governance and climate action. Distinct partnerships and networks with private business, civil society and academia are found in all the cities. And each city engages actively in and adopt policies from many national and transnational city-to-city climate-related networks.

The many similarities observed across the four cities in urban climate governance is a strong indication that governance responses to complex, unruly, collective action problems, such as climate change, typically evolve along similar trajectories and spur specific mixes of integrative and co-creational governing responses. While climate strategies tend to be led by the city municipalities, each city also embodies spontaneous and distinct institutional innovations and actions from the bottom up by various private and civic entities, reflecting local circumstances, which produce a diverse, dispersed, yet also connected, multilevel pattern of governing across actors and scales. These findings are in line with what Elinor Ostrom described as ‘polycentric’ approaches. The study brings up some distinctive and important differences in the urban climate policies and governing approaches between the three Scandinavian cities and Cape Town, but the study also reveals many similarities in approaches across all the four cities.

Drawing upon the comparative experiences of urban climate governance all these forerunning cities, the study suggests *‘eight essentials for effective, sustainable and fair urban climate governance and leadership’* that might bring cities onto pathways towards climate transformation.

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1 Introduction: Cities and climate governance

Trond Vedeld, Hege Hofstad, Jacob Torfing

1.1 Background

Cities are currently observed to take the lead globally and nationally in pursuing goals of resilient, low-carbon, and sustainable urban development, referred to here as *climate transformation*. The failure of the Paris Agreement to become a substantive compact between nation states for addressing the climate crisis, has enhanced the role of cities as strategic actors and arenas for addressing a rapidly changing climate.

Many cities across the world in this regard are observed to reinforce urban climate governance approaches and organize themselves through city-to-city networks at national and transnational levels, such as through C40 and the Covenant of Mayors[2]. Cities fill a void left by nation states at local and global levels. Many global cities provide content to the 'mantra' provided by the C40 Mayors' during the COP 15 in Copenhagen (in 2009):

'Nations talk; cities act'.

In pursuing climate action and pathways towards climate transformation, cities in the Global North and Global South alike are found to develop a multitude of strategies and collaborative efforts to unleash resources across the public and private sectors through new forms of urban governance and collaboration (van der Heijden, 2019, Vedeld et al., 2015, IPCC, 2014, Bulkeley and Betsill, 2013, Bicknell et al., 2010). While we find an increasing number of empirical case studies that explore the emerging role of cities in climate governance, few comparative empirical and theoretical studies have investigated the more precise relationships between urban climate governance and collaborative approaches to sustainable urban futures in circumstances within which climate politics increasingly shapes urban policy agendas. This study aims to fill this gap in the literature by focusing on the evolving role of co-creation in urban climate governance and how city leadership adopts ambitious climate goals and mixes of interactive and integrative governing instruments through hybrid forms of governing (van der Heijden at al., 2019, Kern, 2019, Hickmann and Stehle, 2019, Scott et al., 2019, Visseren-Hamakers, 2018, Vedeld et al., forthcoming, Bulkeley, 2013; 2015). We argue that the most pressing challenge for cities in urban climate governance, more so than finding appropriate technological solutions, is often to develop new and innovative institutions and leadership capabilities and craft coherent climate strategies that combines the governance of Green House Gas (GHG) emissions, climate adaptation, and climate equity. This is required if the goal is to move urban society towards climate resilient and sustainable city futures in line with the SDGs and the New Urban Agenda (UN Habitat) (Adger et al. 2009, Bicknell et al. 2010, Pelling 2011, Bulkeley 2013, van der Heijden, 2019).

Our findings confirm that city leadership do employ collaborative approaches in combination with more traditional bureaucratic governing instruments (budgets, planning, reporting). The fact that the cities studied here combine traditional and new, co-creational measures involving multiple stakeholders reflects that the problem of climate change is a complex and unruly or 'wicked problem' that no one actor has the capacity to address. Climate change needs to be tackled through collaborative and collective efforts across sectors, actors and scales (Head and Alford, 2015, Hofstad and Torfing, 2017, Torfing et al., 2017). Climate change represents in fact *a nexus of unruly collective action problems* that raise polycentric and multi-actor governance challenges

[2] https://www.c40.org/; https://www.globalcovenantofmayors.org/

(Ostrom, 2010). The more precise structure of the problem takes diverse shapes and requires different approaches depending on the actual problem at hand e.g. regarding diverse mitigation and adaptation or climate equity problems.

Moreover, the report underscore findings by many recent studies that collaborative approaches to city governance are increasingly employed by the most ambitious cities across the globe through an array of partnerships, networks and arenas/platforms of interaction and collaboration at local, national and international scales on climate- and energy related policy issues (e.g. ICLEI Climate Initiatives, Eurocities, C40).

The study also argues that for city leadership to be able to play a really effective role in response to the climate crisis, national level state agencies and policies need to play an enabling – not disabling – role in terms providing benign and coherent policies in support of devolved mandates and resources for the cities (Kern 2019).

1.2 Aims and scope

This report provides an outline and comparative analysis of the evolution in climate policies and governance systems of four cities with ambitious climate goals and strategies; three Scandinavian cities, Copenhagen, Gothenburg and Oslo; and one South African city; Cape Town.

Cities and the surrounding metropolitan areas are complex and dense forms of societal organization (socially, culturally, economically and physically). A city can be described as 'the coexistence of multiple spaces, multiple times and multiple networks of relationships that ties together places, people, and technologies in global social, cultural and economic networks (Lathman et al. 2009:4). Due to its scale and function, the city and the city region often involve joint business-, work-, living-, and service-markets. In this report, we keep this broad-scale perspective on cities when exploring how four cities – Cape Town, Copenhagen, Gothenburg and Oslo – have endeavored to formulate, organize, govern, lead and implement ambitious climate policies over the last couple of decades.

In particular, we investigate how contextual factors affect and influence the structure and function of urban climate governance and the role of co-creation in the emerging city climate policy agendas. We are primarily interested in what goals, strategies, policy tools and institutional designs emerge, but also how these choices of diverse governing instruments define governance and materialize in climate action. Our aim to shed light on how different – and similar - paths to ambitious urban climate governance evolve and what the implications are in terms of mitigation, adaptation, climate equity and sustainable futures. The study brings out the evolution in each city's integrative and interactive strategies and organizational structures, specifically related to the enhancement of collaborative capabilities required for good climate governance and action. To this end, the analysis reveals diverse changes in interactive governance and the establishment of networks and arenas for collaboration and co-creation with non-state actors and other cities. The empirical findings are mainly based on reviews of key climate change-relevant policy and background documents and websites published through 2019 and a set of key informant interviews.

The report adopts a polycentric governing perspective (multilevel and multi-actor) to explore the horizontal – and to lesser extent – the vertical - interaction of the cities' policy and organizational responses in governance across scales (Hickman and Stehle, 2019; Kern, 2019; Bernstein and Hoffmann, 2018; Torfing et al., 2017, Bulkeley and Betsill, 2013; Torfing et al., 2012, Leck and Simon, 2012, Ostrom, 2010; Hooghe and Marks 2003). We emphasize the mix of governing responses between traditional government mechanisms, and new, more innovative co-creational instruments utilized to align internal actors and engage with external actors in academia, civil society and private business in networks or arenas for co-creation, including at transnational levels. We also touch upon the vertical integration of the city governance in the overall multilevel

governance and policy system indicating how the city and city level actors interacts with the national level.

We compare the governing responses in the four cities through a comparative framework (cf. methodology). The investigation focuses on similarities and differences in the evolution of climate-related organizational structures, climate policies & goals, and integrative and interactive governing. The comparison between the cities serves a two-fold mission: First, we want to provide insight into the *Scandinavian experience* of urban climate governance by analyzing and comparing governance approaches to climate change in the cities of Copenhagen, Gothenburg and Oslo. From a broader European or international perspective, these cities share a common history, as well as important cultural, political, economic and institutional traits and structures. Second, we include Cape Town as a *"learning"* case. Cape Town is a city of the Global South which is located in a very different cultural-institutional setting than the Scandinavian cities. It has a different institutional history, yet the city has ambitious goals and institutional arrangements regarding its climate policies and activities. It is also a much larger city than the three other cities in terms of population and economy. Cape Town provides an "outside" or contrasting perspective on the Scandinavian cities. By including cities from both the Global North and South with ambitious climate goals and strategies, the report aims to provide insights and learning about *global* trends in the evolution of collaborative urban climate governance and leadership and how new partnerships and national/transnational networks contribute to pathways towards climate transformation across diverse cities. This enlarges the scope for generalizations from the findings.

The report starts by an assumption that the three Scandinavian cites, being embedded in relatively similar national politico-institutional contexts, which in major ways affect urban climate politics and governing, are likely to exhibit relatively similar outcomes in terms of climate goals, policies and strategies, and organizational change. Cape Town is the exception among the four and added as a learning case that provides a 'disruptive' perspective.

The findings reveal how leadership of climate and environmental agencies in each of the cities takes many initiatives beyond what might be expected of public officials, reflecting a dynamic leadership. Each city works to develop bold climate goals and coherent strategies and engages in or create discrete organizations and capabilities for shared strategies and approaches. Key leadership assembles coalitions for change within own municipal agencies and entities. The core climate agencies, invariably, assemble units across the municipality and align other municipal agencies to shared climate goals and decentralized strategies across sectors. Key officials across municipal departments and agencies involved in climate-relevant actions interact regularly with private firms and citizens and other external stakeholders both formally and informally. Moreover, all cities engage in the design of their own climate networks or engage in national and transnational city networks and collaborative arenas beyond the city boundaries to further their climate policy agendas, build their own capacities, and change the circumstances within which they operate. The report points to opportunities as well as limitations in the city-led climate policies and governance. There are also disruptions, temporary setbacks, and challenges in terms of internalizing the climate agenda across actors and in converting ambitious policies to results on the ground. The concluding section of the report suggests '*eight essentials for effective, sustainable and fair urban climate governance and leadership'*.

1.3 Analytical approach and methodology

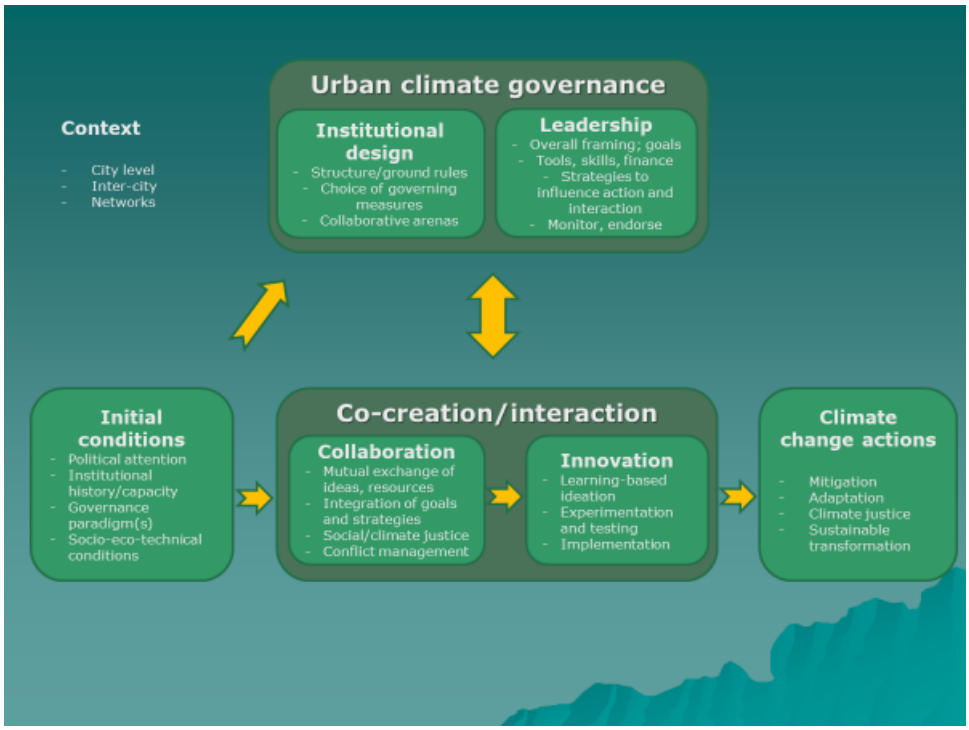
1.3.1 Analytical approach

Our analytical approach is inspired by theories of climate governance and city climate governance (Kern, 2019, Vedeld et al., forthcoming, van der Heijden, 2019, Bulkeley 2013, Leck and Simon, 2012) combined with theories of collaborative and polycentric/multilevel governance

(Ansell and Gash, 2008, Ostrom, 2010, Torfing et al. 2017). The basic hypothesis is that new forms of climate governance emerges in part from certain initial conditions (background policy and institutional and ecological variables) and certain choices by leadership in terms of types of leadership mechanisms and institutional & policy design. Through a mapping of the chronology of key policy and institutional changes over the last two-decades, we illustrate and address how – and to some extent why - gradual changes emerge to the cities' main climate governance and institutional approaches related to e.g. goals, strategies, institutional structures and networks/partnerships. Hence, the analysis brings out the evolution of climate goals, policies and institutions and institutional logics (roles, shifting ambitions, rationales, policy and governance styles).

The analytical framework is illustrated by Figure 1.1 below. The figure outlines the relationship between the initial context variables, which condition climate governance understood constituted by facilitative leadership and institutional design and leadership. Leadership and institutions produce diverse mixes of governing instruments for both integrative and interactive or co-creational governance and leadership. The combination of internal measures for assembling and aligning own entities (integration) and external measures to engage relevant and concerned stakeholders lay foundation for co-creation in-house as well as out-of-house and produce innovation, public value and related outcomes in terms of climate action. A broad specter of initial conditions provides diverse contexts for climate governance in the four cities. These factors include socio-climate-technological conditions, pre-existing political structures and governance approaches, and provision of resources and policies for enabling climate governance at city level and below. They also provide incentive structures for collaboration, enabling/disabling policies, resource allocations, forms of participation/interaction and indicate the history of conflict/collaboration, which are critical starting conditions for collaboration (Ansell and Gash, 2008).

Figure 1.1: Analytical approach: Climate governance and co-creation (authors' own construct)



Initial conditions can either facilitate or discourage collaborative leadership and related institutional design and are, thus, of key importance for understanding climate governance in each of the cities. They condition *institutional design* structures and municipal *leadership* choices in terms of combining intra-agency governance approaches (integration across sectors and levels

within the municipality), inter-agency collaboration across sectors (with other municipal agencies) and public-private boundaries (e.g. with corporate agencies, academia, civil society, and citizens) and with various networks. Facilitative leadership and institutional design are considered the two core factors for facilitating successful collaborative processes or co-creation in the governance literature (Head and Alford 2015, Weber and Khademian 2008, Nye 2008, Sørensen and Torfing 2017). Institutional design sets the basic ground rules for collaboration and involves elements such as key ground rules, participatory mechanisms, inclusiveness, transparency and accountability (Ansell and Gash, 2008). Leadership provides the essential mediation and facilitation for the integrative and collaborative process.

We understand many of these types of interactions as forms of collaboration or in specific cases; *co-creation*. A broad definition of co-creation suitable for urban governance is 'processes through which two or more public *and/or* private actors attempt to solve a shared problem through constructive exchange of different kinds of knowledge, resources, competencies and ideas that enhance production of public value in terms of visions, plans policies, strategies, regulatory frameworks or services' (Torfing et al. 2017). We have added 'or' to the definition in order to illustrate that co-creation can take place among municipal entities as well as among private entities; thus co-creation is not only perceived as taking place across the public-private divide, as is common in the literature.The discussion of co-creation as a concept and theory builds mainly on network and collaborative governance theory – emphasizing multi-actor and collaborative interaction in networks and partnerships, shared learning (within networks and own organizations), and innovations, transitions and transformation of society – often in response to the challenge of tackling complex, wicked and unruly problems (Torfing et al. 2017, Ansell and Torfing 2015, Head and Alford 2015, Weber and Khademian 2008, Ansell and Gash 2008, Agranoff and McGuire 2003, Kickert et al. 1997).

In concrete or narrow terms, *urban climate governance and leadership* in the four cities is about facilitating climate goals, plans, organization (in institutional design) and managing related processes of *deep decarbonization* (mitigation), building climate *resilience* (adaptation), and integrating *climate equity* and justice i.e. *climate transformation* - and broader urban sustainability approaches across institutions, sectors and scales.

Governing in this regard is associated with innovations or reform in the public sector, including in how the state operates at different levels to encourage new forms of citizen and private sector engagement. The focus is on 'what works' – efficiency and effectiveness – in relation to the own goals and policies each city has designed. But we are also concerned with fairness in terms of output legitimacy and how to construct arenas of deliberation/interaction around policy issues (Stoker 2006), as a normative element in all of this. We suggest that maintaining a concern for representative democracy and accountability in governance is also about building trust, which is required for gaining acceptance for broad and coherent climate policies. The New Public Governance paradigm proposes that profound societal transformations, such as inherent in climate transformation, require the collaboration of a range of actors and governing across fragmented institutions and actors. Governments cannot act as single agents to resolve public issues or deliver public services to address the climate challenge.

We thus explore governing approaches and institutional reforms that challenge traditional hierarchies and silos, both in terms of internal integration and networks and market-oriented partnerships and interaction among multiple actors. We are interested in how traditional authority and regulative control measures and government planning condition and sometimes presupposes new governance modes in hybrid or interactive governing (Torfing et al., 2017, Vedeld et al., forthcoming).

1.1.2 Methodology and approach

The approach is qualitative and three different methods of data collection are utilized. First, we reviewed the research literature on climate policy making in the four countries and on urban climate governance more generally.

Second, we carried out systematic analysis of official policy documents and strategies in each of the four cities studied, related to change in climate-related organization, institutional structures (laws, strategies, plans, organizations), governing instruments and policies.

Third, we conducted semi-structured interviews with public officials (core agency leadership and high/medium level officials), politicians and an array of public and private sector and civic stakeholders; from interviews in each city. This background report draws upon these interviews in general terms; the observations are made prior to a full analysis of all interviews.

The empirical analysis covers the period 2000-2020. However, the main focus-period for the empirical observations is on changes taking place over the last ten years. In-depth field work and interviews were carried out mainly in the period 2018-2020.

For the comparative analysis we adopt a simple comparative framework that categorizes policy and organizational change from *small change* (adjustment) to *medium change* (reformistic) and *major change* (pathway towards transformation). This analysis draws upon he public policy literature (Capano, 2009, Hickmann and Stehle, 2020:61).

Inspired by C40's Cities Climate Action Planning Framework (C40 2018:3, Watts 2018) which sets out key content-components perceived as essential of a climate action plan to deliver low-carbon resilient development consistent with the objectives of the Paris Agreement – we have selected the following three components we consider of critical importance for a city to succeed in developing coherent pathways to climate transformation. These guide our review or assessment of the evolution in *content* of the four cities' climate strategies[3];

- Develop goals and a pathway to deliver an emission neutral city by 2050, and set an ambitious interim target and carbon budget
- Demonstrate how the city will adapt and improve its resilience to climate hazards that may impact now and, in the future
- Improve the inclusive and equitable distribution of social and environmental costs and benefits of climate impacts, adaptation and mitigation measures, and ensure a socially just climate change policy (climate justice), based on a detailed assessment of the social, environmental and economic costs and benefits

The C40 framework in addition suggests a key focus on the city's governance, powers (mandate/influence/assets & planning & development capacities across sectors) and the partners who need to be engaged in order to accelerate the delivery of the city's mitigation and resilience goals. An 'inclusive' plan in C40 terms (Watts 2018:3) is defined as a plan that ensures that diverse stakeholders are involved in the planning process, that policy design and delivery is fair and accessible, and the benefits of action are distributed equitably. The framework furthermore insists on the importance of engaging stakeholders in the development of the climate action plans and governance to foster collaboration, networks and partnerships. Forerunner or frontrunner cities – seven of them reviewed in the C40 (2018) document – use the planning process to engage internal and external stakeholders to buy into the level of ambition needed and the roles different players can take.

[3] The C40 Cities Climate Action Planning Framework (CAP Framework) was developed in collaboration with the cities that participated in C40's Deadline 2020 Climate Action Planning Pilot Program. The CAP Framework has since been peer reviewed by key external organisations dedicated to climate change. The CAP Framework is available at www.resourcecentre.c40.org

1.4 Introduction to the cities

As capitals (Oslo and Copenhagen) and/or significant regional capitals (Gothenburg and Cape Town), the four cities hold a unique economic and politico-institutional position in each of their respective countries, as drivers of innovation and societal change processes. These cities all have high ambitions concerning climate transformation, although the level of ambition has shifted over time. *Oslo* aims to cut their climate emissions by 95 % within 2030 (Oslo 2016). *Copenhagen* aims to be carbon neutral by 2025 (Copenhagen 2009). *Gothenburg* aims to maintain an equitable and sustainable level of green-house gas emissions by 2050 thus putting emphasis on the social dimension of sustainability (Gothenburg 2014). *Cape Town* will significantly reduce climate emissions and build a sustainable low carbon economy with strong emphasis on equity (Western Cape Government 2014).

Despite variable success in implementing ambitious goals and strategies, the four cities may be considered among the global forerunners in pushing forward the climate agenda, both locally and internationally. Their climate goals and visions are manifest in their participation in different global climate networks among other relatively ambitious global cities (e.g. C40, Eurocities, CNCA, ICLEI). Each of them has great potential to contribute with innovative solutions towards sustainable, low carbon society.

Each of the cities, however, expose different approaches and strengths that can contribute to broader learning on urban climate governance. Oslo is strong on internalizing climate goals into their own administration across municipal entities using a climate budget as a mainstreaming mechanism (Watts 2018). Gothenburg has a long experience with co-creation in their role as being a partner in the Mistra Urban Futures program[4]. Copenhagen has been a leading star among cities when it comes to developing innovative sustainability goals and measures supporting their climate transformation[5]. Cape Town is successful in exposing ingenious co-production/co-creation arenas, for example between science and administrators and other stakeholders, on the climate change agenda (Cartwright et al. 2012). Thus, despite their difference in terms of the national-institutional setting, the four cities share high climate ambitions and active involvement in implementing policies to reach their goals.

Each of the four subsequent city chapters on climate governance covers the following sections; background to urban climate governance (political, social, climate); main climate governance approach related to change in climate goals, organizational structure and institutional capacity, and policies. We also raise issues of political ambitions and resources allocated to climate actions; chronology of key events (evolution in goals, policies, energy/climate strategies - both mitigation and adaptation); interaction in governance through partnerships and governance networks (local and international); and a summary with observations on the emergence of collaborative governance and co-creation linked to a broadening of goals, increase in multi-actor approaches and collaborative arenas, partnerships, and networks.

The final chapter of the report compares and analyses similarities and differences between the cities in socio-economic-climate context, historic evolution in goals and strategies, and changes in climate-related organization, policies and governance.

[4] https://www.mistraurbanfutures.org/en

[5] Copenhagen has been ranked high on various sustainability indexes and the like: https://www.wonderfulcopenhagen.com/convention-bureau/association-congresses/copenhagen-most-sustainable-capital-world, http://www.copcap.com/newslist/2016/denmark-no-4-in-global-sustainability-ranking, https://www.gds-index.com/destinations/explore/view/copenhagen/denmark/2017/4.

2 Cape Town: Facilitating coalitions for climate change?

Trond Vedeld, Anna Taylor, Marianne Millstein

2.1 Background to urban climate governance

The City of Cape Town is the provincial capital of the Western Cape Province and includes the National Assembly of South Africa. Few middle-income cities have been as quick and as engaged in defining a climate change program as Cape Town and enhancing the institutionalization of the agenda (Hickmann and Stehle, 2019, Scott et al., 2019, Taylor, 2019a, 2019b, Taylor 2016, 2012, Taylor et al., 2014).

This chapter outlines how the municipality of Cape Town has tackled issues of climate and energy governance over the last two decades.[6] The chapter starts by, first, providing a background on the city and the context for climate governance. This section briefly describes the political-administrative systems, key climate and energy challenges confronting the city, and an overview of a few demographic, socio-ecological and economic parameters characterizing the city. Second, the chapter outlines the main climate governance approach related to key climate and energy goals, reviews the main policy and strategic documents and indicates how the climate and energy work is organized and structured and governed. Third, the chronology of key policy and institutional events is outlined (in table form). Fourth, the emergence of key partnerships and collaborative governance networks (local and international) is referred. Finally, some preliminary observations on the extent and forms of collaborative governance at different scales are provided, and a reflection on whether these represents forms of co-creation.

2.1.1 Political system[7], administration and organization of climate governance

The city council of Cape Town is the supreme democratic body of the city. The city council is currently under the political leadership of the Democratic Alliance (DA), which holds absolute majority (66,7 % of the votes in 2016 election). The main opposition party is African National Congress (ANC). The municipality is headed by 231 democratically elected political representatives (councilors) to the City Council (mixed-member proportional representation). The city is divided in 116 wards, each electing their ward councilor. The remaining councilors are elected from party lists (the total number elected is proportional to the number of votes by that party). The City council has 19 political committees with representatives proportionate to the composition of parties in the city council. These committees are responsible for developing policies and handling tasks on a specified political area. The executive authority for the city is vested in the Executive Mayor who is elected by the council. The mayor appoints a mayoral committee whose 11 members oversees various portfolios (area-based and sector based).

In addition to the city council, Cape Town has 24 sub councils representing between three or six neighbouring wards[8]. The sub councils have delegated power from the city council to make decisions regarding service delivery requests, building and planning applications, receiving and responding to resident's requests and making recommendations to the council on matters affecting their area, etc. A sub council consists of *ward councilors* that are elected by the

[6] The chapter builds in part on work undertaken under CLIMWAYS, an RCN/NFR funded project that ran from 2014-2017. Input to an early draft of the paper by Gina Ziervogel and Hilton Trollip, UCT is greatly appreciated.
[7] For more information about Cape Town's political system consult: http://www.capetown.gov.za/Family%20and%20home/Meet-the-City
[8] For more information about the subcouncils consult: http://www.capetown.gov.za/Local%20and%20communities/meet-the-city/City-Council/Subcouncils

constituents in their wards, and PR councilors appointed by their political party. The sub council elects a sub council chairperson acting as their political leader.

Since 2008, the energy and climate change policy sectors were managed under an Energy and Climate Change Committee directly under the Mayor. The program operated under an Energy and Climate Change sub-committee of the City's Executive Management Team and covered three work-streams; energy security and carbon mitigation; adaptation and climate resilience; and communication and education (Lewis and Jooste, 2012). This Committee engaged more on energy security issues than on climate change (Taylor et al. 2012). The work of coordinating climate change policy and action across line functions within the City has more recently been undertaken by the Green Economy, Energy and Climate Change Working Group, comprising representatives from 14 different line functions. The work has been managed and coordinated by the City's Energy and Climate Change Unit, within Environmental and Resource Management Department (ERMD), across all directorates and departments. The Unit worked to establish important sector-wise climate policy groups to foster engagement internally. However, these arrangements have been changing lately (2017) as the City implements a new transversal management system and undergoes a substantial organizational change process. The climate change mitigation work now sits mainly within the Sustainable Energy Markets Department that reports into the Energy and Climate Change Committee, while the adaptation work is coordinated from within the Environmental Management Department, formally reporting to the Spatial Planning and Environment Committee.

2.1.2 Municipal finances and engagement of key actors

The municipality has about 26 000 employees and provides a set of important public services, including water and sanitation, primary health care and early childhood development (in coordination with provincial government). Many of these services are heavily stressed by levels of poverty and unmet needs for basic services. The annual operating budget for the 2019/2020 financial year is USD 3.66 billion, with a capital budget of USD 0.73 billion (City of Cape Town 2019). The municipality is recognized for promoting good governance and sound financial management. Yet, the rather strict public financial management has tended to limit public spending in non-tested areas such as climate change (Cartwright et al. 2012).

The city includes a wide variety of private business, including in the urban development and energy sectors, and civil society organizations that are mobilized, or which otherwise engage with the municipality on governance and urban development issues (see section on partnerships and networks). Many groups find it challenging to contribute meaningfully to local government activities, because local government is large and bureaucratic. NGOs include several that are involved with housing, a key social challenge in the city, such as Development Action Group (DAG), and the NGO CORC which is affiliated to the global movement Slum-dwellers International (SDI). There are also present a set of environmental NGOs, such as the Environmental Monitoring Group, Project 90 x 2030, WWF and the Centre for Environmental Rights (CER) among others. A number of these organizations work more at the policy level, such as Isandla and Palmer Development Group and Sustainable Energy Africa. There are also active academic involvement in public life through groups at the universities, including the African Centre for Cities, the African Climate and Development Initiative, Climate System Analysis Group, and the Energy Research Centre at University of Cape Town, and the Centre of Excellence in Food Security, co-hosted at the University of the Western Cape.

2.1.3 Social and eco-climatic conditions

Cape Town metropolitan area is shaped by hills and mountains and rivers crossing over the low-lying coastal plains (Table Mountain peaks at 1080 m). The city is a large metropolitan city with just over 4 million people (cf. Table 2.1). Cape Town is known for its spectacular location by the Atlantic Sea, rich natural and cultural heritage, extensive tourism and diverse economy. But the city also has very high levels of inequality and poverty in terms of access to basic services,

income levels, and employment; the inequality having a distinct racial character (reflecting the legacy of apartheid) (Taylor et al. 2012).[9] It is also located in a country and region largely with higher levels of poverty and insecurity, and it has over last years experienced large in-migrations from these surrounding regions, driving population growth of some 7% over the past years which is most likely to continue. These in-migrations have been associated with significant social friction and violence.

Cape Town has a Mediterranean climate with warm, dry summers and cool, wet winters. Cape Town's Action Plan for Energy and Climate Change (approved by the Cape Town City Council in 2010) states that the city faces a number of challenges related to high carbon footprints, energy security, transportation, water resources and poverty and risk exposed settlements in vulnerable informal areas (including energy poverty). Climate related impacts include drought, water stress, intense winds, rainstorms, excess storm water, rising groundwater and flooding, and heat stress. Located by the sea, the city is also faced with major issues of sea-level rise and coastal erosion (City of Cape Town 2006 and 2017, Cartwright et al. 2012).

Table 2.1: Overview table of key socio-political and climate context factors in the case cities

	Cape Town
Area	2461km2
Population	4.0 (2016), with relative high number of younger people
Population growth rate	7 % (2011-2016)
Unemployment	25% (youth unemployment 32%)
Political leadership	Democratic Alliance (DA)
Annual municipal budget/pr. capita[10]	3.6 billion USD/ 750 USD
Number of employees	26 000
Climate risks	Increase in intense rainfall events of short duration, higher temperatures; more droughts; rising sea levels; stronger winds, fires in dry/drought periods
Water risks[11]	Water scarcity during drought years; annual rising flooding in low lying areas; coastal inundation from storm surges; poor water quality due to high pollution loads
Energy risks	Energy security a main policy concern (reliability, prices); CO2 emissions mainly from residential, commercial and transport; renewable energy a key issue in the Energy and Climate Action Plan. Problematic supply of infrastructure and institutions
CO2-equivalent emissions per capita	5,6 tonnes CO2e/capita

Sources: State of Cape Town Report 2016[12]

[9] Nearly 36% of the households live below the poverty line of less than R 3 500; 3,7% of the households do not have access to electricity for lighting; 8,8% have no access to sanitation on sitehttp://www.statssa.gov.za/?page_id=1021&id=city-of-cape-town-municipality).

[10] Here it is striking that for example Oslo has about 13 and 16 times greater budget per capita at its disposal for governing urban affairs compared to Cape Town. Oslo also has twice the number of employees compared to the much larger city of Cape Town in terms of its population and area.

[11] The high dependence of the municipality on revenue generated from the sale of water and electricity has constrained demand side management initiatives.

[12] http://resource.capetown.gov.za/documentcentre/Documents/City%20research%20reports%20and%20review/16429%20COCT%20State%20of%20Cape%20Town%20Report%202016%20FINAL.pdf

2.2 Main climate governance approach: climate goals and organizational structure

2.2.1 Climate goals and strategies

Cape Town was a pioneer among cities in the South (and internationally) in developing an agenda on local energy and climate action. It was the first African city to publish a regular State of Energy Report (initially in 2003) and adopted an Energy and Climate Change Strategy in 2006/2007 – as a component of the City's Integrated Environmental Policy (City of Cape Town 2006). A new Action Plan for Energy and Climate Change was subsequently developed (City of Cape Town 2011). The city early on engaged in international climate reporting platforms. The Energy and Climate Change Strategy placed energy at the forefront of local climate change concerns, although concerns around sea level rise and coastal management were developing alongside. The city was also an international frontrunner on adopting a broad sustainability approach to climate adaptation and mainstream water/storm water issues through efforts to engage with other state and non-state actors (Scott et al., 2019, see below).

The five-year Integrated Development Plan (IDP) is the key strategic document guiding the city's budget allocations and finance, including for climate and energy issues. Energy was subsequently a Strategic Focus Area in the IDP (2008). While energy issues feature strongly in the previous IDP (2012-17), climate change was not yet substantially budgeted for in the later IDP. Energy issues, however, became of main concern to the most recent IDP. Climate adaptation featured the least prominently of the two. The latest IDP (2017-22) differs from previous ones as a more strategic and less operative document, divided into a strategic plan and an implementation plan. Climate change program is located under the strategic focus area called The Opportunity City, where one of the goals targets resource efficiency and security (objective 1.4), where both energy issues/mitigation (aligned with the Energy 2040 goals), adaptation and resilience policies and strategies are teased out.

The city has also developed and updated a Cape Town Spatial Development Framework (SDF) that incorporates resilience and adaptiveness as one of its guiding principles (City of Cape Town, 2012b in Taylor et al. 2014; Taylor, 2019a). There are efforts underway to align the climate dimensions of the SDF with the City's Built Environment Performance Plan (BEPP) too, partly prompted by new guidelines published by National Treasury.

The city authorities were always strong on stressing collaboration with a variety of actors. For example, in the 2010 Action Plan for Energy and Climate Change it is stated:

'Cape Town's response to climate change must be a collective partnership between government, business and civil society'.

Reflecting this position, the city municipality, spearheaded by key leadership in the Environmental Management Department (previously named the Environmental Resource Management Department, ERMD), thus gradually reinforced multi-actor networks and collaborative arenas across the city administration, including with private business, academia, civil society, and, to lesser degree, also with the citizens (see above and below). Two notable platforms for facilitating such collaboration have been the Climate Change Think Tank, established in 2009, and the Cape Town Climate Change Coalition, created in 2010 in preparation for a bid to host COP 17 (ref. Cartwright et al, 2012, Scott et al., 2019).

The Climate Change Action Plan (2010) for the City of Cape Town outlined several ambitious energy and climate action objectives and actions for promoting low carbon development and a resilient city within the framework of economic development and poverty reduction.[13]

ECAP included 11 objectives and detailed implementation plans involving 40 programs and more than 120 projects. The plan addressed resource efficiency, poverty, green economy, adaptation, and reduction of carbon emissions. The projects would either be driven by the city or the city would be partner in these projects. The actions included reduction in energy consumption and retrofitting of buildings and streetlights with energy efficient technology.[14]

In order to support the implementation of Energy and Climate Action Plan (ECAP) from 2010 and coordinate energy and climate change responses across the municipality various institutional advances were made, overseen by the CCT Executive Management Team Subcommittee on Energy and Climate Change (see above).

