

CHAPTER 8:
**GOVERNING CLIMATE CHANGE IN CITIES: MODES OF URBAN CLIMATE
GOVERNANCE IN MULTI-LEVEL SYSTEMS**

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Based on the results of both existing research and recent developments in OECD countries, this study focuses on two issues: the local and the multi-level dimensions of urban climate governance. Starting from the distinction between different modes of climate governance (self-governing, governing through enabling, governing by provision and governing by regulation), we discuss the relevance of these modes for both mitigation and adaptation policies. These modes are distinct in terms of their governing capacities, which range from soft forms of governing to traditional forms of state intervention. The development in many countries suggests that municipalities do not fully exploit their authoritative powers and are reluctant to apply authoritative modes of governing through regulatory measures and strategic planning.

Various forms of horizontal and vertical collaboration are relevant to the success of urban climate governance beyond the local level. Horizontal collaboration includes climate governance within metro regions and city networking. Due to a lack of horizontal collaboration within such regions, many metro regions are characterised by a spatial mismatch. A second form of horizontal self-governing, city networking at the national and transnational level, has become prevalent among pioneering cities in recent years. Such networks focus on best-practice transfer, learning among their members and the representation of their members' interests at the national, European and international level. However, such networks tend to be networks of pioneers for pioneers. Vertical collaboration within nation-states includes various modes of governing, ranging from an enabling role of national governments (guidelines, awards, benchmarking and certification schemes) to funding schemes, such as the Dutch *Bestuursakkoord Nieuwe Stijl* (New Style Management Agreement) agreement (BANS) and Sweden's Climate Investment Programme (KLIMP), and authoritative modes of governing. In most countries, climate change policy is still a predominantly voluntary task for local authorities, and most national governments limit themselves to enabling modes of governing.

Introduction

Local governments have become major policy players in the area of climate change policy over the past 20 years.¹ During this period, many cities around the world have developed their own climate action plans and strategies. While mitigation was the main focus in the early phase of local climate change policy, both mitigation and adaptation measures can now be found on the local political agenda (Table A1, Annex). Moreover, many cities have become members of national and transnational city networks, ranging from the U.S. Mayors Climate Protection Agreement and the Swedish *Klimatkommunerna* network to the C40 Cities, an international network of the world's largest cities committed to tackling climate change.

Global climate change affects local governments in three different ways. First, a high and increasing portion of greenhouse gas (GHG) emissions is generated in cities. Second, the effects of global climate change have a direct impact on cities, which need to adapt to the changing situation. Third, linkages and synergies between climate policy and sustainable development become most obvious at the local level, and motivate cities to generate the social and technological innovations that help in the reduction of GHG emissions and adaptation to new challenges. This is particularly true for metro regions that have high innovative and creative capacities. Metropolitan regions do not only compete with each other, cities may also co-operate with their peers, at home and abroad, and may serve as a focal point for the development of best practices that can spread within and beyond such regions.

However, the actual response of local governments varies considerably, due to:

- The impact of global climate change at the local level (such as increased precipitation, flooding, rising sea levels, coastal erosion. etc.) (*cf. Zahran et al., 2008*) and the perception of these regional vulnerabilities and risks by citizens and policy makers;
- A city's competences and authority to regulate climate-relevant issue areas, its commitment to fight global climate change and its capacity to do so;
- National programmes that support local initiatives, in particular initiatives of local authorities that lack the resources to follow the pioneers;
- The involvement of cities in national and transnational networks, which facilitate the exchange of experience, the transfer of best practice and the joint development of innovative solutions.

Although research on local climate change policy started more than ten years ago (Feldman/Witt, 1993; Alber *et al.*, 1996; Collier/Löfstedt, 1997), the research conducted up to now has tended to focus on mitigation activities, adopting a case study approach, and concentrating on individual countries, such as the United States and Sweden (Betsill, 2001; Granberg/Elander, 2007; Aall *et al.*, 2007; Lundqvist/Borgstede, 2007; Kern *et al.*, 2005; Bulkeley, 2000) and on individual city networks, such as the "Cities for Climate Protection Campaign" (CCP) (Betsill/Bulkeley, 2004, 2006). In most countries, research on adaptation is still in its early stages (Lindseth, 2005; Næss *et al.*, 2005; Storbjörk, 2007; Zahran *et al.*, 2007). Studies that go beyond a limited number of city case studies are as rare as international comparative approaches (Bulkeley/Betsill, 2003; Bulkeley/Kern, 2006; Kern *et al.*, 2005) and comparative studies with a focus on all, or at least a considerable number of OECD countries, have not yet been conducted. Moreover, there are very few studies that take national programmes into account and analyse national multi-level systems and the conversion of national policy goals into local politics (Gupta, 2007). Finally, there is a lack of research comparing the various national and transnational city networks and analysing their relationships and impact on local action (Toly, 2008; Kern/Bulkeley, 2009).

Based on both the results of existing research and recent developments in OECD countries, this study focuses on two perspectives. First, we will concentrate on the local level and the urban governance of climate change (Section 2). Starting from the distinction of different modes of climate governance, we discuss the various sectors of activity and the complex relationship between mitigation and adaptation at the local level. In Section 3, we will change our perspective, turn to our second topic and discuss the modes of urban climate governance in multi-level systems, in particular the various forms of horizontal and vertical collaboration.

The urban dimension of climate governance

In the early stages of the debate on climate change, both scientific and public discourse focused primarily on *mitigation*, *i.e.*, the reduction of GHG emissions. At the local level, climate change policy includes, first, the definition of emissions reduction goals, which vary widely between local authorities and include cities with very ambitious targets, such as Växjö's vision to reduce CO₂ emissions by 50% by 2010 and become fossil fuel free in the long run (Växjö kommun, 2008; Granberg/Elander, 2007). A number of cities have adopted the Kyoto target to compensate for the inaction of their governments, because, for example, they have not ratified the Kyoto Protocol (*e.g.*, the United States) or are unlikely to achieve their Kyoto commitment (*e.g.*, Italy).

Second, many cities have conducted GHG emission inventories to analyse the potential for GHG reduction and subsequently, measure their performance. This development is evidenced in the initiatives of transnational city networks, such as the International Council for Local Environment Initiatives' (ICLEI) Carbon Disclosure Project. In August 2008, around 30 urban centres in the United States agreed to use the same methodology to monitor and disclose their emission data. Problems remain, in particular, when cities are compared, although they do not use the same methodology to measure their GHG emissions.²

Third, integrated climate change strategies and plans for specific sectors (energy, transport) constitute the next step towards the institutionalisation of climate change policy at the local level. The establishment of a special unit in the mayoral office may help to accomplish this important step.

Fourth, in terms of the implementation of climate protection action plans, two alternative approaches exist: first, a unit that is in charge of climate change policy can be established within each climate-relevant department. Given the limited availability of staff, a second approach, which relies on a climate policy steering group, a climate protection co-ordination office or an overarching unit with appropriate competencies for mainstreaming climate change policy, appears to be more promising. This needs to be combined with various task forces that co-ordinate the activities around specific issues and across all relevant policy areas within the city administration.

Such a comprehensive approach has been pursued by a number of cities. In the city of Zurich, for example, a special unit for environmental protection (*Umweltschutzfachstelle*), which, among other tasks, is in charge of supervising the city's climate policy and acts as a service agency with cross-departmental tasks within the city administration. This special administrative unit is responsible for assessing every planned development and construction project in terms of its impacts, and the departments responsible for the implementation of such developments need to account for the results of this assessment. To guarantee that this model works properly requires, first, strategic plans comprising sectoral targets, policies and measures (such as the combination of a general master plan for the environment and a specific master plan for energy in the city of Zurich); and, second, a project-based approach that prevents departmental segregation.

