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Urban Governance and the Politics of Climate change

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Summary. — Cities and urban areas are increasingly recognized as strategic arenas for climate change action. Processes of urban governance addressing climate change reconfigure the politics of climate change. Practitioners and scholars may be interested in the transformation of urban governance that follows global advances in climate change and urban policy. They may specifically be interested in how the urban governance of climate change is achieved and with what consequences for international development. This review evaluates the deep changes in urban governance that follow attempts to address climate change and how, in turn, attempts to govern climate change in urban areas reconfigure discourses informing the politics of climate change. The review shows that efforts to institutionalize climate change governance in urban areas reflect the conditions of specific contexts; that cities and sub-national entities have gained traction in international climate policy through heterogeneous forms of network governance; that governing climate change in urban areas relates to the production and deployment of new climate rationalities, or governmentalities; and that governing experiences in cities are reconfiguring discourses of climate change governance toward an increasing emphasis on experimentation as a means to deal with the open ended processes of governing urban areas.

Key words — climate change institutionalization, participatory planning, network governance, governmentality, experimentation, urban laboratories

1. INTRODUCTION

International development policy in 2015 delivered a consolidated view of cities and urban areas as strategic arenas for climate change action. The 2015 Sustainable Development Goals (with the inclusion for the first time of an explicit urban goal) emerged linked to a radical change toward a pro-urban policy consensus in sustainable development (Barnett & Parnell, 2016). The 2015 Paris Agreement for Climate Action underscores the importance of subnational levels of implementation. Alongside the Agreement, Anne Hidalgo, Mayor of Paris, and Ignazio Marino, Mayor of Rome, hosted the Climate Summit for Local Leaders, a series of side events under the auspices of the Secretary General's Special Envoy for Cities and Climate Change, former New York City mayor Mike Bloomberg, which emphasized urban areas as innovation testing zones and showcased climate action at the local level. The underlying assumption in these initiatives is that cities and urban areas can help bridge the gap between the aggregate national intended contributions agreed in Paris, and the actual requirements of emissions reductions needed to keep temperature changes under 1.5 degrees. The New Urban Agenda (NUA) was adopted in Quito, in October 2016, at the III United Nations Conference on Housing and Sustainable Urban Development. NUA represents a definitive abandonment of perspectives that cast urbanization as a challenge to be controlled in favor of those which emphasize the opportunities for living sustainably in an increasingly urban future (Parnell, 2016) and recognizes the efforts to deliver climate change action in cities.

Today, transitions to sustainability emerge inevitably related to the possibilities opened for action in urban areas (Bulkeley, Castán Broto, Hodson, & Marvin, 2010; Frantzeskaki, Castan Broto, Coenen, & Loorbach, 2016). Simultaneously, this interest in urban areas casts a new light on global environmental politics, as Solecki and Leichenko (2006) predicted. In the international policy arena, climate change has most often been presented as a global problem requiring global solutions (Bulkeley, 2013; Bulkeley & Newell, 2015). For example, climate change action was delinked from the emphasis on local action that followed sustainability agendas from the 1992 Rio Declaration on Sustainable Development to the Local Agenda 21, despite international efforts to coordinate what was often perceived as two separated realms of action (e.g., Gebre-Egziabher, 2004). The spectacular failure of international negotiations in the 2009 COP15 in Copenhagen has often been regarded as an inflexion point in climate politics. Copenhagen marked a radical shift toward voluntary commitments for climate action in country states and away from multilateralism. Social movements' abandonment of the meeting made visible the disconnection between public attitudes to climate change and the seemingly cynical positions of negotiators. Yet, Copenhagen was also a success because for the first time, the COP showcased the possibilities for action outside the international climate regime, for example, in cities (Hoffmann, 2011; Jones, 2012). A series of high profile international reports on cities and climate change followed, all emphasizing the possibilities opened up in urban areas to mitigate climate change and adapt to climate changing futures (IPCC, 2015; UN-Habitat, 2011; Hoornweg, 2011).

The combination of voluntary approaches to climate change policy and a growing interest in local action has supported a politics of climate change where multiple forms of governance, rather than a regulatory understanding of governing, play a fundamental role (Newell, Pattberg, & Schroeder, 2012). Governance relates to mechanisms directed toward the coordination of multiple forms of state and non-state action (Rosenau, 2000). In this vein, governance implies a recognition of the multiple actors who intervene in the purposive steering of society, toward low carbon, resilient or sustainable objectives (Newell *et al.*, 2012; Okereke, Bulkeley, & Schroeder, 2009). For debates on cities and climate change,

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this means, first, a recognition of the role of local governments alongside other forms of state-control; and second, a turn of attention toward the multiple actors that intervene directly or through hybrid arrangements in urban governance, including the business sector, public–private partnerships, civil society organizations and community groups, and other diverse networks of actors who routinely change urban trajectories. Their actions, however, are hardly circumscribed to arbitrarily-defined administrative boundaries of cities: while reshaping metropolitan areas and their hinterland, efforts to govern climate change in cities are also creating new forms of transnational governance (Bulkeley, Andonova *et al.*, 2014).