An Energy Futures model update was produced as the ECAP was reviewed in 2015 and an Energy 2040 vision[15] and updated ECAP came in 2017. The new ECAP is now out for public review and comments, which will strengthen the city's Energy 2040 goal – while also recognizing more strongly than the first Action Plan the importance of the economic and social dimensions of climate change.

The Energy 2040 vision sets a goal of reducing 'carbon emissions by 37% off a projected business-as-usual path by 2040'. The vision brings in sustainability and resilience perspectives and links the energy and climate agenda to (green) economy – including goals of reducing emissions through different measures such as decreasing dependency on coal and furthering solar energy (solar water heaters across city rooftops), increased densification and improved public transport.[16]. A Clean Energy Vision was approved in 2018 linked to Energy2040.

A new Climate Change Policy was finalized and approved in June 2017. This new policy brings in a broader perspective by highlighting the importance of recognizing the economic and social dimensions of climate change. The policy – which is adopted by Council but still in the early stages of aligning with other policies and implementation - focuses on: (1) preparing for changes in the regional and local climate by reducing risks and building adaptive capacity; and (2) contributing to national and global efforts to reduce GHG emissions while addressing energy poverty and building local energy security. The policy is designed to mainstream climate change into all CCT work by realizing co-benefits between climate change specific goals and sustainable urban development goals more broadly, such as improved resource security, reduced costs, improved air quality, improved quality of life, long-term fiscal efficiency and the protection of lives, livelihoods, the economy, ecosystems and investments. The policy is intended to provide a framework to encourage and enable departments within the CCT to work in transversal and collaborative ways internally, as well working more effectively in partnership with citizens, business, NGOs and others.

The city relatively early on focused also on mapping climate risks, impacts and vulnerabilities and took on the adaptation agenda. This was initially done at regional or provincial level in collaboration with Western Cape authorities (Midgley et al. 2005, Western Cape Government 2014). Following this, the ERMD commissioned a framework for adaptation to climate change in the city (Mukheibir and Ziervogel 2006). The approach to adaptation – driven mainly by ERMD and DRMC – has been aimed at building climate perspectives into the work of municipal agencies

[13] http://resource.capetown.gov.za/documentcentre/Documents/Graphics%20and%20educational%20material/Moving_Mountains_Energy+CC_booklet_2011-11.pdf

[14] http://savingelectricity.org.za/pages/climate_change.php

[15] https://savingelectricity.org.za/wp-content/uploads/2018/01/2040_energy_vision_cct_brochure.pdf

[16] file:///H:/aaaaGreenGov2017/Cape%20Town%20information/city_of_cape_town_energy_and_climate_project_-_sarah_ward.pdf

across all sectors more so than developing a single adaptation program within ERMD. A Framework for Adaptation to Climate Change was approved in 2006/07. The Climate Adaptation Plans of Action further specify 82 adaptation measures to be undertaken across nine line functions (Taylor, 2016). The issue of climate risk is also of major concern to the City's Disaster Risk Management Centre and the Stormwater and Sustainability Branch (Taylor et al. 2012). The City's Water and Sanitation Department has also engaged with the climate change adaptation agenda, especially since the water crisis associated with the 2015-2017 drought, as reflecting in the city's new Water Strategy[17].

2.2.2 Evolution in climate goals and strategies

The city of Cape Town started working on climate change around 2000. The city had a draft Energy and Climate Strategy in place in 2003 (adopted in 2006). Cape Town had an adaptation framework or policy in place in 2006. There was little or no support from the central state government to the city's work on climate change, however the Western Cape Provincial Government has been working on climate change, as has the eThekwini Municipality (including the city of Durban), both of which have intersected with and encouraged the work of the city. The city focused initially more explicitly and publicly on the mitigation agenda, more so than on adaptation, but slowly the two parts of the climate agenda have been brought together in various ways.

Regarding institutional innovations, Cape Town established an Energy Committee in 2008 to oversee energy and climate work. A climate change knowledge network was established in 2009 (CC Think Tank). Table 2.2 summarizes institutional and strategic evolution of the climate change field in the city of Cape Town.

Table 2.2: Chronology of key climate policy events – institutional design and strategies

Year	Evolution in climate policies, institutions, events
2000	New environmental policy after amalgamation into a unified metropolitan government: Integrated Metropolitan Environmental Policy (IMEP) adopted 2001
2003	Draft Energy and Climate Change Strategy as part of Environmental Policy 1st State of Energy Report
2005	Draft edition of Energy and Climate Change Strategy produced with input from Sustainable Energy Africa, UCT-GSB and ERC
2006	Framework for Adaptation to Climate Change in the City of Cape Town
2006	Energy and Climate Change Strategy adopted (first edition in 2005)
2008	Energy and Climate Change Committee – high level – politically established with administrative committee
2009	Climate Change Think Tank; 2nd State of Energy Report
2009	Global Sea Level Rise Risk Assessment for the City of Cape Town study completed
2009	Western Cape Provincial Climate Change Response Strategy and Action Plan finalized
2010	Energy and Climate Action Plan approved by Council
2011	7 sectoral Climate Adaptation Plans of Action adopted
2011	Cape Town Climate Change Coalition (CTCCC) established and runs Climate Smart Cape Town campaign
2012	City Development Strategy adopted by Council with climate change included as key development consideration
2013	Draft Integrated Coastal Management Policy includes climate
2014	CCT joins the C40 Climate Leadership Group

17 http://resource.capetown.gov.za/documentcentre/Documents/City%20strategies%2c%20plans%20and%20frameworks/Cape%20Town%20Water%20Strategy.pdf

2015	Energy2040 - 3rd State of Energy Report; Economic Cluster – Green economy, energy and climate change (GEEC) CCT signs the Compact of Mayors, joins the 50 Municipal Climate Partnerships Program and wins C40 Adaptation Implementation Award for the Water Conservation and Demand Management Program
2016	CCT Electricity (internal, but landmark) department workshop on futures IRP submission Commissions an updated set of climate change projections from CSAG at UCT Draft Climate Change Policy out for public participation CCT joins the 100 Resilient Cities Network
2017	City declared a local disaster area due to drought; crisis management plan developed Energy 2040 vision; updated Climate and Energy Action Plan Climate Change Policy approved by Council. *Replaces Energy and Climate Change Strategy of 2006* Mayor appoints Chief Resilience Officer Environmental Strategy to replace IMEP Re-structure City energy and environmental governance
2018	Clean Energy Vision
2019	Water Strategy approved and Resilience Strategy approved Cape Town Climate Change Hazard, Vulnerability and Risk Assessment completed

Cape Town relatively early on adopted a broad sustainability approach to climate adaptation through public-private engagement and collaboration. From a co-creational leadership point of view, the interaction of public officials and academics and private actors within the Climate Change Think Tank and CityLab process is particularly interesting.

2.3 Creation of partnerships and governance networks

To reach its ambitious climate change and energy goals the city over the years embarked upon a strategy that required extensive collaboration and partnerships within and across the municipal boundaries. The early studies and strategic work on vulnerability/adaptation (Midgley et al. 2005, Mukheibir and Ziervogel 2006) and the Energy/mitigation status reports set the track for the city leadership in taking the work on adaptation and mitigation forward, initially spearheaded by the staff of ERMD (Taylor et al. 2012). These studies prepared the ground for a more profound production of knowledge on both adaptation and mitigation – the officials and politicians of Cape Town adopting a CityLab program approach in collaboration with the African Centre for Cities at UCT to bridge knowledge gaps between conventional knowledge production and local knowledge (among citizens and civil society) (Parnell et al. 2009). A transdisciplinary approach was adopted to understand and find ways to tackle climate change (Cartwright et al. 2012). Funded through the Mistra Urban Futures program, which was committed to the co-production of urban sustainability knowledge, staff of ACC and the city engaged in a knowledge partnership seeking to foster a climate–resilient city (Cartwrigth et. al. 2012:3). This led to the formation of the Cape Town Climate Change Think Tank and process towards building an institution on climate knowledge and policy; a work that has continued through a variety of modalities (see below).

Cape Town's Climate Change Think Tank and collaboration with academia

The Climate Change Think Tank developed into an interesting arena for co-production of knowledge between the municipality and the University of Cape Town's African Centre of Cities (ACC). The Think Tank early on initiated 4 pieces of commissioned research – undertaken jointly by academics and officials – based on climate change challenges identified by city officials as critical and constraining in their work to address climate risks. The work co-produced information

required to understand risks and uncertainties related to resilience and low-carbon development. The final products of this research resulted in the book 'Climate Change at the City Scale, Impacts, mitigation and adaptation in Cape Town' (Cartwright et al 2012) containing 14 chapters on these broad topics. This Think Tank involved forty members drawn from the academic, business, and civil society who were invited to research and deliberate climate-related questions or knowledge gaps. In this regard, Cartwright et al. 2012 suggested that officials and politicians within the city of Cape Town recognized the centrality of climate knowledge in all its facets to the process of change and realized the limitations of conventional knowledge production and transfer in the context of local climate change in the city. More intense collaboration between actors was required. They suggest that the increasing uncertainty stressed in climate-adaptation theory presupposes greater emphasis on flexibility, iterative progress, piloting, reflection and continual learning as information becomes available. In this regard there was perceived to be tension between science as basis for long-term policy that at the same time would cope with uncertainty and the need for bold and transformative leadership (ibid:3). City leadership thus engaged the African Centre for Cities, which through its CityLab programs was already seeking to engage alternative points of knowledge formation within local government and civil society (Cartwright et a. 2012, Parnell et al. 2009), including in the area of urban climate change. They promoted an activist intellectual agenda in which universities responded more directly to societal problems i.e. took more of a catalyst role.

The collaboration under the Climate Change Think Tank set out to create an arena of 'co-production'; 'an institution with a memory that outlasts the political and economic cycle' (Cartwright et al. 2012). The program was supported financially by DANIDA, as well as the Mistra Foundation. Observers argued that the real value of Think Tank came from the contributions and engagements of the many members of a community outside ACC and the city through a special knowledge partnership (Cartwright et al. 2012:263).

Since the Climate Change Think Tank, the knowledge partnership between the city and the ACC, enabled through the Mistra Urban Futures program, has entailed two additional modalities. One modality has been two cohorts of embedded researchers undertaking PhD research in combination with working within the city government to co-produce new knowledge on various urban sustainability themes. The second modality is three rounds of officials' knowledge exchanges, which entailed city officials being pair with UCT academics and given a writing sabbatical to produce a written output from the policy, practice and analytical work they have been engaged in. The third round of this resulted in the production of a new book written by officials and academics entitled 'Climate Change and Urban Development: Lessons from Cape Town' (Scott et al., 2019).

Cape Town Climate Change Coalition

This coalition of actors was facilitated by the city in 2011 as a partnership between the city, local business, civil society and academia. It ran the Smart Cape Town campaign in the lead up to COP17. After showcasing the work being done in Cape Town at COP17 in Durban, the coalition partners agreed to continue working together to build Cape Town citizens' understanding of and commitment to addressing climate change issues. However, it has become somewhat dormant.

Climate Adaptation Action Plans

The city completed nine Climate Adaptation Plans of Action (CAPA's) (Taylor 2016) with an array of 82 smaller and larger adaptation actions ranging from studies and policies to actions on the ground across key sectors. Their preparation included a set of interviews and workshops with city officials across many sectors. These were within key sectors such as catchment, river and stormwater; coastal; disaster management; health; housing; planning; water and sanitation

Collaboration with other cities and the region

The city government has also developed close ties with other cities in South Africa, especially cities with ambitious climate goals, such as Durban and Johannesburg. Cape Town has fronted city municipalities' engagement of the state to obtain a legal mandate to work on climate change adaptation and mitigation (Taylor et al. 2014). The city initially had limited success in mobilizing support for its climate work from the state and from national as well as the city's own political leadership (compared to e.g. Oslo). However, the city government has worked in relatively close partnership with the regional Western Cape Government on issues of disaster risk management and water resource management and green economy that span beyond the territorial boundaries of the city.

International networks

Moreover, being highly international in its orientation – the city is an active participant in C40 Climate Leadership Network - a network of more than 90 cities working to reduce carbon emissions and climate risks. In C40, Cape Town has been leading the municipal energy efficiency working group. It is also engaged in ICLEI's climate initiative and various international networks on climate change. Networks like ICLEI's CCP program and the organisation Sustainable Energy Africa were important partners in shaping the initial policies and strategies on climate change and energy in 2005/06. The city is signatory of the Global Covenant of Mayors for Climate and Energy. Since the Paris COP and joining the C40 network, the Mayor Patricia De Lille (serving from 2011 till 2018), provided increased support for climate change issues, although energy and energy security issues still figure more prominently on the political agenda than climate change adaptation does. However, the drought and the work around the Water Strategy and the Resilience Strategy have begun to shift this. Patricia De Lille, – now the national Minister of Public Works and Infrastructure – became a member of the Global Commission on the Economy and Climate in 2016 while still serving as the Mayor of Cape Town. The city reports its energy and climate data to the Carbon Disclosure Project (CDP) annually; a UK based organization which works with shareholders and corporations to disclose the greenhouse gas emissions of major corporations. The city has also been involved with the Rockefeller Foundations work on resilient cities, through the 100 Resilient Cities program.

Overall, the city has developed a governance model that enhances collaboration across public-private actors and sector boundaries at various levels and scales. For example, the city worked closely with the private sector industry in order to address consequences of drought and water scarcity.

2.4 Preliminary observations on the emergence of collaborative governance and co-creational leadership

The evidence above reveals that the action of public officials in Cape Town in response to the climate change agenda drew the political and administrative attention to key climate and energy issues, pushed for new strategies to be developed, engaged actors across the public-private divide and promoted new arenas and institutions for collaboration, notably as a result of action within the key responsible institution for climate change and environment, ERMD. With minimal direction from national and provincial government and no instructions from political representatives, ERMD leadership, with notable input and support from local academics and consultants, took bold initiatives to further the climate agenda across sector silos and scales.

A more substantive integration of climate policy and action (that included both adaptation and mitigation) into the overall municipal development plans seemed to have taken place around 2013 in Cape Town, but efforts to really bring those climate policy directives and strategic actions

to fruition are still underway. The work was reinforced and governance re-structured in 2016, including with backing from an active Mayor.

In terms of climate action outcomes, the findings show how climate change and energy gradually became anchored in the city and metropolitan governance system. The policy sectors became governed by a diverse range of actors across sectors and levels, from key city agencies with firm responsibility for environmental and climate change management issues to other relevant sector agencies (e.g. energy, transport, water, disaster risk management), and increasingly involved private business and civil society actors, especially during the water crisis.

On the adaptation side, triggered by a large flood event in 2004 and made possible by their involvement in the Climate Change Think Tank, the City's Stormwater and Sustainability Branch made inroads into the process of mainstreaming future climate change projections into catchment management and infrastructure planning. This entailed commissioning detailed research into the impact of rainfall and sea level rise projections on streamflow and estuarine water levels. This information was in turn fed into river catchment models used as a basis for planning flood risk reduction interventions (Taylor, 2019b). Such climate policy initiatives and the establishment of new institutions occurred despite limited budgets and lack of firm institutional and political backing from above (vertically from the state and provincial levels). Individual champions also met with limited support and even sometimes reluctance and resistance from counterparts in key city sector departments (horizontally) (Taylor et al. 2012).

Despite mixed support from above, city officials facilitated several crucial internal reforms and important external partnerships and arenas of collaboration that worked as catalysts for furthering the climate agenda. The University of Cape Town and the work with the Climate Think Tank initiative were cases in point.

There were also important horizontal partnerships evolving with sector departments within the municipality (cross-sectoral thematic groups), especially among those agencies and individuals involved more closely in key climate actions, such as with the Climate Think Tank; the Energy and Resource Centre (at UCT); the Cape Town Climate Change Coalition; and in strategic work (developing the Energy and Climate Action Plan; the Climate Adaptation Plans of Action; the DRM Plans; the Spatial Development Framework; and the Climate Change Policy).

Under the Climate Change Coalition, leadership of ERMD facilitated partnerships with private business and civil society. Hence, the fact that leadership catalyzed the involvement of important, relevant actors in concrete policy and strategy work mattered for innovation and progress on the climate change agenda, although progress has been intermittent and slow to materialize.

A bit different from in the three Scandinavian cities, the lack of financial resources allocated to the city to fund staff, research, planning and projects remained a severely limiting factor on the city's progress in adaptation and mitigation (Taylor et al. 2014). Critical additional funding came from outside or donor sources (e.g. DANIDA, Mistra Urban Futures, African Development Bank). The lack of funding slowed down processes and limited the possibility of building capacity and competence and institutional strength.

3 Copenhagen: Fading international star?

Karsten Bruun Hansen, Annika Agger, Jacob Torfing

3.1 Background to urban climate governance

In this section, we describe the background for how the city of Copenhagen has dealt with issues pertaining to climate and energy governance within the last two decades. We present the city by describing its political system and some basic demographic and socio-economic parameters. The chronology of key climate policy events and organizational changes is also presented.

This serves to demonstrate the evolution in new climate and energy policies at a city level, including the overall goals and strategies, the actors involved in policy arenas, and the emergence of institutions and networks. The section provides some perspectives on the extent and forms of collaborative governance taking place between actors at different scales. A more detailed overview of the chronology of key events is included in table form in Appendix 2.

3.1.1 Political system in Copenhagen

The government of the city of Copenhagen consists of its supreme body, the city council, followed by seven standing committees.

The city of Copenhagen has an intermediate government system with a divided administrative management. In an intermediate government system, the Lord Mayor as well as the chairmen of the standing committees (6 mayors) are born members of the Finance Committee – with the Lord Mayor as chairman of the Committee with 13 members. Table 3.1 provides further details on socio-political and demographic indicators in the city.

In a system of divided administrative management, the Lord Mayor and the six chairmen of the standing committees (the mayors) share responsibility for the senior management of the city: Each of them is head of the administration in charge of the tasks falling under their various committees. Also, under this type of government, the committees can make final decisions within their areas, which reduces the number of cases that must be submitted to the city council.

Furthermore, the committees are elected by proportional representation, which implies that a simple majority cannot take all the seats in a committee. Since the committees are not merely advisory bodies, this ensures that minorities are heard in the administration of the city's tasks.

The city council (Borgerrepræsentationen)

The city council is Copenhagen's supreme political authority. It has 55 members who are elected for a term of four years. The city council sets up the frameworks of the committees' tasks. The Lord Mayor is chairman of the city council and sets the agenda for the meetings of the city council, convenes the meetings and chairs the discussions. Members of the public and the press may attend the meetings, unless confidential matters are on the agenda.

The distribution of the 55 seats in the city council (in city Government 2018-2021) is: the Social Democratic Party 15, the Red-Green Alliance 11, the Alternative 6, the Danish Social Liberal Party 5, the Socialists People's Party 5, the Liberal Party of Denmark 5, the Danish Peoples' Party 3, the Conservative People's Party 3, and the Liberal Alliance 2.[18]

[18] https://international.kk.dk/sites/international.kk.dk/files/uploaded-files/the_city_of_copenhagen_government_2018_-_2021.pdf

In order to strengthen local citizens' ability to voice their opinions in relation to decisions that affect their specific locality the city has been divided into 12 local districts with each their district committee. Each district consists of 23 members, of which 9 are appointed by the political parties in the CR and the rest are representatives of local stakeholders within different areas such as housing, sport, culture or other place-based actors. The intention is thus to give residents and local stakeholders a platform for voicing their views on local matters. All decisions from the municipal council and the seven committees, influencing the districts, e.g. on environmental matters, must be presented for the local district committees that are asked to submit their response. The district committees have no independent decision-making power. For more information on these councils, see footnote[19].

3.1.2 Economy and business

The overall 2018 budget for Copenhagen is 7.56 billion USD or 12.330 USD per capita. The municipality claims to have a well-functioning economy and enjoys a wide-ranging autonomy in matters of governance, planning, and economy. Exceptions from governance autonomy are when it comes to some aspects of strategic infrastructure, and climate and energy planning.

Copenhagen does not have many traditional production industries left, but it has many business firms in the service sector, in life science technology, and finance, and also a considerable amount of businesses in the hotel- and restaurant sector, the transport sector and tele communication[20]. It also has many cultural institutions, national-level NGO's and institutions of public administration. The unemployment rate is relatively low; 3.2 % in 2018[21].

3.1.3 Population, climate change and geography

Population and demography

613,000 people live in the city of Copenhagen (June 2018). In the next 10 years (until 2028), it is expected that the population will grow to approximately 700.000 inhabitants (cf. Table 3.1). This means that each year the number of inhabitants will increase by around 10,000 people. The population of Copenhagen differs from the rest of Denmark by having considerably higher shares of people in their twenties and thirties and thus a rather young population[22]. The Copenhagen metropolitan area, including smaller municipalities to the north, west and south has close to 1.2 million inhabitants. The Municipality of Copenhagen itself covers an area of 88 sq. km[23]. Thus, Copenhagen is a dense city, with about 6,700 persons per sq. km.

The Øresund Bridge links Copenhagen to Sweden and Malmö, the biggest city in southern Sweden. Copenhagen and Malmø are part of a cross boarder collaboration aimed at enhancing growth – covering the metropolitan region called 'Greater Copenhagen' that together with 85 municipalities in the region of Zealand and southern Sweden is home to 4.3 million inhabitants[24].

Situated at the strait of Øresund, Copenhagen is a low-lying city (approx. from 1 meter to 14 meters above sea-level), thereby being vulnerable to any significant sea level rise and storm surges. Other climate challenges relate to more extreme rainfall (cloud bursts), higher temperatures and strong winds.

Geography and climate

Winters are comparatively warm, with a normal of 0.5 degrees Celsius in January and February. Summers are not very warm either, a part from the summer in 2018[25], with a normal of about 17

[19] https://lokaludvalg.kk.dk/
[20] https://international.kk.dk/sites/international.kk.dk/files/uploaded-files/Business_and_%20Growth_%20Policy.pdf
[21] https://www.kk.dk/budget2018
[22] https://www.kk.dk/sites/default/files/alder_og_taethed.pdf
[23] https://en.wikipedia.org/wiki/Copenhagen_Municipality
[24] http://www.greatercph.com/about
[25] One of the hottest summer since 1874: https://www.dmi.dk/nyheder/2019/sommeren-2019-blev-den-9-varmeste-siden-1874/

degrees Celsius in July and August. Annual average precipitation is modest, with about 600 mm, the highest monthly averages falling during the summer. Extreme events can occur, such as the cloudburst of 2011 proved[26]. During winter months, a few storms, and even a hurricane, may appear[27].

Socio-economic structure

The capital region covers the north-eastern part of the island of Sjælland, an area of 2,546 sq. km. encompasses a population of about 1.8 million inhabitants. The municipality cover an area of 86.3 sq. km., and Copenhagen is a fairly dense city, with about 6,700 persons per sq. km. Much of the expansion of the city is expected to come in its southern area.

The labor force participation rate[28] in Denmark is 78.5 %, the unemployment rate is 6.9 %, and the long-term unemployed as a share of all unemployed is about 27 %. The figures for Copenhagen region show a higher labor force participation (81 %) and lower unemployment rate (6 %).

In the period 2000 to 2013, the income of people living in Copenhagen has on average increased, together with the educational level. The share of people with higher education is larger in Copenhagen than in the rest of Denmark[29]. While the first decile has had stable income level, the tenth decile has experienced a However, although Copenhagen has become a more affluent city, disparities have been increasing between, with largest share of low-income people living in Nørrebro. The affluent (10th decile) is overrepresented in the urban districts of Downtown/indre By, Østerbro, and Amager West (see Annex 2).

Table 3.1: Key socio-political and climate context factors in Copenhagen

	Copenhagen
Area	88,3 km²
Population	613 000 and 1,3 million in Greater Copenhagen (June 2018)
Population growth rate	1.7% (2018)
Unemployment	3.2 %
Political leadership	The Lord Mayor, since 2010, is Frank Jensen, Social Democrat. The six mayors, chairmen of the standing committees, are primarily from left winged parties (3). Only one is right winged.
Annual municipal budget/pr. capita	7.56 billion USD/ 12 330 USD (2018)
Number of public employees	40 100
Climate risks	Increase in intense rainfall, cloudburst, stronger winds, higher temperatures, rising sea level
Water risks	Fresh water available and accessible to all households, some pollution issues in lakes and ground water. More storm surges and flooding
Energy risks	Challenges in making a shift to carbon-neutral and smart districts heating energy systems. Re-constructing power plants to be biomass fueled; CO2 emissions from transport is a key issue

Source: City of Copenhagen. (2018a). Budget proposal 2018.

[26] The 2011 incident brought 135 mm of rain during a period of three hours, causing damages amounting to one billion US dollar.
[27] Figures are taken from http://yr.no, http://www.copenhagen.climatemps.com/
[28] The people in the age between 15 and 64 who have paid work or actively seeking paid work.
[29] The figures in this paragraph is taken from OECD, Statistics Denmark and Lighedsutredningen For Københavns kommune (2016),

3.1.4 Socio-eco-technical conditions of the city

Regarding energy consumption, a particular feature of the city of Copenhagen is that 98 % of the urban dwellings in the capital are served by the district heating system in which big centrally located power plants simultaneously produce electric power and hot water to the private households and industries. This means that changing the fuel sources at the power plants from coal and oil to biomass is expected to have a huge impact on CO2 emissions. Currently, the power plant “Amagerværket” is converting from fossil fuels to biomass, to be completed in 2020. HOFOR, the Greater Copenhagen Utility, are investing more than EURO 670 million in replacing the steam-based district heating network with a more energy-efficient, water-based district heating system. However, in 2019 it is being questioned if forest biomass is a sustainable solution[30] [31]

Another important characteristic of Copenhagen is in relation to urban transport. The city is considered one of the most bicycle-friendly cities in the world. Many Copenhageners travel by bike. In 2016, 36 % commute to work or school[32]. The political vision is that 50 % of all trips in 2025 will be by bike and 25 % of all trips to be by public transport[33].

3.2 Main climate governance approach: climate goals and organizational structure

Pursuing goals of low-carbon and resilient urban development in Copenhagen started with a more specific focus on sustainable development in the 1990’s. Following the Rio Declaration on Environment and Development of 1992, the city of Copenhagen formulated its own plan for how to curb emissions of greenhouse gases, stating that it would be possible to achieve a 30 % reduction in CO2 emission from 1988 to 2005. However, the subsequent increase in energy consumption, transportation and waste made it urgent to reconsider how to reduce CO2 emissions in Copenhagen. Adding to this was the signing of the Kyoto Treaty in 1997 that set more ambitious emission reduction goals.

A more specific approach towards climate governance started in the beginning of the 21st Century with the launch in 2002 of the first *Climate Action Plan*. The climate governance field received an increasing political attention in the period leading up to the *COP 15 – United Nations Climate Change Conference* that took place in Copenhagen in 2009. The intention of the municipality, and not least the Lord Mayor at that time, was to make a plan that could lead the way forward inspired by the motto "*Nation talk – Cities Act*". To that end, a second strategy was launched before the COP 15 meeting in 2009, and it was proclaimed that the ambition in Copenhagen was to be 'CO2 neutral in 2025'. TheC40 metropolis was present in Copenhagen at a parallel mayor meeting, to showcase how it was possible, in the C40 cities, to work with CO2 mitigation without hampering economic growth or reducing the quality of life of the residents. When the national COP15 meeting failed, C40 mayors claimed with yet stronger force the ‘nations talk - cities act’ mantra. Copenhagen became afterwards an international beacon – several ambitious climate projects were exposed in the international media, as well as the planning of a strategy to become the first CO2 neutral capital in the world.

[30] https://www.euractiv.com/wp-content/uploads/sites/2/2018/01/Letter-of-Scientists-on-Use-of-Forest-Biomass-for-Bioenergy-January-12-2018.pdf
[31] For more information see; *KBH 2025 klimaplan – Energiforbrug* file:///C:/Users/kabha/Downloads/kbh-klimaplan-2025-faktaark-_1251%20(3).pdf
[32] file:///C:/Users/kabha/Downloads/cykelregnskab-2016-_1679.pdf (p.4)
[33] For more information, see the bicycle strategy; “Fra god til verdens bedste” Københavns Cykelstrategi 2011 – 2025. file:///C:/Users/kabha/Downloads/cykelstrategien-2011-2025-_818.pdf

In 2014, the city of Copenhagen was awarded as "*European Environmental Capital*"[34]. This award committed and encouraged the city, not least the new lord mayor, to continue to take ambitious action with regard to climate initiatives.

In the last two decades, Copenhagen has adopted three climate strategies including three Roadmaps, or action plans, the latter related to the ambitious strategy from 2012, aimed at CO2 neutrality in 2025 (Damsø, Kjær, & Christensen, 2017).

In 2010, after COP 15, a *Climate Secretariat* was established in the Technical and Environmental Administration in order to enforce and target municipal climate policies. Currently, there are still 10-12 persons working in the secretariat[35]. However, the secretariat does not have a budget for new projects or leadership over ongoing climate initiatives. According to the leader of the secretariat, they are responsible for approximately 10 % of ongoing climate projects. All other projects are carried out by actors outside the secretariat, for example the Greater Copenhagen Utility Company "HOFOR" or in other parts of the administration. The climate secretariat is functioning as a facilitator and coordinator of climate mitigation projects (Abildgaard, 2018).

In the following, we present more details about the three strategies, with a particular focus on: i) goals and intentions; ii) the institutional set ups and governance tools.

3.2.1 The first Climate Action Plan launched in 2002: "CO2 plan for Copenhagen 1990–2010"

Goals and intentions

According to a status made in relation to the work of the strategy from 2002, the previous work on reducing CO2 emissions in the time before 2002 had achieved a 23 % reduction in emissions. Therefore, it is outlined how to achieve the remaining 12 % reduction necessary for meeting an aim of 35 % reduction in 2010, compared with 1990.

In addition, the strategy looked beyond the 2010 target, underlining that a more demanding reduction of 70 to 80 % lies ahead. The focus is on energy, transport, and waste handling, addressing measures under three headings: a) municipal installations, regulations and investments; b) intra-municipal climate mitigation governance and campaigns; and c) regional cooperation. The plan primarily deals with governance instruments in areas where the city has significant influence[36]. In more details, the plan comprises the following components:

Energy: The report lists a number of initiatives such as constructing and developing the district heating system by converting steam based heating to water based heating and thus lowering the temperature and energy consumption. Introducing and developing geo-thermal energy, biomass fuel, solar cell energy, and wind turbines. Implementing energy saving measures in municipal buildings and disseminating energy saving information to residents and housing associations are other measures along with green accounting for enhancing green awareness and networking with other cities to get new inspiration.

Copenhagen took part in initiating "*the Dogme 2000 Municipal Cooperation*" (the municipalities of Copenhagen, Albertslund, Ballerup, Fredericia, and Herning, and the Capital Region of Denmark). The Dogma collaboration is now called "Green Cities" and consists of progressive Danish climate municipalities.

Transportation: Measures or tools to reach huge CO2 emission cuts are considered to be road tolls and more effective transport management for people (commuters) and goods. Better public transportation and better conditions for bicycles are listed as being needed. Important additional

[34] http://ec.europa.eu/environment/europeangreencapital/winning-cities/2014-copenhagen/
[35] https://www.kk.dk/artikel/klimasekretariatet
[36] file:///C://Downloads/draft-plan-for-co2-reduction-in-copenhagen-1990-2010-_617.pdf (a draft version)

measures to curb CO2 emissions are more restrictive regulation for parking of vehicles and the municipality's own use of more 'green vehicles'.

Among the general activities, the plan points to the need for building local and municipal environmental networks for stimulating and facilitating the reduction of CO2 emissions from agencies/businesses. Copenhagen Environmental Network was established in 2001 with the aim of stimulating the introduction of environmental leadership for achieving environmental improvements through cooperation between municipal agencies, citizens, and the Environmental Monitoring Agency of city of Copenhagen.

Besides curbing CO2 emissions, the strategy stresses that the need for new 'green solutions' should provide opportunities for 'green growth' for companies in the capital area. The shared effort in pursuing a climate friendly capital, working closely together with the business community, should open doors abroad for local companies developing new green technologies tested in Copenhagen Hence, Copenhagen pursues primarily a strategy of green growth in which environmental strategies and economic growths go hand in hand.

The institutional set up and governance tools

The process of formulating a particular "CO2 plan", initiated in 1999 by the Technical and Environmental Administration, was presented in 2001. A green paper and a draft of the strategy was circulated as part of an internal consultation process in 2001 that solicited comments from five other municipal administrations. On this basis, a "CO2-plan for Copenhagen 1990–2010",was issued in December 2002.

The responsibility for implementing the strategy was primarily in the hands of planners from the Technical and Environmental Administration. It provided a general CO2 emission status and pointed out the most relevant instruments and processes enabling the municipality to make the desired cuts in the capital's CO2 emissions. It had no budget or binding obligations for stakeholders, but it contained recommendations and proposals for internal administrative actors and Copenhageners. From 1997 until 2000, Copenhagen published annual green accounts stating, among others, developments in CO2 emissions. The planning is closely related to the climate committed mayor of the Environment, Bo Asmus Kjeldgaard, in office from 1997-2001.

3.2.2 The Second Climate Action Plan launched in 2009: The Copenhagen Climate Plan

From 2006 onwards, politicians in the city council deemed it necessary to revise the plan of 2002. A central question for the new upcoming strategy was how to utilize the climate strategy as a spring board to enhance economic growth and welfare for the residents in Copenhagen, and, at the same time, implement solutions that could adapt to climate changes such as heavy rainfall, flooding and storm surges.

Goals and intentions

In 2007, Copenhagen published a vision document entitled "The Environmental Metropolis" with a target of reducing emissions by 20 % by 2015. In this document, Copenhagen promotes itself as the world's "Environmental Metropolis" defined in relation to four themes: i) the best city for bicycling in the world; ii) a center for the world's climate policy; iii) a blue-green capital that exploits climate change for aesthetic purposes; and iv) a clean and healthy city. It is repeatedly underlined that the city wants to demonstrate that there could be a correlation between cutting CO2 emissions and, at the same time, achieve positive effects on the economy with a growing population.

In 2009, "the Environmental Metropolis" vision was followed by the new strategy outlining the initiatives planned in order to reach the target of reducing CO2 emissions by 20 % in 2015. The plan comprises 51 initiatives that are grouped under six headlines: Energy supply, Transport, Buildings and renovation, Copenhageners and the climate, Urban development and Climate

Adaptation. CAP 2 also contains a new vision for emission reduction: Copenhagen being carbon neutral by 2025[37] [38].

Central aims and measures in this strategy are:

Energy: Biomass has fully replaced coal at the power station “Amagerværket” block 1. Biomass will be introduced at “Amagerværket” block 3, as it is planned to build a new biomass block at Amager (2020). Regarding other renewable energy sources, Copenhagen is expecting to build more wind turbines both within and outside the municipality and expand the testing of geothermic heating.

Transportation: Restriction on car driving, rush hour fees, environment zones for private cars, traffic transformation, parking restrictions are proposed. Improved and wider bicycle lanes and more buses with lower CO2 emissions are also part of plan. Introducing infrastructure for electric cars and cars powered by “hydrogen” was given high priority in the transportation plans for all administrations.

Buildings and renovation of buildings: Copenhagen’s own buildings should use energy management and environmentally correct operation, adopting a focus on climate when carrying out renovation, constructing future buildings, and save energy in buildings rented from private owners. Information campaigns about energy savings will be directed towards business buildings and homes. Conditions for local energy production, e.g. in terms of solar cells, is to be improved.