However, numerous cities that have adopted GHG reduction targets have failed to pursue a systematic and structured approach and, instead, prefer to implement no-regret measures on a case-by-case basis. Empirical evidence suggests that the responsibility for climate change policy is usually located in the environmental policy agency (for example, in approximately two-thirds of German cities; Kern *et al.*, 2005: 38). This may lead to co-ordination and integration problems if the environmental agencies do not have the capacity to implement comprehensive concepts and are in the same position as the environmental ministries within national governments. Although climate change policy is an issue that affects a variety of departments within local administrations (for example, administrative units dealing with finances, procurement, urban planning, economic development and education), expertise on these questions in many cities is still concentrated in the environmental department. In a majority of cases, climate-related issues

are not taken into account when decisions that could have an influence on climate policy are taken outside the environmental department. Given the urgency of the problem and the need to achieve significant cuts in GHG emissions in industrialised countries, this would appear to be insufficient.

More recently, the debate on climate change has shifted, and mitigation approaches have been complemented by a new paradigm, that of *adaptation* to the risks introduced by climate change. This paradigm shift can be observed at different policy levels, from the global to the local. One example can be found in the Green Paper on “Adapting to Climate Change in Europe – Options for EU Action”, which was released by the European Commission in June 2007 (CEC, 2007). Adaptation has become necessary because the effects of climate change have already become apparent, but it is complicated by the fact that, depending on physical and socio-economic vulnerability, natural and human adaptive capacity, health services, and disaster surveillance mechanisms (CEC, 2007, 11), the impact of climate change varies from region to region. Although the local and regional level appear to be the optimal levels for adaptation, the development of local and regional adaptation plans started only recently, and research on local adaptation strategies is still limited.

Modes of urban climate governance

Four governing modes emerge as significant in the analysis of the dynamics of urban climate governance. These modes are distinct in terms of their governing capacities and range from soft forms of governing to traditional forms of state intervention (Bulkeley/Kern, 2006: 2242). First, *self-governing* can be defined as the capacity of local government to govern its own activities, for example by improving energy efficiency in government offices and other municipality-owned buildings. Self-governing relies on reorganisation, institutional innovation and strategic investments. Second, *governing through enabling* refers to the role of local government in co-ordinating and facilitating partnerships with private entities and encouraging community engagement. Tools such as persuasion and (positive) incentives are most important for this mode of governing. Third, *governing by provision* implies shaping practice through the delivery of particular forms of services and resources. This is accomplished through infrastructure and financial policy. Fourth, *governing by regulation* can be characterised as the use of traditional forms of authority, such as control and the use of sanctions. Although these modes of governing may overlap, and individual measures are often based on a combination of several modes, these distinctions provide a framework for the analysis of urban climate governance and the measures preferred by municipalities. In the following sections, we will discuss the relevance of these four modes of urban climate governance for both mitigation and adaptation policies and measures.

Mitigation: sectors of activity

In addition to identifying distinct modes of governing, it is also possible to observe key spheres of action regarding climate change. In the area of mitigation policy, four sectors appear to be crucial. First, new approaches to energy policy have become the most visible instruments in local climate policy and aim primarily to improve energy efficiency (e.g., in public buildings) and promote renewable energy solutions. Second, in the transport sector, local authorities have become engaged in the “greening” of their fleets, improving public transport systems and promoting alternative forms of transport, such as walking and cycling. Third, waste policy, less frequently used as an integral part of local climate policy, concentrates on waste prevention, reuse and recycling. Finally, urban planning and land use feature among the central responsibilities of local authorities, providing many opportunities for local action, ranging from standards for new buildings to strategic planning for new neighbourhoods. Table 1 depicts both dimensions of this analysis, *i.e.*, the modes of urban climate governance and the sectors of climate change mitigation.

Table 1: Modes of urban climate governance and sectors of climate change mitigation

Self-governing	Governing through enabling	Governing by provision	Governing by regulation
Energy			
Energy efficiency schemes and use of combined heat and power (CHP) within municipal buildings (e.g., schools) Procurement of energy-efficient appliances Purchasing of green energy Eco-house and renewable energy demonstration projects	Campaigns for energy efficiency Advice on energy efficiency to businesses and citizens Promotion of the use of renewable energy	Clean energy service provision Energy service companies Provision of incentives and grants for energy-efficiency measures	Strategic energy planning to enhance energy conservation Ordinances on the mandatory use of renewable energy Energy efficiency requirements in zoning ordinances
Transport			
Mobility management for employees Green fleets	Education campaigns Green travel plans Quality partnerships with public transport providers	Provision of public transport Provision of infrastructure for alternative forms of transport Logistics centres for freight transport	Transport planning to limit car use and provide walking and cycling infrastructure Workplace levies and road-user charges
Waste			
Waste prevention, recycling, and reuse within the local authority Procurement of recycled goods	Campaigns for reducing, reusing and recycling waste Promotion of the use of recycled products	Waste service provision Installations for recycling, composting and "waste to energy" facilities Recycling, composting and reuse schemes	Regulations on methane combustion from landfill sites
Urban planning and land use			
High energy-efficiency standards and use of CHP in new public buildings Demonstration projects – whether at the residential or neighbourhood level	Guidance for architects and developers on energy efficiency and renewables		Strategic land-use planning to enhance energy efficiency and the utilisation of renewables Planning of sites for renewable installations Strategic land-use planning to enhance public transport

Source: Based on Bulkeley, H. and K. Kern (2006), "Local Government and the Governing of Climate Change in Germany and the UK", *Urban Studies*, Vol. 43, No. 12, p. 2243.

Self-governing: the municipality as consumer

The implementation of climate protection measures is relatively simple in areas in which the municipality can make its own decisions and can control its own consumption. In many countries, the majority of climate protection measures concentrate on this type of initiative (Bulkeley/Kern, 2006; Kern *et al.*, 2005; Bulkeley/Betsill, 2003). However, changing the procurement policy of local governments may have a considerable impact on the local economy, because city governments demand a variety of goods and services.

Improving energy efficiency in municipal buildings has been the key area for action in many cities. In Sweden, 95% of the municipalities and all regions are engaged in improving energy efficiency in their own buildings (SKL, 2007: 3). Furthermore, municipalities can purchase a certain percentage of their energy from “green” sources. In Heidelberg, for example, the city council decided in 2001 to spend EUR 330 000 for a 25% share of renewable energy consumption in municipal buildings. Self-governing is also crucial for the transport sector. Today it has become very common for municipalities to purchase alternative vehicles, such as biogas or natural-gas cars and buses, for the purpose of “greening” their fleets. Operating alternative-fuel vehicles and constructing green buildings has helped Seattle’s city government reduce its GHG emissions by 60% (Sierra Club, 2006: 2). In the city of Graz, for example, biodiesel from used cooking oil, which is collected systematically, is used for the city’s fleet.

Such actions are most often driven by both environmental and economic concerns. In Munich, an assessment of 1 000 municipal buildings was conducted by the administration to identify the potential for energy savings; 3 000 individual measures were identified, amounting to annual savings of EUR 1 million. The city of Berlin pooled public buildings in order to be able to conclude better contracts with performance contractors. Motivated by a lack of economic resources, many German cities have cancelled their contracts with external energy service companies (ESCOs) and implemented performance contracting projects in the energy sector. Another approach employed in Germany involves the use of internal resources, based on revolving funds. Energy saving in schools and other public buildings is also encouraged by offering a share of the energy costs saved as a financial incentive to change energy-related behaviour (*e.g.*, 50/50 projects for schools).

Such initiatives are often driven by the financial benefits of energy saving but can, nonetheless, increase political support for climate policy at the local level. Local self-governing initiatives have certainly helped to put climate protection on the political agenda. However, in most countries, local authority energy consumption only accounts for between 1% and 5% of total CO₂ emissions within municipalities (although it can be higher if the cities own residential buildings, as in Austria and Sweden). Thus, significant effects can only be achieved when local climate change policy is complemented by other modes of governing (Bulkeley/Kern, 2006).

Governing through enabling: the municipality as facilitator

Apart from initiatives targeting their own consumption patterns, city governments co-operate with non-state actors, encouraging and facilitating voluntary action undertaken by businesses and citizens. The enabling mode has various dimensions, including public education and awareness campaigns and the promotional activities of local governments. For example, the city of Leicester (United Kingdom) conducted an energy education project that included the use of an electric energy-advice bus that tours local schools, and the development of best-practice case studies, which helped other municipalities identify the potential for and barriers to the development of renewable energy. Moreover, the efforts in Leicester have also had a regional dimension. In co-operation with other actors, the city has developed the East Midlands Community Renewables Initiative, which promotes the development of renewable energy on a regional level (Bulkeley/Kern, 2006).