While actions to govern climate change in cities can be found in cities all over the world, regardless of their geographical location and state of development, they emerge associated with the specific conditions that shape the context of implementation. The manner and impacts of climate change governance are shaped by the local conditions to the extent that any generalization will likely be inaccurate. Broadly speaking, there is a divide between cities with high levels of consumption and those in which the majority of population live in informal settlements or areas with great deficiencies in service provision. This is akin to highlighting a difference between places where the priorities of climate change governance are to reduce emissions and those where the priority is to reduce structural vulnerabilities. In the latter case, actions to adapt to climate change and to deliver cleaner energy tend to emphasize co-benefits, especially urban health (Smit & Parnell, 2012). However, differences between populations may also exist within a single city, such as in Bangalore, India, where cosmopolitan communities of IT and offshore professionals, with high carbon lifestyles, are contiguous to communities of subsistence farmers and informal workers who lack basic services (Benjamin, 2000). What is common everywhere is the need to address the political and governance matters associated with a tremendous socio-ecological and technological transformation (Simon & Leck, 2015). While urban areas open indeed numerous opportunities to address climate change, they are also sites of political struggle where the politics of climate change become manifest.

The aim of this review if to evaluate both how climate change politics have led to deep changes in urban governance, and in turn, how new attempts to govern climate change in urban areas are further reconfiguring global environmental politics. For the purposes of this review, governance is understood as a broad concept that relates to intentional actions or interventions to address a specific problem, in this case, climate change. Governance represents a recognition of the multiple actors that perform acts of governing, rather than a move away from the State as the sole source of authority. The review engages with two complementary, but also somehow opposed notions of environmental governance. The first perspective engages with governance as a process resulting from specific attempts to mobilize resources and actors to address climate change. Taking a normative stance that assumes a need to align efforts to address climate change challenges, the notion of governance as a process raises question about the means to improve existing forms of governance. The second perspective engages with governance as a means to build authority and support actors' attempts to gain control over different realms of urban life. Taking a critical perspective that questions how the politics of climate change reshape environmental battlefields, the notion of governance as a means of control directs attention to the political struggles that emerge as a result of actions to address climate change.

These two distinct notions of governance structure the argument in this review. While from a normative point of view urban areas offer grounds for hope about possible transformations toward low carbon, climate resilience futures, a critical perspective maps a political environment in which climate change has already refashioned the possibilities and consequences of climate-oriented urban development. Both perspectives offer insights into how climate change imperatives are shaping urban governance as well as how actions in urban areas shape global climate politics (key themes are summarized in Table 1). The review engages first with the normative perspective looking into the processes of institutionalization of climate change action; and then, into the organization of cities into networks and other structures of standing in global climate politics. Then, the argument moves into the critical perspective, to examine how climate change discourses have generated new forms of urban governance; and then, to look into how climate change politics has consolidated forms of experimental governance as the dominant means to deliver sustainable futures.

2. GOVERNANCE AS A PROCESS WHEREBY DECISIONS ARE MADE AND IMPLEMENTED

Urban governance discussions are intrinsically linked to debates about who has responsibility to deliver climate change action and analyses of actors' motivations to participate in acts of governing. Accepting climate change action as an imperative, the question is how to improve urban governance processes to address it. Initial discussions on political leadership, transfer of resources and capacity building have evolved into analyses of the institutional conditions that enable effective climate action. The political question emerges in relation to the management of governance institutions who have both the motivations and capacities to deliver climate action. Cities have become implicated in new forms of urban governance that have broader expression in the global arena. Network governance has emerged as the key mechanisms whereby cities make visible their influence on transnational climate change politics.

(a) *Cities, climate action and international development discourses*

How to prioritize different areas of intervention is a central question for the governance of climate change in urban areas. The division between climate change adaptation and mitigation, and the potential conflicts that can emerge between the two, has shaped debates about what kind of action is most appropriate (Laukkonen *et al.*, 2009). This separation, however, has hindered the development of integrated action. While trade-offs between specific mitigation and adaptation actions may exist, in practice, effective action will most often address both simultaneously (Moser, 2012). Nevertheless, such division has shaped debates on climate change governance, as explained in the section below.

Adaptation has most often been framed as a local issue. Urban climate change hazards are not only increasing in severity and frequency, but also, they are likely to have a profound impact in a wide range of urban infrastructures, services, the built environment, and supporting ecosystems (Revi *et al.*, 2014). The impacts of maladaptation may last decades (Fatti & Patel, 2013). Over the last two decades, empirical research has consistently emphasized the close relationship between poverty, urban inequality, and the vulnerability of urban pop-

Table 1. *Research themes emerging in relation to two alternative views on urban governance*

	Responses to climate change in urban areas	Urban governance reconfigures climate change politics
Governance as a process whereby decisions are made and implemented (Section 1)	Responsibility, motivations, and the institutionalization of climate action	The eruption of city networks in global environmental governance
Governance as a means to gain control and authority (Section 2)	The discursive production of climate politics at the local level	The rise of experimentation in global climate politics

ulations to climate change impacts (e.g., Banks, Roy, & Hulme, 2011; Douglas *et al*., 2008; O'Brien & Leichenko, 2000; Satterthwaite, 2007). The vulnerability of the urban poor is not only dependent on their exposure to climate-change related hazards, but also on the structural conditions that reproduce poverty, such as economic inequality, lack of political representation, deficient access to services, and diminished life opportunities (e.g., Castán Broto, Oballa, & Junior, 2013; Dodman, Bicknell, & Satterthwaite, 2012; Pelling, 2010; Pelling & Manuel-Navarrete, 2011; Satterthwaite, 2007).