The Environmental network for companies, which was established in 2001, is renamed to “Green enterprises”, and it introduces climate coaching for facilitating enterprise initiatives for reducing CO2 emissions. Educating children and youngsters to become aware of environmentally friendly behaviour, is a new topic. Improving Copenhagen municipality’s efforts for saving energy and educating employees is another new topic.

According to the new plan, these measures should be implemented through information and concrete advisory activities, collaboration and partnerships with businesses.

Climate actions initiated by Copenhagen residents will be facilitated and coordinated by providing free climate advisory activities. In the Copenhagen municipality, administration campaigns towards energy savings and energy effective purchasing would be directed at employees in the municipality.

Adapting to future weather conditions was considered to be very important. Coping with more water from heavy rainfalls and higher temperatures, through local retention of water, greening of the city and adaptations of buildings, had a high priority, not least due to the increased frequency of devastating cloud bursts. It will be dealt with in a separate climate adaptation strategy.

The institutional set up and governance tools

In order to formulate the content and vision of the strategy the following process was set in motion: All seven administrations were invited to take part in nine working groups. To inform the debates, a group of external consultants had collected general knowledge and place-specific information including implementation scenarios and costs. The Technical and Environmental Administration was project owner and, together with The Finance Administration, it had the overall project responsibility. All administrations were invited to join the steering group.

Each of the nine working groups submitted their own report, contributing to the final strategy in 2009. The working group themes included: Baseline, Transportation, Energy supply, Buildings, Urban development, Behaviour and attitudes, A CO2 neutral Copenhagen, Adapting to a

[37] file:///Downloads/kbenhavns-klimaplan-_833%20(3).pdf

[38] Carbon neutral refers to net zero carbon emissions, thereby balancing a measured amount of carbon emissions with a corresponding amount carbon sequestered or offset but also buying sufficient of carbon credits to balance emissions

changing climate and Collaboration and partnerships. The Baseline report presented different scenarios for expected CO2 emissions towards 2015 and 2025. The next five reports focused on measures for different policy fields, as well as implementation and operational costs. Sometimes, conclusions provided by external consultants deviated from what was estimated by the municipality's own professional staff, and for such cases, the working group's judgements applied.

The plan underscored that meeting the emission targets is contingent upon collaboration across traditional municipal sectors as well as with external actors (public and private). Furthermore, the report stated that Copenhagen will seek new ways for implementing several of the activities outlined in the plan and the need for broadly communicating climate change messages was recognized and so were new frames for involving more stakeholders.

In order to keep track on the progress of the plan, it was decided to make an annual progress report, thereby enabling and allowing the city to make necessary adjustments for meeting targets.

3.2.3 The third Climate strategy "CPH2025"

In 2009, after the COP 15 meeting, the politicians in the city council decided to have a new, revised strategy plan, called "CPH 2025", outlining how the city will become CO2 neutral by 2025.

CPH 2025 makes distinctions between three implementation periods, the first from 2013-2016, embedded in the "CPH 2025-report", the second for 2017-2020 called Roadmap 2, and the third, Roadmap 3, valid from 2021-2025.

CPH 2025 reveals that the energy sector contributed to the largest share of emissions throughout the 2000-2010 period. Therefore, energy sector measures and projects comprise 165 initiatives in the three roadmaps or periods of CPH 2025. Replacement of coal by biomass at central power plants will provide for most of the cuts in the capitals CO2 emissions (approximately 75-80%)[39]. Expected investments for the municipality of Copenhagen to be CO2 neutral in 2025 are estimated to approximately 4.1 billion USD[40]

CPH 2025 comprises targets and initiatives under four headlines: Energy consumption, Energy production, Green mobility, and the city administration as a climate company[41]. The concept of "smart city" made its initial entrance into the vocabulary of the strategy, where "green growth" is a central aim.

As mentioned, CPH 2025 is divided in three separate Roadmaps or implementation plans. Below, the focus is on the current Roadmap 2 that runs from 2017-2020.

Roadmap 2 begins by summarizing the work of the first period of CPH 2025 covered by Roadmap 1 (2013-2016), concluding that by 2016 most of the 66 initiatives presented in Roadmap 1 have started. Many of the initiatives have had significant effects (Damsø, Kjær, & Christensen, 2017). Roadmap 2 then goes on to present initiatives for the second implementation period running from 2017–2020.

Goals and intensions

Roadmap 2 underlines that since 2005 Copenhagen's CO2 emissions have been reduced by 38 %, but it is also acknowledged that what may be termed the "low hanging fruits" of reducing CO2 emissions are dwindling, making future reductions economically more difficult to achieve. Hence, we may infer that it will become more important and demanding to raise popular (and political) support. The roadmap is stressing the need for new ideas, risk takings, and flexibility. Therefore, it is also necessary to engage in collaboration with competent partners, businesses, science, and

[39] file:///C:/Downloads/kbh-klimaplan-2025-faktaark-_1251%20(6).pdf
[40] file:///C:/Downloads/kbh-klimaplan-2025-faktaark-_1251%20(6).pdf (p.9)
[41] file:///C:/Downloads/kbh-2025-klimaplan-_930%20(21).pdf

citizens in order to realize the vision of a CO2 neutral Copenhagen in 2025. Enterprises taking part in such activities may use them as international door-opening activities, the report surmises. The initiatives listed in the roadmap fall under the four categories; Energy consumption, Energy production, Mobility, and city of Copenhagen's own activities. Initiatives under these categories are shortly summarized below:

Energy consumption: the energy sector must comprise more effective operations and installations, effective district heating, energy saving in retailing and service enterprises based on flexible energy consumption, new initiatives and smart solutions.

Energy production: Biomass based heat and power plants in the Copenhagen's district heating system. Clarifying the possibility of building large-scale solar cell installations and more wind turbines (100 MW). Prepare a biogas strategy for Copenhagen, and establish waste based biogas production, and increase the collection of plastic waste, consider the possibility of establishing a pre-sorting installation.

Mobility: Copenhagen aims yet again to be the world's best city for safe bicycling and CO2 neutral public transportation.

Copenhagen municipality will immediately act in relation to their own estate and activities, understood as their own buildings, own transportation (car running by electricity and hydrogen), green purchasing, demands for non-road vehicles in building and construction projects; and showroom for climate initiatives.

Each initiative is divided in three stages: the first is 'analysis'; the second is 'testing and demonstrations¨'; and the third is 'implementation'. The plan states that conducting thorough analyses very often are prerequisite for successful initiatives, and before putting things into use, it is necessary to conduct realistic tests. For the period 2017–2020, the plan highlights seven initiatives as ready for implementation; eight initiatives having reached the testing and demonstration stage; and five initiatives are to be analyzed.

The seven initiatives ready for implementation are: Optimization of energy for buildings; Wooden chips for combined heat and power stations; Establishing more wind turbines; Voluntary agreements with large real estate actors; Improved conditions for cycling; Electric vehicles for the municipality; and CO2 neutral buses.

The institutional set up and governance tools

CPH 2025 has in line with previous strategies a strong focus on innovation and economic aspects. Cooperation with internal and external actors are an important topic in CPH 2025. Regarding collaboration and partnerships, the report identifies Copenhageners; enterprises, investors, and knowledge institutions; agencies owned or co-owned by Copenhagen municipality; and the state, as central actors and stakeholders.

Copenhagen residents are involved and made co-owners through energy saving efforts and the ability to buy shares in wind turbines. Furthermore, the municipality aims to enter a more direct dialogue with its residents in order to motivate them for green solutions in homes, transport, consumption, and education.

Engaging enterprises, innovators, and knowledge centers are central aims in the discourse for developing smart city and attract investments for green growth initiatives. Thus, a dialogue regarding public enterprises and organizations, promoting and facilitating energy saving, as well as waste handling, is considered a central process aim in CPH 2025.

The Roadmap report pays attention to how state policies affect initiatives under the four headings. As for energy consumption, Copenhagen identifies a need for focus on the performance of a building regarding its construction; developing energy label regulations providing house owners incentives to carry out energy saving renovations; Therefore, formulating

national regulations for effective energy consumption is crucial. Roadmap 2 calls for better economic incentives for large-scale renovations through demands on energy enterprises for pursuing energy saving in buildings and addressing the interaction between owners and renters to facilitate energy saving.

The state should maintain support arrangements for wind turbines and maintain the non-fee policy on biomass or ensure that any fees will not make biomass less competitive than fossil fuel consumption.

The state should improve national regulations that allow stronger environmental demands in environmental zones, road pricing and environmental differentiated parking fees. As electric cars are no longer 100 % free of taxes and fees, and the fee on electricity for cars is three times higher than the energy fee on diesel, law changes are called for.

According the report, is it difficult for Copenhagen to provide green procurement. It would be easier if the state introduced national mandatory aims, in terms of nationally formulated instruments and guidelines supporting municipalities' use of overall economic assessment, recognizing environmental informative labels, and the opportunity of formulating demands on transportation of persons and goods.

3.2.4 Other plans relevant for achieving the aims formulated in climate plans

During the last 15 years many other plans have been introduced and measures been implemented that determine the success of the climate mitigation and adaption plans. It comprises e.g. cycling plans, green mobility strategies, urban greenery planning, (Local) Agenda 21, as well as climate adaptation and cloudburst plans.

Here, we will just mention a few of those that are relevant to demonstrate how the city of Copenhagen aims to collaborate with external actors in more general terms in relation to sustainability and to the everyday handling of more rain.

Sustainable relationships (Bæredygtige Sammenhænge – Københavns Kommunes Agenda 21-strategi 2016-2019)

This plan presents four principles for how citizens, and other private actors as well as the municipality can contribute to making the city more sustainable. These are by working; a) from an integrated and inter-disciplinary perspective, b) by the use of partnerships, c) by encouraging citizens to take part and participate in projects in their city, and, finally d) by creating more joint 'communities'. What is worth noting, is that this plan sends a signal of that it is only by 'acting together' rather than 'acting for' that the municipality can realize the goal of creating a 'sustainable city'[42].

Climate Adaptation Plan (Klimatilpasningsplanen 2011)

In the Strategy from 2002, was there a chapter, addressing what extreme weather would mean for Copenhagen. The inspiration to making a particular plan for adaptation comes in part from other cities and was adopted in august 2011. The plan addresses those challenges that may arise in Copenhagen as a result of the changes in climate in a short and a long time perspective. The plan got enormous momentum, since the summer of 2011 experienced the most extreme rain fall situation that have been measured in many decades. Not only were several of the highways flooded, but also several central institutions such as hospitals and data centers were in risk of losing power and breaking down. This cloud burst demonstrated that although it was handy

[42] For more information see: https://www.kk.dk/artikel/baeredygtige-sammenhaenge-koebenhavns-kommunes-agenda-21-strategi

to have a plan for climate change, it was not near enough in order to address, more specifically, the management of a heavy rainstorm[43].

Stormwater Plan (Skybrudsplanen 2012)

This plan deals with how the municipality of Copenhagen and the neighboring municipality of Frederiksberg can prevent damages from cloud bursts, storm surges and flooding. In this plan, there are listed hundreds of projects, aiming to handle periods with heavy rain and surges. The point is that the sewer system cannot handle huge amounts of rain, and the plan indicate how rainwater can be retained, delayed and be led to the harbor, lakes or underground tanks, and thereby avoid flooding. A central principle in the Copenhagen way of working with climate adaptation has been to integrate the projects with recreational aspects and actively involve local residents in the transformation of urban spaces for stormwater management[44].

The climate adaptation strategies for Copenhagen has also be connected to the plan for 'Bynatur 2015-2025' that addresses how urban nature can be improved and expanded as part of climate adaptation projects[45].

Copenhagen's work with climate adaptation has inspired many other cities. Recently, Copenhagen became part of a climate partnership with New York, where many of the Danish adaptation principles have inspired the design of an urban park in Manhatten[46]. Some of the most important climate-related reports are listed in Table 3.2.

Table 3.2: Evolution in climate-relevant plans in Copenhagen

Year	Climate policies and plans
1999	Planning started for the preparation of the first Climate Action Plan
2002	City of Copenhagen's first climate strategy report released; "CO2-plan for Copenhagen 1990–2010"
2002	Bicycle Strategy 2002-2012
2003	Agenda 21 Strategy 2003-2007
2007-2009	The vision for "The Environmental Metropolis" (2007) Second Climate Action Plan (2009)
2011	Bicycle Strategy 2011-2015
2012	CPH 2025; a strategy aimed for CO2 neutrality in 2025 Green Mobility action plan
2012	Agenda 21 Plan 2012-2016
2015	"Community Copenhagen", a vision towards 2025 (for the Technical and Environmental Administration)
2016	CPH 2025; Roadmap 2017-2021
2017	Green mobility, status and recommendations
2018	Resource- and Wasteplan

[43] For more information see: https://www.kk.dk/artikel/klimatilpasning-i-k%C3%B8benhavn
[44] See e.g. Skt. Kjelds http://klimakvarter.dk/en/projekt/skt-kjelds-plads-2/.
[45] See, https://www.kk.dk/artikel/bynatur-i-koebenhavn-2015-2025
[46] For more information on the cloud burst plan see: https://kk.sites.itera.dk/apps/kk_pub2/index.asp?mode=detalje&id=1018

3.3 Moving towards co-created planning and implementation in Copenhagen

The last two decades, the city of Copenhagen has succeeded in branding Copenhagen as 'green' and 'sustainable'. This is for example, resulted in several nominations as 'Green capital', 'Most livable city' or 'World's Smartest city'[47]. These nominations served in many ways as positive aspirations that aimed to hold the politicians accountable for sticking to their visions. There seems, however, to be a need for new political engagement and commitment if Copenhagen shall fulfil the intentions in the strategy and action plans and sustain its position as one of the world's leading environmental metropolises, and producer of cleantech innovation and green growth.

In the last five years, since 2015, most of the ambitious climate strategy and action plans have primarily been coordinated by the Climate Secretariat in the Technical and Environmental Administration together with HOFOR, the Greater Copenhagen Utility Company that is owned by city of Copenhagen, but run as a private firm. District heating covers 98 % of all heating demands in Copenhagen. By converting from fossil fuels to biomass, in a water-based district heating system, and introducing more wind power, Copenhagen is expected to fulfil its objective to be carbon neutral in 2025, although many experts in 2020 would also question if biomass is CO2 neutral. The biomass and related technical solutions count for 80% of the planned CO2-emission reductions in 2025.

Other parts of the strategy and action plans have been hampered by state regulation, and that may have hindered the city to realize some of its ambitions, e.g. in terms of introducing toll roads.

Drawing on the experiences from Copenhagen hitherto, there are two overall mechanisms that seems to have played a decisive role in labeling the city as a front runner metropolis promoting a 'green shift' in regard of its intension to curb CO2 emissions and facilitating resilient urban planning.

Firstly, the formulation of *ambitious goals* in the Climate strategies creates a common overall strategy for the different administrative departments of the municipality. However, it may be questioned to what degree the strategies' aims are pursued by all seven administrations in Copenhagen, and not primarily by the Climate secretariat and HOFOR. For approximately ten years the secretariat, currently with 10-12 employees, has been a crucial driver and facilitator of climate strategy planning and action plan implementation, requesting, every year, for a budget covering about half of the employees' salaries, and without a budget post for new initiatives.

Secondly, the focus on *collaboration with external actors* has played a crucial role in achieving the aims. From early on there have been a recognition on that city of Copenhagen alone cannot realize the goals in relation to CO2 emission reductions. Thus, in the plans, there have been an emphasis on collaboration and making partnerships with actors such as HOFOR, businesses and universities. Collaboration regarding innovative new clean tech with private sector actors, is handed over to "Gate 21", a partnership for green transition and growth in the Greater Copenhagen area, with approximately 60 employees[48].

To reach the ambitious goals in the strategies the Climate Secretariat has been keen to engage external experts and stakeholders into the planning and implementation processes. To unleash further potential from private and public actors to realize Copenhagen's climate ambitions, change in governance structures, steering and leadership approaches are important. The New Public Management governance paradigm and related steering approaches, with sector

[47] https://www.copenhagencvb.com/copenhagen/awards-accolades-copenhagen

[48] https://www.gate21.dk/?lang=en

administrative silos, seems to be wide-spread in city of Copenhagen. The NPM steering approach may hinder *further* co-creation not only internally among the seven administrations, but also externally with relevant stakeholders.

An interesting question is how the Climate secretariat cope with the challenge to keep momentum and legitimacy for the strategies in the Copenhagen administrations, in business and among Copenhageners. It does not seem, in the last five years, to be a highly prioritized and shared topic by politicians, executives, and leaders in Copenhagen. Despite the Lord Mayors further engagement in C40 in 2014, there seems to be uneven political and managerial engagement in the climate planning, in particular internally among the seven administrations, but also between the secretariat, managers, politicians, Copenhageners and the national administrative level.

4 Gothenburg: Bold goals – fragmented governance?

Trond Vedeld, Sandra Valencia, Anders Tønnesen

4.1 Background to urban climate governance

This chapter outlines the evolution in climate policies and governance systems in the city over the last couple of decades. We are interested in what goals, strategies, organizations and institutional designs emerge and how these materialize in urban climate governance and co-creation. The chapter aims to shed light on the city's specific paths to ambitious urban climate governance i.e. in terms of mitigation, adaptation and climate equity.

The chapter starts by, first, providing a background on the city and the context for climate governance. This section briefly describes the political-administrative systems, key climate and energy challenges confronting the city, and an overview of a few demographic, socio-ecological and economic parameters characterizing the city. Second, the chapter outlines the main climate governance approach related to key climate and energy goals, reviews the main policy and strategic documents and indicates how the climate and energy work is organized and structured. Third, the chronology of key policy and institutional events is outlined (in table form). Fourth, the emergence of key partnerships and governance networks (local and international) is referred. Finally, some preliminary observations on the extent and forms of collaborative governance at different scales are provided, and a reflection on whether these represents forms of co-creation.

4.1.1 Population, socio-economy and geography

Gothenburg is located at the west coast of Sweden, along the North Sea and at the mouth of the Göta River. With a population of 564 039 (based on 2017 data) (Göteborgs Stad, 2019a), Gothenburg is the second-largest city in the country (SCB, 2017). About 25% of the people living in the city were born outside of Sweden (2016). When considering the metropolitan urban area of Gothenburg, the population reaches about 1 million inhabitants (SCB, 2017b). The municipality of Gothenburg covers an area of 448 km^2 with a density of 1243 inhabitants/km^2 in 2016, up from 1042 inhabitant/km^2 in the year of 2000 (SCB, 2017b). The city is growing rapidly, planning to make space for 150,000 more residents by the year 2035 (Göteborgs stad, 2016). It is expected that by 2030, there will be 1.75 million residents in the Gothenburg metropolitan region.

Sweden and Gothenburg have a well-developed welfare system and a high standard of living. However, relative poverty, rather than absolute poverty, has become a challenge for the city. Unemployment rates are close to 7% (2016), which is high by Scandinavian standards. According to a recent report, income inequality and relative poverty have steadily intensified since the 1990s (Göteborgs stad, 2014a). This report suggests that, although most people are doing better than before, inequalities are increasing in relative terms, and, some population groups and areas of the city are worse off than before. Hence, Gothenburg involves a mosaic of relatively sharp socio-spatial differences. The lowest income levels are found in the districts of Angered and Östra Göteborg. This socio-geographical pattern is also reflected in other indicators, such as high unemployment rates, cash limitations, and child poverty.[49] As a result of this pattern, reducing inequalities has become a central priority for the city, reflected in the city's flagship program, 'Equal Gothenburg' (Göteborgs stad, 2017).

[49] Measured as children of families with less than 60% of the median income.

4.1.2 Governance and political system in Gothenburg

The city council (*Kommunfullmäktige*) is the highest decision-making body and consists of 81 elected politicians. Under the city council is the City Executive Board (*Kommunstyrelsen*) in charge of leading and coordinating operations (Göteborgs stad, 2016). Four elected politicians lead the Council's meetings, with one mayor and three vice-mayors.

The political organization in Gothenburg follows a "formannskapsmodell" (presidency model) where the positions in the city council are distributed in proportion to electoral voting results. During the last 40 to 50 years, the Social democrats and the Moderates have been the two largest parties. The Social democrats, a center-left party, was the ruling party for 24 years up to 2018, governing a majority in a "red-green" alliance with the Environmental Party and the Left party. A shift in power followed the 2018-elections, with the Moderates taking the power through a right-wing alliance with the Liberal and Christian Democrats parties.

The city council's mandate includes the task of defining and putting in operation committees consisting of elected politicians from all the parties responsible for the daily management in specific policy fields. The council consists of 17 such committees, some of them with overlapping roles regarding issues related to climate change and energy. The most relevant committees for the topic of this report are the Environment and Climate Committee (*Miljö och klimatnämnden*); Transportation Committee (Transportnämnd); Building Committee (Byggnadsnämnd); Circulation and Water Committee (*Kretslopp och vattennämnd*); and Parks and Nature Committee (*Park och naturnämnd)*. The city council also governs a range of public corporations through an umbrella organisation (Göteborgs Stadshus AB), under which are public corporations in charge of issues such as Energy (Gothenburg Energy), Housing, Port and Business (Business Region Gothenburg). Administratively, the city is sub-divided in 10 districts, each of them having a local administration.

4.1.3 Socio-eco-technical conditions: key climate mitigation and adaptation issues

A study showed that in 2010 the main sources of GHGs emissions per capita were from public sector consumption (hospitals/health care, schools, administration), food consumption (e.g. meat consumption), other consumption, car transport and air travel – in this order (Larsson and Bolin 2014). The city has a very dense commercial and industrial base and includes the largest port in Scandinavia, which generates high numbers of transport movements. Other sources of GHG emissions are energy plants and industry. A defining feature of the city's energy situation has been its reliance on fossil fuel for heating and industry. As a result, an important element of the city's energy policy has been to transform the city's reliance on fossil fuel to use of waste for heating. Even though the Gothenburg region has been growing economically and in population in the past two decades, the region's emissions of carbon dioxide were a constant level during the 2000s and have decreased substantially in recent years, this despite the region having three large regions and chemical industry facilities (BRG, 2019). Gothenburg is recognized as a world leader in district heating. 90% of all apartment buildings in Gothenburg are heated through district heating, using heat from waste burning that would be otherwise lost (IBID:38). In addition, the proportion of vehicle kilometers driven with renewable fuel, mainly biodiesel, electricity, biogas, tall oil and animal waste (HVO[50]) has increased from about 36% of Gothenburg region's public transport powered by renewable fuels in 2010 to 95% by 2017.

The fact that Göta River cuts across the city territory as a defining landscape structure is important regarding the city's vulnerability to extreme weather and flood risks; the two central city districts being the most densely populated (Centrum and Majorna-Linné). Urban climate governance also needs to be understood in relation to the current plans for compact city transformation of the downtown central areas. This transformation involves massive construction

[50] HVO is currently the largest source of fuel for public transportation in the Gothenburg region.

of new buildings, as well as new transport infrastructure both on and underground on both sides of the Göta river. This transformation will involve demolition of existing built structures and change in former land use, such as development on former parking lots and grey fields (harbor area).

Table 4.1: Overview table of selected key socio-political and climate context factors in Gothenburg

Indicators	**Gothenburg**
Area	448 sq. km
Population	556,000 (2016) (Göteborgs Stad, 2019a)
Population growth rate	1.6% between 2015 and 2016[51]
Unemployment	6.7% (2016) (Göteborgs Stad, 2019a)
Political leadership (from 2018)	Moderates (in Alliance with Liberals and Christian Democrats)
Gross regional product/pr. Capita (Gothenburg region)	€60 billion (BRG, 2019)
Number of people employed by the municipality (2017)	55,000 (Göteborgs Stad, 2019b)
GHG emissions per capita	8 tons (based on Climate Program 2014) (Göteborgs Stad, 2014b)
Climate risks	Increase in extreme weather events. Risk of overflooding due cloudburst and sea level rise. Low lying areas along the river are particularly vulnerable but technical measurements are being developed to reduce it (e.g., rain gardens, storm surge barriers)
Water risks	Flooding as a result of extreme weather events, snow storm risk, landslide as well as high water flow rates (Göteborgs Stad, 2018a, 2018b). The city risk analysis highlights the need for maintenance of the drinking water system.
Energy risks	The existing heating/energy system is based mainly on burning waste; further transition to renewable energies is a goal (cf. city's budget, 2019). The electrical system is considered vulnerable to disruptions, such as extreme storms.

4.2 Main climate governance approach: climate goals and organizational structure

The city's main policies and programs are focused largely on the challenge of combining growth with sustainable and inclusive urban development. Gothenburg's Climate Program, which was approved in 2014, provides the overarching framework for the city's climate mitigation work, setting out the goals to reduce the city's carbon footprint in the most emitting sectors (Göteborgs Stad 2014b). The Climate Program, however, addresses only mitigation, adaptation is not included. The city does not have a comprehensive adaptation strategy, but rather there are several studies and plans to address the risks of specific hazards, with a main focus on

[51] www.worldpopulationreview.com

stormwater and water-related risks. Several agencies are responsible for addressing different aspects of climate change mitigation and adaptation. The city's Environment Administration is in charge of coordinating and overseeing the Climate Program. The adaptation work has mostly been led by the Planning Office in collaboration with other departments such as the Sustainable Waste and Water Department and the Traffic Office. Since 2017, the City Executive Office (*Stadsledningskontoret)* has been in charge of coordinating the climate adaptation work of the city (Valencia et al. 2020), along with responsibility for integration of the SDGs (Stadsledningskontoret, 2018). By treating mitigation and adaptation separately one runs the risk of missing their potential synergies and conflicts. Both climate adaptation and mitigation goals have increasingly become an integrated element of the city's urban development policies, especially within specific sector policy areas.

4.2.1 Climate goals, strategies and visions

The overall climate objective of the city's Climate Program (2014b) is to achieve 'Reduced climate impacts', which is defined as follows:

"In 2050 Gothenburg has a sustainable and equitable level of greenhouse gas emissions" (Göteborgs Stad 2014b:23)

This level has been interpreted as 1.9 tons of carbon dioxide equivalent per inhabitant per year. In 2011, about 2.5 million tons of CO2e were emitted in Gothenburg (Göteborgs Stad 2014b:14). Studies conducted in preparation of the Climate Program found that in 2014 the average inhabitant in Gothenburg emitted about 8 tons of GHGs per year, compared to the Swedish national average of 10 tons per citizen per year. The emissions for Gothenburg include those that take place locally and globally (which consider, for example, air travel). The lower emissions for Gothenburg compared to Sweden are in part explained by a well-developed public transport system (Göteborgs Stad 2014b:15).

The Climate Program's overall objective is underlined by the following policy statement, reflecting a long-term political will in the city to maintain high environmental ambitions:

> *Gothenburg will become one of the most progressive cities in the world in the rectification of climate-related problems. The city of Gothenburg will be a forerunner and demonstrate that it is possible to live well without contributing to negative climate impact and with associated changes in living conditions for future generations, not only in Gothenburg but also worldwide (Göteborgs Stad 2014b:3).*

The Climate Program is conceptualized as a 'strategic' Climate Program – that is at the same time one of the 'action plans' of the city's broader Environmental Policy and Program (approved in 2013). In other words, the Climate Program is the concretization of the environmental objective 'Reduced climate impact' (being one of 12 main environmental objectives). In this regard, the Climate Program is framed within and related to a broad ecological approach to sustainable development and the environmental monitoring system of the city. The program document also contains an Energy Plan for the city, related to 'secure and safe energy supplies' (mainly).[52] The main vision and ambitions of the Climate Program were in part inspired by Gothenburg signing the Covenant of Mayors, which implies aiming to move beyond the European Union Climate Targets for 2020.

The overall climate (and environment) objectives of the city have been relatively stable over time, albeit reinforced more recently. The city's budget has included a specific climate goal for many

[52] In this regard, the Climate Program expands on an earlier Energy Efficiency Strategy towards 2020 adopted by the City Council (produced by the Environmental and Climate Committee, with support of the Swedish Energy Board).

years, with some variations over the years. In the 2018 city's budget the specific goal for the environment and climate read:

> *Gothenburg shall reduce its environment- and climate impacts in order to become a sustainable city with global and local equitable emissions (Miljöförvaltningen 2018:16)*[53]

In 2017, the goal was modified to include 'environment impacts', not only climate impacts. However, in concretizing this goal the focus in the budget text remained mainly on the climate issue, suggesting that this was still the prioritized policy area.

The concretization of this budget's goal is as follows,

> *by 2020 the GHGs emissions from non-trading sector should be reduced to at least 40% (with respect to 1990-level) and by 2035 the consumption-based emissions should be maximum 3,5 tons (Miljöförvaltningen 2018:16)*

These two objectives are the same as two of the four intermediate objectives of the Climate Program. An analysis carried out by the Environment Administration questioned the fact that only two intermediate goals were brought up in the city's budget, instead of better overall alignment to the Climate Program with reference to all the intermediary objectives (Miljöförvaltningen 2018). The city's budget for 2019 brought forward by the new political coalition does not include overarching topic-based goals as previous budgets. The budget does include a section on sustainability, which refers in its sustainability plans to climate change and refers to the intermediate objective four from the Climate Program (By 2035, the consumption-based emissions of greenhouse gases by the people of Gothenburg will be a maximum of 3.5 tons of carbon dioxide equivalents per person) (Kommunstyrelsen 2018: 67).

The Climate Program (2014b) embodies the long-term climate work within the city, both related to the municipal organisation and the work of private business and citizens (p.3). The program document argues that the strategy was the result of broad-based collaboration between several of the city administrations and companies as well as different bodies and experts from private actors and research. The program is directed primarily at politicians and public officials in the city, but it also aims to 'function as a guide for industry, other stakeholders and the inhabitants of the city' that are required to be involved if goals are to be reached (Gothenburg 2014b:3; Miljöförvaltningen 2018:31).

The Climate Program has been produced under the guidance of the city's Environmental and Climate Committee, however, other committees and companies relevant for follow up of the program are supposed to put relevant strategies of the program into climate action and incorporate the climate strategies into their regular budget and planning processes.

The Climate Program and local environmental objectives are framed within national and local environmental policies and goals and regulatory laws and documents. To this end, Sweden has a national Environmental Governance system (*Miljöledningssystem*) which systematizes and streamlines the environmental work. This ensures that the climate work becomes goal-oriented and that the whole municipality is involved.

The Climate Program sets out four intermediate objectives (for 2020 to 2035) and nine strategic objectives (with 24 strategies) which are of interest as they reflect the city's approach to climate governance through the definition of the ambitions and focus of the city's climate work. The four intermediate objectives are:

[53] In earlier documents, such as in the 2013 city's budget, this objective was stated as; "Gothenburg will reduce its climate impact in order to become a climate-neutral city" (Miljöförvaltningen 2018:16)). Note that the city has changed its climate goal formulation from a climate-neutral city to a sustainable city with equitable sustainable emissions locally and globally.

1. Reduced carbon dioxide emissions – by 2020 the emissions of carbon dioxide from the non-trading sector will be reduced by at least 40% (1990 as base year)
2. Energy use in homes will be reduced – in private homes by at least 30% and electricity use reduced by at least 20 % (1995 base year)
3. Reduced production-based emissions of GHGs – by 2035 the emissions of GHGs within the city geographic area will be maximum 2 tons per person
4. Reduced consumption-based emissions of GHGs – by 2035 the consumption-based emissions of GHGs per capita will

Like for the intermediate objectives, the strategic objectives vary in terms of thematic field and complexity. There are ambitious goals for GHG emissions from transport, production of renewable energy, and for reducing the levels of energy consumption per inhabitant (with a focus on climate smart consumption and energy/transport efficiency issues). The intermediate objectives together with the strategic objectives and 24 strategies are to provide guidance towards the task of achieving 'a sustainable and equitable level of emissions' (IBID:29). It is argued that the strategies do not involve specific actions but have an overall strategic character within key areas that require mitigation actions to accomplish the objectives. The lack of specification on concrete actions to be taken is in part in recognition of the limited control the municipality has in many policy areas, and the need to build upon the 'commitment and involvement by industry and the people of Gothenburg' (IBID:29). Below are a few examples of the strategies outlines in the climate program, which required the involvement of private sector and civil society to succeed:

- The climate smart citizen developed - through knowledge communication, education and networks
- Resource-efficient urban planning – through plans for an energy- and transport-efficient society and a climate-smart regional expansion
- Efficient energy use and conversion to renewables – through a set of measures within the municipality, industry and private homes
- Reduced climate stress from travel and transport
- Climate-conscious consumption

Some unique features of city's Climate Program are:

1) First, it highlights equity as part of its goal, which considers the global and historic perspective of emissions. The focus on equity reflects among others that the average family emissions from high-income families were found in a study to be almost twice as high as those of the low-income family, due in particular to higher extent of travel by car and by plane (Cf. report by Larsson and Bolin 2014);

2) Second, the GHGs emission cuts ambitions are higher than the EU policy goals. For example, a key strategy is to reduce CO2-emissions from transport with 80 % within 2030 (2010 as base year);

3) Third, it considers the emissions produced outside the city's geographic area as part of the production and transportation process of products consumed within the city;

4) Fourth, it includes actions aimed at the reducing inhabitants' emissions through consumption behaviour change, for example both regarding food consumption and travel by plane (which none of the three other case cities do in the same way). This also makes it more ambitious than the national level goals, which do not consider emissions from consumption.

The city revised the Environmental Program in 2018, as well as its Action Plan. The revised program maintains the same 12 environmental goals, but several of the targets has been revised through decisions by the city council. The second major change is that the action plan has been revised and made as a standalone part (with a separate document, called The city's Action Plan for the Environment 2018-2020). The original Environmental Program was approved in 2013, the year before the Climate Program. The revised version of the Environmental Program aligns its targets under the 'Reduce Climate Impact' goal to the Climate Program. To illustrate, while the original version had only one target "2020 emissions of carbon dioxide from the non-trading sector in Gothenburg have decreased by at least 30 % compared to 1990", there are now four targets which are the same as the Climate Program's intermediate objectives. Important to note that the ambition with respect to non-trading sector emissions was increased from 30 % reduction to 40 % reduction by 2020 (compared to 1990) in both the Climate Program and the revised Environmental Program (Göteborgs Stad, 2013, 2014b, 2018i, 2018j).

The Action Plan for the Environment contains measures that aim to ensure the city reaches its 12 local environmental goals. The measures are a concretization of the seven action strategies in the environmental program and how these contribute to fulfilling the city's environmental goals. The Action Plan document notes that the measures in the plan should not be interpreted as the sum of the city's environmental work since other efforts are under way that promote the environmental goals that are not captured by this plan. For each measure, which committee is responsible has been designated, as well as which other partners have agreed to participate. The plan also notes that if the responsible (designated) committee wants additional partners, it is up to that committee to engage with them. There are 27 measures under the 'Reduce Climate Impact' goal. The measures address a number of areas ranging from energy, transport (including transportation of goods, travel, biking, test of new materials for roads, test of self-driving cars, alternative fuels, etc.), consumption, logistics, fossil-free district heating, and green bonds, to name a few. Different administrations and city's corporations are responsible for executing these measures (Göteborgs Stad, 2018j:5-12).

In addressing climate action at the regional level, a strategy called Climate 2030 was launched in 2017. It is a regional strategy, resulting from a cooperation between Region Västra Götaland and Länsstyrelsen Västra Götaland Län.

4.2.2 Main actors and organizational structure

The city of Gothenburg's organisation is made up of administrations and companies with 54200 employees (Göteborgs stad, 2016). The responsibility for various levels of climate leadership is currently allocated as follows:

Politically, the city council approves mandates and overall climate and energy policies.