In addition to promotional campaigns, governing through enabling requires local governments to develop external ties and facilitate co-operation between stakeholders. This includes the establishment of public-private partnerships for the provision of services and infrastructure. For example, the London Climate Change Agency (LCCA), which is owned and controlled by the London Development Agency, was established with the direct support of private companies. Its main mission is to deliver projects that reduce London's GHG emissions and implement the mayor's Climate Change Action Plan and the Mayor's Energy Strategy. In 2006, the LCCA and EDF Energy, one of the largest energy companies in the United Kingdom, set up a joint venture energy service company to develop decentralised energy schemes for London. Moreover, the London Energy Partnership (LEP), which consists of a consortium of private companies and public agencies, aims to stimulate energy actions, transform London's energy infrastructure and promote sustainable energy solutions by bringing together all relevant sectors and organisations. The partnership has created several task forces, *e.g.*, for low-carbon finance and community heating, to fulfil its mission more effectively.

In Munich, the city has created not only an energy commission but established various other fora that directly involve private stakeholders. Two specialised working groups (*Fachforen*) were established, *i.e.*, Solar City Munich (*Solarstadt München*) and Energy-Saving in Residential Buildings, as part of the Extended Climate Protection Programme (*Erweitertes Klimaschutzprogramm*). These working groups bring together potential investors and companies that have the necessary expertise for the realisation of innovative energy strategies.

A similar approach has been pursued in Venice, where the city council approved a municipal energy plan in 2002. This plan aims primarily, but not exclusively, to improve energy efficiency in the public and private sectors. It comprises a series of intention protocols that outline a number of joint venture projects between the municipality and other interested parties. Based on a formal framework for co-operation, a number of such protocols have been agreed on by the local administration and various stakeholders, for example an agreement between the city of Venice and the glassblower companies in Murano. These agreements include not only private companies but also municipal transport companies, the housing administrators' associations and the associations of planners, architects and engineers.³

Enabling activities, which are primarily based on persuasion and argument, seek to encourage other actors to establish climate protection initiatives. While awareness and promotion campaigns have become part of the general repertoire of most cities when it comes to climate change policy, the establishment of new partnerships for the transition of existing infrastructure and services is less common. Such arrangements appear to be better suited to the needs of large and competitive cities, such as London or Munich, which are highly committed to climate change policy and pursue ambitious GHG reduction goals, while also being driven by economic incentives and prospects.

Governing by provision: The municipality as provider

If a municipality is the majority shareholder in the local utility companies for energy, transport, water and waste services, it is in an excellent position to steer local action on climate change. Cities in this position can directly influence the generation of electricity, prioritise district heating systems and combined heat and power (CHP) and/or combined cooling and power systems, push for investments in energy efficiency and renewable energy technologies, and can even combine this with funding schemes for private investors. This means that the direct provision of services enables local governments to create infrastructure that generates fewer GHG emissions.

The internationalisation and liberalisation of the energy markets are putting such arrangements under increasing pressure. This applies in particular to European countries, which are obliged to implement the EU directives on the liberalisation of the European electricity market. In Germany, for example, the Power

Industry Act (*Energiewirtschaftsgesetz*) of 1998 restricted the influence of municipalities over the generation of electricity primarily to their options as shareholders. In the course of liberalising electricity markets, German municipalities have almost entirely lost their potential to influence the supply side of energy, because many public utilities have been partly or completely privatised, while most of the remaining municipally owned companies have restricted themselves to the distribution of electricity and buy electricity on the spot market, which is now generated by a limited number of big private companies. Demand-side management programmes, which were popular among local utilities, have been almost completely phased out since liberalisation. The liberalisation of energy markets has made the task of local climate change policy even more challenging, because these policy objectives are difficult to reconcile.

Despite the liberalisation of the European energy markets, some pioneering cities, such as Heidelberg and Munich, have managed to implement climate protection measures. In Munich, the *Stadtwerke*, now a private company owned by the city of Munich, charges a premium for electricity from renewable sources, which is transferred to a special fund for innovative projects such as photovoltaic (PV) installations. Using the proceeds from the sale of shares in their utilities has helped some other cities to set up funds for sustainable-energy projects, such as Hanover's *Proklima* fund. Although liberalisation has limited the governing capacities of European cities in the area of climate change policy, municipalities with their own utilities appear to be more successful in the field of climate change policy (Kern *et al.*, 2005; Weimer-Jehle *et al.*, 2001:4).

Moreover, because the cross-subsidisation of transport services is no longer possible, the liberalisation of the European energy markets has had far-reaching consequences for the transport sector in European cities. If public transport systems are privatised, local authorities are still able to influence the transport system through local public transport plans. However, these regulations change their role from governing by provision to a combination of enabling and the use of regulatory power. In North America, the situation is somewhat different because public transport systems are less developed than in Europe. However, they have experienced a revival in the last few decades, with cities such as Portland, Sacramento, San Diego and Minneapolis establishing new transport infrastructure, in some cases through public-private partnerships. Although transit use has increased, *e.g.*, in Portland by 75% since 1990 (USMCPA, 2008:20), the existing transport infrastructure poses considerable challenges for successful climate change policy in American cities, because a relatively high, and even increasing portion of GHG emissions originates from the transport sector.

Governing through provision affects the development and transformation of urban infrastructure, which, in turn, is decisive for consumption patterns and affects local climate change policy. From existing research, we can draw the conclusion that the significance of this mode of governing will further decrease with the increasing liberalisation of the energy markets. If local governments, in Europe at least, would like to address the issue of climate change, they will need to turn to other modes of governing (Bulkeley/Kern, 2006; Kern *et al.*, 2005; Le Gales, 2002: 256).

Governing by regulation: the municipality as regulator

In many countries, local governments have the legal power to govern urban climate change by regulation, in particular through strategic energy, transport and land-use planning. If such plans incorporate climate change mitigation goals, they have significant effects on GHG emissions. Although municipalities at large have the authority to include climate policy goals in their strategic planning, they are not obliged to do so. After all, climate change policy remains for the most part a voluntary task of local authorities.

The case of Barcelona's Solar Thermal Ordinance of 2000, which requires the installation of solar thermal collectors for hot water supply, clearly shows that governing by regulation can have considerable impact at local level, and that such regulations can become a model for similar initiatives in other

jurisdictions. Such ordinances were subsequently adopted in around 40 municipalities in Catalonia and in almost 30 municipalities in other parts of Spain (Ekelund/Sigurdson, 2007:12).

Municipalities in the United States established their initiatives in the area of climate change policy considerably later than their European counterparts, but pioneering cities have caught up fast and are now developing similar approaches. In 2007, the Mayor of New York announced that the Taxi and Limousine Commission will phase in new emissions and mileage standards for the more than 13 000 yellow taxicabs over a four-year period. This will lead to a fully hybrid fleet by 2012, reduce the carbon emissions of the taxicab fleet by 50% over the next decade and will also decrease the fuel costs for taxi drivers (Ward, *et al.*, 2007: 13). Moreover, in 2007, the city of Santa Barbara, California, passed an ordinance and adopted provisions for all buildings within the city. This local ordinance aims to reduce the fossil fuel standard for all new buildings in order to achieve carbon neutrality by 2030. This building regulation exceeds state standards for energy use by 20% for low-rise residential buildings, 15% for high-rise residential buildings and 10% for non-residential buildings (Ward *et al.*, 2008: 5).

In the United Kingdom, local authorities need to comply with certain regulations, such as specific requirements for new housing. In addition, they have discretionary powers for the introduction of supplementary guidance, for example on energy efficiency standards for buildings that exceed national regulations. However, empirical evidence suggests that only a few measures in strategic planning documents relate to energy conservation (Bulkeley/Kern, 2006; Bulkeley/Betsill, 2003; Bruff/Wood, 2000). In some countries, such as Germany, municipalities even face legal obstacles if they wish to incorporate climate change considerations fully into urban planning.