Strategically the Committee for the Environmental and Climate Committee has a strong mandate to develop climate strategies and programs (to be finally approved by the city council); other Committees are also involved in strategic climate work (e.g. committees in charge of water, energy, transport). Administratively, the Environment and Climate Administration is the main institutional home for climate program implementation and follow-up. In addition, other administrations which are particularly relevant for the management of climate-related policies and programs include, the City Executive Board (*Kommunstyrelsen*), the City Executive Office (*Stadsledningskontoret*), the Environment Administration (*Miljöforvaltningen*) and the Transport Office (*Trafikkontoret*).

The city council sets the strategic climate, environment and sustainability objectives of the city and approved the Climate Program. The City Executive Board has the overall responsibility for governing, leading and coordinating all the work of the municipality. The City Executive Board approves the mandates and directives of each sector Committee and Administration. Through a recent revision of the city's rules and regulations (2016), all Committees and the City Executive

Board have adopted a common responsibility for sustainable development through a common text that is included in their mandate (‘ägardirektiv’): *“*The effect of the Committees work shall contribute to sustainable development” (Miljöförvaltningen 2018:14). Directives have also been prepared for the city’s corporations (but no specific or overall directives have been provided for their work with environment and the climate, except through their given mandates).

The City Executive Office is the administration of the City Executive Board and oversees the management, coordination and follow-up on agencies and enterprises under the municipality. It leads, takes initiatives and drives coordination including within the environment and climate policy sector. This is also the office preparing cases handled by the City Executive Board and the Committees. The City Executive Office consists of six departments; welfare and education, city development, economy, communication, human resources (which includes human rights), and legal issues.

The Environment Administration has the task (on behalf of the Committee for Environment and Climate) of coordinating, following-up and leading the city’s work on climate and environment (as part of the ecological dimension of sustainable development). This is done through providing support, coordination and inspiration through a wide range of tools and measures (regulatory, planning, and finance). It is also charged with protecting people’s environment and health and provide good living environments for the inhabitants. Moreover, it proposes which other committees and administrations should be ‘process owners’ for budget objectives related to climate and the environment involving other sectors (Miljöförvaltningen 2018:6).

The Environment and Climate Committee is the ‘process owner’ for the budget’s goal concerning environment and climate change. As a process owner, the committee has a coordinating, monitoring and leading role to achieve the goal. But the Committee cannot take over responsibility for other Committees or Boards’ domains. The Environment Administration is responsible for developing and monitoring the (strategic) Climate Program for the city (by request from its Committee), and in accordance with e.g. the Environment and Climate Laws and regulations. In this regard, it is responsible for preparing a simple environment monitoring and leadership system. This also includes a coordinating role in relation to water- and ocean-environment. While the Environment Administration holds the overall responsibility for the governance of the strategic climate program, it is stated in the program document that goal achievement depends on all units within the administration working and implementing measures in accordance with the program. However, and this is important to highlight, the Environment Administration is not charged with any active influencer role in relation to citizens, businesses or private organizations, except in relation to environment oversights and food safety measures and the ecological dimension of climate change.

The Transport Office is involved in a wide range of issues and contains units dealing with both the more technical aspects of traffic management to units working on city life and urban environments. Central to the work of the Transport Office is the Traffic strategy (Municipality of Gothenburg 2014c).

Gothenburg Energy is the most significant player in the local energy production market and in implementing the Energy Plan.

The city administration of Gothenburg can influence its own emissions in a number of areas such as through its own transportation fleet, the use of energy in public buildings, energy production (through Göteborgs Energy), building techniques in the city’s offices and housing, waste management and purchasing of goods (e.g. food consumed at schools).

4.3 Chronology of key events: evolution in climate strategies and institutions

The work on both climate adaptation and mitigation has generally received relatively high attention by the city council over the last couple of decades. This has been done as an integrated element of the environmental policies and programs and has reflected the city's focus on sustainable development. The city started work on climate change in the late 1990s and early 2000s, initially with the appointment of a city Committee on climate change (1997/98) (see Table 4.2 on chronology of key events). This work was in part inspired by climate work at national level related to the Swedish Climate Strategy which was approved in 2001 (Prop 2001/02:55).[54] In 2003, the city joined a national climate network of Climate Municipalities – which aimed to reduce GHG emissions, share experiences, lobby, and propagate best practices. However, the Comprehensive Plan for Gothenburg as late as 2009 - emphasized goals of a sustainable city – and while it acknowledged that climate change was one of the challenges the city is facing (both with respect to its emissions and the impacts of climate change in the city) – no concrete actions were laid out. The Comprehensive Plan does mention that a local environmental goal related to climate change has been adopted by the city council, which includes a goal in the traffic sector of reducing carbon dioxide emissions by 30 % by 2020 (Göteborgs Stad, 2009). What this comprehensive plan do have, however, is a clear focus on social sustainability as part of urban development:

> *Our vision is a society in which we have created long-term sustainable growth and more jobs, developed citizens' welfare, health and security, deepened democracy and equality, created an ecologically sustainable society, with justice and solidarity and turned segregation into integration. Gothenburg is a segregated city. We see this as the biggest challenge to overcome (Göteborgs Stad, 2009:49).*

Social sustainability, with clear emphasis on social equality is still a core focus of the city, as illuminated in the city's operative climate goal presented in the mitigation section below.

The Environmental Committee shifted name to the Environmental and Climate Committee in 2011, the Committee being firmly mandated to take on climate mitigation work and developed the Climate Program in 2014. The city interacted closely with the regional level, including also with the Business Region Gothenburg, and the county-level (Västra Götaland) adopted specific GHGs climate goals in 2009 (fossil free by 2030).[55]

4.3.1 Adaptation

Initially, climate change impacts and related adaptation concerns were at the center of attention of the city council more so than mitigation. Adaptation was always linked to key sector policies such as water resources management, green structures and housing, possibly reflecting which sector institutions were mandated to work on this policy issue (more so than the Environmental and Climate Committee). Adaptation was included in the city's Water Plan already in 2002 linked to river flooding and storm water challenges. This reflected the city's location by the Göta River. The city prepared a report on extreme weather in 2006 - following a heavy storm (Gudrun) that struck the city in 2005. A new city level report on Extreme weather followed in 2010. A Vision for the River city was prepared in 2012. However, adaptation did not figure prominently in the overall Environmental Policy and Program (2013). This Environmental Program only addressed mitigation ('Reduced climate impacts'), even if the vulnerability of the city to climate impacts was

[54] At national level, a Climate Policy was approved in 2005 and a National Climate Adaptation Policy in 2007. These policies were brought together at national level in 2008/09 when Sweden adopts a common national climate and energy policy. In 2017, Sweden adopts a Climate Act and Climate Policy Framework, building on earlier policies and climate work.
[55] The county furthermore prepared a Climate 2030 policy in 2017 (with more ambitious goals).

briefly mentioned, and thus the need for adaptation raised. Gothenburg still does not have a program on climate change adaptation, however, the city has included provisions for climate resilience in its building regulation and the city's Planning Office has proposed to include a thematic supplement on flood risk into the city's new comprehensive plan, which is currently under revision and expected to be approved in 2019. Climate adaptation has also been included in the regional waste plan (Göteborgs Stad, 2018f, 2018g, 2018h)

4.3.2 Mitigation, energy and transport programs

In 2014 the Climate Program with an Energy Plan was produced interlinked with the Environmental Policy and Program's goals of 'reduced climate impacts'. According to a national act (Municipal Energy Resource Planning Act), every Swedish municipal authority must have a current energy plan covering supply, distribution and use of energy.

The city had an active energy policy throughout the twenty years period, from the Energy policy approved in 1997/98 (which had no mention of climate change) to the Energy Plan in 2005, which included linkage to climate change goals. This was also the case for Strategy for Energy saving in 2011. The concern of the Energy Plan (2014) is to ensure a sustainable energy supply and how to go about this, while reducing negative climate impacts. Energy efficiency, reduction in energy consumption and emphasis on renewable energy sources were at the core of this plan. Gothenburg Energy was the main collaborator on implementing energy policies and plans.

The Climate Program aims to reduce climate stress from travel and transport, reflecting that the transport sector accounts for about one-third of GHG emissions in the city. Priorities to this end are to reduce traffic by car through various policy instruments, promote non-fossil fuel cars, increase travel by public transport, walking and biking. The city also aims to become a 'world leader in climate-smart cargo handling', and to reduce climate impacts of transport infrastructure construction and maintenance. One feature relating to transport is that despite ambitious goals of 25% reduction in car traffic and 80% reduction in emissions, the Climate Program seems relatively weak in terms of suggesting/paving way for the politically hard (but effective) restrictive measures. Examples are the use of higher taxes for parking or in toll roads to regulate traffic volumes; or the removal of car lanes or parking to be used for cycling or public transport. It can be asked whether the program sufficiently addresses '*the how*' and the complexity of reaching ambitious policy goals.

In terms of transport, municipal policies have centered around three main objectives; 1) Create an easily accessible regional center; 2) Create attractive urban environments, where pedestrians and cyclists are prioritized, and, 3) Sustain Gothenburg's position as a logistics center in Scandinavia. A central structure for financing and developing transport infrastructure in Gothenburg is the so-called West Swedish Agreement (Västsvenska paketet).[56] In addition to containing a set of projects to be implemented, it involves a comprehensive governance network with partners from the local, regional and national levels. The agreement has a total budget of SEK 34 billion, with state grants and toll road income being main financial sources. The toll road payment was introduced as a congestion charging scheme in 2013. In addition to securing financing for the West Swedish Agreement, its main goals are to reduce congestion and to contribute to improving air quality. The congestion charging in Gothenburg has been highly controversial, also because the result of an advisory referendum, which ended with the public suggesting a termination of the toll road, has not been followed. Controversy also relates to the massive construction, and different types of challenges (e.g. detours, congestion and noise) likely to be present in the construction phase.

Large scale infrastructure built will provide improvements for both public transport and for private car driving. Inhabitants of the Gothenburg region will have far better railroad-services, potentially

[56] It shares many similarities with the Norwegian Oslo package 3, and can be seen as what is referred to as a policy package in the academic literature (Givoni 2014).

reducing the number of car commutes and the level of transport emissions. On the other hand, facilities for car driving are also clearly improved through the West Swedish Agreement, as road capacity is enlarged and better road connections across the Göta river are provided. Hence, as found elsewhere (see e.g. Richardson et al. 2010, Tønnesen 2015) also the West Swedish Agreement contains an ambivalence concerning whether to facilitate or reduce car usage.

4.3.3 Links to other strategies and programs

The city has developed a set of governing documents on policies that are interrelated with the climate and environment programs, such as: Green strategy (2014); Traffic strategy (2015); Strategy for city development (2014); Vision River city (2012); Program for environmentally adapted buildings (2017); Nature conservation program (2005); Bicycle program (2015); Waste plan (2011); and Parking policy (2009).

Table 4.2: Key climate policies, programs and related sector strategies, Gothenburg

Date	Evolution in climate policies, programs and events
1997/99	City Committee on climate change appointed. Energy policy on sustainable energy supply produced – no mention of climate change. The city initiates/reinforces work on adaptation work linked to Water plan
2002	Gothenburg 2050 project – visions across diverse stakeholders of a sustainable society and energy system with low/towards zero GHG emissions and fair use of resources
2003	Water plan, includes adaptation concern (first time in the city)
2005	An Extreme Weather Group across agencies and sectors established (p531) – spurs work on adaptation - following the storm – “Gudrun” – and production of report on Extreme weather for the city (KF 2006/2009)
2005	Energy plan - explicit linkage to climate change and goals of shifting energy use based on fossil oil to more waste heating
2009	Västra Götaland adopts a regional climate goal - to be fossil free by 2030
2009	Comprehensive Plan for Gothenburg – focuses on goals of sustainable city ways to reduce risks of extreme weather events and floods/landslides – new report on extreme weather and flooding (2010) – adaptation mandated to Building Committee
2011	Strategy for energy saving with action plans; measures such as reduced GHGs from vehicles, carpools, cycling
2011	Environmental Committee shifted name to Environmental and Climate Committee
2012	Vision for the River city produced (Älvstaden); Gothenburg joins UNISDR’s Making Cities Resilient program; a storm water model for the city, by Building Committee made (2014)
2013	Environmental Policy for the city of Gothenburg; includes goal on “Reduced climate effects” (Begränsad klimatpåverknan)
2014	Climate Program for Gothenburg –with an Energy Plan – with ambitious goals. Gothenburg signs the Covenant of Mayors
2014/15	Green strategy (compact, green city); Traffic strategy; Bicycle program
2017	Climate 2030 – Västra Götaland in transition, regional climate strategy
2017	Coordinated function for adaptation established at City Executive Office
2017	Preparation of Report Fossil Free Gothenburg (which analyses measures necessary to fulfil Paris Agreement- aiming at limiting global warming to 1.5°C)
2018	Report by Environmental Department: Follow-up of Gothenburg’s local environmental goal 2017; reinforces climate objectives
2018	The City Executive Office starts work on the global SDGs
2018	Revised action plan; Gothenburg’s action plan for the environment
2019	Revised Comprehensive Plan for Gothenburg to be approved

4.3.4 Key governance and leadership approach, tools and measures

The city uses a combination of political, regulative, strategic, economic, administrative and informative (pedagogical & knowledge based) measures on urban climate governance.

The starting points for the governance, as for any city, are the political directives/policies, plans, strategies, as well as relevant laws and administrative regulations (Environmental law/Climate law). But in order to plan and govern, there is a need for administration, economic/resources, programs, networks and cooperation with citizens (as voters and co-producers and clients of services) and key public and private stakeholders. The more precise governance approach is a result of the actual roles of and relationships between the various actors involved - from the city Council and City Executive Board to Committees, sector administration and municipal corporations.

The city budget (prepared by the city council) is the key governing and leadership document for the city's Committees and corporations. The budget provides the objectives, directions and mandates that are to be obtained within the economic frames and existing laws and regulations. Up to 2018, the selected 'process objectives' in the budget defined the overall priorities for the coming year and mandate periods. The process objectives were subsequently deconstructed, valued and adapted by Committees and company Boards for operationalization. The 2019 budget does not include process objectives but outlines priority areas and thus the process of Committees and Company Boards having to deconstruct and adapt the budget to their mandate remains the same. Plans, programs, directives, mandates ('*uppdrag*') and policies are in this sense subordinated to the budget and the budget process. Hence, the budget objectives within and across sectors related to specific climate actions have been critical steering mechanisms. The City Executive Board appoints specific process owners for different areas of work that require specific or structured cooperation.

Each year specific mandates are directed to specific actors, for example, for 2018 Gothenburg Energy is to transform Rya powerplant to a fossil free enterprise. Each Committee and company Board has responsibility for achieving its defined budget objective, and to consider how best they should interpret their mandate and govern their own enterprise. Based on their own budget, they prepare and approve a specific budget policy document for their respective administration or company ('*innriktingsdokument*'). To this end, they have large degree of autonomy in developing own routines and directives and preparing strategies and plans and thus prioritize actions in relation to different budget objectives and areas of work. These budget policy documents are in turn the basis for the Administrations and corporations budget proposals and related objectives, to be approved by the Committees. The final objectives, directions and mandates become part of the overall management system (Stratasys) for follow-up.

In this regard, it is critical how climate objectives and strategies are reflected in climate 'sector' action plans, in specific sector plans as well as in the overall Comprehensive Plan and Development Planning Strategy for the city. At a general level, the city's budget is informed by sustainability objectives, especially following the governance reform in 2016, which 'mainstreamed' the sustainability concept with its three dimensions (social, ecological and economic) – both overall and across sectors (Committees) (Miljöförvaltningen 2018a:13). It may also be argued that climate objectives have become mainstreamed into the city (through the inclusion in the budget) and in sector planning. According to local staff, the Environment Administration foremost employs a governance approach of "enabling and encouraging" ('möjliggjöra och driva') to pursue the climate objectives. This entails largely referring to key governing documents and action plans in combination with co-creation, informative measures and economic support of environmental projects. A precondition for succeeding, however, is that the leadership, both at the city council as well as at the sectoral committees and corporation boards, is engaged and that resources (staff and budgets) are allocated to the work.

The approach to urban climate governance is based on a set of guiding policies and strategy documents, approved by the city council, which are closely integrated and define a hierarchy and an approach to monitoring and managing the program. The main policies and strategies in their hierarchical order are as follows; The Environmental Policy, which defines the common vision and local objectives for the environmental work and what environmental status the city aims to achieve; the Environmental Program, which defines how and what actions are to be done to reach these objectives); the (Strategic) Climate Program which provides guidance on how to achieve the environmental goal – 'Reduced environmental impacts'; and the (annual) Environmental Report which monitors the environmental status and shows progress in relation to the objectives.

A main measure to this end, carried out by the Environment Agency, is to monitor and follow-up the extent to which environmental and climate objectives are reached. The Climate Program is monitored annually by the Environmental and Climate Committee as an integrated element of the Environmental Program, which defines the concrete climate actions to be taken. The environmental status related to key objectives is presented in the annual Environmental Report which is a main 'climate governance' and monitoring tool, along with the budget and defined actions.

In this regard, environmental issues in general are overseen, first, in relation to the Swedish Environmental Code (1998) (but which does not address climate change). Second, the monitoring is based on the specific environmental quality management system in Sweden – in Gothenburg developed into the Gothenburg Method ('*Göteborgsmetoden*'). This system represents a tool to streamline and rationalize the environmental work also of private businesses and organizations. Hence, it addresses issues related to organization's policy, objectives, procedures, instructions, templates and records in the environmental field. The ideal is that an organisation should develop a chain from the goals and objectives in the organization's policy, via key strategies to action plans and related budgets.

Other important measures employed by the Environment Administration have been to produce a variety of review documents and research reports as basis for decision making within the Environment and Climate Committee as well as for other Committees and Boards.

Since the city's environmental and climate objectives were developed in 2013/14, the national environmental measurement system has been given a new goal structure and new assessment rationales. Also worth noting is that in 2017 the Environment Administration assessed how the city's environmental objectives addressed the UN Sustainable Development Goals, suggesting that the ecological dimensions of the SDGs are well catered for by the city's environmental and climate objectives, the exception being for climate adaptation (Miljöförvaltningen 2017). At a more general city governance level, the city in 2016 and 2017 introduced a new directive to reduce the number of governing documents (considered to be too many) and to increase the applicability and focus of new governing documents.

4.3.5 Collaboration and coordination with other internal actors for implementation

In order to implement the specific Climate Program, the Environment Administration coordinates three key networks or strategic groups of actors related to three key domains; transport, energy and consumption. These were also working groups in preparing the program. The groups meet two times a year in order to exchange experiences and enhance co-creation. The strategy groups are directly involved in advice on implementation and follow-up of the strategies.

A set of administrative bodies of the municipality and the public enterprises were early on involved in preparing the Climate Program and a set of external actors and experts was also involved from business, research and civil society.

The Climate Program is not monitored separately as a whole, but objectives and sub-goals are monitored as 'indicators' within the annual reporting under the Environment Program (said

earlier). Each year data is provided on the four key sub-goals (intermediate objectives) e.g. regarding GHG emission levels, emissions from consumption and changes in energy use.

A defining feature of the Gothenburg governance approach is the objective on reduced emissions from consumption. A main goal for the Environment Administration is to develop workshops on the consumption aspect within corporations and in society in general (p. 32).

4.3.6 Key networks and partnerships on climate change

The city has been involved in several networks and partnerships with varying level of engagement; a few of them indicated below.

The Covenant of Mayors. This was established the European Union in 2008 established a Climate and Energy package. Reaching beyond Europe, in 2010 the covenant was signed by about 2000 places. In 2015, the Covenant was merged with another EU initiative; Mayors Adapt. The members commit to actively support EU's goal of a 40% reduction of greenhouse gases by year 2030. In addition, they will work for integrating emission reductions and adaption to climate changes, as well as make sure that everybody has access to secure, sustainable, and cheap energy. In 2016, this association merged with Compact of Mayors, creating the Global Covenant of Mayors for Climate and Energy.

The Green Digital Charter: The charter was established in 2009 through a Eurocities initiative, responding to the 2009-recommendation by the European Commission for mobilizing Information and Communication Technologies in a transition to energy-efficient and low carbon economy. In short, the aims are reducing emissions through ICT, and promote progress in tackling climate change through innovative use of digital technologies in cities. In total 50 European cities are signatories to the charter.

Gothenburg Climate Partnership (GCP) is a long-term partnership between trade and industry in the Gothenburg region and the city of Gothenburg (initiator) that aims to actively reduce climate impact. GCP offers members advice on process management, communication and impact analysis linked to specific projects or challenges governed by business needs.

Mistra Urban Futures was established as an international research center in 2010 in order to work for a sustainable urban development through trans-disciplinary research in collaboration with local and global stakeholders. There are four centers in middle-sized cities involved in the collaboration: Gothenburg, Sheffield-Manchester (UK), Kisumu (Kenya), and Cape Town (South Africa). In Gothenburg, the board and main stakeholders in the local transdisciplinary research platform are Chalmers University of Technology, Gothenburg University, the Swedish Environmental Institute; Västra Götaland Region; the county administration of VGR; the Gothenburg Region; and Gothenburg municipality. The strategy of the international center focuses on research that supports change and transformation for enhancing sustainability; co-creating among science and societal stakeholders; through the network of the center, focusing on global challenges; and with cities as important contributors for the work on globalization, climate change, and growing inequalities.

Gothenburg Science Parks. Through three local science parks (Johanneberg, Lindholmen, and Sahlgrenska), there are linkage to international research clusters.

Gothenburg sister cities and other cities. International sister cities are Lyon, Shanghai, Port Elizabeth (South Africa), and Chicago. In addition, there are linkages with Scandinavian cities.

4.4 Preliminary observations on the emergence of collaborative governance and co-creational leadership

This chapter provides an overview of the institutional and political conditions in Gothenburg that has constituted the historical and current policy space of maneuver under which the actors within the city have interacted to design and operate (new) climate policies, institutions, goals and programs. Our investigation has been motivated by a search for new forms and extent of collaborative governance emerging between key actors internally and externally in response to complex climate problems. The outline of the chronology of key climate policy events over two decades points to related institutional change, continuity & disruptions, as well as innovations in terms of new experiments, partnerships and networks.

The city of Gothenburg – represented by an array of municipal agencies and politicians - has had a vision that the city shall be a forerunner in environmental and urban development and be one of the most progressive cities in the world when it comes to rectifying climate and environment problems. To this end, we have found evidence of a rich history of co-development of relevant climate policies and programs among a variety of public and private actors framed within a broad approach to a 'sustainable' and 'fair' city. Important research has been produced by the local academic institutions – frequently in tandem with key stakeholders - to provide substantive research-based evidence to back up the development of policies, strategies and programs on climate-related policies. The strategies are systematically brought together in a distinct ‘Gothenburg model’ of planning.

The findings indicate that the municipal leadership – including in the Environment Administration - developed goals and policies, changed organizational structures and created arenas and networks for collaboration within the municipality as well as across public and private sectors, including also with neighbouring municipalities, the county and state agencies. The city has engaged in various national and European climate networks.

Despite the development of substantive collaborative climate strategies within the Climate Program and observed progress in pursuing both climate and environmental goals, a recent review of governance and leadership within the ecological dimension of sustainable development conducted by the Environment Administration, supports our observations and suggests that the city is still facing challenges in operationalizing and reaching the Climate Program objectives (Miljöförvaltningen 2018). One of the key challenges we observe is the limited power the Environment Administration has over the implementation of the climate-related strategies outlined across sectors within the Climate Program. While the Environment Administration has the role to oversee and coordinate the implementation, it does not have the mandate to steer or allocate climate-work to other administrations or committees, even if such work might be related to achieving the goals set out in the Climate Program.

In the 2017 review, the foreword written by the Environment Administration Director, it is argued that all the five sub-goals under the strategy objective ‘Reduced Climate Impact’ will be ‘very hard or not possible to reach’ within the time limits set, even if additional measures are taken (Miljöförvaltningen 2018).

The development trend for each of these climate objectives is either neutral or negative, except for the emission of GHGs towards 2035, where the trend is positive (meaning emissions are reducing) – yet the goal will be hard to reach. Climate indicators monitored by the City Executive Office showed a positive trend in 2014 but showed a worsening trend in 2016 (Miljöförvaltningen 2018:21). To this end, the internal report argues that future developments regarding emissions are dependent on stronger interactions by a variety of actors at local, national and international

levels (Miljöförvaltningen 2018). Moreover, it is argued that in order to reach key climate objectives, the relevant plans and programs need to be implemented and budgeted more effectively, and goal conflicts tackled in the newly planned city infrastructure and housing developments.

With reference to this report, we highlight several key challenges in taking the climate agenda forward as an integrated element of the city's sustainable development approach (cf. Miljöförvaltningen 2018). First, the report argues at a general level that climate change – both mitigation and adaptation - represents complex and cross sectoral problems which do not belong to any specific sector, and, hence, need to be internalized across sectors and sector agencies. Second, and related to the first issue, there is a lack of clear division of responsibilities between key actors to address the climate and environmental agenda, both internally between the Environment Administration, other sector administrations and the municipal corporations and externally, with the private sector and civil society. Third, there are general problems at the city municipal level in outlining clear policy and program objectives; and, as generic problem, there exist too many strategic governing documents that are not easily operationalized and understood across the city stakeholders; in other words there is not a streamlined system of strategic governance. Fourth, the governing documents within the climate (and environment) area are mainly informative governance tools with limited opportunities for the Environment Administration and Environmental and Climate Committee to sanction or provide economic incentives directly attached to the program documents. These documents are mainly for informing, educating, convincing other agencies to reach objectives; hence, climate objectives may not always be prioritized in relation to other policy domains perceived important. Fifth, the report points to general problems by municipal actors in prioritizing between conflicting objectives. Sixth, there are also internal governance and leadership issues related to the operationalization of the climate and environment programs, including capacity and competence issues in the Environment Administration (in part related to temporary but rather serious staffing issues; which have now basically been resolved but affected operations for a couple of years). Seven, governance issues also relate to the limitations in mandates and available governance measures for dealing with external stakeholders and citizens, such that the Environment Administration foremost relates to the city's own organizations. This reinforces coordination and collaboration challenges both internally and with external actors.

Further institutional issues relate to how the external or national/international policy environment constrains internal management. In that respect, the division of responsibility between the municipality and the national and regional governments are not always clear. Further, the directions or guidance from the national government – in laws and policies – are not always clearly defined. For example, there is lack of clarity regarding adaptation, particularly between water laws and regulations, and building acts on managing run-off/storm-water and sea-level rise. In other words, there is lack of clear guidance on how the municipality should handle risks and vulnerabilities.

However, despite the acknowledgement of the city's strong dependence on citizens and other non-municipal actors at national and international level for achieving the climate goals, the Environment Administration does not seem to engage in any active influencer role within the strategic environmental and climate work towards citizens, businesses or organizations; this is also not part of its mandate (Miljöförvaltningen 2018:14). An exception is the work the Administration does through environmental inspections and food control. The limitation in its mandate and governance approach seems to hamper the work on climate change, particularly in terms of developing and enforcing 'hard' policy measures.

Moreover, there also seem to be some general governance issues arising from the overall political-administrative structure of the city organisation that we will look further into. Preliminary observations suggest for example that at the Committee level in the city administration, a common pattern is that policy or program proposals are often postponed ('bordläggas') or

returned to the Administrations for reformulations, often spurring several rounds of deliberation at the committee level. This process delays both planning and implementation and enhances capacity issues of the committees.

Other issues to be studied further are the concrete implementation of policy measures and the way in which public officials and decision-makers view measures conjunction. Taking for instance the transport sector, there are highly ambitious goals stated in the climate strategic program (25% reduction in car traffic and 80% reduction in emissions). However, the program is relatively vague in terms of suggesting/paving way for the politically hard (but effective) restrictive measures that could facilitate goal achievement. Examples of such measures are the use of higher taxes for parking or in toll roads to regulate traffic volumes; or the removal of car lanes or parking to be used for cycling or public transport. It can be asked whether the program sufficiently addresses '*the how*' and the complexity of reaching ambitious policy goals. Research efforts will thus be put on the concrete operationalization of the defined goals of the climate strategic program (Municipality of Gothenburg 2014b).

Finally, despite the city adopting a broad sustainability approach to urban development and environmental programs, the policies adopted have not brought the adaptation and mitigation agendas together in specific programs. This may reflect the dispersed institutional responsibilities for adaptation policies, as well as for mitigation. The responsibility for climate change policies has been spread across many sector agencies e.g. the Committees of Environment and Climate, Transport, Physical Planning, Building, Water and Sanitation, Parks and Nature, Municipal Real Estate Company, and various public corporations, such as the Energy Gothenburg AB. This dispersion can be argued to indicate the sectorial silo structure of the city. It also points the lack of a strong institutional champion with strong enough mandate to lead and enforce coherent climate work (joining mitigation and adaption) across the city.

5 Oslo: Narrow CO2 fixation – strong governance

Hege Hofstad, Trond Vedeld, Anders Tønnesen

5.1 Background to urban climate governance

This chapter outlines the evolution in climate policies and governance systems in the city over the last couple of decades. The chapter brings out the evolution in the city's integrative and interactive strategies, and organizational structures, specifically related to the emerging role of co-creation in climate governance. The chapter aims to shed light on the city's specific paths to ambitious urban climate governance i.e. in terms of mitigation, adaptation and climate equity.

The chapter proceeds by, first, providing a background on the city and the context for climate governance related to political structure, socio-economic and climate context. Second, the chapter outlines the main climate governance approach. Third, the chronology of key climate policy and institutional events is outlined focusing on the mix of governing instruments and hybrid forms of governing (in table form). Fourth, the emergence of key partnerships and governance networks (local and international) is referred. Finally, some preliminary observations on the extent and emerging forms of co-creation are provided.

The city is governed under a parliamentary system. Oslo is presently governed by a left-leaning coalition government consisting of the Labour Party, the Green Party and the Socialist Party. It has a well-functioning economy and low unemployment. The city is an administrative city but with a considerable knowledge based industry and harbor.

5.1.1 The governance system in Oslo

Oslo is the capital of Norway with 683 794 (2019)[57] inhabitants. A city government (byrådet), which is elected according to the principles of parliamentarism governs Oslo[58]. Thus, the city government derives support from a majority in the city's "parliament" or the city council (bystyret). It governs as long as it is provided support by the city council. Oslo is presently governed by a left-leaning coalition government consisting of the Labour Party, the Green Party and the Socialist Party.

The city government consists of up to eight members, called "byråder", i.e. "governors". They are headed by a governing mayor. They are responsible for the administration of the municipality, and for making political proposals to the city council and implementing the political decisions made by the city council. Each governor heads a department in the same vein as a minister manages a ministry at the national level. Each department has relatively limited human resources of its own. But it oversees several underlying city agencies and offices that together make up each department and the overall city administration. The city government and the city council have authority to instruct the city administration. The organigramme of the city administration is provide in the footnote[59].

The city council, Oslo Parliament, is the city's supreme body. It consists of 59 elected representatives, democratically elected every four years. A mayor heads the city council. Compared to the head of the city government (byrådsleder) which is the one that governs and execute policies, the mayor of Oslo has a more ceremonial role apart from her role as the administrator of the city council. The city council determines the main lines in the development of the city and the municipality's services, including the distribution of the city's finances. Eight

[57] https://www.ssb.no/kommunefakta/oslo
[58] For more information, see https://www.oslo.kommune.no/politikk-og-administrasjon/politikk/slik-styres-oslo/
[59] Downloaded from (downloaded march 2018): https://www.oslo.kommune.no/getfile.php/1315869/Innhold/Politikk%20og%20administrasjon/Politikk/Slik%20styres%20Oslo/Organisational%20chart%20City%20of%20Oslo.pdf

operative political committees handle political cases according to each one's specific policy focus area (finance, environment & transport, health, education). The political composition of these committees is based on proportionate representation.

In addition to these central municipal bodies, Oslo has 15 district councils responsible for the decentralized municipal tasks. These councils supervise and control the district administration and the specific, limited services performed there.

5.1.2 Socio-economic context

The city has strong constitutional and political mandate to govern its own affairs, including wide autonomy in matters of governance, planning, land use, transport, water resources and running of its economy. Oslo has a well-functioning economy and low unemployment (3.2 %). The overall Oslo budget was USD 8.0 billion (2017), out which the capital budget was USD 1.6 billion and the operating budget USD 6.4 billion.

The city is an administrative city with a considerable knowledge based industry and an important container port, as well as growing tourist and service industry. The city includes an active business society and civil society; both of which are engaged in the climate agenda through formal and informal networks and arenas. The city encompasses the largest and third largest national university; University of Oslo and Oslo Metropolitan University, in addition to several university colleges, business schools and research institutions.

The city has a well-developed public transport system (metro, tram, train, buses) yet there is also high reliance on private transportation to work and for leisure travels (private cars and buses). The city has subsidized electric cars and is among the cities in Europe with highest density of electric cars. Table 5.1 summarizes key socio-political context factors in Oslo.

Table 5.1: Key socio-political context factors in Oslo

	Oslo
Area	454 km²
Population	673 469[60] (1,2 million in greater Oslo)
Population growth rate	1.27% (2016)
Unemployment	3.2 %
Annual municipal budget/pr. capita[61]	USD 8.0 billion/ USD 12 000
Number of employees	50 000
Political leadership	Coalition between Labour Party, Socialist Party, Green Party

During the last 15 years Oslo has been a fast-growing city, even if more recently the population increase has slowed down. Oslo needs about 50,000 new homes towards 2030. The location and construction of these buildings will affect Oslo's climate footprint through the choice of material, energy solutions and the mobility patterns they generate (City of Oslo 2018a).

Social conditions influence the policy space for introducing climate response measures that represent economic, judicial and behavioural restrictions for citizens, public agencies and the business community. For example, Oslo's restrictions on down-town car use through toll rings and removal of parking lots meet opposition and most recently met with open protests and

[60] The growth are and will be lower than the last 10-15 years, but in a longer historical perspective it is still strong (Oslo 2018:32, kunnskapsgrunnlaget)

demonstrations[62]. The opponents argue that enhanced fee and new toll roads unfairly affect the economically vulnerable the hardest. However, nearly half of Oslo's population supports the overall goals of the green transition, while ca 20 % are neutral and 1/3 are negative[63]. Klimaoslo.no reports that a large majority of the population supports the overall climate goals of the city (www.klimaoslo.no).

Oslo has higher than average income per capita than the mean for Norway, but a larger share of households with low income (10 % vs. 6 %[64]). Hence, Oslo is a socio-economically divided city; the eastern city districts have a larger share of households with low income.

Oslo states that the climate strategy towards 2030 should address inequality and contribute to promote public health (Oslo 2018:32-33). Thus, consideration of positive and negative public health consequences of climate measures are about to become an integrated part of the climate strategic work (ibid).

5.1.3 Key climate mitigation and adaptation issues

Oslo resides in the end of the fjord of Oslo in the Southeastern part of Norway. The city is surrounded by the sea to the south, a large forest, Nordmarka and Østmarka, to the North and East, and an adjacent urban area to the West. Oslo metropolitan area is rather hilly and includes a mosaic of rivers and streams that runs North-South through the city into the fjord (above or below ground level).

The climate changes taking place in Oslo are representative for Norway in general; the climate will continue to get warmer and wetter (Oslo 2018b:19). The average temperature in the Oslo Region has increased by about 2 degrees since the measurements began in the early 1900s, and precipitation has increased by 18 %. The increase in precipitation is primarily due to an increase in extreme rainfall, not in the number of precipitation days. However, compared to other cities in Norway, Oslo is less exposed to extreme hazards due to its sheltered geographical localization within the Oslo fiord (Oslo 2018b:20). The main climate-related hazards relate to heavy rainfall, stormwater, floods and strong winds. Since 1900, the city has also experienced landslides, local earthquakes, and forest fires (ibid). In the future, Oslo is likely to experience extreme events related increased flooding, stormwater, and storm surges due to heavy rainfall and higher average temperatures. Table 5.2 summarizes climate relevant risks in Oslo.

Table 5.2: Climate-relevant risks of Oslo[65]

Climate risks	Increase in intense rainfall, stronger winds, higher temperatures
Water risks	Fresh water available and accessible to all households, some pollution issues in rivers/streams/fiord; increased stormwater and flooding a key climate change issue
Energy risks	Energy surplus country and city; challenges in making a shift to carbon-neutral and smart energy systems; CO2 emissions from transport the key issue

[62] https://www.nettavisen.no/meninger/kjellmagnerystad/byutviklingen-i-oslo-er-brutal/3423505613.html
[63] https://www.aftenposten.no/osloby/i/P3J7k5/Her-er-dommen-Dette-mener-Oslo-folk-om-Bilfritt-byliv?spid_rel=2
[64] https://www.oslo.kommune.no/politikk-og-administrasjon/statistikk/inntekt-levekar-og-sosiale-forhold/levekar/#gref
[65] https://www.oslo.kommune.no/politikk-og-administrasjon/miljo-og-klima/miljo-og-klimapolitikk/klimatilpasningsstrategi

5.2 Main climate governance approach: Climate goals and organizational structure

5.2.1 The key climate goals and (political) ambitions and visions

The developing of policies on climate mitigation and adaptation in Oslo and the Oslo region goes back in time to the late 1990s and early 2000s. An interesting aspect of the evolution process of Oslo's climate policy is that there has mostly been cross-political support and pressure to develop relatively ambitious climate goals and policies for the city. Climate policy responses and approaches to climate governance have to limited degree been politically divisive. Rather, a core trait of Oslo's climate policy is its stability over time. Moreover, the city has interacted closely with neighbouring municipalities and regional counterparts in terms of developing common land use and transport planning and mutual stimulus for climate policy development between county and state-level actors.

Table 5.3: Evolution in climate policies and strategic plans, Oslo and the Oslo Region

Year	Evolution in climate policies, strategies and plans
2003	Energy and Climate Strategy for the larger Oslo region (78 municipalities)
2005	Climate Action Plan 2030 for the larger Oslo region (78 municipalities)
2007	Report on impacts and adaptation to climate change, city of Oslo
2009	Status report – reinforced climate emission aims, city of Oslo
2011	City Ecology Program 2011-2016 with actions on reduction in climate gas emissions
2013	Climate Action Plan for Oslo including adaptation and mitigation goals
2013	Strategy for storm water management
2015	The Green Shift – Oslo's Climate and Energy Strategy Climate Adaptation Strategy Smart, safe and green: Oslo towards 2030 – Municipal Plan (2014-2030) Regional Land Use and Transport Plan (with the nearest 22 municipalities)
2016	New Climate Communication plan for Oslo
2018	Climate strategy 2030 – Proposal for a new climate strategy for Oslo on public hearing "Our city, our future. A greener, warmer and creative city with room for all" visions, goals and strategies towards 2040 - Master plan for Oslo, on public hearing Spatial strategy 2030-2050, on public hearing Map showing developmental areas and public transport hubs, on public hearing

Table 5.3 outlines the chronology of key events over a fifteen years period – related to the adoption of key strategies on adaptation, mitigation and energy of importance to Oslo's climate governance.

5.2.2 Climate mitigation

The climate strategic work of relevance to Oslo started with the three county municipalities Oslo, Akershus and Buskerud formulating a joint climate strategy for the larger Oslo region consisting of 78 municipalities. The strategy was politically adopted in 2003 and stated that the development in the Oslo region should be based on long-term sustainability principles. Oslo would adopt goals of low greenhouse gas emissions and become a pioneer region internationally. The strategy was followed by a climate and energy package that was politically adopted in 2005 providing measures and instruments for achieving the goals of the strategy, with focus on stationary energy, transport and waste.

In 2008, the Parliament instructed Oslo and Akershus county to prepare a common regional plan for land use and transport (Proposition to Parliament 2008). Such a plan was perceived as

necessary to obtain a change of direction in the development of the metropolitan region, while also to achieve national targets for climate, transport, farmland protection and biodiversity. The state was thus also obliged to support the plan, together with Oslo municipality, Akershus county and the 22 municipalities in Akershus. The 23 municipalities covered by the plan agreed on and designed a joint, more concentrated development pattern around public transport hubs in order to limit urban sprawl, and enhance the focus on developing the systems for public transport (metro, tram, buses, train), bicycle and walking. The regional plan was formally adopted in 2015 and has served as a common guide to city development in Oslo and surrounding towns and municipalities (City of Oslo and Akershus County Municipality 2015).

Oslo city's climate policy evolved through close dialogue with the partners preparing this region land use and transport plan. Two reports, one on climate impact and adaptation, and one on climate gas emissions constituted the knowledge basis for the first plan with expressed aims on climate mitigation, namely the "City Ecology Program 2011-2026" (City of Oslo 2011). In this program, the climate policy is perceived within a broader sustainability and ecology framework. However, the program includes specific climate aims; the overriding 2011-climate goal of the city is to reduce climate gas emission with 50 % by 2030 (compared to 1991 level) and become climate neutral by 2050.

In the spring of 2015, the center-right city government of Oslo presented its proposal for a new Climate and Energy Strategy, the so-called *Green Shift* (City of Oslo, 2015). The plan was prepared with substantive input by professional experts and representatives of the business sector and put out for public hearing. The aim of this strategy is 'to institute substantial changes in how we as a city function, and we call this the green shift' (City of Oslo, 2015: 3). The green shift is about spurring a transition to a sustainable society based on renewable energy (City of Oslo, 2015). The Action Plan includes 76 new climate and energy initiatives across 16 administrative sectors. This results in decentered efforts across administrative departments and agencies to fulfill the disaggregated climate goals, with monitoring and systematic follow up as a part of the city budget (Oslo 2016a).

Soon after the formal adoption of the green shift strategy in June 2015, the local election in September 2015 resulted in a political shift with considerable consequences for the implementation of the climate and energy strategy. A new left-green city government replaced the right-center city government. The new city government had an expressed goal of accelerating the implementation of Oslo's ambitious climate goals. The government revised the green shift strategy in ways that maintained the original goals, but shortened the timeframe for their realization and developed several important new measures and instruments (City of Oslo 2016b). In June 2016, the new climate and energy strategy was formally adopted (City of Oslo 2016c).

Figure 5.1: The development in Oslo's climate goals under shifting governments (from Hofstad and Torfing 2017).

Starting from the left, Figure 5.2 illustrates the dynamic between the shift in city government and the acceleration of the climate goals.

The original goals of the right-center city government were to: 1) cut CO2 emissions by 50 % in 2030 (compared to the 1991 emission level) and 2) reduce emissions to zero by 2050 (City of Oslo, 2015). The new and revised version of the climate and energy strategy aims to accelerate the fulfillment of the climate goals by 1) cutting CO2 emissions by 50 % already in 2020 (compared to the 1990 emission level) and 2) cutting CO2 emissions by 95 % by 2030 (compared to the 1990 emission level) (City of Oslo 2016b).

5.2.3 Climate adaptation

The approach to adaptation in the city involves to build climate awareness into the work of key sector agencies, in particular as concerns water and sanitation, but also related to transport, planning, building, leisure, preparedness, health and welfare. The White Paper no. 33 (2012-2013) Climate Change Adaptation in Norway reinforces the role of the municipality in adaptation; stating that 'the local character of the impacts of climate change puts the municipalities in the front line in dealing with climate change'. Subsequently, the adaptation work in Oslo becomes guided by the Climate Adaptation Strategy, which was approved in 2015.[66]

The work on adaptation in the municipality commenced, but did not figure prominently, in the Oslo region's Energy and Climate Strategy in 2003. Substantive work on adaptation only started with background research work by CIENS researchers around 2005-06, resulting in a CIENS report to serve policy development (CIENS 2007:1). According to this report, adaptation had not been included in the Municipal Plan, although potential sea level rise was recognized in the plans for the Fiord City (waterfront development). Moreover, climate considerations related to flooding was a concern in e.g. development along main rivers and new urban settlements. The opening of rivers gained momentum at this stage among others through dialogue with Oslo River forum (Oslos Elveforum) which is an NGO working for the management and protection of the city's many rivers and streams.

A key focus of the adaptation work was on storm water management and flood risks, which included the preparation of flood zone maps (e.g. along Akerselva following heavy rains in 2000) and identification of 14 flood exposed and vulnerable areas. The management of storm water through local infiltration and sinks had already been carried out since the 1980s. The municipality embarked upon a plan for protection of green areas, inspired by similar work in Germany, in order to build flood resilience. Regarding physical infrastructure improvements were made in storm water drainage and cleaning, recognizing that these get filled through litter and run off silt and sand annually.

The work on adaptation always related to safety and preparedness issues and was in part motivated by the demand in the Plan and Building Act (revised 27th June 2008) and the Civil Protection Act for the undertaking of the municipality of a complete Safety and Vulnerability Analysis (ROS). This ROS-analysis was to be integrated in the municipal government steering along with responsibilities for other sectors. A non-commercial organization or network for the water sector (Norsk Vann/Norwegian Water) – which includes municipalities (370 in number) and municipal owned water plants - prepares guidelines for ROS analysis and plans and capacity training (assisted by engineering consultants such as SINTEF and Norconsult.

Four key municipal documents define the adaptation strategy, projects and actions today; i) The Municipal Plan 2015 – Oslo Towards 2030 (City of Oslo 2015): Smart, safe and green; ii) The Climate Adaptation Strategy for the Municipality of Oslo (City of Oslo 2013); and iii) The Strategy for Stormwater management in Oslo (2013-2020) (City of Oslo 2013b); and, finally iv) The latest Climate Strategy 2030 (City of Oslo 2018).

[66] https://www.oslo.kommune.no/politikk-og-administrasjon/miljo-og-klima/miljo-og-klimapolitikk/klimatilpasningsstrategi

The adaptation strategy[67] covers in particular water in the city, land use, buildings and infrastructure, health consequences, and nature and ecosystems. The plan states that climate adaptation will be included in ordinary plans, budgets and governance systems – while ensuring that strategies, plans and measures are coordinated and challenges met in a holistic manner. An Action Plan was developed to engage a set of municipal agencies in the work and measures included to insure coordination across these agencies (Kjerschow pers. Mess 2016).

The Strategy for Storm water management was developed in parallel to the adaptation strategy. This strategy also states the need to collaborate across sectors and interests to meet the challenges. The Strategy includes a Steering Committee with representatives of four key municipal agencies; Agency for Water and Sanitation (chair), Agency for Urban Environment, Agency for Real estate and Urban Renewal, and Agency for planning and building services. Other agencies involved are the Agency for Emergency Planning and the Cultural Heritage Management Office. The focus is on the use of open and local land-use solutions, meet climate change challenges and minimize damage to people, buildings, property and infrastructure; safeguard the environment; and utilize stormwater as a resource. The focus is threefold; on review of laws and regulations; management of urban flooding; and sustainable urban drainage systems, involving eighteen measures and five focus areas.

5.2.4 A new, coherent strategy combining mitigation and adptation

In the proposal for new climate strategy in late 2018, the city adjusts its previous climate mitigation goal to the following:

Oslo's direct greenhouse gas emissions shall be reduced by 95 % by 2030 compared with 2009 levels. The goal includes all sectors in the official greenhouse gas emissions statistics (Oslo 2018c:12).

According to national statistics, the emissions of CO2, which is the primary focus of Oslo's climate strategy, increases between 1990 and 2009[68] (Oslo 2018b:41). Hence, the change of reference year represents a reduction in Oslo's overall climate ambitions (Hofstad and Torfing 2017). Still, the 2009-goal encompasses two additional very important emission sources, aviation and shipping.

Another aspect of the new goal is that it underlines that emission calculations shall only concern Oslo's *direct* greenhouse gas emissions. Oslo's goal refers to (scope 1) emissions where the source of the emissions is located within Oslo's administrative borders (cars, stationary energy, ships at the harbour). It does not include emissions generated by Oslo's consumption, or from the energy used in producing the goods and services that Oslo's citizens consumes (scope 2 and 3).[69] However, in the knowledge basis prepared by the Climate Agency staff for the proposal to Oslo's new climate strategy, indirect emissions are brought up as a new explicit concern that requires attention. It is, however, recognized that indirect emissions are a new area for Oslo. Moreover, it is also accepted that the data basis of these emissions at present is highly uncertain (City of Oslo 2018b:49). The most important indirect emissions stems from use and consumption in relation to housing, travels and food (City of Oslo 2018b:86). Moreover, the city administration also controls certain indirect emissions, among which the construction of buildings and

67 https://www.oslo.kommune.no/getfile.php/13191827/Innhold/Politikk%20og%20administrasjon/Etater%20og%20foretak/Klimaetaten/Dokumenter%20og%20rapporter/Klimatilpasningsstrategi%20for%20Oslo%20kommune.pdf

68 http://www.miljostatus.no/tema/klima/norske-klimagassutslipp/

69 Since the formulation of the previous climate goals of Oslo, the focus on indirect emissions has increased not only in Norway, but also internationally. In the international discourse on accounting for greenhouse gas emissions and calculating the carbon footprint, one differentiates between three forms of emissions that becomes important in Oslo's new policy. Scope 1 emissions are direct emissions produced by the burning of fuels of the emitter69. Scope 2 emissions are indirect emissions generated by the electricity consumed and purchased by the emitter. Scope 3 emissions are indirect emissions produced by the emitter activity but owned and controlled by a different emitter from the one who reports on the emissions.

infrastructure are considered the most important (ibid). The city administration is currently working to specify and operationalize climate friendly procurements and sustainable and circular consumption principles. This work involves developing a better data basis for measurement of emissions from indirect sources (City of Oslo 2018b:49).

A third aspect of the climate strategy proposal is the combined focus on climate mitigation and climate adaptation and the attempt to develop a more coherent climate strategy. The city aims to be climate resilient by pursuing the following adaptation goal: 'The city must as far as possible withstand undesired consequences of climate change' (Oslo 2018c:12). The climate mitigation and adaptation goals are combined in a coherent manner 14 prioritized strategic areas (Oslo 2018c:10-11), involving *inter alia*; utilizing Oslo's large urban forest areas for carbon storage; enhance adaptation to prevent consequences of climate change; development of compact city housing areas with densification around public transport hubs while maintaining blue-green structures; develop climate-friendly transport and sustainable mobility; zero-emission harbour and shipping; emission-free construction sites; circular-based handling of waste and drainage; efficient and reduced use of energy; from fossil to renewable stationary energy; flexible and resilient energy supply; procure services and goods with a low climate footprint; inspire and create understanding for climate friendly behaviour; facilitate green innovation through close collaboration between the municipality, business community and academia; and, finally, develop and enhance urban climate governance.

A fourth, somewhat less specified novelty in the strategy document, is the proposal for a more holistic perspective in the climate policy action approach that combines climate and social equity policies. This perspective is not specified in the climate strategy document itself, but it is visible in the knowledge basis for the strategy and the recent formulated political platform of the city government (2018). This policy platform states that the climate strategy should contribute to societal development that promotes public health, address social health inequalities and considers welfare and distributional issues (City of Oslo, 2018b:32-33). The platform furthermore includes an expressed intent to make visible climate consequences *and* distributional consequences in all relevant political propositions to the city council (Political platform 2019:7). This political platform also introduces a set of 'Oslo promises' signaling a more holistic or coherent approach to climate and city development. One of these promises states that Oslo will create more green jobs and act to get more people into the job marked (Political platform 2019:4). A manifestation of this intent is the agreement between the city of Oslo and the Labour Organisation (LO) for involvement of workers in decision making about climate transformation in order to safeguard a just transition. This reflects the Paris Agreement and ILOs conventions on workers' rights (Ibid:42). Combined, these aims and measures signal a willingness to widen the scope of the city's climate policies to include also social aspects.

5.2.5 Climate governance approach

Core politicians in Oslo acknowledge the need for accelerated climate action to reach the ambitious climate goals;

"The city government's goal is to make Oslo into an environmental capital. Oslo shall function as a good example as a climate smart, inclusive, and diverse city," says governor for city development Hanna E. Marcussen (City of Oslo, 2016d). She is accompanied by the governor for environment and transport Lan Marie Nguyen Berg, who says:

"*Climate measures are not going to be implemented somewhere else, in another place, or by someone else. Oslo must take responsibility and use all available municipal means to act here and now"* (City of Oslo, 2016d).

Hence, the city government is encouraged both by core politicians and key policy documents to speed up the implementation of policies, specify priorities, tasks and actions, enhance organizational capacities and make climate change mitigation the responsibility of the municipality

as a whole (City of Oslo, 2016b). This calls for substantial changes involving innovation in mindsets, institutions and organizational systems, as well as in technology, production systems and urban infrastructures. The city aspires to be a “test bed for innovation and cooperation” (Monsen, 2016). Oslo’s ‘green shift’ is about stimulating innovation within the public sector and society at large.

How will Oslo stimulate innovation? According to the city government, it will deploy a combination of direct and indirect measures when implementing the climate and energy strategy, summarized in Table 5.4 (City of Oslo 2016a:5).

Table 5.4: Climate governance: Direct and indirect measures (adjusted from Hofstad and Torfing 2017).

Direct measures (mainly internal, integrative, regulative)	**Indirect measures (mainly external, interactive)**
• Annual budget, linked to an innovative climate budget to align entities for climate action and strict monitoring and reporting • Municipal acquisition/procurement • Municipal own estate management (management through ownership) • Available financing/subsidiaries arrangements • Use of formal authority and regulatory powers (laws, regulations, planning system, toll rings) • Oslo’s financial/economic support for citizens and local businesses	• Communication with citizens and private sector • Competence building • Involvement of citizens in planning and governance • Collaboration with business and academic communities and NGOs in partnerships, networks, co-creation arenas and platforms

Direct measures are a type of measure for which the city government of Oslo has considerable control and can prioritize action in ways that have a direct impact on emissions (City of Oslo, 2016a:5). Oslo’s annual budget, which sets priorities and allocates resources for each department and entity, is a core example of a direct measure and possibly the key internal governing instrument. Indirect measures have a more indirect effect on emissions, while they are key to align and mobilize relevant and concerned public and private stakeholders (City of Oslo, 2016a:5). Business for climate network and a variety of stakeholder collaborations are examples of indirect measures that carry the potential of either enhancing the effect of existing measures or creating new and innovative measures that rely on co-production, co-creation and co-governance.

Currently, Oslo’s climate governance is mostly concentrated on direct measures, although increasingly the city directs attention also to indirect measures. A core innovative governing tool for the climate governance is the climate budget which is operated by the Departments of Finance and the Climate Agency in concert. The climate budget is closely tied to the financial budget in both process, design and implementation (City of Oslo 2018b:82). As a governance tool, it works to assemble and align internal departments and entities across sectors for shared climate goals. It ensures that each sector entity adopts decentred CO2-reduction activities and pursues relevant climate action with internal and external stakeholders. The design and implementation of each climate budget is a two-year process. The first year is used for planning and investigating potential CO2 reduction measures across sector and activities. In the second year, the actual fiscal year, progress is reported by each municipal entity responsible for implementing a given climate measure. The detailed and relatively strict monitoring and reporting system constitutes a strong governing tool for implementation follow-up and assessment of outcomes in terms of reduced CO2 emissions by each activity (cf. Ostrom, 2010). Each entity reports three times a year; first and third quarter, and at the end of the year. The report

summarizes the status for the measures each entity is responsible for, and a judgement of whether the progress is according to plan (City of Oslo 2017). As such, there is organizational learning involved in the interactive processes. Oslo has developed a set of climate indicators that captures the development in emissions from each activity (even if there are delays and a few issues in the collection of timely and high-quality data; proxy indicators being utilized for certain activities). These indicators are published at www.klimaoslo.no in rhythm with the reports from the municipal entities. Although focus is to a large degree on quantifiable measures, non-quantifiable measures are recognized and included in the climate budget.

In addition to the climate budget, climate concerns are included in the letters of assignment sent from the city government's departments to each of the underlying agencies and entities, with reference to the activities outlined in the climate budget. Thus, high degree of consistency in design and operations is secured throughout the municipal administration and its external bodies and agencies (e.g. Environmental Agency, Waste and Recycling Agency, Agency for Urban Environment). Additionally, climate criteria are also built into the design of new procurement systems/rules and into all major municipal investment decisions (City of Oslo 2018b:83). However, these systems are not yet fully internalized. For example, informants suggest that there are no systematic internal structures developed to assess climate concerns in relation to other concerns in the tendering evaluations. Other governing aspects that awaits further development, is to consider how indirect emissions, such as emissions from the forest, land use changes and climate adaptation may be included in the climate budget. Despite such governing challenges, Oslo has taken important steps towards a more administratively stringent and consistent governance of climate responses.

5.2.6 Organizational institutionalization of climate mitigation and adaptation

This section focuses on an exploration of the key climate-related organizations and climate-leadership actors that drive and execute the climate policies of Oslo. The execution of climate leadership in the city can be perceived at different levels and scales:

- *Politically,* mainly by the Governing mayor and the Governor for Environment and Transport

- *Strategically* mainly by the administration of the Governor for Environment and Transport

- *Administratively* largely by the Climate Agency in collaboration with other departments and agencies, such as the Agency for Urban Environment and Waste-to-Energy

We concentrate the analysis mainly on the institutional evolution of the *administrative* climate leadership. The political and strategic leadership have been touched upon in previous sections.

The administrative follow-up of Oslo's climate mitigation ambitions was from the outset allocated to the Waste-to-Energy Agency of Oslo (prior to 2012). This helps explain why the main focus of the strategic work initially was on energy and climate-related energy issues. There was also a wider climate and adaptation focus included in the specific City Ecology program (City of Oslo (2011). From about 2012, a group of officials from the Waste and Recycling Agency was given a special assignment as a Climate Program Unit under the auspices of the Governor for Environment and Transport to produce a new strategy. This task force developed the Climate and Energy Strategy for Oslo, referred to as "the Green shift", which was finalized in 2015/2016. During the planning period for the strategy the task force engaged Oslo's various administrative entities in setting the goals of the strategies. Organizationally, these entities were placed in cross-sectoral thematic networks that developed and reported on each target in the strategy. A group of 120 professionals, most of them from the private sector, were also engaged to provide input. The final Strategy states that each sector/agency of the municipality is responsible for mobilizing citizens, business and others to develop Oslo into a leading environmental city, while indicating what role key actors should play. In 2016, the task force was dissolved, and the new Climate Agency was established to enhance internal capabilities and provide the climate agenda with an institutional home. During 2016 and 2017, the agency was staffed up and today constitutes a unit

of about 30 professional employees. From 2016, the Climate Agency is allocated the policy and strategic responsibility for both climate mitigation and climate adaptation; adaptation having been with the Agency for Urban Environment. Table 5.5 summarizes the evolution in the administrative institutionalization of the climate change policy in Oslo.

Table 5.5: Evolution in the administrative institutionalization of climate change in Oslo

Year	Climate change mitigation	Climate change adaptation
2000	Waste and Recycling Agency	Agency for Urban Environment
2012	Program Unit on Climate and Energy Strategy established	
2016	Climate Agency	Climate Agency

The core administrative actors constituting the leadership for strategically designing and implementing the climate change policy of Oslo are outlined below.

The Climate Agency

The Climate Agency's main task is to be a driver for the 2020 goal (50 % cut in greenhouse gas emissions), establishment of carbon capture, provide the basis for goal attainment in 2030 (95 % cut in greenhouse gas emissions), and make sure that Oslo is well adapted to a changing climate (City of Oslo 2018d:4). This involves to be the city's primary climate specialists taking responsibility for the follow up of the climate and energy strategy, the climate adaptation strategy, as well as the day-to day responsibility for the climate budget (laying the professional foundation, being a counselor and driver of execution) (ibid). Thus, they play a mobilizing and coordinating role involving collaboration with city agencies, city districts, municipal enterprises, city government departments, citizens, the business community, R&D environment, organizations and public authorities. The Climate Agency also manages the Climate and Energy Fund in Oslo funding the introduction of various green solutions – chargers for el-cars, el bicycles, solar cell panels, and replacement of oil fueled ovens with environmentally sound firewood ovens.

The Agency for Urban Environment

The Agency for Urban Environment is a large administrative unit with approximately 750 employees. The agency is an amalgamation of five former administrative units (from 2010-2011). They have responsibility for all aspects of the urban environment – infrastructure for transport, outdoor recreation, sports, management and cleaning of urban space, and environmental health. Their main task in Oslo's climate work is to follow up Oslo's aim to create a car-free city environment, arrange so that the citizens have the ability to live sustainable lives by focusing on urban agriculture, creating sustainable mobility opportunities, and develop measures ensuring a healthy and resilient urban environment (City of Oslo 2018e).

The Waste and Recycling Agency

The Waste-to-Energy Agency's main role is to secure an efficient, technically optimal management and development of waste and energy solutions that prioritizes the environment and climate (City of Oslo 2018f). Production of biogas and bio fertilizer from waste are among the core task. The Agency operates according to full cost recovery – i.e. fees are payed by the citizens to cover the expenses.

The Agency for Planning and Building

The Agency for Planning and Building has the responsibility for strategies and projects concerning Oslo's urban development and land use. The Agency consists of 450 employees. It is a main actor in securing that Oslo becomes "a green, zero-emission city" through follow up of the regional plan, the city's master and land-use planning, and area-specific plans (City of Oslo, 2018g). Furthermore, the agency shall secure urban growth with quality i.e. attend to and strengthen blue-green structure, building of social infrastructure and promote green mobility (ibid).

General expectations to all administrative entities

All administrative entities of the municipality are expected to take responsibility for reducing climate change impacts, among others through green procurement and by requesting climate-friendly solutions for attaining Oslo's climate goals (City of Oslo, 2018h). In addition, these departments and entities are expected to collaborate across sectors, and to mobilize citizens, business community and others to contribute to the development of Oslo as a leading, green city (ibid).

5.3 Creation of partnerships and governance networks

Most of the efforts to reduce emissions rely on interaction with core stakeholders such as citizens, business, private organizations, other municipalities, regional authorities and the state. Knowledge sharing is critical for making well-informed decisions; coordination is important in order to prevent overlaps, gaps and conflicts and to create synergy; and collaboration helps to develop new, innovative and disruptive climate solutions and secure ownership of their implementation.

The city of Oslo has over time engaged in convening and facilitating public and private actors into a variety of multi-actor networks and collaborative arenas. In this section we present how Oslo works and have worked to engage and mobilize external actors and briefly introduce some key networks and partnerships of importance to Oslo's climate strategic work.

5.3.1 Civil society and citizen involvement

The various municipal agencies are bound by law and do utilize a diversity of *public hearings, workshops and collaborative efforts with civil society* to exchange views on climate policies and responses. Both the Climate Agency and the Agency for Urban Environment have established procedures for consultation and public hearing on policies, strategies and local adaptation projects utilized to engage citizens and civil society and generate input to, and support for, the development of new climate solutions among local associations and citizens. In particular, local adaptation projects related to water resources management and green structure improvements are undertaken with considerable citizen and civil society involvement (e.g. Bjerkebekkdalen, Hovinbyen, Groruddalssatsinga). Another example is the collaboration between the Agency for Urban Environment and Oslo River Forum, an NGO engaged in Oslo's approach to opening of streams and rivers to protect the green environment and strengthen storm water management.

The city of Oslo also strives to engage citizens on a broader basis. First, on an operational level, the Climate Agency has developed an elaborate communication strategy to engage citizens in making the city a green livable city by stimulating behavioural changes through positive examples[70].

Second, on a strategic level, the Planning and Building Agency adopted a broad-based public hearing approach to the new Municipal plan in 2017, which involved sending personal sms's to all

[70] https://www.klimaoslo.no/

citizens and received a large number of inputs. The agency engaged in discussions about the plan which involved a reinforcement of the city's approach to compact city development around public transport hubs and other key measures to promote the 'green shift'.

5.3.2 City networks

The Climate Agency has established a *Business for Climate Network* which constitutes an arena for collaboration between the city of Oslo and a broad range of private firms from the Oslo region on climate friendly development. The Climate Agency holds the secretarial function of the network and is the agency's main channel for climate dialogue with the business community (City of Oslo 2017:23). Key private and public corporations are members. To become a partner in the network implies an invitation to take active part in relevant seminars and arrangements, while each partner organization is required to contribute to enhance Oslo's climate goals and carry out climate proofing in own business organization and report on progress annually[71]. About 200 among the cities' most prominent firms are today members of the network and high-level meetings are held regularly.

5.3.3 National networks

The city also takes part in *FutureBuilt (2010-)* which constitutes a ten-year program to develop climate neutral housing areas and architecture of high quality. This is an on-going network between the city neighbouring municipalities and counties and private actors.

The *Future Cities Network* (2008-2014) was an early national network initiated by the Ministry of Climate and Environment to enhance collaboration between the state government, the Municipal Union (KS) and thirteen city municipalities in Norway to reduce climate emissions, including Oslo. The work within the network motivated Oslo's work on climate change. The city developed its own Future Cities program and included climate and energy concerns in its Municipal Strategy for the first time in 2008. The network promoted rather ambitious climate change goals, initially mainly related to mitigation issues, but it relatively quickly moved to involve also adaptation goals and measures. The main aims of the adaptation work within the network were to develop competence, ensure ways of integrating climate adaptation in municipal governance and planning, develop methodologies for adaptation assessment, policy and guidelines development.

The *Large City Network (Storbynettverket)* is a network of the largest cities in Norway; Stavanger, Bergen, Trondheim and Oslo, which was formed in 2014, under the new government. It was in operation until 2017, and was then dissolved by the same government.

5.3.4 Partnerships with civil society

The Climate Agency and most key entities of the municipal administration engage with civil society in various capacities and also develops more formal partnerships to this end. For example, a civic organization ZERO was hired to provide a secretarial function to the Large City Network. ZERO is an important civil society think tank located in Oslo with the aim to share experiences on climate mitigation work. The Climate Agency also work closely with Bellona, another key civic think tank, on fossil free construction sites and machinery. Bellona provides support and guidance, as well as critical perspectives, on the city's climate change policies.

5.3.5 International networks

The city is an active participant in C40 Climate Leadership Network, ICLEI's climate initiative and various European and international networks on climate change (notably Eurocities and Carbon Cities Neutral Alliance (CNCA)). The participation in these networks provides opportunities for policy learning, capacity strengthening, influence and branding as a green, climate friendly city.

[71] https://www.oslo.kommune.no/politikk-og-administrasjon/prosjekter/naring-for-klima/

C40 Climate Leadership Network is a network of the world's megacities committed to addressing climate change. C40 supports cities to collaborate effectively, share knowledge and drive meaningful, measurable and sustainable action on climate change. Oslo is a so-called innovator city. Innovator Cities are smaller cities that have shown clear leadership in environmental and climate action. C40 is a political network of cities in the sense that it is the Governing Mayor of Oslo, Raymond Johansen, that represents Oslo in the network. As a C40 member Oslo annually reports its carbon emissions to CDP Disclosure Insight Action and is compliant with the Compact of Mayors.

Eurocities is an association of large cities in Europe. Eurocities works with its member cities to influence EU legislation and policy. Eurocities is also a platform where city-experts can share knowledge and ideas. Oslo is a full member of Eurocities and Oslo experts participate in Environment forum, Mobility forum and a number of Working groups on topics such as air quality, noise, waste, water management, green areas and biodiversity, Smart city logistics & fleet management and developing a new mobility culture. The collaboration takes place at an operational administrative level.

CNCA is a collaboration of international cities committed to achieving aggressive long-term carbon reduction goals. Cities striving for carbon neutrality recognise that averting the worst impacts of climate change will require cutting GHG emissions by at least 80 % by 2050. The Alliance aims to address what it will take for leading international cities to achieve these deep emissions reductions and how they can work together to meet their respective goals more efficiently and effectively. The collaboration takes place at a strategic administrative level.

Furthermore, Oslo has signed several international initiatives relating to sustainable development. The most known are the Covenant of Mayors, Aalborg commitments, the Mexico Pact, Compact of Mayors, The Paris City Hall Declaration, as well as UN Global Compact and Earth Charter. Table 5.6 gives an overview over the most important local, national and international networks and partnerships Oslo are members of.

Table 5.6: Key local, national and international climate networks by year

Year	City-level	National	International
2000			ICLEI conference organizer in 2002
2008		Cities of the future	
2010	Business for Climate	Future Built	
2012			C40 Eurocities (uncertain year)
2014		Large cities climate network	CNCA (uncertain year)
2017	Climate communication strategy		

5.4 Preliminary observations on the emergence of collaborative governance and co-creational leadership

The climate leadership of Oslo seems to have a clear understanding of the need to spur integration internally and interaction externally between public and private actors in order to

exchange knowledge, information, ideas and resources and stimulate learning, and innovation. The city administration, spearheaded by the Climate Agency, has a clear focus on assemblage and organized interaction around concrete climate-related problems. This facilitates the sharing of visions and ideas between core actors which play a key role in securing policy implementation and spurring innovation and experimentation. This aspect of urban climate governance is obvious in three distinct ways. First, in how the administration of the Governor for Environment and Transport strategically leads climate policy development and in how the Climate Agency operates both hands-on and in meta-governance modes to implement the climate budget in interactive fashions. Second, climate leadership across sector entities and agencies takes on catalyzing roles by stimulating the development of new technologies in the transport (introduction of el-buses, el-machinery), energy (zero-emission buildings) and construction sector (fossil-free construction sites). There are several small and large-scale experiments on-going in new forms of smart living or green mobility related to compact city development. The city has a special focus on nurturing business cases and self-governance in the private sector in order to commercialize needed solutions. The municipal estate ownership and purchasing power is utilized to stimulate the creation of new technologies and planning solutions. Third, Oslo takes part in a wealth of different networks at city, national and international level. Of special interest and importance are the international networks C40, CNCA and Eurocities. These networks play an important role in Oslo's climate governance by being of source of inspiration, gaining international support, creating a larger market for climate solutions, receiving political support and reputation as a green city.

Oslo has put seminal effort into setting clear targets for reduction of greenhouse gas emissions and mainstreaming efforts throughout the administrative apparatus particularly by developing the climate budget as a core governing tool. It is not yet clear, however, what all these efforts will amount to on the ground in terms of emission reduction and enhanced resilience. Some policy areas and efforts need additional attention. First, and starting with the goal formulation of Oslo, the main attention today has been on addressing direct emissions (mostly), while the international climate literature and development suggest that it is important to move towards addressing also indirect emissions from consumption and the broader climate transformation agenda. The city has indicated that it will move away from the present 'CO2-fixation' to a broader sustainability agenda involving not only technological solutions and direct cuts, but also a focus on the issue of consumption. This is somewhat unspoken of in the current climate discourse in Oslo (and in Norway). Second, related to the issue of sustainability, is the need to have a broader perspective on climate change policies to capture the social and climate equity issues. If such issues are not addressed, potential political backlash may arise from climate and social equity protests, such as by the toll-ring protests in Oslo and other Norwegian cities in 2018/2019 (similar to the Yellow Vest movement in French cities). Social issues not only have an economic side, but democratic issues arise as well. Third, the city has not utilized the potentials to involve and empower citizens and them engage substantively in co-creating policies and services. Citizens have only to limited degree been directly involved in the design of new strategies, plans, or solutions beyond regular public dialogue. This is also an important aspect when striving to secure support for ambitious climate policies.