The same tendency is evident in the transport sector, in which emission reductions are difficult to achieve. Although the transport sector is frequently included in climate strategies and climate action plans, in German municipalities, even pioneering ones like Munich, the priority given to climate protection in the transport sector is relatively low. Although municipalities have the authority to enact comprehensive plans, transport measures aiming to reduce GHG emissions tend to be limited to smaller projects, such as the construction of cycle paths. Compared to the energy sector, it appears that it is considerably more difficult for most cities to reach a political consensus and broad acceptance for policies in the transport sector, in particular when measures aim to reduce and restrict the use of cars.

In the United Kingdom, municipalities can introduce demand management measures through local transport plans, including hard measures such as road-user charging (Bulkeley/Rayner, 2003). The most prominent example in this respect is London's congestion charging scheme, which was introduced in 2003 and led to a decrease of traffic in central London by 21% in five years. Other cities followed suit, for example, Stockholm, where a congestion charge was introduced in 2006, despite considerable resistance.⁴

These examples show that cities can use their authoritative power in very creative ways, even to generate funding for the implementation of their climate protection policy. The city of Boulder, Colorado, attracted media attention in 2006 when voters approved a city-wide carbon tax to fund Boulder's GHG emissions reduction strategy, laid down in its Climate Action Plan (Betsill/Rabe, 2008). In spite of the limited number of success stories, such as Boulder's carbon tax, Barcelona's Solar Thermal Ordinance and London's congestion charge, it appears that municipalities are reluctant to apply an authoritative mode of governing through regulative measures and strategic planning for climate protection. Instead, a lack of willingness to act locally in the face of political, business and public opposition can be observed – even if the capacity to intervene exists (Bulkeley/Kern, 2006). It may be added that far-reaching approaches, such as the introduction of a carbon-tax or congestion charge, are difficult to achieve because they may require not only a consensus in the city council but also a referendum.

Having discussed the different modes of governing in the area of mitigation, we will now turn to the question as to how cities have been dealing with the new challenges posed by the need to adapt to the effects of climate change.

Adaptation

Whereas cities had initiated mitigation policies and created networks even before the Intergovernmental Panel on Climate Change (IPCC) First Assessment Report was released, adaptation policies at the local level are still in their infancy. The forerunner cities in the area of mitigation accepted scientific uncertainty, focusing on “no-regret” measures and linking their activities closely to local and regional sustainable development. However, a sound scientific basis is imperative when developing an adaptation strategy (Lindseth, 2005:63). This is one of the reasons why cities tend to wait until they are actually affected by extreme weather events.

Cities receive input and guidance from scientific and governmental institutions at the national level in relation to adaptation. In many countries, such institutions have started to investigate potential impact and produce recommendations that show how actors at various levels can adapt to climate change. This stands in sharp contrast to the situation in the area of mitigation, where cities’ mitigation activities were not recognised by national governments and the scientific community for several years. Learning by doing was the only option available to these cities to advance their knowledge in this area. Nevertheless, numerous local governments produced and adopted mitigation plans, whereas, at present, adaptation plans are only at a preliminary stage and range from preparatory studies on how to prepare an adaptation plan (*e.g.*, for Cape Town), and impact assessments (*e.g.*, for London), to the early stages of mere sectoral action plans (*e.g.*, for the health sector in the Toronto/Niagara region and for Stockholm, with an emphasis on biodiversity).

The first countries to take adaptation into consideration at the local level were the United States, Canada and the United Kingdom. In the United States, regional case studies were initiated in 1997 as part of the national assessment of climate variability and change. Subsequently, regional studies were carried out in Canada, including dialogue and participation processes with local stakeholders (Lindseth, 2003). In the United Kingdom, the United Kingdom Climate Impacts Programme (UKCIP) was set up in 1997 by the British government to help various organisations to adapt to climate change. The Local Climate Impacts Profile (LCLIP) methodology, which investigates vulnerability and further needs for scientific information was developed and disseminated among local governments. To date, some 25 local authorities (counties and cities) have compiled LCLIPs. Other relevant projects that provide guidance for local governments include the French *Campagne nationale de sensibilisation et adaptation*, which addresses local governments, among other actors, the World Bank’s Primer on Climate-Resilient Cities, which focuses on Eastern Asia (World Bank, 2008), and the Tyndall Centre’s “Tyndall Cities Programme”. The latter aims to develop city-scale assessment capacities, simulate the evolution of climate impacts and emissions over the 21st century, compare alternative adaptation and mitigation strategies, and consider how cities grow whilst reducing emissions and vulnerability to climate change (Tyndall Centre, 2007).

Cities in high-income countries are considered to enjoy a relatively high adaptive capacity (Satterthwaite *et al.*, 2007). It may thus be assumed that they will be able to improve resilience and manage adaptation once a certain degree of awareness has been developed and guidance has become available. In contrast, the lack of adaptive capacity in middle-income and low-income countries calls for extensive support, both in terms of capacity building and investments in infrastructure and services.⁵

Transnational networks in the area of climate change, which concentrated on mitigation for a long time, began to extend their interest to adaptation around five years ago:

- In 2003, a working group “Global Warming – Local Warning” was created on the initiative of British cities and the European Commission and is co-ordinated by Eurocities;
- In 2005, the Climate Alliance of European Cities initiated the AMICA project to campaign for a combination of mitigation and adaptation and for an integrated methodology to address both;
- In 2006, the ICLEI added the topic of adaptation to its Strategic Plan.

In most cases, cities seek to adapt to current climate variability. In doing this, they are at least increasing awareness and preparedness, which is expected to be helpful in the management of future risks (Storbjörk, 2007) and can be a good starting point for adaptation to the impacts of climate change. Whereas such event-driven activities concentrate on a specific problem, *i.e.*, mainly flooding due to intense rainfall, some cities pursue a more comprehensive anticipatory approach, aiming to reduce vulnerability and improve resilience to climate variability. An increasing number of efforts in this area are seeking synergies between mitigation and adaptation (Tyndall Centre, 2007). Moreover, there is a broad range of basic options, ranging from defensive measures, such as dams, to preventive measures, such as avoiding the development of sites that are at risk from flooding, and “no-regret” measures that lead to synergies with other fields of action, such as the renaturation of rivers to enhance their water retention.

The more proactive and targeted the approach, the more crucial are, first, the validity of the underlying predictions and, second, a common understanding of the underlying science. This is important so that decisions can be made as to which investments and levels of risk are acceptable. Thus, close interaction between policy makers and scientists and the participation of citizens and stakeholders are required (Lindseth, 2005). Moreover, certain conflicts between goals must be resolved, such as the “conflict between safety and scenery” (Storbjörk, 2007: 461), *e.g.*, the attractiveness of settlements with proximity to water bodies versus the risks of flooding and the need for expensive investment in flood protection measures.

UKCIP, in collaboration with the Nottingham Declaration, promotes an integrated approach, which distinguishes between three forms of local governance, roughly in line with the modes considered in the previous section on mitigation: *i.e.*, municipalities and administrators are seen as *i)* estate managers, *i.e.*, as employers and major consumers of energy and other resources and as managers of transport and buildings; *ii)* service providers, which includes the responsibility for emergency planning and social care; and *iii)* community leaders, covering community strategies and partnerships. The authors identify the need and options for adaptation in all these spheres.

The ***self-governing*** mode implies that the planning and the management of public buildings should be adapted to climate change. Sites under risk from flooding should be avoided, sufficient cooling in cases of heat waves should be guaranteed, etc. ***Governing through enabling*** is the mode in which the least practical experience is available. In principle, local governments should influence private actors to do their share in the area of adaptation; however, it has been reported that a lot of persuasion is still required in this area, except in the direct aftermath of extreme weather events (Lindseth, 2005; Storbjörk, 2007). ***Governing by provision*** includes the above-mentioned service provider areas, in particular warning systems and emergency planning that take climate change and extreme weather events into consideration. ***Governing by regulation*** involves, for example, urban planning, which is a core area both for local mitigation and adaptation, since this has in most countries been a field where local governments play an influential role. Because adaptation has recently focused on flooding, it has become clear that urban development planning needs to ensure that the development of sites that are prone to flooding is avoided.

Urban climate governance in multi-level systems

Modes of urban climate governance in multi-level systems

Successful climate change policy at the local level depends both on internal factors, which were discussed in the previous section, and external influences. The latter are concerned with the fact that climate change policy needs to be implemented in multi-level systems, ranging from the international system and the European Union to nation-states and metropolitan regions. Effective multi-level arrangements depend on a fruitful combination of horizontal and vertical collaboration.

Horizontal collaboration, which can be regarded as a form of *self-governing* within multi-level systems, can take different shapes and forms. This includes, first, collaboration between cities and regions. In climate change policy this is, in many countries at least, crucial to the success of urban climate change policy. Cities and regions share competencies in many areas that play an essential role in climate change policy, for example in the spatial planning and the transport sector. Furthermore, formal city boundaries are often too narrow to make it possible to address urban development and transport issues adequately unless a significant effort is made to collaborate within metro-regions (OECD, 2006). Second, horizontal collaboration between cities can lead to the establishment of national and transnational city networks, which have gained in importance in recent years.

Apart from horizontal collaboration, various forms of vertical collaboration are also crucial to urban climate change policy. The municipalities' scope of action in this policy area depends primarily on their position within the national multi-level system. In most countries no direct link exists between national GHG-reduction goals derived from national climate protection programmes and international agreements (UN, EU), on the one hand, and the implementation of these goals at the regional and local level, on the other. Since mandatory provisions in the national legislation, which is relevant for local climate policy, is somewhat limited or lacking altogether in most countries, local climate action remains a voluntary task for local authorities. This explains why the debate on local action to curb GHG emissions started in some pioneering cities almost 20 years ago, while other municipalities remained passive or limited their actions to energy-efficiency projects that promised financial benefits. Even in Sweden, not more than 30% of local authorities have set reduction targets close to the national or regional target (SK, 2007: 13).

In accordance with the debate on urban climate governance in the previous section, it is possible to distinguish three different modes of vertical collaboration within nation-states that focus directly on local climate policy. First, national governments can use *governing through enabling* to stimulate and facilitate action on the ground. Most popular in this respect are guidelines for local authorities and the dissemination of information on best-practice cases. Second, *governing by provision* goes beyond the transfer of information and knowledge for capacity building and offers additional services for local authorities. These include positive incentives in the form of funding programmes for local projects in the area of climate policy. *Governing by regulation* is a third alternative for the organisation of local-state relations in the area of local climate change policy, although most countries have opted, at least up to now, for "softer" forms of governing and have abstained from intervening directly in local climate politics.

As in the case of the debate on the local dimension of urban climate governance, in terms of the multi-level dimension of urban climate governance, these modes may overlap and complement each other. National governments may therefore choose a combination of these modes. Voluntary agreements between national and sub-national governments, for example, combine the enabling and provision mode if the voluntary agreement includes a funding scheme. While national governments can apply all three modes of governing, the European Union, international organizations and transnational networks are far more limited in the choices available to them, and rely in particular on enabling local decision-makers to become more active in the area of climate change policy.

Horizontal collaboration: from the metro-region to transnational networks

Climate governance in metro-regions

The current debate on climate mitigation and adaptation measures at the local level shows that the key problem concerning the co-ordination of mitigation and adaptation measures appears to be a spatial mismatch, which necessitates horizontal collaboration within metro-regions. Municipal boundaries may pose serious problems for adaptation measures because a number of adaptation strategies need to be decided and implemented on a regional scale (for example, water management systems and precautionary flood-protection measures along rivers). In addition, some measures, such as early-warning systems, require effective communication and co-ordination mechanisms beyond city boundaries.

However, the problem of a spatial mismatch is not limited to adaptation measures. It can also be observed in the analysis of mitigation plans and strategies. In many cities, the county or regional government is responsible for climate-relevant issues, such as public transport, and even if the city is in charge, it is absolutely necessary to co-operate with the surrounding communities on a regional scale to find appropriate solutions. Successful climate policy often depends on technical infrastructure, which transcends city borders. Moreover, horizontal collaboration within metro-regions can avoid harmful competition between local authorities to attract developers and investors, which sometimes leads to a race-to-the-bottom in the area of environmental and efficiency standards (Lundqvist/Biel, 2007).

It may be assumed that collaboration within metro-regions will gain considerably in importance for climate change policy. In Europe, this development is supported by regional energy agencies, which are partially funded by the EU and have been established throughout Europe. Some 260 local and regional agencies already offer guidance and services on energy and transport policy. However, in most cases, decision-making remains the prerogative of local governments, and the influence of these agencies is limited, in particular if their funding is not ensured in the mid- and longer term.

The German metropolitan region of Hanover, a metro-region with about four million inhabitants, is an example of a regional approach to both mitigation and adaptation strategies. The Regional Climate Protection Agency (*Klimaschutz-Agentur Region Hannover*), which was established in 2001 by the Hanover City Council, the former regional association of local governments, the city's utility and various private partners, is in charge of co-ordinating all climate protection efforts throughout the region. In the meantime, the regional association of local governments and Hanover county have been transformed into a new authority covering the metro-region, *i.e.*, Hanover Region (*Region Hannover*), and major competences have been transferred to this body.

Another example is Metro Portland (Oregon), which serves the city of Portland, three counties and 25 cities in the region. It is now in charge of maintaining the Portland area urban growth boundary and is also responsible for the region's transportation system. This is crucial to avoid urban sprawl and is therefore a key element of regional mitigation efforts. The city of Portland was the first city in the United States to initiate a local climate action campaign. In 2001, Multnomah county followed Portland's lead and developed a regional strategy (Local Action Plan on Global Warming) covering the city and the county. This strategy includes 150 short- and long-term measures with the overall goal of reducing CO₂ emissions by 10% by 2010 (Ekelund/Sigurdson, 2008: 25). Both metro-regions, *i.e.*, Portland and Hanover, are governed by elected bodies, which may explain the strength of the regional collaboration and co-operation (OECD, 2006: 168).

National and transnational networks

Horizontal collaboration in local climate change policy depends not only on a co-operative approach to the management of urban affairs within metro-regions but also on the “foreign policy” of local authorities. The propensity of many pioneering cities to join national and transnational city networks can be regarded as a second type of self-governing local climate protection within multi-level systems. Innovative cities often join transnational city networks, whose aims include best-practice transfer, learning among their members at home and abroad, and the representation of their members’ interests within the national, European and international multi-level system.

Various city networks focusing on climate change have emerged in recent years, based either on top-down approaches, such as C40 cities, membership of which is limited to big cities, based on invitation and supported by the Clinton Foundation,⁶ or bottom-up approaches, such as the Cities for Climate Protection Campaign (CCP), the Climate Alliance and Energie-Cités. These three networks were created in the early 1990s, shortly before the UN Conference on Environment and Development (UNCED) in Rio de Janeiro in 1992, which put climate protection policy on the political agenda at global, European and national levels. Whereas all three networks have climate protection policy as their mission, the reasons behind their creation differed considerably. CCP is a global city network, the Climate Alliance developed bottom-up as a network of European cities and Energie-Cités stemmed from a project funded by the EU Commission. Nevertheless, the general goals of these networks are almost identical. The networks seek voluntary commitments from municipalities for the reduction of GHG emissions, they try to enhance local capacities to address climate change, they promote the exchange of experience and transfer of expertise between their member cities, and they represent the interests of their constituents at national, supranational, and international levels (Kern/Bulkeley, 2009).

Cities co-operate not only at the international, but also at the national level. In the United States, the U.S. Conference of Mayors Climate Agreement, which was launched in February 2005 by Mayor Greg Nickels of Seattle, has already been signed by almost 900 American mayors. Mayors who join this campaign commit themselves to strive to meet, or even beat, the Kyoto target for the United States (minus 7% of the 1990 emissions levels) in their own communities.⁷ Like their European counterparts, American cities have started to lobby for climate protection legislation in their state capitals, in Washington D.C. and even at the international level.

Based on an analysis of the various forms of governing capacities of national and transnational city networks, fundamental differences between active and passive member cities are apparent, in particular in big networks. Passive member cities are difficult to reach via networks. Although transnational city networks constitute a promising new form of climate governance, they appear to be primarily networks of pioneers for pioneers (Kern/Bulkeley, 2009).