Fourth, in the latest proposal for a reinforced climate strategy (December 2018), climate mitigation and adaptation is to a larger degree seen in concert. The efforts to build a coherent strategy needs further elaboration and development. An interesting aspect of this work is to ensure a stronger integration of equity and social development concerns. The social tensions that tend to arise with more restrictive and local policy measures, such as those restricting the use of cars, the social dimensions of climate policy responses need to become of greater concern in urban climate governance.

6 The evolution in approaches to climate governance in Cape Town, Copenhagen, Gothenburg and Oslo

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6.1 Scope of the comparative analysis

The comparative analysis in this chapter outlines the emerging urban governance responses in terms of changes in climate goals, climate-related organizations, strategies, policies and the adoption of integrative and interactive governing instruments over the last two decades. First, the chapter compares key social, political and eco-climate context variables that shed light on each city's unique choice of approach to urban climate governance. Second, the chapter turns to the evolution in climate goals and strategies and the functional focus areas of these strategies related to how and when adaptation, mitigation, and climate equity issues are raised and possibly institutionalized. The focus is on whether these issues are brought together in a coherent and city-wide strategy for resilient, low-carbon, fair and sustainable futures. Third, the evolving climate policies are for each city held up against processes of institutionalization and forms of integrative and interactive change in climate-related organizational structures and city governance approaches. The concern is to understand if or how a gradual shift takes place in the strategic focus towards more integrated or holistic climate policies. Finally, the general structural characteristics of the cities' climate-related organization and urban governance structures are compared. The interactional relationships between politico-administrative representatives, and the state, private business and civil society actors in city governance are of key concern. This analysis allows a reflection of the role of co-creation in the policy and institutional change processes within and across the four cities.

6.2 Context variables: Characteristic features of the four cities

What characterizes the context within which the cities we compare are embedded? The first section identifies the social, political and eco-climatic risks characterising each city context. We suggest that context matters and clearly influences the cities' choice of urban climate governance approaches and pathways to sustainability.

6.2.1 Socio-economic features and main climate risks

Regarding socioeconomic characteristics and climate challenges, the four cities feature several differences, although there are also some important similarities especially amongst the Scandinavian cities. Only important or essential features are highlighted as a background to the comparison. Further details of the comparative overview are provided in matrix form in Annex 2.

Cape Town is a large economic hub with an important tourist- and services industry and among the four largest cities in South Africa. It encompasses a growing renewable energy sector. The city has very high GHG emissions per capita due mainly to coal-fuelled energy production, but emissions are also high from transport. The city is confronted with major adaptation issues in terms of sea-level rise/storm surge/erosion, flood risks and drought/water supply risks. The city is well connected to other South African cities and transnational city networks (ICLEI, C40, and Rockefeller 100 resilient cities). It is a highly internationally oriented city. The city has

comparatively high unemployment rates and high rates of poverty and inequality due to a socially and ethnically divided city, from colonial and apartheid planning. Important political priority is placed on social development and socio-spatial integration.

Copenhagen is the capital and the largest city and economic centre in Denmark. It has long-standing recognition as an important innovator and leader of globally connected cities on sustainability. The city has since the turn of the century experienced rapid economic development in the services and clean technology business. It has relatively low unemployment rates, even if there are also several low-income districts and obvious socio-spatial inequalities. Copenhagen organized COP 15 in 2009 and obtained the European Green Capital Award for 2012, in part due to its high presence of biking (today with an evolving system of super cycle highways). The main GHG emissions were historically from fossil-fuelled energy production; emissions from transport being second in importance. The city faces major challenges related to sea-level rise, storm water and flooding.

Gothenburg is the second largest city in Sweden localized at the country's western coast. It has a major port and is a major economic centre in Sweden with important heavy industry (car/heavy vehicle production) within the metropolitan region. Its major GHG emissions have been from fossil-fuelled energy production, but emissions are also high from transport. The city faces critical flood-level issues from the Göta River and has prioritized flood risk management. Large immigration and recent economic recessions and high unemployment rates have geared local politics towards social equity and sustainability issues.

Oslo is the capital and largest economic centre in Norway. Oslo has no polluting heavy industry and embodies mostly services and tourist and oil- and ICT-related businesses. The economy has been steadily growing and unemployment remains low. In relative terms the city is socially divided, however, largely between Western and Eastern neighbourhoods. The main GHG emission sources are from transport/public transport and heavy machinery/vehicles, but also from buildings, energy production and waste/consumption. Oslo was adopted as an innovator city by C40 in 2013 and awarded European Green Capital Award in 2019, in part due to its successful public transport system and introduction of electric cars. The city is confronted with stormwater flooding and floods from minor rivers, but overall, the city is less exposed and vulnerable to adaptation issues, such as sea-level rise and heavy rains/drought than the other cities.

The cities' unemployment rates can serve as a proxy-indicator of the large differences in socio-economic inequalities between the four cities (before the impacts of the Covid-19 pandemic); illustrating that Cape Town experiences much higher inequalities than the other cities, cf. Table 6.1. The table shows that Gothenburg and Cape Town have significantly higher rates than the other two cities; 7% and 25% respectively. Interestingly, this situation is also reflected in the two cities' greater focus on social inequality and social development in their climate and urban development responses. Gothenburg is the odd case among the three Scandinavian cities.

Table 6.1 Unemployment rate by city (sources: see Appendix 2)

Cities	**Oslo**	**Copenhagen**	**Gothenburg**	**Cape Town**
Unemployment rate	2,7 % (2019)	4,5 % (2019)	7,1 % (2018)	25% (2018)

6.2.2 The cities' political system – balancing between efficiency and representativeness

This section discusses diverse structures of the cities' political systems and their potential implications for efficient and democratic climate governance.

Background: the multilevel governing system of the cities

Before embarking upon the cities' political structure, it is important to situate the city climate governing level within the national or multilevel governing system. Each of the three Scandinavian cities and city councils have, generally speaking extensive autonomy in managing their own affairs. Yet, reflecting the Scandinavian state structure, the city governments enjoy substantive intergovernmental relationships with a strong central government in key policy domains (reflecting a decentralized unitary state structure). As local governments, the cities' political bodies are integral to the implementation of central government policies and extensive welfare-state programs, which are defined largely by the central governments. A lion's share of the city municipality's budget thus derives from the central government budget via the fiscal system and income/property taxes (about 75%).Each of the Scandinavian cities operate within comprehensive national policy frameworks and general supportive fiscal and institutional structures for city level climate policies and governance. Even so, there are relatively limited specific or concrete central government directives provided in the national climate policies and acts (each having adopted such) and planning systems, the situation for Gothenburg being slightly different (slightly stronger policy guidance). Within a cooperative framework, Cape Town similarly enjoys considerable autonomy from the central government on many local development and environmental management issues. While Cape Town essentially develops its own climate policies, and, on many accounts, acts in a climate policy vacuum (Hickmann and Stehle, 2019), which is not the case regarding the three Scandinavian cities. This reflects the strong mandate and autonomy devolved to local government in each of the Scandinavian countries on issues of climate change, land use, urban development and mobility. It also reflects that cities are allocated considerable financial and administrative resources to provide leadership, administration and services on a broad scale.

Presenting and comparing the political system of the cities

Regarding the city level political structures, all four cities have an elected city council as their supreme political body. These bodies are quite diverse, however, in terms of numbers of representatives and structure. This has implications for processes of policy design and implementation. The Copenhagen's city council consists of 55 members, Oslo's of 59 members, Gothenburg's of 81 members, while Cape Town has as many as 231 members (115 proportionally elected from party lists and 116 ward councilors elected first-by-the-post). Moreover, each of the city governments are composed of political committees designated to handle specific political tasks and policy areas. The political composition of the members in these committees is proportionate to the representation of the different parties in the city council. Copenhagen has seven standing political committees, Oslo has seven (five thematic and two with control functions), Gothenburg has 17 and Cape Town has 19 such political committees in charge of key policy domains (see Table 6.2).

Table 6.2: Key attributes of the cities' political system

Cities	**Oslo**	**Copenhagen**	**Gothenburg**	**Cape Town**
Political system	Parliamentary system	Proportionate representation	Proportionate representation	Mixed-member proportionate representation
Number of representatives in city council	59	55	81	231*
Number of standing political committees	7	7	17	19

Among the 231 there are 115 directly elected representatives and 116 ward councilors

While it is noticeable that each of the cities have a relatively similar organization of their main political bodies, they differ greatly in the number of representatives and committees as well as in the type of representatives and involvement of politicians in daily public management. Copenhagen and Oslo have comparatively smaller city councils than Gothenburg and, especially, Cape Town. Likewise, Copenhagen and Oslo have way fewer political committees compared to Gothenburg and Cape Town. Moreover, the number of ward councilors in the Cape Town's city council is more than three times the number of representatives in the other cities. In this regard, we are tempted to suggest that the structure of the political system in Oslo and Copenhagen confer efficiency in policy implementation due to a relatively slim political representation in daily public management, compared to Gothenburg and Cape Town, which to greater degree seem to place more weight on representativeness, reflected in the far more extensive political organization and number of political representatives involved in city governance.If we turn to the executive part of the cities' political systems, this diversity in institutional pattern becomes even clearer.

Oslo's political system especially differs from the other three. Oslo is governed according to a parliamentary system resembling a political system often found at the national level. A 'city government' governs on basis of political support from a majority in the city council. If the majority is lost, the 'city government' must resign. In Oslo, the city government consists of nine members; each assigned as a governing vice-mayor (resembling a 'minister') and being responsible for the administration of a designated policy domain of the municipality. Each vice-mayor makes political proposals to the city council and oversees the implementation of policies. Each vice-mayor thus heads a department in the same vein as a minister manage a ministry at the national level[72]. The politico-administrative structure in Oslo seems to facilitate efficiency in the implementation of climate policies.

This requires some further elaboration. The three cities of Copenhagen, Cape Town and Gothenburg, different from Oslo, have designed the executive branch of their political system according to proportionate representation. In Cape Town, the executive authority for the city is vested in the Executive Mayor who is elected by the city council. The mayor appoints a mayoral committee whose ten members oversees various portfolios (area-based and sector based). In Gothenburg, the Mayor elected by the city council and three vice-mayors govern the city's day-today activities. In Copenhagen, the day-to-day execution of the city's policies and decisions are handled by the Lord Mayor together with six mayors all leading one of the seven political committees in the city. The Lord Mayor leads the financial committee where all mayors are members. Thus, in these three cities, the political day-to-day leadership mirrors the political composition in the city council. A core purpose of this system is to secure political support from all parties – position and opposition – to policy design and implementation. Political committees especially, but also the city council, are active in developing political solutions. Hence, the political leadership represented by the cross-political committees may consist of representatives from political parties that are far apart politically. In practice, however, representatives from political parties come together in coalitions to negotiate and divide tasks and positions between them. However, typically the opposition representatives hold key political positions and influence decision making, even on a day-to-day basis.

A main difference between the political systems is that the cross-political committees have comparably less influence in Oslo compared to the other cities. In the city's parliamentary system, compared to a proportionate system, the opposition to the governing coalition is less integrated in the day-to-day governance of the city. The Achilles heel of parliamentarism is, thus, a potential lack of political anchorage in everyday policymaking. The strength might be efficiency in governing. Each governing members of Oslo's city government has great autonomy and the authority to represent the city in 'external affairs' and s/he can make decisions in line with the governing coalition's political platform. This ensures efficiency and predictability. In the three

[72] However, from 2019, one of the departments are headed by two governors (health, work and integration)

other cities, the cross-political committees may intervene in policy decisions and have greater influence on local day-to-day governance. The Achilles heel of the proportionate system, though, especially as observed in Cape Town and Gothenburg, might be a certain inefficiency in (climate) policy implementation. The committees are many and thematically overlapping which is a challenge especially for a broad issue that cut across sectors such as climate change. Representatives of different and diverging parties may head each of these committees making coordination and coherence of climate policies challenging. The efficiency of the political system in the cities is also affected by the fact that many among the politicians are only active on part-time or free-time basis and receives no fixed salary; they are only honorary enumerated. This affects their ability to follow-up on complex political matters.

In sum, we observe that Oslo's parliamentary system deviates from the system of the other cities. In Oslo, each of the elected governors for key policy areas are provided strong mandates to lead and take decisions on daily basis. This may arguably provide for an efficient politico-administrative system in terms of implementing climate policies. For the proportionate political systems of the three other cities, mandates to take day-to-day decisions are less substantive and governors need to refer important management decisions to the higher-level political committees, thus potentially lowering efficiency in the day-to-day running of the city, while possibly increasing the democratic potential. Hence, it is proposed that the overall ability to secure efficient 'hands on' political decisions and operational strength in climate action might be harder to obtain in Gothenburg and Cape Town than in Oslo, possibly also in Copenhagen, due to structural complexity and system 'deficiencies'. There are, however, reasons to believe from the empirical observations that differences in the actual political support to the climate agenda over time might be a more critical factor for explaining differences in policy and organizational change and functional outcomes than differences in the political structure. This will be further elaborated below when presenting the evolution in climate goals and strategies.

6.3 The evolution of climate strategies and institutions

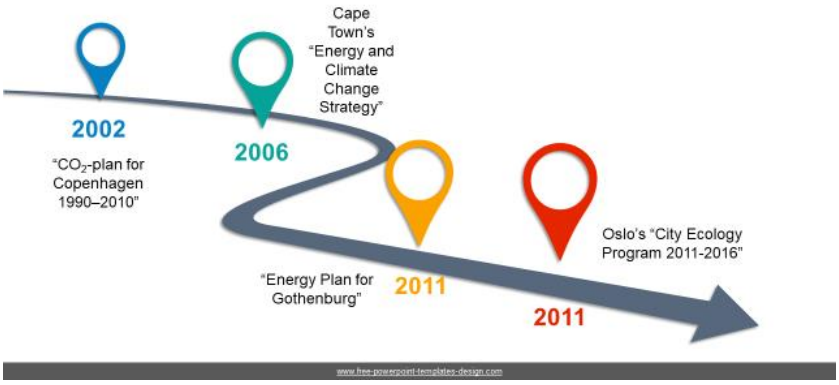
How has the cities' climate strategic work been developed and become reflected in goals, policies and climate-related organization over time? This section outlines the evolution in climate strategies, aims, dedicated organisational entities, and how interaction and collaboration within the cities and with other cities in networks have gradually emerged.

Our empirical evidence from the four cities reveals that, under quite different social, political-economic and institutional contexts, the actions of concerned public leaders in response to local perception of climate change issues, have gradually drawn the political and administrative attention to climate mitigation, adaptation and energy issues. Progress has not been even over the two decades or so covered by our review, however, and politico-institutional support and attention to the agenda has varied over time and in each of the cities.

6.3.1 Evolution and change in climate strategies and policies

While climate work started in each of the cities in the 1990s, by the end of the first decade of the 2000s, climate change and the mitigation agenda had firmly raised political attention in all of them. This attention materialized in comprehensive climate change strategies – or on energy and climate change – being adopted, that invariably combined quantifiable CO2 emission reduction goals with broader qualitative goals. Figure 6.1 shows the adoption of the first plan that included clear CO2 emission reduction goals in each of the cities.

Figure 6.1: First generation climate strategy/action plan adopted



The figure illustrates that Copenhagen and Cape Town early on placed climate change on the policy agenda by developing climate mitigation plans; Copenhagen in 2002 and Cape Town in draft form in 2003 and as an approved plan in 2006. Oslo and Gothenburg followed suit in 2011; Oslo building upon an Oslo regional climate strategy approved in 2003.

Cape Town

The presence of institutional stability, capacity, access to external funding and committed public officials within the city's environment department facilitated Cape Town's early development of strategies and policies. In 2006, the city adopted the Energy and Climate Change Strategy (building on the Integrated Metropolitan Environment Policy of 2001); and the same year the Framework for Adaptation to Climate Change was developed. Hence, the city had by then put in place structures and strategies for coping with climate change and goals of enhancing energy efficiency in the metropolitan area.

The Energy and Climate Change Strategy placed energy at the forefront of local climate change concerns, although concerns around sea level rise, coastal management and flood risks were developing alongside. The city was also an international frontrunner on adopting a broad sustainability approach to climate adaptation through efforts to engage with other state and non-state actors. A new Climate Change Policy was finalized and approved in June 2017. This new policy brings in a broader perspective by recognizing the importance of economic and social dimensions of climate change and takes a balanced approach to furthering both adaptation and mitigation objectives.

The city focused initially explicitly and publicly on the mitigation agenda, more so than on adaptation, but slowly the two parts of the climate agenda were brought together in various ways, the two agendas being championed by different entrepreneurs and public leaders, which at times put them into competition with each other and required specific efforts to produce a more integrated agenda.

Energy was always a key feature of the city's Integrated Development Plans (IDP), with less prominent attention afforded to climate mitigation and especially adaptation issues.

Although the city has to limited degree initiated large-scale transformative climate mitigation projects, due in part to lack of domestic and international funding, the city has invested substantively in e.g. coastal protection measures and improvements in water efficiency and water resources development. Moreover, Cape Town laid the foundation for small-scale renewable energy and energy saving projects, which substantively decreased local energy consumption,

making a case for both strong organizational and policy change. The city carried out low-carbon projects within the building, infrastructure, waste, energy supply and social housing sectors. It also facilitated small-scale solar energy input into its energy grid (through feed-in tariffs).

The city's focus on energy production in its climate policy, reflects that the main source of energy is from coal-fired electricity production and thus the main source of CO2 emissions being burning of coal. A main barrier to the city's adoption of renewable energies, is that energy production and supply is dependent on the centralized policy and monopoly of the state-owned energy production company ESKOM. This centralized energy system is recognized to be highly inefficient (Hickmann and Stehle, 2019), yet difficult for the city to influence. Eskom is closely tied into the vested interests of the coal-mining business sector.

The implementation of the energy and climate policy also met with constraints linked to sector-silos and limited adoption of new collaborative mindsets across sectors, for example, related to the fact that spatial planning and current infrastructure do not adequately address major climate change issues. Such issues not addressed may be related to GHG emissions from the transport sector, urban sprawl and expansion of townships in the city periphery.

Copenhagen

On the mitigation side, sustainable energy production was always the core focus area of the climate policy in Copenhagen; due to coal fueled central power plants and high potentials for emissions cuts. Transport produced only about 34% of emissions. The second Climate Action Plan (2009) thus focused mainly on sustainable energy production (replacement of coal by biomass in power plant operated mainly by HOFOR; the main energy public utility company) and transportation and energy savings in private homes and businesses. "Green growth" became a central aim to be achieved through major collaboration with organized external stakeholders. The strategy also included a reinforced focus on climate adaptation. The broader third Climate Action Plan led to 16 concrete climate plans towards climate neutrality each with an appointed project leader who were requested to develop business plans. A project portfolio of up to 60 investments projects was developed of which about 10% were led by the Climate Secretariat. These projects included, beyond the switch to sustainable energy production, energy efficiency through renovations of buildings, climate teaching, electrification of construction machines, and carbon capture. The expansion of a super bicycle highway system was a key feature of the plan, reflecting Copenhagen as a major biking city.

Gothenburg

The city's Climate Program, approved in 2014, provides the overarching framework for the city's climate mitigation work, and sets out the goals to reduce the city's carbon footprint in the most emitting sectors, such as in energy production and transport (Göteborgs Stad 2014b). 'Reduced climate impact' is defined to be that in 2050 Gothenburg will have a 'sustainable and equitable' level of GHGs. Emission reduction is perceived mainly from the municipality's own estate and services, however, also from local firms and from the consumption of citizens. The climate policy is otherwise formulated within the city's main policies of combining economic growth with sustainable and inclusive urban development.

The revision of the city's Environmental Program and Action Plan in 2018, results in an integration of the 'reduce climate impact' goals of the earlier 2014 Climate Program in a broader environmental sustainability approach. Different administrations and city's corporations are given responsibilities for executing the 27 measures highlighted linked to this goal (Göteborgs Stad, 2018j:5-12). A key element of the city's climate and energy policy has always been to transform the city's reliance on fossil fuel and burning of waste to renewable and biogas for heating. Another core element of Gothenburg' approach is to reduce GHG emissions from travel and transport, reflecting that the transport sector accounts for about one-third of GHG emissions in the city. Priorities to this end are to reduce traffic by car through various 'soft' policy instruments,

such as to promote non-fossil fuel cars, increase travel by public transport, walking and biking. The use of politically 'hard' measures to restrict care use are less obvious. For example, while parking lots are being removed in relation to the large urban-development projects, this is not related to a clear political transport-change ambition. And it is unclear how much of this parking which will be replaced after the rehabilitation projects finish. A publicly contested measure though, was the introduction of a toll ring linked to the co-financing with the state of the large-scale road infrastructure of West Swedish Agreement (Västsvenska paketet). This project is governed by a comprehensive governance network of partners from the local, regional and national levels.

The city does even today not have a distinct, comprehensive adaptation strategy. Rather, the city has developed several interlinked plans to address the risks from specific hazards with a focus on stormwater and flood-related risks reflecting that Göta River cuts across the city territory. Climate adaptation was, as such, early on included in the city's Water Plan (in 2002) and linked to river flooding and later to reports on extreme weather. This reflects the experiences of damages from several heavy storms and flood-related events (e.g. in 2005).

A visible feature of Gothenburg's approach is the many guiding sector policies and strategy documents (as well as many technical background documents) prepared and approved by the city council as governing documents linked to the climate and environment programs. These governing documents are all attempted integrated through a defined hierarchy and tied to an approach for monitoring and managing the programs – in Gothenburg developed into the Gothenburg Method (*Göteborgsmetoden*). This method of governing is typical of large Swedish cities and represents a mechanism to streamline and rationalize the environmental policy work from national to local level. These policy documents also serve to guide private businesses and civil society organizations in a 'soft' manner. Several key informants complain, however, that too many strategic governing documents exist in the city that are not easily brought together and operationalized and understood across the city stakeholders. In other words, there is not a streamlined system of strategic governance and operationalization of climate policies for the city. The governing documents stand out mainly as informative governance tools with limited opportunities for the Environment Administration and Environmental and Climate Committee to sanction or drive the agenda. They find it difficult to provide economic incentives directly attached to the policy documents for other sector entities and stakeholders to take climate action. Such observations about issues of too many policy documents that lacks clarity are also made in internal review documents (Miljöförvaltningen 2018).

Oslo

Oslo relatively early developed ambitious and clear CO2 emission reduction goals, even if a distinct climate strategy was developed only in 2015. Reflecting a strong political and administrative drive to reduce CO2 emissions, the strategic climate approach focused initially on quick and measurable effects related to direct sources of emissions and internal climate actions and experiments across municipal sectors (low-hanging fruits). The focus was thus largely on key sector and sector-related activities with the largest CO2 emission reduction potentials, essentially transport, but also on energy efficiency in buildings, and waste, and in city development, in this sequence (City of Oslo 2016, 2018). A policy to enhance the use of electric vehicles and restrictions on inner city circulation is reinforced through the program "car free city life in Oslo". Oslo has among the highest density of electric and hybrid cars in the World. The electric car policy and mobility policy (e.g. regarding toll rings) is dependent on various state agencies/policies and has been developed with support from national authorities. This work goes hand in hand with development of car-free zones, strategic removal of parking, and planning of cycling and walking infrastructure. The toll ring stands out as a key governing mechanism for reducing congestion and pollution in the inner city (established initially in the early 1990s and later expanded). Climate criteria are also developed to inform new land use guidelines in order to encourage developers to include climate effects of new city developments. Hence, the climate

policy informs planning policies aiming for compact, resilient and sustainable city development. The overall policy aim is to enable sustainable urban living and mobility as stressed in the latest municipal plan (2018).

Annual CO2 emission targets and indicators are developed as part of the climate budget process, and these goals are decisive for mobilizing broad collective commitment across multiple and diverse sector departments and entities. Reflecting the high political priority accorded to climate issues, the municipality develops climate criteria to shed light on climate consequences of all relevant policy and operational decisions. Many of the cities policies and large-scale projects (in public transport and infrastructure and energy) involve a firm co-investment with the state. These investments are made possible for the city in part through the income from the toll ring. Further, the state supports Oslo`s promotion of electric vehicles by a national tax regime that taxes fossil-fuel vehicles but exempts taxation on the corresponding electric vehicles, making an electric vehicle to the consumer equally priced as a corresponding fossil-fuel vehicle.

Summary and comparison

With variable support from the political leadership, administrative leaders in each of the cities have pushed for new climate goals and strategies to be developed. Spearheaded by distinct climate/environment agencies, dedicated leaders and officials worked to change internal organizational structures and build institutional homes and capabilities for pursuing the climate agenda across internal departments and entities. Key collaborating agencies were found within environment, energy, transport, water and city planning and development. All the cities launched initiatives for energy efficiency and use of renewable energies. Two of them launched major initiatives to shift their energy production systems away from fossil to non-fossil fuel (Copenhagen and Gothenburg), while Cape Town, not being able to influence the national power company, aimed particularly at enhancing energy efficiency within the metropolitan area. Climate leadership in each city gradually engaged an ever broader array of internal public entities and external non-state actors in various participatory efforts in response to complex, unruly climate issues across sectors. The cities have all engaged in and today enjoy support from national and transnational city networks. In each city, we find several climate-related small-scale and large-scale infrastructural projects and experiments. Cape Town has been least able to pull off large-scale mitigation-oriented projects due to limitation in funding and support from the city and national level.

The analysis underlines, furthermore, that the cities do not act in a climate policy vacuum. However, both the Scandinavian city cases and Cape Town receive limited concrete guidance and instruction from the national level in policies and climate acts beyond acceptance of the critical role that city governments play in both mitigation and adaptation as well as in the broader sustainability agenda. Cape Town is to some extent an exception, since despite the South Africa's national white paper on climate response also recognizing the crucial role of local governments, very limited financial flows from the central government accompanies the informal transfer of functions to climate action at the municipal level. Policy support from the national level is weak within the climate agenda (Hickmann and Stehle, 2019). The climate policy and work of the three Scandinavian cities all receive considerable financial support, mainly directly from the municipal budget (and local taxes and citizen fees), but also from national sector funding and projects.

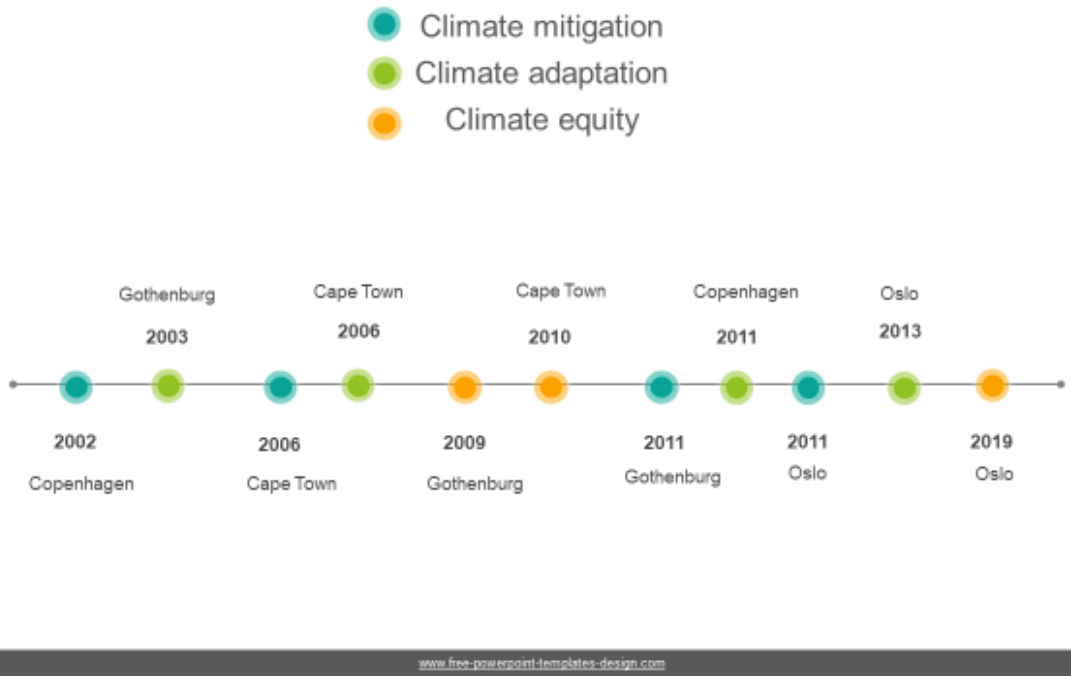
6.3.2 Evolution in climate goals and strategic content of policies

Upon closer inspection, we find that the frameworks of the cities' plans encapsulate both similarities and differences in goals, content and institutional design. Copenhagen was the first of the cities to adopt a plan dedicated mostly to the reduction of CO2 emissions (2002), while Oslo's approach involved the integration of climate goals as part of a wider sustainability and ecology plan for the city (2011). Cape Town and Gothenburg both focused on the linkages between

energy and climate change mitigation reflecting local issues of energy security (Cape Town) and energy production based mainly on fossil fuel (Gothenburg).

However, in each of the cities, the approach to climate governance has since converged in the sense that today the respective climate strategies all take a relatively broad approach towards combining or integrating adaptation, mitigation and energy issues. The strategies speak to an agenda of resilient and carbon neutral/zero-carbon development approach framed invariably with reference to sustainability and the SDGs. In addition, social equity and distributional effects of climate action have increasingly received attention, initially most pronounced in Gothenburg and Cape Town; the two cities that were confronted with the most severe social equity issues. The Figure 6.2 below shows the evolution and expansion in thematic scope (mitigation, adaptation, climate equity) in each of the four cities.

Figure 6.2: Thematic evolution in the climate strategies



Cape Town

Cape Town's overarching climate vision is 'to become a city that is climate resilient, resource efficient and lower carbon, in order to enable sustainable and inclusive economic and social development, and environmental sustainability' (City of Cape Town 2017:16). The Energy 2040 vision specifies the goal of reducing 'carbon emissions by 37% off a projected business-as-usual path by 2040'. Cape Town in a similar manner to Gothenburg, has adopted a broad sustainability perspective combining climate mitigation with social justice concerns. The city, furthermore, has included adaptation into their overall aim since 2011, significantly earlier than the other three cities (Cartwright et al., 2012, Taylor et al., 2014).

Copenhagen

Copenhagen aims to be CO2 neutral by 2025, and formulates their goal in the following way:

'In 2025, Copenhagen is the world's first CO2 neutral capital, and the city's businesses and universities lead the development of green solutions that create increased employment and green growth' (Copenhagen 2017:8).

A core concept is CO2 neutrality. What does this goal imply exactly? According to Lexico (2019), an Oxford dictionary, carbon neutrality means 'making or resulting in no net release of carbon

dioxide into the atmosphere'. This involves three basic actions. First, calculating the total climate-damaging carbon emissions thereby providing an overview over key sources of CO2 emissions (Ziegler 2016:256, Macmillan dictionary 2019). Second, reducing, to develop measures capable of reducing CO2 emissions (ibid). Third, offsetting, to adopt measures that balances your remaining CO2 emissions by purchasing a carbon offset (Ziegler 2019:256). Examples of carbon offsets are planting of trees or investing in green technologies such as solar or wind power (ibid). CO2 neutrality thus do not necessarily mean carbon free.

Copenhagen accounts, monitors and evaluates its progress annually in order to calculate if the policies implemented so far will lead to the desired result in 2025. Technical solutions count for 80% of the planned CO2-emission reductions in 2025. This is visible also when it comes to the third step in becoming carbon neutral, offsetting. In Copenhagen, the aim of CO2 neutrality involves to balance CO2 emissions with a corresponding level of renewable energy development within or outside the city. Therefore, the City of Copenhagen has involved extensively in building of wind turbines, establishment of a bio-fuel power plant and geothermal plant to balance their CO2 emissions. In addition, Copenhagen aims to strengthen energy efficiency in existing and new buildings as well as stimulate the use of solar panels, develop climate friendly public transport and continue to stimulate cycling – which is a core trait of Copenhagen's mobility. A significant aspect of Copenhagen's CO2 neutrality goal is the attempt to integrate the climate policy with economic stimulus, green jobs and clean tech innovations.

Gothenburg

Gothenburg's climate program of 2014 has an overarching aim of obtaining a sustainable and fair emission of greenhouse gases by 2050 (operationalised as 1,9 tons of CO2-equivalents per inhabitants per year). Further, the city will be "… a forerunner and demonstrate that it is possible to live well without contributing to negative climate impact and with associated changes in living conditions for future generations, not only in Gothenburg but also worldwide" (Gothenburg Climate Program 2014:5). Reflecting these goals and visions, the climate program does involve novel dimensions. First, the approach highlights equity as part of its overall climate goal (as early as in 2014). Most other cities, Cape Town being another exception, have only more recently raised 'just transformation' and climate equity issues as integrated dimensions of climate policies (see for example EU's Green New Deal). Second, Gothenburg's strategy considers not only direct emissions, but also indirect emissions, called scope 2 and scope 3 in IPCC terminology. In 2014, this was also in the frontline of city climate change policies. Third, in a similar vein, the city includes actions aimed towards citizen's consumption aiming to stimulate climate friendly attitudes. A fourth innovative feature is linked to the introduction of Green Bonds that can be bought for investments in e.g. electric cars and biogas production. Green Bonds involve reporting on climate impacts of financial investments. Consequently, Gothenburg's policy approach is both broad and progressive.

Several quantifiable strategic objectives are linked to Gothenburg's overarching goal. Among others, the city aims to cut CO2 emissions from road transport within the Gothenburg municipal area with at least 80 % by 2030 compared to 2010. However, upon closer examination these goals are to limited extent substantiated by action plans, mandates or monitoring to secure development of policies and measures to support implementation. This points to certain weak sides of the Gothenburg-method, within which the ideal is to develop a chain from policy goals and objectives, via key strategies to action plans and related budgets. In practice, however, this chain of action is not supported by clear expectations, carrots and sticks, and bold monitoring of progress and follow-through.

Oslo

Oslo's operative climate strategy, passed in 2016, states that the city aims to:

1) Cut CO2 emissions by 50 % in 2020 (compared to the 1990 emission level)

2) Cut CO2 emissions by 95 % before 2030 (compared to the 1990 emission level) (City of Oslo 2016b).

Since then, Oslo has formulated a new climate strategy and policy (presented in draft form 2018 and only recently adopted). This climate policy is reflected in the newly re-elected city government's political platform (Oslo city government platform 2019:15). This platform states that Oslo aims to be the world's first zero-emission metropolitan city in 2030 A stepwise approach is proposed with an expressed intent to reduce CO2 emissions by at least 52 % by the end of 2023 (compared to 2009-level).[73] This will lay the foundation for further reductions during the remaining part of the decade in order to reach the goal of 95 % reduction by 2030. Additionally, the city aims not only to be a zero-emission city, but also to be a resilient one; The city will by 2030 become a climate resilient city and reduce the city's GHG emissions by 95% (Climate strategy proposal 2018:10). Hence, with this new strategy Oslo makes a big leap forward in terms of bringing mitigation and adaptation policies together in a coherent climate strategy. This represents a novel way of working in Oslo.