City networks can try to counterbalance this gap between pioneers and laggards by setting tiered standards that attract members with differing levels of performance and ambition. For example, the certification scheme set up by *Energiestadt Schweiz*, a Swiss city network, is characterised by a membership structure that includes two groups of cities: *i*) member cities that have already completed the certification process and have been awarded the label; and *ii*) member cities that participate in and support the initiative but have not been certified because they cannot fulfil the requirements. This structure appears to offer an appropriate approach to bridging the gap between pioneers and laggards, because it attracts not only the best-performing organisations but also organisations that cannot play in the first league but are prepared to play in the second or third league.

Vertical collaboration within nation-states

Governing through enabling: national government as facilitator

Governing through enabling is primarily limited to the collection of information and the dissemination of knowledge on best-practice cases. The main aim of this approach is to build capacity at the local level. Guidelines and guidebooks for local authorities have been developed in various countries. In Germany, for example, the federal government provided municipalities with guidelines for local climate protection (*Leitfaden Kommunalen Klimaschutz*) in 1997. These guidelines contain sections on general aspects of local climate protection, steps for the development of local concepts, the exchange of experience, funding of climate protection activities and recommendations for all relevant sectors (energy, transport, urban planning and land use, and waste). More recently, such guidebooks contain recommendations for actions concerning mitigation and adaptation at local level, e.g., the guidebook “Climate Change: A Guidebook for Local, Regional, and State Governments”, which was published recently by King County (Washington) and written in co-operation with ICLEI and the National Oceanic and Atmospheric Administration’s Climate Resilience Communities Program (Ward *et al.*, 2008).

Governing local climate change policy through enabling appears to dominate in federal states such as Germany. In such political systems, the states, such as the German federal state of North-Rhine Westphalia, constitute an additional layer of government, which may run more comprehensive programmes for local authorities than the federal government. This may explain why local climate change policies may differ between unitary and federal states. National (funding) programmes, which will be discussed in more detail in the next section, are often developed at a later stage in countries with a federalist structure, such as Germany (Kern *et al.*, 2007; Kern, 2008).⁸

Enabling is a form of voluntary governance that could be further developed, because even in the absence of regulation and subsidisation, it is possible to create incentives to institutionalise climate change policy at the local level. Best-practice transfer can be expanded in two directions: first, benchmarking certainly helps to generate more action on the ground. Competitions and awards can be used to recognise the best-performing local authorities. An example is the “Competition for the capital city in climate protection” (*Wettbewerb Bundeshauptstadt im Klimaschutz*) which was initiated by the German federal government. Benchmarking is also crucial for the Local Governments Climate Partnership, a research and development project funded by the German Federal Environmental Agency and run by the Climate Alliance, which is based on a benchmarking system for the analysis of climate protection activities in Germany, Japan and the United States.⁹ In addition, NGOs frequently use benchmarking as a tool to promote local climate policy. The Swedish Society for Nature Conservation, for example, has ranked the climate policy of Swedish local authorities, and presented its first climate index for Swedish local authorities (*Klimatindex för kommuner*) in 2005 and its second in 2007 (SK, 2005, 2007). In 2007, more than 70% of all Swedish municipalities participated in this exercise on a voluntary basis. A similar approach has been developed by the Dutch NGO *Milieu Defensie* with its Climate Map (*Klimaatkaart*), which presents the *per capita* carbon dioxide emissions of Dutch local authorities and a score for their key GHG reduction-activities on a map.

Second, in addition to benchmarking systems, voluntary certification schemes can also be established, an approach that has been chosen by the city network *Energiestadt Schweiz*. Under this system, more than 160 Swiss municipalities have been certified by an independent commission and have been awarded a label.¹⁰ The spread of this label is remarkable, because this certification scheme is not market-driven. Energy labels for cities may however, improve the reputation and image of a city as compared with that of other members of their peer group. Although the Swiss scheme is managed by an NGO, such a system could also be based on a voluntary agreement between the national government and cities.

Governing by provision: national government as provider

However, in many countries, certification schemes cannot solve the most urgent problem that many local authorities face when considering climate protection initiatives, *i.e.*, the lack of financial resources (Collier/Löfstedt 1997; Betsill, 2000; Bulkeley/Kern, 2006). As local government finance varies widely among OECD countries in terms of total revenue (as a percentage of national GDP) and fiscal autonomy (*cf.* Caulfield, 2000), the financial capacity of cities to set up climate protection programmes depends not only on city-specific factors but also on national preconditions. Funding schemes that support capacity building and the preparation of climate action plans and low-carbon investments at the local level have been established in various states. Programmes of this type, which have been active for many years, can be found primarily in unitary states with relatively strong local authorities, such as the Netherlands and Sweden. National funding schemes, such as the Dutch BANS agreement and Sweden's Climate Investment Programme (KLIMP), can help to create local capacities and put climate change policy on the political agenda.

The Dutch *Klimaatcovenant* is a multi-level arrangement involving local government, provinces and several ministries at the national level. In order to receive funding provided by the BANS (*Bestuursakkoord Nieuwe Stijl* – New Style Management Agreement) agreement, local authorities have to undergo an initial scan and need to present and implement a comprehensive climate action plan using a common methodology. This is based on a performance card (*Prestatiekaart*), which comprises targets, policies and measures, grouped according to the relevant fields of work (municipal facilities, housing, mobility, business etc.). Cities can choose between three activity levels: active, advanced and innovative. The active level is more or less identical with the implementation of the Kyoto target at the local level, *e.g.*, energy management and the enforcement of national guidelines for sustainable buildings. The advanced level requires activities that go beyond the national targets and norms, *e.g.*, concerning the share of renewable energy and the standards for buildings. The innovative level requires even higher targets and standards. The programme was developed in the context of a negotiation process involving the government and the national association of local authorities.¹¹

The funding of local measures depends on the number of inhabitants or the municipal area. It cannot be used for investments but for the implementation of local climate plans, *e.g.*, costs for personnel, research, communication and education. It is complemented by specific sectoral programmes supporting and guiding local action in core areas such as mobility and housing. The scheme started in 2002, with subsidies of about EUR 36 million for a five-year period, and resulted in several hundred local climate scans and more than 250 municipal implementation plans. The second phase of the scheme was launched in 2008, and includes another EUR 35 million of subsidies up to 2011, with EUR 31.5 million reserved for municipal authorities and EUR 3.5 million for provincial authorities (NOVEM, 2003; VROM, 2007; Gupta, 2007; Gupta *et al.*, 2007).

Local climate protection policy in Sweden has been supported by two investment programmes. While its Local Investment Programme (LIP) was a general environmental subsidy programme, KLIMP is a programme for climate projects. The requirement of municipal co-funding is a common factor of these two subsidy programmes. LIP started in 1998 and aims both to increase ecological sustainability in society and create new jobs. The KLIMP programme, which replaced LIP in 2003, specifically targets the reduction of GHG emissions. From 1998 to 2008, approximately SEK 25 billion, of which about SEK 6 billion was provided by the government, was spent on environmental and climate protection projects. A total of 126 climate investment programmes and 211 local investment programmes, consisting of some 2 700 projects, have been funded by the programme. Most projects approved under KLIMP were energy and transport projects (Langlais *et al.*, 2007: 18). The Swedish Environmental Protection Agency evaluated both programmes in 2008 and established that they had resulted in a reduction of 2.1 million tons of GHG emissions per year, which corresponds to 3% of all Swedish GHG emissions (Naturvårdsverket, 2008; *cf.*

Baker/Eckerberg, 2007; Johansson, 2007; Granberg/Elander, 2007; Baker/Eckerberg, 2008; SOU, 2008: 244-245).

Other funding schemes include, for example, Canada's Green Municipal Fund (GMF), which was established in 2000. This funding programme, which is managed by the Federation of Canadian Municipalities (FCM), provides loans and grants for municipal governments. The Government of Canada endowed FCM with CAD 550 million to establish the GMF and to provide a long-term sustainable source of finance for municipal governments. Compared with their Canadian counterparts, American cities face a rather difficult situation, because there is still a lack of federal and state support for local initiatives in the United States. The new Energy Independence and Security Act of 2007 authorises USD 2 billion a year for energy efficiency and conservation block grants for local governments. However, these resources must be appropriated by Congress (Ward *et al.*, 2008: 17-18).

Similar to national governments in a federal state, EU institutions do not have direct links to European cities, but the European Commission has nonetheless started to establish its own system, the "Covenant of Mayors". This scheme is based on a voluntary agreement, but goes beyond the enabling mode of governing because it includes a funding scheme. The European Commission initiated this programme in January 2008. The initiative aims to bring together the mayors of Europe's most pioneering cities to improve energy efficiency and promote cleaner energy production. This includes a formal commitment by the cities to reduce their CO₂ emissions by more than 20% by 2020. Almost 100 cities throughout Europe, including 15 capital cities, such as London and Berlin, have expressed their willingness to join. The local authorities will have to present regular reports and provide action plans. The European Commission plans to set up a "benchmark for excellence" mechanism. A Covenant secretariat, funded through the Intelligent Energy Europe programme, will facilitate monitoring, networking and promotion. Cities that do not comply with the rules will be excluded from the plan, which will provide EU funding to local authorities to promote energy efficiency or renewable energy in the region.

The development of these programmes suggests that governing by provision depends, primarily at least, on the structure of the political system (unitary systems, federal systems) and the preferences of policy makers at the national (and European) level, which in turn determines the allocation and availability of resources at the local level. Relatively rich unitary states with a good environmental record, such as Sweden, tend to become forerunners in this area. Moreover, the example of the Dutch BANS agreement clearly shows that such schemes are most successful when local authorities have a say in the development and set-up of such programmes. Thus, it does not come as a surprise that associations of local authorities in other countries, such as Sweden, are seeking greater inclusion in and influence on national climate change policy and the programmes decided at the national level (SKL, 2008).

Governing by regulation: national government as regulator

Apart from capacity building through enabling and funding, national governments can also use their state authority to set mandatory requirements for local climate change policy. It may be assumed that in countries in which local authorities are strongly influenced by national regulations, the national government can steer local climate protection action better than in countries in which local authorities enjoy a stronger and relatively independent position. In contrast to countries where municipalities are relatively independent, research on the United Kingdom suggests that planning has been traditionally characterised by a strong hierarchical relationship between local authorities and the national government. This relationship can ensure that local decision makers fulfil national demands. From 2008, councils are assessed on their performance in reducing *per capita* carbon emissions in their area (Collier/Löfstedt, 1997; Cowell/Murdoch, 1999: 663; Bulkeley/Kern, 2006; Granberg/Elander, 2007; LGA, 2008).

Although comparable regulations tend to be less stringent in other countries, local authorities may be obliged by national legislation to develop strategic plans in sectors of relevance to climate protection policy. Swedish local authorities, for example, which are far more independent of national government than their British counterparts, must fulfil mandatory requirements in the energy sector. The Swedish law on municipal energy planning requires that municipal councils develop an energy plan, including strategies for the supply, distribution and the use of energy. However, in 2005, less than 60% of the Swedish municipalities had an energy plan in place (SK, 2005: 20). Moreover, there is even uncertainty among Swedish municipal administrators about their responsibilities in relation to climate change policy (Langlais *et al.*, 2007: 15, 17).

Furthermore, more specific regulations can be found in some countries: in Denmark, the municipalities are required to carry out energy labelling of all public buildings between 60 and 1 500 square meters in size (Sperling, 2008: 10-11); in Spain, Barcelona's Solar Thermal Ordinance eventually led to the incorporation of a similar, but less stringent, provision in the Spanish building code (Ekelund/Sigurdson, 2007: 12); and legal obligation exists in Italy whereby municipalities with more than 50 000 inhabitants must integrate a specific provision on the extension of renewable energy into their development plans.

Governing by regulation is certainly facilitated when state-local relations are organised in a predominantly hierarchical manner, as is the case in the United Kingdom. However, in federal states such as Germany, Canada and the United States, climate change policy also depends on the (federal) states and provinces and the relationship between this additional layer of regional governments and their municipalities (Betsill/Rabe, 2008; Lutsey/Sperling, 2008). Furthermore, in many countries besides the United Kingdom, local governments enjoy a higher degree of autonomy, state-local relations are more co-operative, and the national government is in a considerably weaker position in terms of its influence on the implementation of climate change policy at a local level.

Conclusions

Based on both the results of existing research and recent developments in OECD countries, this study has focused on two issues: *i.e.*, the local and the multi-level dimensions of urban climate governance. In terms of the modes of urban climate governance, our analysis revealed that authoritative governing can be observed less frequently than might be expected, at least when taking the salience of the climate issue into account. Many cities do not take advantage of their options for implementing climate protection measures through "hard" regulation and strategic planning. Due to internal problems of co-ordination and a lack of political support within local government, local authorities appear to be reluctant to use their statutory power, even if they could use traditional forms of state authority to implement climate protection strategies. This problem is evident even in pioneering cities and even in the absence of a spatial mismatch, for example in the area of urban planning. However, the recent dynamic development in the United States also shows that American city pioneers, such as New York or Boulder (Colorado), are less reluctant to use their statutory power in creative ways. Nonetheless, this applies only to the pioneers, and most cities in the United States and many other parts of the world have not yet initiated their own climate change policy.

Instead of governing by regulation, the majority of measures undertaken in relation to climate protection concentrate on the self-governing and enabling mode, in which municipalities have most discretion and decision-making power. While modes of governing through provision appear to be in decline due to the increasing liberalisation of the energy markets, and forms of traditional regulation and planning are avoided because of popular resistance and possible conflicts, even pioneering cities appear to prefer self-governing and enabling other actors as alternatives for achieving emissions reductions. However, the trend not to exploit all options to govern by regulation has serious consequences. Urban planning is crucial for the structural shape of cities, and determines the intensity of CO₂ emissions.

Successful climate change policy calls for new forms of urban planning that take into account the differing spatial needs of public transport systems, renewable energy installations and so on.

Moreover, climate change policy appears to concentrate primarily on activities in the energy sector, in particular the energy management of municipal properties. This is most evident in countries such as Germany, the United Kingdom, Sweden and the United States (Bulkeley/Kern, 2006; Langlais *et al.*, 2007: 14). Furthermore, energy issues are also the key area for the Covenant of Mayors, the EU's new initiative on local climate change policy. When climate change policy focuses primarily on energy issues, it tends to become fragmented, and the integration of the different dimensions of climate change mitigation and adaptation policy becomes very difficult or even impossible.

Effective climate change policy needs appropriate forms of institutionalisation: preferably a climate policy steering group, a climate protection co-ordination office or an overarching unit with appropriate competences for mainstreaming climate change policy, combined with issue-specific task forces. This would appear to be desirable because such an institutional setting seems to be a precondition first for the integration of different sectors of mitigation policy; second, the co-ordination and combination of mitigation and adaptation plans and strategies; and third, the improvement of the standing of climate policy compared to key issues of urban governance, including social issues, public health, economic growth and competitiveness. An appropriate form of institutionalised policy co-ordination within local government helps to avoid potential conflicts and trade-offs between climate change policy and other policies at the local level.

In terms of horizontal and vertical collaboration in multi-level systems, we can conclude, first, that, in most cities, local climate change policy is characterised by a spatial mismatch between the local and regional level. Both mitigation and, even more, adaptation measures, require strong co-operation within metro-regions, because competences are divided among local and regional authorities. Another form of horizontal collaboration is the establishment of national and transnational city networks. Although such networks do not have the capacity to govern by regulation and do not have enough resources to run their own subsidy programmes, these self-organised networks of cities play a crucial role for local climate change policy. They can provide guidelines, like the U.S. Mayors Climate Protection Agreement, particularly if the federal government does not provide such documents. Furthermore, national and transnational city networks can commit their members to GHG emission goals, stimulate actions to reach these goals and monitor progress; they can even set up benchmarking systems to assess their progress. However, research reveals that national and transnational city networks consist mainly of pioneering cities.