Table 6.3: Climate goals and scope of climate policies

Climate goals and scope of policy	Oslo	Copenhagen	Gothenburg	Cape Town
Climate goals	Cutting CO2 emissions by 95 % before 2030	CO2 neutrality in 2025	Sustainable and fair emission of greenhouse gases by 2050 Maximum of two tons CO2 emissions per person in 2035	Climate resilient, resource efficient and lower carbon city Inclusive economic and social development Reduce CO2 emissions by 37% off projected business-as-usual path by 2040 Decrease dependency on coal
Scope of climate policies	Focus on I) long-term sustainability principles, II) social and health equality III) Innovation	Focus on I) long-term sustainability, II) green growth opportunities for private firms.	Focus on I) long-term sustainability, II) social equality, III) combining growth with sustainability	Focus on I) long-term sustainable energy system, II) interest in renewable and sustainable energy
Political commitment	Yes. Long historical commitment	Medium. Strong support in early phases, but waned	Continuous political backing across party lines, not strong support	Variable, medium Commitment varied depending on support from different Mayors and external funding/specific events/programs

[73] The revision of the previous goal of 50 % by 2020 is due to an unsuccessful funding of carbon storage (through co-funding with the state) that was a core premise for the 2016 goal.

Summary and comparison

The analysis in this section reveals that all cities, arguably, expose coherent strategic visions and both short-term and long-term climate goals and approaches to address climate mitigation and adaptation. However, the forms and degrees to which each city does this in an integrated and coherent manner in policy, organization, planning and practice vary quite a bit. Table 6.3 is an attempt to qualitatively assess the climate goals, the scope of the climate policies and political commitment to carry them through. While mitigation is the main concern within the climate strategies of all the cities, adaptation was also an important concern. However, specific strategic efforts on adaptation was taken up earliest in Cape Town, Copenhagen, and Gothenburg, reflecting that they faced more severe extreme events (storm-water and flood risks) and impacts from sea-level rise than did Oslo. Only Gothenburg did not have a discrete adaptation policy or framework but addressed potential adverse flood risks as an integrated dimension of its water/extreme event management policies.

The climate goals differ across the cities, however. Invariably the goals combine broad and inclusive vision-making goals with more restricted and quantifiable CO2 emission reduction goals and what the city itself can control in collaboration with identifiable stakeholders. Especially Gothenburg and Cape Town focus on broader goals. The targeted nature of Oslo and Copenhagen's goals and practices makes the goals easier to operationalize into measurable indicators and thereby, possibly, provide clearer 'march order' to their administration and business community. The implementation of climate policies especially in Gothenburg, but to some degree also in Cape Town, may likely be affected by the vagueness and broadness of their goals.

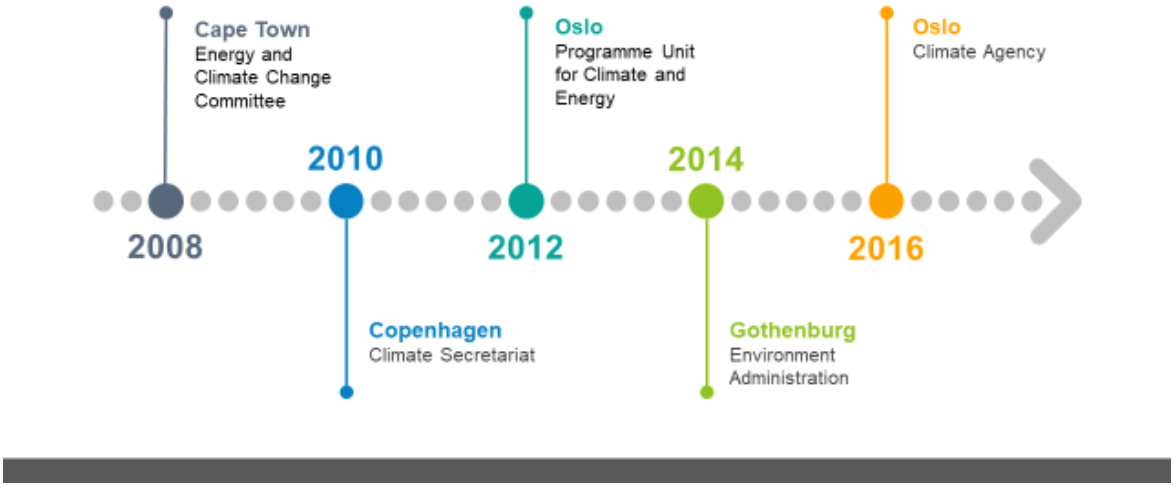
6.3.3 Evolution in climate-related organizations and institutions

The previous chapters show that in all the four cities, public leaders have had the insights to develop policies, implement climate action, and change organizational structures. They have also created arenas and networks for collaboration and innovation across public and private sectors.

A variety of internal and external actors are brought together for developing knowledge and jointly facilitate common goals and innovative climate policies and institutions. The cities proactively institutionalize collaborative platforms and arenas as well as engage in established collaborative endeavors – networks and platforms at the local, regional, national and international level.

We know from previous research that administrative leadership and commitment is a key to create social change, which is crucial to attain ambitious climate and sustainability goals (Wang et al. 2014). Administrative leadership plays a key role in involving citizens in visioning and planning; enhancing technical know-how; expertise in implementation, mobilizing financial resources, and developing managerial execution capacity (Ibid:344). Research from other complex and sector crossing problems shows that policy development and implementation is enhanced if the city has a dedicated administrative entity with a clear mandate for following up the city's climate strategy (Vedeld et al., forthcoming). Figure 6.3 shows when and which type of administrative resource each of the cities have institutionalized.

Figure 6.3: Institutionalization of dedicated climate entity in the city administration



Cape Town

Cape Town stands out as relatively successful in setting up organizational structures and changes within the city administration to establish early capacity on the topic of climate change (from the early 2000s). A dedicated Energy and Climate Change Unit within the Environmental Resource Management Department assumed a particularly active role and served as the institutional home in driving the mitigation agenda. The skilled and committed staff of this unit, together with other City colleagues championing climate-related issues, established links to NGOs and academic institutions in order to develop knowledge and enhance their own capacity on both adaptation and mitigation (e.g. the NGO Sustainable Energy for Africa, the Energy Research Centre and the African Centre of Cities at the University of Cape Town) (Cartwright et al., 2012; Hickmann and Stehle, 2019).

Various cross-sectoral coordinating committees on climate change have been formed to progress knowledge and ensure the inclusion of climate change in sector plans, such as the Climate Change Think Tank, the Green Economy, Energy and Climate Change Working Group, and an Energy and Climate Change Committee (Cartwright et al., 2012, Scott et al., 2019). The organizational structures were redesigned during a period of political reorientation when the Mayor Patricia de Lille was in power (since 2011) (cf. also Hickmann and Stehle, 2019). Much of the mitigation work has moved to the Sustainable Energy Markets Department, while coordination of the climate adaptation work remains positioned within the Environmental Management Department, with growing links to the work of the city's resilience team.

However, in Cape Town support from political leadership has been weak overall, with only moments of strong support, usually associated with events, such as international conferences, electricity shortages and most notably the recent drought. There was also limited overall support from the central state government to the city's work on climate change. The city gained from positive interactions with the Western Cape Provincial Government.

Copenhagen

The Technical and Environmental Administration (TMF) was formed in 2007 as one of seven municipal departments to oversee the climate agenda under the auspices of the Mayor for Environment (who takes advice from the Political Technical and Environmental Committee). The merging within this department of diverse climate-relevant entities promoted collaboration across environmental and technical expertise and facilitated internal alignments (Sørensen and Torfing, forthcoming). The responsibility for climate issues was initially located to a Center for Environment, but later a special-purpose Climate Secretariat was created in order to drive and coordinate the work with the Climate Action Plan and the main goal for Copenhagen to become CO2 neutral in 2025. The strategy and cclimate action plan entitled *CPH 2025* was adopted in 2012 with a firm Climate gas reduction focus. Climate issues received high political priority and support, until about 2013 when the political support slightly waned. But the administrative leadership within TMF remained important. The planning and design of both the climate action plans involved internal cross-sectoral working groups. An internal cross-sector CEO steering group was established to coordinate initiatives and enroll other administrative departments in both the design and implementation of the strategies and action plans (Sørensen and Torfing, forthcoming).

There was also close interaction – both formally and informally - between leading politicians and executive administrators in the design and early operations phases of these climate action plans. The strong political support for a strategy aiming for CO2 neutrality had important effects all the way down the administrative system. However, after 2010, influence also went the other way as administrative directors played a crucial role in leading upwards and securing political support from the Lord Mayor and the Mayor for Environment.

Gothenburg

The Environment Administration (EA) under the guidance of the city's Environmental and Climate Committee of the city council was allocated the responsibility for preparing the Climate Program which was adopted in Gothenburg in 2014. The Environment Administration was the 'process owner' for the budget's goal concerning environment and climate change ('reduced climate impact') and in charge of coordination and monitoring and follow-up climate work as part of the ecological dimension of sustainable development. EA only proposes which other sector administrations and city utility companies (energy, housing, water, business) should take responsibility for sector-related climate and environment actions and budgets (Miljöförvaltningen /Environment Administration 2018:6). It should not interfere or take over responsibility for other departments or entities domains (i.e. there are relatively strict institutional boundaries). Moreover, within EA a relatively small climate team of dedicated professionals deals exclusively with climate change mitigation. Climate adaptation is not an element of their work. EA is also charged with protecting people's environment and health and provide good living environments for the inhabitants. EA is not mandated to take on any active influencer role in relation to citizens, businesses or private organizations, except in relation to environment oversights and food safety measures and the ecological dimension of climate change. Overall responsibility for integration of sustainability goals is with City Governance Office (Stadsledningskontoret, 2018).

The implementation of the Climate Program is thus critically dependent on the willingness and capacity of other sector agencies to engage. Three critical agencies to this extent are Gothenburg Energy, which is the public energy utility company in charge of the Energy Plan for non-fossil energy production and enhanced energy efficiency, and the Transport Office, which is involved in a wide range of climate-related mobility issues raised in the Traffic strategy (Municipality of Gothenburg 2014c). Moreover, coordination of adaptation work has been with the City Executive Office (*Stadsledningskontoret)* since 2017 (Valencia et al. 2020), and thus organizationally separated from climate mitigation.

A specific institutional capacity issues arose in EA around 2015-2017 due to internal governance and leadership issues which resulted in staff leaving the EA and the operationalization of the climate and environment programs moving slower. Even so, Gothenburg is and has for a long time been among the more active European cities in the areas of urban climate change and environmental sustainability. The issues have received high and relatively continuous political support.

Oslo

Oslo's political leadership has over the last decade or so provided continuous support for the city's climate policy and organisational development. Along with the approval of the Climate and Energy Strategy, the City Government establishes a discrete 'Climate Agency' in 2016 within the Department of Environment and Transport, and, as such, a main institutional home to lead and coordinate the city's climate work. Previously the climate policy work had been led by an environment unit and a small project team. Today, the Agency comprises 30 dedicated and skilled professionals. It is mandated to be a technical agency and advisor to strengthen the municipality's own authority and conscious management of own estate. The unit has been the main driver and coordinator of strategic work on both climate mitigation and adaptation. It is not, however, an implementing agency.

The Climate Agency focuses on developing innovative reforms of traditional governing instruments, such as the introduction of the climate budget and new planning and procurement criteria that take climate impacts into account. The climate budget is the main mechanism to assemble and align relevant internal technical and environmental entities of the municipality behind the climate goals and decentred climate actions (City of Oslo, 2019e; 2020, Watts, 2018). The climate budget process is combined with a relatively strict monitoring and reporting system of quantifiable GHG emission indicators on outcomes and measuring of results. The approach has a clear CO2 fixation. Cross-sector coordination is done formally/informally through meetings of staff across sector entities at both medium- and higher staff levels (Director levels). The integration process involved in the climate budget process has substituted for previous cross-sectoral working groups which were initially established to facilitate the design of the 2016 Climate and Energy Strategy.

The reformulation of the city's procurement rules is another important governing mechanism that works to align both internal and external stakeholders in developing innovative climate solutions. These procurement rules guide relevant tender providers, and, in turn, influence both external markets among entrepreneurs and city developers (regarding stimulation of zero-emission buildings, electric heavy machinery, vehicles, and clean construction sites).

Relatively coherent national policies/climate policies have for a decade or so generally supported municipal climate action through both formal regulations (Climate Acts, planning and climate guidelines, financial schemes) and informal channels of interaction.

Summary and comparison

Despite limited concrete guidance and support provided by national policies, the analysis demonstrates that all the four cities have taken important steps towards developing organizational structures and governing instruments that foster internal coordination and integration of climate policy issues. Even so, each of the cities, in different manners, struggles with certain deficiencies in cross-sectoral cooperation and integration within their local administration across departments and entities; Oslo seems to follow a promising path towards addressing coordination and collaboration issues across actors and sectors through the use of the climate budget to leverage both integrative and interactive governance.

6.3.4 Interaction and international networks

Each of the cities have for more than a decade been involved in various national city networks and transnational city networks that provide support and build capacity for climate responses in the respective cities. These networks contribute to policy learning and similarities in urban climate governing approaches cf. Table 6.4.

Table 6.4: Network engagement by city and level (key examples)

Level	Cape Town	Copenhagen	Gothenburg	Oslo
City	CityLab program Climate Think Tank Cape Town Climate Change Coalition	CPH-HOFOR	Gothenburg Climate Partnership	Business for climate
National	South African Cities Network, SALGA and Cities Support Programme	Dogma 2000/Green cities	Climate municipalities	Future Built Metropolitan network
International	C40 ICLEI Mistra Urban Futures 100 Resilient Cities	C40 ICLEI Eurocities CNCA Covenant of Mayors	ICLEI Eurocities Mistra Urban Futures Covenant of Mayors	C40 ICLEI Eurocities CNCA Covenant of Mayors

Cape Town

The city authorities were always strong on stressing collaboration with a variety of civil society, research and private sector actors. Our investigations also indicate that transnational city networks have provided considerable support to the climate responses of the city. ICLEI's local sustainability, energy and climate programs have been instrumental in building up and strengthening early the capabilities of Cape Town to take action on climate change. With regard to C40, public officials point to its important role as a knowledge exchange platform and its effort to engage directly with the mayors. Collaborations with other cities through research networks, such as Mistra Urban Futures, have also been influential in furthering the climate agenda in Cape Town.

Copenhagen

While early work on climate change was mainly based on intraorganizational collaboration, the strategies from 2009 and 2012 respectively, emphasized involvement of and collaboration with external actors with support from the political level, including the creation of a network of green enterprises. The 2012 strategy was in the design phase presented to a workshop of 130 professional stakeholders representing private businesses, investors, consultancy firms, universities which were invited to an all-day seminar with 16 sub-workshops. The collaboration between the public and private partners was considerable in the design phase, however, this interaction seems to wane in the implementation of the plan. Reflecting the major focus on shift to non-fossil energy production, the collaboration between TMF and HOFOR was critical for the strategy. This was also a close and effective relationship. However, this collaboration may have taken attention away from broader projects and engagement with citizens, local neighborhoods and civil society organizations, necessary to mobilize if CO2 neutrality is to be achieved by 2025. There are, however, many examples of distributive and horizontal leadership interaction given

that the strategy of 2012 is supposed to be implemented through more than 150 projects that frequently includes external stakeholders who are responsible for specific tasks.

Gothenburg

The climate program of the city embodies the long-term climate work within the city, both related to the municipal organisation and the work of private business and citizens. The strategy design was the result of relative broad-based collaboration between several the city administrations and companies as well as different bodies and experts from business, research and civil society. To this end, the Environment Administration coordinates three key networks or strategic groups of actors related to implementation of three key domains; transport, energy and consumption. These meet regularly. These collaborative entities were also working groups in preparing the program. A strategy group are directly involved in advice on implementation and follow-up of the strategies.

However, the program is directed primarily at politicians and public officials within the municipality. Regarding external collaboration the program only aims to 'function as a guide for industry, other stakeholders and the inhabitants of the city' that are required to be involved if goals are to be reached' (Gothenburg 2014b:3; Miljöförvaltningen 2018:31). Hence, despite the acknowledgement of the city's strong dependence on citizens and other non-municipal actors at national and international level for achieving the climate goals, the Environment Administration does not seem to engage in any active influencer role within the strategic environmental and climate work towards citizens, businesses or organizations; this is also not part of its allocated mandate (Miljöförvaltningen 2018:14).

The city's various memberships in international networks and international projects are supported by its political and administrative leadership (cf. also Pierre, 2019).

Oslo

Interaction and co-creation are key ingredients in the city's development of climate strategies, policies and practices, initially mainly with involvement of selected private stakeholders in developing the first Climate and Energy Strategy, but later with more substantive involvement also of citizens, research and civil society. The Climate Agency operates as a key driver for diverse forms of interaction, internally with other agencies and externally with key stakeholders, most notably business and environmental experts/entrepreneurs and (academic) think tanks. Both formal and informal channels of interactions and networks are utilized. The establishment of the "Business for Climate" network in 2010 is one prominent example that illustrates the city's willingness to mobilize the private business sector for shared climate policies and actions. The network serves as an interactional arena between the city and a broad range of private close to 200 business and firms in the Oslo-region and the work within the network has been intensified lately to more firmly engage an ever-wider array of private actors across sectors and scales.

Oslo is also active and engages strategically in transnational city networks, such as Eurocities and CNCA. The city joins C40 in 2013 as an 'innovator city'.

Summary and comparison

All cities are actively engaged in local, national and transnational climate city networks of different kinds and in interactional arenas with private business and civil society.

7 Assessments, lessons and conclusions from four city cases

Trond Vedeld and Hege Hofstad

7.1 Introducing the comparative framework

The comparison provided in this chapter is between four major coastal cities confronted with important yet diverse climate mitigation and adaptation challenges and socio-economic inequalities. But all of them are considered international forerunners in terms of the adoption of ambitious climate policies and climate action. We expect them to reveal significant organizational and policy changes in response to climate change due to them being relatively well endowed with political mandates, financial and human capacities. If we find similar trajectories in how policy and organizational responses to climate change challenges have evolved across the four, it underscores key findings regarding how forerunning medium-scale cities located within larger metropolitan regions address climate change in policies, organization and governance. The findings from our cities are obviously not necessarily representative for all such cities, however, reflected in part in the variety of context-related and contingent circumstances affecting local and city-wide governance.

We assumed from the outset that the three Scandinavian cities would exhibit many similar outcomes in terms of climate-related responses since they are embedded in relatively similar national politico-institutional contexts, which may likely strongly affect climate politics and policies at city level. For example, we found that while the three Scandinavian cities are embedded in relatively similar and benign national climate policies and decentralized politico-administrative systems in support of climate actions at city level, Cape Town is set in a context of a much less coherent national climate policy framework and a contrasting political-economic context, with less obvious political support from the national level, even if the city is endowed with strong and capacitated institutions. It is thus expected that Cape Town would differ in climate-related responses from the three Scandinavian cities on several accounts. Cape Town is, in this regard, a contrasting case – and reveal itself on many accounts as a 'most different case study'. However, we also expected to – and do in fact find - many similarities in climate responses and governance across all the four cities.

We furthermore suggested that both similarities and differences would help interpret and nuance the findings. For example, if co-creational approaches are pronounced across all four cities as the climate agenda gradually broadens in scope and in the numbers of relevant and concerned stakeholders mobilized, it increases the scope for generalizations about the role of co-creation as a way that forerunning cities tackle unruly and complex climate challenges.

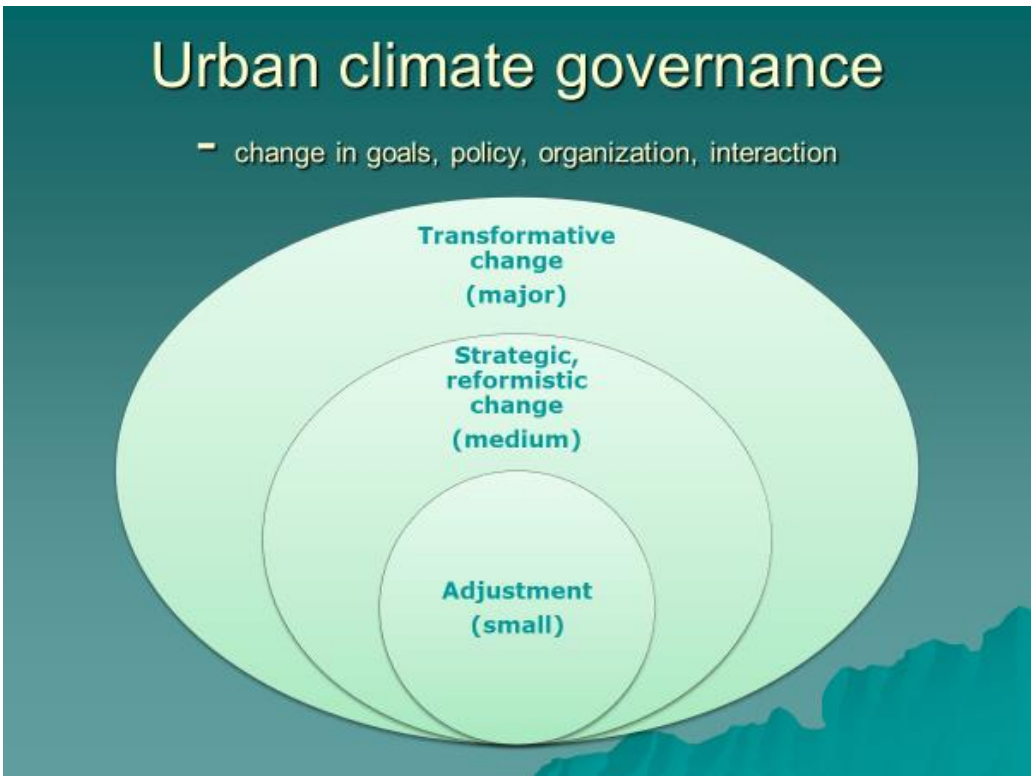
Taking a step back, the chapter makes an overall comparative assessment of the cities' climate governance structures in terms of goals, organizational changes and policies. Inspired by the public policy literature (Capano, 2009), we adopt a simple comparative framework that categorizes policy and organizational change from *small change* (adjustment) to *medium change* (reformistic) and *major change* (Hickmann and Stehle, 2020:61). The more precise indicators for each of these categories are explained below.

Following this overall comparative assessment, the chapter proceeds to discuss crucial conditions for the context of each city or for the specific choice of climate policies and governance systems in order to deepen or widen our understanding of the conditions for climate governance. Finally, it ends by suggesting eight essentials for effective, sustainable and fair urban climate governance and leadership'.

7.2 Comparative framework for assessing climate strategic work

Building on our empirical findings in the three cities, and inspired by the public policy literature (Capano, 2009), we in this section adopt a simple comparative framework that categorizes and compares the policy and organizational change in each of the four cities from *small change* (adjustment) to *medium change* (reformistic) and *major change* (pathways towards climate transformation) (IBID, Hickmann and Stehle, 2020:61). Small, medium and major change are categorized according to the below key variables, graphically illustrated in Figure 7.1 below:

Figure 7.1: Urban climate governance – related to changes in goals, policy, organization, and interaction



Small change relates to adjustments from business-as-usual - incremental change through relatively isolated climate actions and projects, and limited innovation/experimentation.

- Climate goals: Non-ambitious climate goals with limited scope
- Policy: Non-coherent, sector-wise climate planning and isolated pilot projects and CO2 monitoring; limited integration of mitigation and adaptation. Weak attention to social and climate equity.
- Integrated organization: only a few people or project teams work on climate change issues with limited efforts to open up and integrate the municipal administration across sector silos
- Interactive governing: emergent involvement of private sector and citizens in policy design and focus on collaborative governing and potential social benefits of network society.

Medium change relates to strategic, integrated, reformistic change - significant changes in climate goals, strategies/policies and governance and with some degree of innovative experimentation.

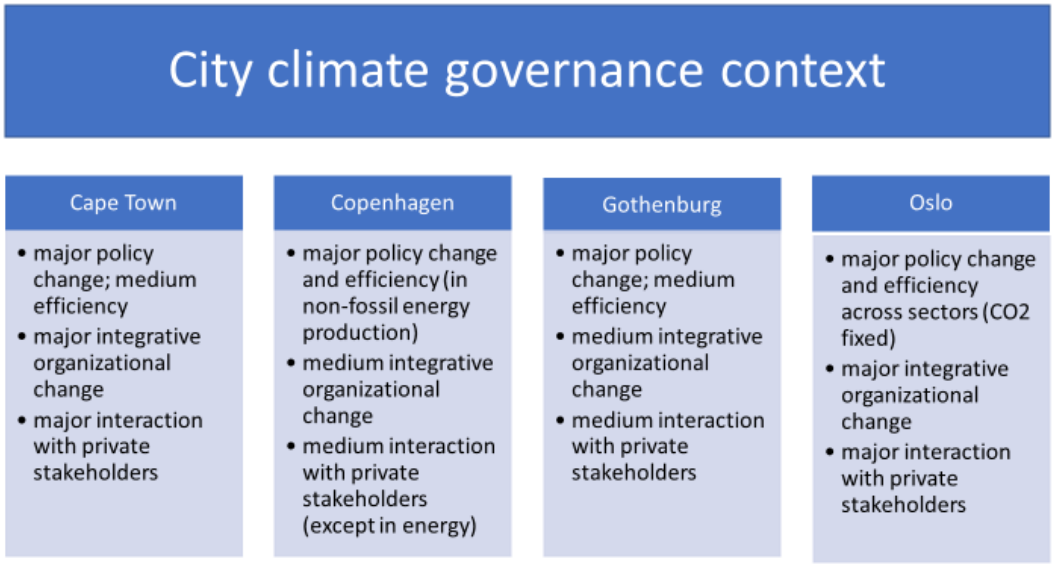
- Climate goals: Broad short- and long-term climate goals, citywide and sector-wise
- Policy: Established coherent climate strategy and policies with the scope of a gradual integration of mitigation, adaptation and social and climate equity
- Integrated organization: Established climate agency and an institutional home and additional establishment of functional cross-sectoral committees and mechanisms for alignment of internal entities, such as climate budgeting, strict monitoring and reporting, climate friendly planning and procurement rules
- Interactive governing: Emergent participation in or establishment of city networks or business for climate networks and active involvement of citizens and relevant stakeholders

Major change signifies pathways towards transformative interactive and integrative change – pathways towards a radical and broad shift in climate goals and policies; towards integrative and interactive climate-related organisation and governing; active multi-actor interaction/co-creation for shared goals and co-governing; private business and citizens engaged in climate friendly, sustainable self-governing

- Climate goals: Clear, unambiguous, with the scope of addressing both direct & indirect emissions, short- and long-term goals and engagement in radical change in economy, behaviour and values of business and citizens
- Policy: Adoption of a broad, coherent climate policy and large-scale transformational infrastructural projects and compact city planning across all key sectors and integration of mitigation/adaptation/resilience within a sustainable and climate equity framework
- Integrated organization: Established regular internal meeting platforms and governing mechanisms for cross-sectoral and intra-agency integration. A major focus on interactive governing with strong and regular involvement of private business and citizens in co-design and co-implementation; large-scale experimentation and innovation to co-create public value and change the urban fabric.
- Interactive governing: Political and administrative leadership acts as collaborative capacity builders internally and externally with private sector and civil society to build networks, partnerships and platforms for co-creation; strong and active involvement in national and transnational climate city networks and reporting to international agencies

Assessing in qualitative terms the response in terms of climate-related organizational structures and policies for the four cities along the key variables identified in the beginning of the chapter, the following picture emerges, cf. Figure 7.2.

Figure 7.2: Comparative assessment of the four cities' climate-related policies, organizational structures and forms/degrees of interaction with private and civic stakeholders (small, medium, major changes)



It should be stressed that this crude assessment of change is based on an approximation of an average over time, meaning that moments of major interaction with private stakeholders might occur during specific planning periods, events or programs, the average degree of interaction over time might still be assessed at medium level. More recent changes are given higher 'weight' in the assessment.

Cape Town, Copenhagen, Gothenburg and Oslo have all under variable degrees of coherence in national climate policies and fiscal frameworks, developed major strategic policy changes and climate-relevant organizational changes in support of climate mitigation and adaptation within their jurisdictions. Their impressive achievements support numerous recent studies of city climate change that highlights the global and local importance of cities in multilevel climate governance. However, the findings also support observations in research that progress is uneven over time in terms of efficiency in governance and there are gaps between ambitious policies, policy implementation and actual achievements on the ground.

In their efforts to address climate change, the city administrations of all four cities interact actively with both national and transnational city networks, private business, research and civil society. This facilitates and provides technical support and governance capacity to the city. Yet, a set of domestic political-economic and administrative barriers in varying degree hinder the four cities in taking full advantage of collaborative efforts and co-creation and advance climate policies further.

The city administrations of Oslo and Cape Town stand out when it comes to present-day development and implementation of climate-related strategies and policies (as of 2019). We observe major changes in policy and organization. In the case of Oslo this is both a consequence of continuous cross-party political support for climate change over a decade or so, generous fiscal support and recent strengthening of administrative capacity and hiring of dedicated, skilled staff that build organizational capacity and embark upon innovative governing instruments. Oslo is today strong on both experiments and small- and large-scale climate related infrastructural investments and interaction with a private business community that is generally supportive of the 'green shift'. Cape Town's achievements are largely related to the relative institutional stability of the city's environment/climate department over time, the commitment of several highly skilled

public officials, and a network-based cooperation with local research and civil society across several policy domains. Moreover, recent shock events have prompted specific action and investments (most notably the severe drought and periodic energy shortages). The relative local stability and capacity made it possible to leverage externally funded opportunities (Mistra Urban Futures, Rockefeller 100 resilient cities program), complement the low internal funding of climate action, and build on one another and create coherence (which is quite unique compared to other African cities where climate work tend to be exclusively externally funded and lacking continuity). In Copenhagen, although major efforts were achieved in shifting energy production to non-fossil fuel and reducing CO2 emission, the political attention to the implementation of climate change policies began to decline after 2013 with shift in the political support as new mayors had other agendas. This restrained the bureaucratic approach to fully supporting climate-related projects related to biking and transport, beyond the energy-fixed approach and interactions that favoured collaboration with energy sector actors. A new focus on consumption and transport behavior of citizens, has potentials to lead to a second and stronger wave of co-creation. Gothenburg's climate policy implementation and actions have for several years been hampered by institutional set-backs and capacity limitations, while also unclarity in the formulation of climate policies and operational priorities and limitations in the main climate agency's mandate to interact with and actively influence non-state actors.

Overall, Oslo stands out among the four to have the most coherent and comprehensive climate policy today, with the firmest drive towards experimentation, innovation and actual climate action on the ground. This is so, even if Oslo was among the latest starters in developing a coherent climate policy and organization compared to the three others. This underscores our point that the progress in policy development and implementation is not unidirectional, there might be stand-stills (Copenhagen) or temporary set-backs and discontinuities (Gothenburg) in institutional and policy changes.

7.3 Diverging climate goals: Possible implications

A deeper analysis and comparison of the four cities' climate goals provides an opportunity to reflect on the nature and consequence of different forms and quality of goals in terms of their level of ambiguity, and implications for the adopted climate governance approaches and implementation performance. Considering the nature of the cities' goals, we find that the goals share some basic characteristics. The goals are all *ambitious* in the sense that they are hard to attain and complex; *long-term,* as they will require continuous effort over time; and implying a need for *innovation*, as the cities' need to develop new ideas and solutions in order to reach their goals. Such ambitious, complex, long-term goals implying innovation come close to so called 'stretch goals'; seemingly impossible goals to achieve (Sitkin et al. 2011). Interestingly, stretch goals force the problem solver to develop new ways of thinking and acting as old routines and procedures are incapable of handling such challenging tasks (Stetler and Magnusson 2015:243). This is the case regarding many climate change issues, which typically represent both significant tasks and highly complex and 'wicked' tasks that cut across sciences, institutions and scales. This may temp city leadership to adopt over-ambitious climate goals. Ambitiousness may, however, go hand in hand with *ambiguity* of the goal as city leadership needs to motivate and mobilize a plethora of different actors for action at the same time as one keeps an openness for new ideas and solutions.

Public management research suggests a relationship – potentially both positive and negative – between the type and quality of a public goal in terms of task goal clarity, task significance, complexity of the task and subsequent performance of the task through actions and interactions of relevant and concerned actors (Anderson and Stritch 2015, Locke and Latham 2002). Goal ambiguity theory provides an opportunity to develop a nuanced understanding of goals and goal-orientation of public policy making as it underlines that the level of ambiguity may have both

positive and negative implications. Typically, goal ambiguity, understood as lack of clarity, has received attention due to its negative effects on public administration (Rainey and Jung 2010). However, scholars have also acknowledged the positive influences of goal ambiguity, because it can provide a platform for meaningful dialogue among diverse stakeholder groups and interests (Noordegraaf and Abma 2003). Ambiguity allow a leeway for interpretation within and between organisations and actors (Chun and Rainey 2005, (Stetler and Magnusson 2015:232).

Cape Town

Cape Town's climate goals are initially framed in general and strategic terms with only some of the key objectives being translated into concrete targets (electricity reduction and use of sustainable energy in particular). The city adopts, however, a clearer aim of reducing CO2 emissions in the 2040 Energy vision. First, the city has been successful in enhancing the institutionalization of the climate goals – both mitigation and adaptation - into other strategies and plans. It has to a lesser degree addressed the key challenge of balancing the climate and social justice agendas in goals and strategies. Overall, the lack of clarity in goal-targets opens up for multiple interpretations and suggests high level of expansiveness. Second, only some objectives have clearly formulated targets and there are limitations in the overall system for monitoring and evaluation. Access to relevant data and statistics is relatively good in Cape Town and utilized in evaluative studies and reports and provides key actors with some understanding of performance and challenges, although quite narrowly framed. CO2 emissions are reported to national and international actors regularly. Third, although the city has been a forerunner in terms of addressing the climate justice perspective, there are obvious conflicting goals and ambiguities confronting the city in terms of setting priorities between multiple conflicting goals. The water crisis also redirected budget sources to focus on water initiatives, with added benefits to climate adaptation while other climate change priorities were put on ice. Administrative staff have been key drivers of innovative ideas and experimental collaborations in the climate policy field. However, climate policy implementation has been mainly limited to small pilot projects. Large-scale innovative programs have been more difficult to achieve, and implementation has also been constrained by shifting political leadership and commitments and restructuring of the city's organisations.

Copenhagen

Copenhagen's aim of being carbon neutral by 2025 (through green growth) is a seemingly clear goal, yet upon closer inspection, it exposes high level of expansiveness. The strength of this form of ambiguity is that a plurality of actors can adhere to the aim. Moderate actors may consider to offsetting climate action (balancing CO2 emissions with renewable energy expansion) and be able to continue their activities, while the more radical forces interested in reducing CO2 emissions will also easily relate to the goal. This middle level of ambiguity does not go hand in hand with a corresponding ambiguity regarding the possibility for evaluation of progress towards the goal. Copenhagen calculates and monitors its emissions through an annual account of CO2 emissions. Furthermore, the city has clear reduction targets. What seems more unclear, however, is the prioritization between CO2 reductions and the offsetting built into the city's climate goal. The city has no clear guidelines and procedures for deciding when and to what extent offsetting is needed or the preferred climate action. For example, how far should emission reduction be considered before one switches to offsetting strategies?

Gothenburg

Gothenburg's climate goal is highly ambiguous: *a sustainable and fair emission of greenhouse gases by 2050.* However, the broadness and progressiveness of this goal may also create challenges for the city's policy implementation. Frist, it is an extensive goal as it gives wide interpretative leeway in terms of how to understand and define the goal. "Sustainable" and "fair" are relatively fuzzy and vague concepts that mean different things to different people. The goal is further defined through a maximum of CO2 emission equivalents per inhabitant, which brings a

larger sense of clarity to the goal. Still it is not easy to translate what this means for a business or an administrative servant in practice. Second, the goal is hard to evaluate in terms of performance. When is the city sustainable and fair enough? Gothenburg has a multitude of lower level goals, but they are not operationalised into strict monitoring schemes. There is also weak follow-through in terms of provision of clear expectations for specific actions and few repercussions if task goals are not attained. The main goal attainment is also set far into the future, in 2050, which confers a weak sense of urgency. Hence, corrective actions may easily be postponed or disregarded. Third, the main goal does not provide clear priorities, rather, there is a multitude of underlying goals that are not internally prioritized. The Environmental Administration is mandated to play a driving role, but its mandate is unclear or weak in terms of implementation follow-up. In sum, the climate strategy of Gothenburg is highly ambitious but lack operationalized measures which create high level of ambiguity in terms of its expansiveness, evaluation, priority and duality.

Oslo

The backbone of *Oslo's* climate policy is decarbonisation, guided by a clearly formulated goal to cut climate emissions by 95 % in 2030. The interpretative leeway of this goal is as such low and outlines a clear and predictable development path for the municipal administration, business community and citizens. Hence, on the one hand, the goal is not inclusive in the sense that actors who prefer to maintain the status quo regarding climate action cannot easily read themselves into the goal. On the other hand, the clarity of the goal simplifies decisions. It is clear what the city government wants the actors in the city to prioritize: ideas, experiments and solutions in support of zero-emission development. This clarity has, for example, opened for implementation of effective, but typically politically controversial car-restrictive measures related to toll ring tariffs and removal of car parking in the central areas of Oslo. The targeted approach facilitates the city's emphasis on monitoring and evaluation made possible also through the specific climate budgeting process. Ambiguity understood as a lack of possibility for evaluation is low in Oslo. Furthermore, the ambitiousness of Oslo's climate goal stimulates stakeholders to explore new ideas and solutions that contribute to goal attainment. The clear and ambitious goal of Oslo thus stimulates innovation and performance.

7.4 Significant factors influencing urban climate governance

Overall, each of the cities have made remarkable achievements in climate policy making and moved forward on transitions in climate governance and actions on the ground. They all invariably pursue pathways towards climate transformation. Even if performance differs, the climate change agendas are strategic, integrated and substantive, and city leadership interacts regularly and significantly with external actors and experts. The city leadership in all the cities has in diverse manners engaged actively with the climate agenda for a decade or more. Climate & energy policies have generally been high on the political agendas, albeit with variable priority accorded over time, affecting both the governance and concrete climate action and investments on the ground. Progress in terms of climate policy development has thus not been uniform or unidirectional. Setbacks have been observed due to shifting political leadership (Cape Town and Copenhagen); institutional deficiencies (Gothenburg); administrative inertia or reorganization (Copenhagen and Cape Town); delayed start (Oslo), or lack of continuous politico-administrative backing.

What does this all amount to for each city in terms of their policy responses to and integration of the various policy dimensions of the climate agenda and potential outcomes on the ground? Table 7.1 below provides a comparative and qualitative summary of the assessment in terms of

whether the cities reveal major, medium or small changes in terms of policy change and outcomes for mitigation, adaptation, climate equity and sustainability respectively.

Table 7.1: Qualitative assessment of the cities' climate policy responses to critical dimensions of the climate policy agenda (major, medium, small changes).

	Mitigation policies and outcomes	**Adaptation policies and outcomes**	**Climate equity and social inclusivity**	**Sustainability approach - coherent**
Major change - pathway towards transformation	Oslo	Copenhagen Cape Town		
Medium change - reformistic change – significant changes in policies and governance	Copenhagen Cape Town	Gothenburg Oslo	Gothenburg Cape Town	Copenhagen Cape Town Oslo Gothenburg
Small change - incremental change limited change in policy and institutions	Gothenburg		Oslo Copenhagen	

The achievements in policy change in each of the cities have emerged with minimal direction and no detailed instruction from national and provincial governments. However, each of the three Scandinavian cities have enjoyed relatively consistent policy, financial and devolutionary support from the national level in climate laws and policies and from among concerned state and regional policy actors. Cape Town has on its part been supported by the Provincial level, more so than from the national level in its climate policies and efforts. Despite such political and institutional differences, there are many interesting similarities in the chosen approaches to climate governance and in the evolution in climate strategies.

Reflecting the absence of strong and concrete directions in national climate policies, each city developed relatively distinct governing approaches and climate actions on the ground within their jurisdictions.

In all cities, the achievements are observed in local climate action across sector-specific experiments and actions. However, it is still too early to say what the overall strategic, institutional and practical climate actions will amount to on the ground in terms of pathways towards climate transformation. There are still gaps between policies, governing approaches, and actual climate practice in each of the cities. Overall performance in the medium- and longer-term relies on the buy-in and input to climate actions from an array of both government and non-state actors.

Despite many similarities in organization and policy, differences in evolution of the policy agenda seem to reflect a diversity of factors inherent in highly contextual environment/climate issues and specific politico-institutional circumstances e.g. observed climate extreme events and risks (storms & floods), presence of diverse local emission sources and reduction opportunities (in e.g. energy vs. transport vs. buildings), observed concerns over social and climate equity, concerns identified in linking climate action with the urban economy and business opportunities, and institutional and political priorities. Membership and engagement with transnational networks and events, such as arranging UN COPs and C40/network meetings, influence local capacities and allow cities to influence international climate policies and climate policies to travel between cities.

Such climate-environment contextual circumstances clearly inform policy choices, even if the actual policy choice made is modified through a set of politico-economic and administrative drivers, barriers and policy priorities. For example, the three cities with the largest adaptation and flood risk issues were the first to take these issues into account and integrate them in city

development (Cape Town, Copenhagen, Gothenburg). Moreover, only Gothenburg and Cape Town engage in more substantive manner with the social and climate equity dimensions of the climate agenda, reflecting their specific social inequality challenges. Regarding concerns to link climate action with the urban economy and sector development, both Copenhagen and Cape Town focus on reducing emissions from energy production while also promoting an emerging renewable energy sector and green jobs within this sector. To this end, Copenhagen encompasses an important clean tech energy and wind power technology industry, while Cape Town includes firms engaging in e.g. solar energy, biofuels and energy saving.

Specifically, for Copenhagen, the signing of the Kyoto Treaty in 1997 created an early impetus for emission reduction and led to the launch of the city's first Climate Action Plan in 2002. Copenhagen worked tirelessly to set focus and contribute internationally to climate mitigation. This engagement later facilitated the city's hosting of COP 15 in 2009. Both prior to and after this event climate change mitigation and adaptation issues loomed high on the political agenda for some years. The adaptation plan was approved in 2011, with a major focus on floods and sea-level rise; reflecting also that the city experienced a major city-wide flood in 2011. The third climate strategy was developed and approved in 2012. The city obtained the European Green Capital Award in 2014. In the last few years, however, the political attention to climate policies somewhat faded, however, due to a variety of bureaucratic and political constraints, reaching a new high with the hosting of the C40 meeting in 2019.

Similarly, in Cape Town, the city administration stands out when it comes to early development of climate related strategies and policies, reflecting institutional stability and capacities of the city's environment department and network-based collaboration with local (academic) stakeholders (cf. also Hickmann and Stehle, 2019). Both mitigation and adaptation strategies were adopted in 2006; the adaptation plan focusing for a large part on flooding; reflecting the many floods historically in the city; a major storm and flood occurring in 2004. The adaptation plan was adopted in 2006. However, political support for climate change has varied with shifting political leadership.

Gothenburg was historically been plagued by river flooding from the Göta River e.g. in the year 2000; its adaptation plan adopted in 2003. Major floods in e.g. 2005, 2007, 2008 furthered stronger efforts in flood risk management (based on a 2014 flood risk management report). Moreover, Gothenburg also experienced extreme weather events with strong winds causing damage to the city. While Copenhagen had a serious heavy rain and flood incident in 2011.

Oslo has experienced less severe incidents in recent times compared to the other three cities, even so adaptation has recently been accorded greater attention and integrated with the mitigation agenda in strategy and organization.

Moreover, Cape Town and Gothenburg face the largest social inequality issues; Cape Town being a very segregated city with very high unemployment and Gothenburg having faced specific issues of economic set-backs, unemployment and large immigration issues; both cities having adopted a social and climate equity focus in overall policies.

7.5 Conclusions: Take away lessons for practice

7.5.1 Lessons from comparing climate responses

Comparing climate responses of the four cities at different levels, we find many similarities in adopted changes in policy and organization, but also quite a few differences in the actual climate strategies and the content of the approaches. Below we draw out important lessons from the comparison of the cities as well as some distinct lessons from each individual city case.

In all cities;

- A set of climate-related technical background documents and plans and strategies have evolved and been revised and become adopted over the last two decades with substantive elaborations of climate risks, vulnerabilities, and climate action opportunities
- An institutional home and relatively stable organizational capacities have been built, including a main center in an environment department to drive and coordinate core aspects of the agenda, albeit with varying mandate and resources at the disposal for coordination and follow-up
- The goals have been bold, and the strategies and policies reveal many similarities in structure, content, scope, ambition, and intent; strategies have moved from a separate focus on mitigation and adaptation to a more coherent strategic approach to resilient, low-carbon and sustainable development.
- Institutional integration has been pursued to assemble and open up for collaboration across municipal departments and entities through organizational changes and integrative governing instruments
- Integrative governance approaches have invariably been combined with interactive governance approaches. As the climate & energy strategies have gradually broadened, similar forms of collaboration with external stakeholders have emerged across the cities, for example, in network arenas with the business community and civil society, and in interaction with national and international city networks. However, regarding with whom and how interaction is established, there are differences, depending in part on the choice of specific climate-related sector challenges to address, in part other politico-administrative priorities. The choice of sector focus of the climate policy agenda determines largely which are the relevant and concerned stakeholders e.g. the relevant actors to interact with within energy production differ from those within transport and compact city development
- The attention to develop links between climate change efforts and the urban economy is commonplace. However, Copenhagen and Cape Town seem to pay specific attention to the enhancement of green jobs and the development of the urban green economy. This reflects the two cities preoccupation with emissions from the energy sector and related business opportunities in the sector, as well as early efforts in Cape Town to identify and grow jobs for in repairing and maintaining critical ecosystems, and green infrastructure (e.g. coastal dunes, that increase the adaptive capacity of the city.
- Active involvement in transnational city networks is a key feature of all the cities. All cities except Gothenburg are members of C40 Cities Climate Leadership Group (C40) and all have historically engaged with ICLEI Local Governments for Sustainability (ICLEI). The three Scandinavian cities are all members of the Eurocities and CNCA networks.
- Relationships to the central government and key public agencies at national and regional levels are substantive and continuous. State and regional level actors are generally supportive in the case of the Scandinavian cities, although not without conflicts or differences in relation to key policies or specific climate actions. Cape Town has to some degree operated in a national ‘climate policy vacuum’ – even if South Africa has also developed advanced policies and laws on climate change and the Western Cape Province has provided important support for city climate policies (Hickmann and Stehle, 2019).

Oslo’s approach to urban climate governance illustrates the crucial importance of reforms in public and private governance systems for gaining rapid achievements in climate policy, organization and operations. Oslo combines both traditional and new integrative governing

instruments, such as the climate budget, with interactive approaches; the mix of integrative and interactive instruments working to assemble and align both internal and external agencies and entities for shared goals and governance. The achievements in the other cities are, however, also invariably dependent on combining integrative and co-creative governance as the climate agenda matures and broadens. This is a key finding and suggest that co-creation plays an important role in addressing unruly and complex collective action problems, such as inherent in the many challenges involved in tackling urban climate change.

The Oslo case furthermore shows that changes in climate policy and organizations can come fast and be followed by rapid results on the ground in terms of GHG emission reductions (or enhanced resilience). We find that rapid changes in urban policy and implementation to meet bold climate goals likely depend on bold political backing and creation of administrative capacity and ingenuity in the choice of a good mix of integrative and interactive governing instruments. Oslo is on many accounts a late starter among the four cities. It was the last city among the four to formulate and adopt a climate mitigation policy, and it was also slow to integrate climate adaptation in a coherent climate strategy. Oslo today, however, reveals innovation in governance and a strong and broad set of climate actions and achievements. In contrast, the Gothenburg case indicates that a structured and substantive planning approach to address the impacts of climate change does not necessarily translate into efficient operations and results on the ground. The city faces challenges in building a coherent and cross-sectoral administrative and political support, and the main environment/climate agency does not have a strong mandate for governing and driving the climate agenda.

Specifically, the Cape Town case illustrates, however, that much can be done at city level even without strong national backing or access to large national resources. However, when comparing Cape Town with the three Scandinavian cities, we suggest that national level political-administrative backing is an essential factor for large-scale investments e.g. in infrastructure and, as such, significant progress in climate mitigation and adaptation,

As such, despite the findings from Cape Town, the other Scandinavian cities, especially regarding Oslo, indicate that firm political backing over time might be a prerequisite for moving the agenda forward at several levels. First, political backing is required for the administrative agencies and corporations across key climate-related sector entities to engage on essential, innovative policy and administrative reforms across all sectors in the city. Second, political support is required, for example, in order to access financial and budgetary resources for large-scale interventions related e.g. to major city-wide compact city developments, new roads and infrastructure or new green mobility patterns (e.g. bike lanes), and public transport developments. Third, the city also requires a strong mandate and devolved capacities through the political system in order to be able to influence key climate-related policies. For example, the fact that HOFOR in Copenhagen is owned and lead by the city, made it possible for the City of Copenhagen to engage with HOFOR and encourage the shift from fossil to non-fossil fuel in energy production. In contrast, ESKOM as the sole energy provider in Cape Town is a state run energy production corporation outside the control of the city's influence and vested with national coal interests, and the city has limited leverage to influence ESKOM's policy on the use of fossils.

Despite the recognized importance of political support, and that political support is, invariably, present for local climate responses over long periods of time, the findings also reveal that political backing in each of the cities is not uniform over time. Political backing seems to depend on a set of contingent circumstances. We propose that increased political-administrative attention to climate change relates to a variety of factors at different levels, such as; observed extreme events at the city level e.g. extreme floods, drought, heavy rainfall/storms; municipal-internal recognition of potential GHG emissions and responsibilities for taking action; evolution of institutional capacities; presence of internal administrative or political champions of key agencies (climate/environment, transport, energy), including committed Mayors or other politicians (in position or in opposition), and international engagement and influences. The adoption of specific

new policy or organizational changes at times seems to reflect relationships with and lessons from international networks or involvement in key international events, such as arranging COP or climate network meetings.

Regarding relationship to civil society and private sector, the cities performed unevenly. While Cape Town interacted significantly and regularly with civil society for a period, and gained experience through City Labs on adaptation, none of the cities have exhausted the potentials of involving citizens to the full extent. In Oslo, for example, the Climate Agency has interacted mostly with local civic think tanks, such as Bellona and Zero to gain from their technical expertise, even if the Climate Agency has also embarked upon a major communication campaign to inform and influence both citizens and private firms to become climate friendly (mostly as a one-way information service, but with opportunities for dialogue-based interaction). All cities engage the business sector in formal and informal networks and meetings actively and use variations of public hearings and meetings/workshop and information systems/social media to engage citizens. Each of the cities gradually enhance such communication and involvement systems over time.

It seems that especially Cape Town and Gothenburg are characterized by strong ties to and involvement of academia. In Cape Town this may reflect a wish for mobilizing additional professional capacity and sharing of ideas, the city receiving limited national funding for building own capacity and climate action. Cape Town illustrates how joint publications between public officials and researchers can bring the knowledge and policy on the climate agenda forward (cf. Cartwright et al., 2012 and Scott et al., 2019). The lessons from the collaborative work to produce a book on mainstreaming climate change in Cape Town through a process of mutual learning is assessed by the authors as follows: 'This hybrid process, where practitioner experience is coupled with an academic and research perspective, has produced an 'insider' view of urban development and climate change governance through the lens of theory. The result provides new practice-based knowledge for policy-making in the transition towards more sustainable cities in the face of climate change, particularly those in the global South' (Scott et al., 2019).

In Gothenburg as in Cape Town such collaboration with research was a result of the presence of a rich diversity of applied academic institutions coupled with the 'Swedish' tradition for very elaborate planning and policy development that requires in-depth research-informed technical background documentation, typical of the 'Gothenburg model' (and the Swedish planning model). Oslo and Copenhagen have increased the engagement with academia lately but may to lesser degree than the other cities exhausted the potentials of such cooperation in these two university cities. All four cities encompass several high-quality universities and academic institutes.

Each of the cities are actively and strategically engaged in several transnational city networks, which likely provide considerable technical input and policy lessons in support of the cities' own capacities and policies. For example, diverse forms of policy learning from international arenas is reflected in similar types of goals, concepts, and approaches embodied as found in the international discourse on climate policies (Bulkeley, 2015, Pierre, 2019 on Gothenburg, Hickman and Stehle 2019, and Scott et al., 2019 on Cape Town, Vedeld et al., forthcoming on Oslo, Sørensen and Torfing, forthcoming on Copenhagen). All the cities wish to stage themselves as green, sustainable, global forerunners, and informants present a variety of reasons why they gain from membership in such networks.

7.5.2 A distinct Scandinavian model of urban or urban climate governance?

Do we find a distinct Scandinavian approach or model of urban climate governance that is clearly different from Cape Town's approach?

Overall, urban climate governance in all the four cities operate, invariably, in relatively integrated and interactive and coherent manners. Moreover, the approaches refer to climate strategies with many similar structural features albeit the goals and content differ. There are perhaps, on many accounts, more similarities than differences in the structure of policies and institutions of

governance. This may reflect, on the one hand, that urban governance in response to climate challenges as a set of 'wicked problems' at city levels often will evolve along relatively similar trajectories across global cities, as suggested by co-creation theory (Torfing et al., 2017). On the other hand, it is also a likely manifestation of the fact that all of them are globally oriented cities and each of them take part in transnational networks and are inspired by global as well as global-to-local discourses on the climate change issue, and how to respond adequately to such issues at city level. The cities clearly learn from each other (especially amongst the Scandinavian cities) and from international/national networks. Cape Town to this end is in tight climate networks with national cities such as Durban, Johannesburg and Pretoria (Hickmann and Stehle, 2019); national city networks also playing major roles in influencing the three other Scandinavian cities, perhaps especially as regards Gothenburg which relate closely to the climate policies of Stockholm, Malmö, and Uppsala. In this regard, the literature on public administration and public services mostly suggests that, more often than not, policies travel relatively easily across boundaries. Similarities in approaches to specific policy fields or sectors are often observed across countries - and thus also across cities.

However, the adoption of rather different climate goals, did set each city on quite different courses as regards the actual content of the climate strategies as the types of main CO2 emitting sources varied e.g. Oslo focused mainly on climate friendly transport and the three other cities mainly on shift to non-fossil energy production and efficiency; green transport policies being the second priority. The content and focus of the climate strategies and policies, in turn, determined which were the relevant and concerned actors, and, as such also defined the governing opportunities.

As already indicated, each of the three cities, the adoption of ambitious climate goals and organizational changes, were combined with new specific urban networks and interactional relationships to mobilize external stakeholders.

These were all essential factors for releasing the potentials of climate action (in strengthening mitigation and resilience) and a set of related urban changes on the ground (e.g. in planning, energy, transport, waste, storm water). However, there are also some distinctive and important differences in the goals and in the general focus of the policies and governing approaches between the Scandinavian cities and Cape Town.

This distinctness can be perceived at two levels. First, as already alluded to above, this concerns the *level and forms of integration and interaction between the city and the national level* and the context within which urban climate governance unfolds. A defining characteristic of the context within which all the Scandinavian cities operate, and somewhat in contrast to Cape Town, is that they are embedded in and respond actively to a relatively coherent national climate policy framework. Invariably, each of the three cities, receive relatively strong general support from the national level in terms of finances and devolved capacities and policies, and there exist a close and institutionalized interaction between key city level politicians and administrators and national level agencies, even if this relationship at times or in specific circumstances can also be characterized by negotiation and conflict.

The second specificity of the Scandinavian cities' approach relates to the first and concerns the *wider institutional framework and content of the strategic climate governing approach* at the city level and how the climate agenda gradually became relatively firmly integrated in the broader urban sustainability approach in each of the cities. In all the Scandinavian cities, the climate change agenda moved over time from being a marginal policy (in the 1990s and early 2000s), characterized by weak integration in planning and governance and being relatively experimental and fragmented in character, to reach center stage of urban policy making. From around 2010-15 climate change, invariably, became an integrated concern across sectors and influenced the emerging and broad agenda of sustainability, first, in Copenhagen, subsequently in Gothenburg and Oslo. Of specific importance is that the city-level climate policies became increasingly

integrated with or a central concern of the planning system (regional land use & transport planning and municipal planning) and the national and local transport and energy policies.

It is fair to argue that the increasing focus by the city governments on changing climate policy and related institutions (climate goals, planning, governance) inspired – but was also influenced by – strategic spatial planning, large-scale investments in urban infrastructure and emerging changes in the urban economy. These emerging local policy changes observed reflect, on the one hand, that climate change action is deeply entwined with – and needs to be integrated with these other policy agendas, especially regarding planning, transport, and energy (as regards climate mitigation). It is sometimes hard to unpack and distinguish the distinct *climate* governance and policy contribution from other planning, sector policies and developments. On the other hand, this also suggests that progress in climate change policies depends on large-scale sector and city development investments in e.g. public transport (and energy) and integration of climate responses in mobility policies and city development approaches.

In this regard, the high-quality and advanced public transport systems in each of the Scandinavian cities is different from the public transport network of Cape Town, which consists largely of privately owned and operated (mini-) buses and one coastal railway track/system. In Copenhagen, Gothenburg and Oslo the public transport system has evolved rapidly through major co-funding and co-implementation efforts with state and regional actors. The public transport system is today an essential prerequisite for the acceptance among citizens of restrictions on private car usage, which are significant especially in Oslo and to some degree in Gothenburg and to lesser degree in Copenhagen. But in all the Scandinavian cities a relatively attractive alternative form of transport to the car exists through a combination of public transport, biking and walking. Biking is comparatively not as much used as transport mode in Cape Town.

The changes in Oslo over the last 5 years can serves as an example of how, following the adoption of ambitious climate goals and policies through the Left-Green city government, climate change emerged as a strong mobilizing force for the city to act on a broader urban sustainability and development agenda. In this regard, the climate agenda revealed its urban transformational potential. In Oslo, but also in Gothenburg and Copenhagen, responses to the climate change contributed to a reinforced focus on compact city development (which started in the 1990s), building on substantive and coherent regional land use and transport planning that lay important premises for city development in terms of the location and forms of new housing areas, mobility policies and limitations on urban sprawl. Parallel to the emphasis on compact city development, large-scale investments took place in improving the efficiency of the public transport network and system (interrelated system of metro, tram, train, buses). Mobile phones and mobility Apps guide today customers across these modes of transport which are available at every stop on 5-10 minutes basis. Moreover, efforts were strengthened in improving the network of biking lanes and down-town walking and livability opportunities (car free zones and streets). Today, walking and biking is widespread and accounts for 30% or more of all travels. Copenhagen is among the cities in the world with the highest biking rates and is increasingly developing superhighways for biking in and out of the city; an approach Oslo and Gothenburg have also taken up. Moreover, Oslo as well as Gothenburg has advanced toll ring systems, which particularly in Oslo is a key instrument to regulate the influx of cars and intra-city transport. The presences of alternative modes of transport has made it possible for Oslo to introduce many restrictive policies on car usage/fossil car ownership through a combination of restrictive policies and stimulations (of electric cars) and interactive governing. Oslo's political leeway to introduce e.g. congestion charges, remove parking lots, and establish car-free zones must be understood in relation to the parallel development of the public transport system, which work to enhance the rate of muting and travels by public means greatly. The subsidy on and rapid proliferation of electric cars (by the state) was an integrated element of this urban sustainability policy; 60% of all new cars sold in Oslo today are electric. Consequently, the climate policies and actions at local level in each of the Scandinavian cities, albeit with varying degree of success in terms of outcomes, were facilitated

by a relatively enabling multilevel governing system and a coherent, integrated local and national climate policy framework and emerging co-creational leadership.

7.5.3 Conclusions: 'Eight essentials for effective, sustainable and fair urban climate governance'

An interesting but also obvious conclusion from our comparison is that ambitious climate goals needs to go hand in hand with strong mandates and capacities for the municipality to follow up on the ambitions. Thus, bold goals need to be followed by budgets and institutional capacity as well as innovation not only in products and technologies, but also in governing mechanisms. If not, the city will face trouble in maintaining the focus and cohesion over time (Abdallah and Langley 2012:256). Oslo shows the importance of continuous political backing locally and nationally for selecting bold climate goals and ensuring fiscal support from central government. Cape Town shows that a lot can also be done within a relatively hostile policy environment through local champions (Hickmann and Stehle 2019). Cape Town's extensive collaboration with non-government actors from academia and civil society reflects a means to compensate for lack of internal capacity and access to external economic resources.

Regarding the general approach to urban climate governance, each of the four cities use a combination of political, regulative, strategic, economic, administrative and informative measures for urban climate governance. The starting point for city governance is the cities' own political directives/policies, plans, strategies, and organizations within the framework of relevant national laws, policies and administrative regulations. But in order to plan and govern and implement policies, there are also needs for administrative capacity, budgets, resources, programs, networks and cooperation with citizens and key public and private stakeholders. The more precise governance approach is therefore the result of the actual roles of and relationships that emerge between the various actors involved - from the city councils and political committees to sector administrations, municipal corporations and other relevant and concerned stakeholders. It remains that the city budget (prepared by the city council) is the key governing and leadership document for the city's entities and corporations. The budget provides the objectives, directions, mandates and key resources to lead climate action and interaction within the economic frames and existing laws and regulations. The fact that there are many similarities in urban climate governance across the four cities may be a strong indication that governance responses to complex, unruly, collective action problems such as climate challenges at city levels often will evolve along similar trajectories across global cities and require specific mixes of integrative and co-creational governing responses. This should be expected as a strong finding of our comparison, even if each city responses also embody spontaneous and distinct institutional innovations and actions from the bottom up, reflecting local contexts and circumstances, which, overall, produce a diverse, dispersed, yet also connected, multilevel pattern of governing across actors and scales. This finding is in line with what Elinor Ostrom described as a 'polycentric' approach to governance.

What is then distinct about urban climate governance within cities characterized by ambitious goals, strong and coherent climate policies and organizational capacity for governing across the four cities? What seems to be necessary or essential conditions for making urban climate governance work?

Drawing upon the experiences of climate responses in our four forerunning cities, ***'Eight essentials for effective, sustainable and fair urban climate governance and leadership'*** are suggested that potentially bring cities onto pathways towards climate transformation. These are the following:

1. Put in place ambitious and clear climate goals and strategies through co-design with citizens and relevant and concerned private business stakeholders that combine goals of GHG mitigation, adaptation, climate equity with a broad approach to urban sustainability

2. Establish a distinct organization and institutional home with responsibilities for advice, coordination and for driving the agenda with a mandate to push both internal integration across municipal departments and entities and interaction with external stakeholders
3. Assign a discrete budget for climate actions within the climate agency and develop a climate budget along with the financial budget across sector entities combined with monitoring and reporting systems on the achievements in GHG emission reduction, resilience and sustainability
4. Ensure reform of traditional governing mechanisms and regulative measures (planning system, procurement systems with climate criteria) for assembling and aligning both internal and external entities and concerned stakeholders and citizens through integrative and interactive measures
5. Facilitate co-design of climate policies and experiments, co-governance of operations and co-evaluation through multi-ways communication and co-learning among practitioners, citizens, researchers and private sector actors
6. Develop own or engage in collaborative networks, platforms, arenas, and partnerships nationally and transnationally
7. Encourage city- and urban leadership to be guided by roles and mentalities as collaborative capacity builders that facilitates co-creation within and across public and private organizations, sectors and scales, including skills to productively navigate contestation based on differing values and priorities, as well as complex and skewed power and social dynamics
8. Enable or support emerging climate self-governing in the private sector and civil society, and encourage the evolution of consumption-based change in behaviour and values of individual citizen groups and neighbourhoods observed at city level

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Appendix 1 Copenhagen

Year	Climate Action Plans (CAP's), related strategies and programs	Planning and steering approach
1999-2002	**CO2 Plan for Copenhagen 1990-2010** released in 2002 focuses on energy, transport, and waste handling	The planning was organized in a traditional way and run by a board and project group, primarily representing the Technical and Environmental Administration (TEA). The project group composed of staff within TEA
2002	**Bicycle Strategy 2002-2012**	The planning was organized in the Technical and Environmental Administration.
2003	**Agenda 21 strategy 2003-2007** Focuses on: (I) sustainable urban development (planning, buildings, green areas, biological diversity and transport). (II) Resources (energy, water, and waste). (III) Environment and health (IV) Embeddedness, communication, local environment work. (V) Sweeping before one's own door (green accounting, consumption, sustainable waste)	The Agenda Plan is presented after a round of open comments by residents of Copenhagen The Agenda Plan is a framework plan without designated funds and including initiatives not (fully) funded.
2007-2009	**The Environmental Metropolis** released in 2007, with action plan in 2009. Based on four themes; (i) best city for cycling in the world; (ii) centre of world's climate policy; (iii) a blue-green capital; and (iv) clean and healthy city	All seven administrations invited into the planning process, conducted through nine working groups. Aims to combine reduced CO2 emissions with positive effects on economic growth, and that taking environmental actions adds dynamism for the urban development
2011	**Climate Adaptation Plan** Focuses on; Storm water management. Rising groundwater levels. Floods from the sea. Protection of the coasts. Rising temperatures and heatwaves. Drought. Stronger winds	The planning was organized in cooperation between The Finance Administration and The Technical and Environmental Administration.
2012	**CPH 2025** Initiatives fall under the four categories of (i) energy consumption; (ii) energy production; (iii) mobility; and (iv) municipality's own activities	Distinguishes three implementation periods, 2013-2016; 2017-2020; 2012-2025. Acknowledges that energy sector contributed the largest share of emissions in the 2000-2010 period. Energy sector initiatives become in focus; comprise 165 initiatives throughout CPH 2025.
2016	**CPH2025 – Roadmap 2017-2020** Initiatives fall under the four categories mentioned above	Initiatives unfold in three stages stressing the need for prior technical investigation: analyses; testing and demonstrations; and implementation
2016	**The 2016 Agenda 21 report (2016–2019)** Focuses on the need to (i) foster active engagements of citizens, co-responsibility, and co-creation; (ii) support private–public partnerships; and (iii) citizen involvement (in practice; in flagship projects)	Underlines a need to foster residents' possibilities for active engagement, co-responsibility, and co-creation in achieving the city's environmental and climate aims. The political planning process was similar to the previous report which makes it reasonable to anticipate similar political divisions

Appendix 2 Socio-economic and climate context

This Annex compares core background variables informing on the socio-economic and climate mitigation/adaptation context that invariably influence the cities climate responses and approach to urban climate governance.

A. Socio-economic features

Cities	Oslo	Copenhagen	Gothenburg	Cape Town
Number of inhabitants	683 794 (2019)[74]	623 404 (2019)[75]	571 868 (2019)[76]	4 232 276 (2018)[77]
Annual municipal budget/ Budget per capita	8,0 billion USD/ 12 000 USD (2017)	7.56 billion USD/ 2 330 USD (2018)	Not found	3.6 billion USD/ 750 USD (2017)
Number of employees in the city administration	50 117 (2016)[78]	45 000[79] (2019)	55 000[80]	25 000
Unemployment rate	2,7 % (2019)[81]	4,5 % (2019)[82]	7,1 % (2018)[83]	11,9% (2016)[84]

It is striking that the Scandinavian cities have at their disposal manifold the budget per capita for governing urban affairs compared to Cape Town (10-15 times roughly), reflecting the strong role municipalities have in Scandinavia but also the higher income per capita and general welfare level in Scandinavian society.

[74] https://www.ssb.no/kommunefakta/oslo
[75] From Copenhagen's Climate account 2018 (København 2019)
[76] https://goteborg.se/wps/portal/enhetssida/statistik-och-analys/
[77] https://www.westerncape.gov.za/assets/departments/treasury/Documents/Socio-economic-profiles/2017/city_of_cape_town_2017_socio-economic_profile_sep-lg_-_26_january_2018.pdf
[78] https://www.oslo.kommune.no/politikk-og-administrasjon/statistikk/kommunal-okonomi-og-forvaltning/ansatte-i-oslo-kommune/#gref
[79] https://www.berlingske.dk/samfund/danmarks-stoerste-arbejdsplads-vil-goere-arbejdstiden-fleksibel
[80] https://goteborg.se/wps/portal/start/kommun-o-politik/kommunens-organisation/om-kommunens-organisation/
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[82] https://www.skift-a-kasse.dk/juni-2019-stigning-i-antallet-af-arbejdsloese/
[83] https://vartgoteborg.se/arbetslosheten-fortsatter-att-minska-i-goteborgsregionen/
[84] https://www.westerncape.gov.za/assets/departments/treasury/Documents/Socio-economic-profiles/2017/cit

Climate adaptation and mitigation challenges

In general, the Scandinavian cities face climate adaptation challenges connected to heavy rainfall, stormwater and strong winds, Gothenburg being especially exposed to river flooding, while Copenhagen faces storm surges from the sea. Cape Town needs to adapt to a broader set of climate vulnerabilities and extreme events; heavy rainfall and strong winds and flood risks on the plains and in the city, but also more drought and fires and water shortage.

All cities except Oslo face risks of sea-level rise and storm surges, Cape Town being especially prone to storm surges and beach erosion. Turning to climate mitigation, the Scandinavian cities have all the approach of trying to curb direct CO2-emissions, Oslo focusing particularly on emissions from transport (60% of emission sources), while the approach in Gothenburg and Copenhagen is geared more towards shift to renewable energy production; efforts in mobility being of secondary importance. All cities have started to develop measures to handle indirect CO2-emissions, however, this is not a major focus. Cape Town, on the other hand, focuses more strongly on energy security, energy supply and development of renewable energy that may strengthen both supply and security.

B. Main climate challenges

Cities	Oslo	Copenhagen	Gothenburg	Cape Town
Main climate adaptation challenges	Heavy rainfall and storm water flooding. Fresh water available. Strong winds.	Heavy rainfall, rising sea level and storm surges. Strong winds.	High water flow rates and flooding, maintenance of drinking water system from the Göta river. Vulnerable electricity system.	Heavy rainfall and storm water and flooding risks. Higher temperatures. More droughts. Rising sea level. Stronger winds. Fires in informal settlements. Water scarcity, poor water quality.
Main CO2 and energy related challenges (mitigation)	Curbing direct CO2 emissions. Current main CO2-focus: Emissions from transport	Curbing direct CO2 emissions. Current main CO2 focus: shift to non-fossil fuel of power and heating plants	Curbing direct and indirect CO2 emissions. Current main CO2 focus: Need for transition to biomass in the heating system	Energy security a main concern (at reliable prices). Problematic supply infrastructure and institutions. Renewable energy is a key issue in Action Plan