Furthermore, local initiatives in the area of climate change policy depend on the local authorities' position within the national multi-level system. As direct links between national GHG emissions goals and local politics do not exist in most countries and national governments tend to abstain from mandatory requirements, local climate action relies for the most part on voluntary initiatives. Voluntary approaches to local climate change policy can however, benefit from voluntary agreements between national governments and the cities, which may include benchmarking and certification schemes, and provide additional incentives to improve a city's climate policy record. As the *Energiestadt Schweiz* certification scheme shows, climate change policy can be successful even if "hard" governing modes do not exist.

Funding problems can be regarded as one of the most serious barriers impeding the efforts to integrate the different realms of climate change policy. As climate change policy remains – in most OECD countries at least – a voluntary task of local governments that have limited mandatory responsibilities in this policy area, climate change policy is in a difficult position when it comes to funding, because it competes with other demands that may appear to be more pressing from the perspective of citizens and policy makers. Furthermore, cities only have limited opportunities for generating funding for climate protection measures. Although a city-wide carbon tax was introduced in Boulder (Colorado) in 2006 to fund Boulder's GHG

emissions reduction strategy, such far-reaching approaches are beyond the reach of most cities. Existing alternatives include revolving funds, which are generated by the benefits of energy efficiency projects and can be used, in turn, to fund new projects. National funding programmes, such as Sweden's LIP and KLIMP programmes and the Dutch BANS agreement, represent a second alternative here.

The governing of state-local relations in a hierarchical manner does not play an essential role in most countries. With the exception of the United Kingdom, local climate action is not driven by mandates set at the nation-state level. This fact is most pronounced in federal states such as Germany, Canada and the United States, in which federal governments are even more restrained when it comes to steering local action than their counterparts in unitary states. However, national regulations may even impede effective local climate change policy if they constitute legal barriers, for example concerning the necessary provisions for energy efficiency in urban planning.

In terms of the future perspectives of *local and regional governments*, it may be concluded that subnational governments should make better use of "governing by regulation", *i.e.*, they should exploit their existing powers better, in particular in the area of spatial planning and regulation. They also need to make major efforts to achieve better policy integration, in particular the integration of energy policy with other climate-relevant policy areas. The appropriate institutionalisation of climate protection at a local level is crucial for the implementation of climate policy programmes. Local and regional authorities need to design mechanisms and schemes to avoid spatial mismatch. There is a particular need to improve co-operation within regions and to set up regional energy and climate agencies with adequate financing and competencies.

National governments should check their own policies towards local governments. This will help to combine mitigation and adaptation measures and to achieve a more coherent policy across sectors, *e.g.*, spatial planning for housing and transport. Moreover, national governments need to assess and redesign existing finance instruments for local infrastructure so as to make them "climate proof" in terms of both mitigation and adaptation. In addition, new forms of co-operation between subnational and national governments should be formally institutionalised (covenants, regular meetings between representatives of local authorities and national ministries, etc.). National governments should conclude arrangements with local governments to design funding mechanisms and performance-based incentives. Performance can be measured either in the form of robust local policies and measures put in place by local governments, or in the form of their contribution towards the fulfilment of targets (GHG reduction or performance indicators). National or, if appropriate, regional governments should set up funds for local investments in low-carbon technologies. This can be done in a budget-neutral way in the form of revolving funds. Moreover, national funding schemes for efficient devices or heating systems, which target energy end users directly, should be channelled through local governments and combined with advice programmes at local level.

City networks should stimulate monitoring on a regular basis and should also harmonise their approaches and methodologies, in particular their methods and tools for the inventorying of GHG gases, including monitoring and reporting. This represents a good opportunity for counteracting existing tendencies towards competition between city networks, irrespective of whether they are organised primarily at national or transnational level. Although city networks tend to be networks of pioneers for pioneers, city networks can try to counterbalance the gap between pioneers and laggards by setting tiered standards that attract members with varying levels of performance and ambition. The role of city networks, in particular their function in motivating cities and supporting capacity-building in the area of climate change policy, is crucial and should be rewarded by recognition and reliable funding from national governments or international agencies.

Table A1: Mitigation and adaptation in selected cities

City CO ₂ emissions in tonnes/capita	Mitigation			Adaptation	
	Reduction target	Inventory	Strategy	Inventory	Strategy
Apeldoorn, Netherlands	Energy neutrality		X		
Barcelona, Spain 3.4 (2004)	20% 1999-2010	X	X		
Berlin, Germany 7.4 (2002)	25% 1990-2010	X	X		
Cape Town, South Africa	Sectoral targets, e.g., energy supply: 10% 2005-2010	X	X	X (Framework)	X (Framework)
Graz, Austria	50% 1987-2010	X	X		
Hanover, Germany	40% 1990-2020	X	X	X	
London, UK 5.7 (2004)	60% 1990-2025	X	X	X	X (in process)
Munich, Germany 10.0 (2000)	50% 2002-2030	X	X		
New York, USA 8.9 (estimation 2004)	20% 1995-2010	X (in process)	X (new 2008)	X (new 2008)	X
Portland, USA 14.4 (2005)	10% 1990-2010		X	X (water maintenance)	X
Rotterdam, Netherlands 55.0 (2005)	50% 1990-2025	X	X	X (water management)	X (water management)
San Francisco, USA 12.2 (2004)	20% 1990-2012 80% 1990-2050	X	X		
Seattle, USA	7% 1990-2010	X	X	X	X
Stockholm, Sweden 4.0 (2005)	3.0 t/capita (2015) Fossil free (2050)	X	X	X	
Vancouver, Canada 6.0 (1990)	6% 1990-2010	X	X	X	X
Woking, UK	60% 1990-2050 80% 1990-2100	X	X	X	X
Zurich, Switzerland	10% 1990-2010	X	X (energy plan)		

Source: Based on: Ekelund/Sigurdson (2007: 5-6).

NOTES

1. Please note that this article focuses primarily on cities in high-income countries.
2. No uniform methodology currently exists, although climate-policy city networks are striving to establish methodologies and provide tools. ICLEI has agreed on a GHG emissions analysis protocol and provides a multinational tool, *i.e.*, the “Harmonised Emissions Analysis Tool” (HEAT), while the Climate Alliance adopted rules and guidelines on GHG emissions monitoring, developed the online tool ECO2-Regio and has created benchmarks, including additional indicators that allow for an improved assessment of performance and progress in the various areas of action.
3. Similar, but less formalised, voluntary agreements between the city government and private actors can also be found in numerous other cities, for example, Seattle (Seattle Climate Partnership) and Stockholm (Klimatpakten).
4. However, in the case of Stockholm, this was not an integral part of Stockholm’s climate action programme but a decision made by the Swedish government.
5. This must be taken into consideration during the preparation of National Adaptation Programs of Action (NAPAs) and the arrangements for spending, in particular from the Adaptation Fund under the international climate regime.
6. In May 2007, the city of New York hosted the C40 Large Cities Climate Summit, which was supported by the Clinton Foundation. Former President Bill Clinton launched the Clinton Climate Initiative (CCI) in August 2006. This initiative supports programmes that result directly in substantial GHG emissions reductions. CCI provides direct assistance to individual cities for the development and implementation of a range of actions that reduce GHG emissions.
7. The U.S. Conference of Mayors Climate Protection Center was established in February 2007 to provide mayors with information, guidance and assistance.
8. Although German cities have been among the forerunners in local climate policy, the German federal government has only recently set up a subsidy program and service agency for local climate protection as part of its national climate protection initiative.
9. Starting from the varying national preconditions, the project has developed a benchmarking system for the classification of local climate protection activities by field (energy, transport, urban planning) and by type (use of administrative, fiscal, soft instruments, etc.). Moreover, it includes qualitative (policies and measures that have actually been implemented) and quantitative (GHG emissions and additional sectoral indicators) indicators.
10. In addition, national experiences in Switzerland, Austria and the German Federal State of North-Rhine Westphalia have led to the development of a European scheme, the European Energy Award (EEA). The European Energy Award was developed within the 5th EU Framework Programme for Research and Technological Development (RTD). The IEE (Intelligent Energy Europe) project BALANCE currently extends the implementation of the programme to include other European countries and regions.
11. There are separate schemes for the cities and provinces.

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