There is thus a wide agreement that urban governance efforts should be directed toward pro-poor forms of adaptation that support the urban poor's assets and that link local development through adaptation planning, especially in programs for upgrading housing and services (Moser & Satterthwaite, 2010; Stein & Moser, 2014). This argument is by now relatively uncontroversial, being recognized in the experiences of different cities around the world (e.g., Bartlett & Satterthwaite, 2016), in the latest reports of the Intergovernmental Panel for Climate Change (Revi *et al*., 2014) and in policy guidance from international organizations such as the World Bank. For example, the Mayor's Task Force on Climate Change, Disaster Risk and the Urban Poor, launched at the Mayor's Summit in Copenhagen, 2009 and led by the World Bank, has argued for climate change adaptation investments that recognize the position of the urban poor "at the front line" (Baker, 2012). Bartlett and Satterthwaite's (2016) book "Cities on a Finite Planet" delivers a summary of arguments in the field, with nine case studies of local experiences in climate change adaptation which demonstrate the potential to deliver interventions that work for the urban poor.

Many such interventions build, more or less explicitly, on discourses of resilience already prevalent in disaster risk reduction agendas (Adelekan *et al*., 2015). Resilience perspectives highlight how people's capacities to cope with disasters relate to systemic challenges and feedback loops that simultaneously exacerbate poverty and vulnerability (e.g., Seeliger & Turok, 2014; Wamsler & Brink, 2014). Resilience emphasizes the coevolution between urban practices and ecosystems (McPhearson, Andersson, Elmqvist, & Frantzeskaki, 2015). Resilience turns attention away from specific technical and spatial planning measures toward facilitating processes of adaptive governance which enable institutional change in rapidly changing environments (Boyd & Folke, 2011). Resilience thinking has, however, been challenged for promoting an incremental approach to adaptation that does not fully recognize the structural drivers of vulnerability and their dependence on the dominant structures of capitalism (Pelling, 2010; Pelling & Manuel-Navarrete, 2011).

Pelling's (2010) book "Adaptation to Climate Change" presents a framework of adaptation practices that distinguishes between practices of resilience that do not challenge underlying drivers of vulnerability, transition practices that focus on institutional change, and transformative practices that attempt to question the underlying structures, values and assumptions embedded in global political economy structures. For example, political changes toward democracy in South Africa and Brazil may have a transformative impact in water provision systems, although these impacts may take decades to materialize (Hordijk, Sara, & Sutherland, 2014). This critique, however, overlooks the emphasis on institutional change already embedded in resilience thinking (Boyd & Folke, 2011; Boyd & Ghosh, 2013). Indeed, building resilience is most often considered as synonymous of supporting radical political changes (Bahadur & Tanner, 2014) alongside broader paradigm changes that enable more inclusive means of knowledge production (Ensor, Boyd, Juhola, & Castán Broto, 2014). Nevertheless, the overall lesson remains: effective adaptation planning in urban areas is akin to a revolution in urban governance that addresses the political, economic and social determinants of poverty and climate change vulnerability. In practice, efforts to integrate adaptation with municipal service provision and disaster risk management services have dominated (e.g., Howes *et al*., 2015; Wamsler, 2015). The prevalence of economic discourses of urban development misdirects adaptation planning away from transformative forms of change (Boyd, Ensor, Castán Broto, & Juhola, 2014). Under a frame of urgency and the need for effective measures, adaptation planning is too often associated with unjust forms of development that either affect the urban poor directly (acts of commission) or prioritize the interests of urban elites (acts of omission) at the expense of actions that address directly the most urgent vulnerabilities affecting the urban poor (Anguelovski *et al*., 2016).

Mitigation, in contrast, has most often been framed as a global issue (Laukkonen *et al*., 2009). However, as the scale of the material changes required has become evident, mitigation has become more closely associated to climate justice agendas visible at the local level (Seyfang & Haxeltine, 2012; Sovacool, 2011). This argument is however seen with suspicion in countries that see their development policies hindered because the global politics of climate change are reconfiguring the international aid flows, and hence, aid may be perceived as linked to a Western-led climate mitigation agenda. Nevertheless, mitigation actions are common worldwide, and often they are explicitly linked to environmental and social justice agendas (Bulkeley, Carmin, Castán Broto, Edwards, & Fuller, 2013; Castán Broto & Bulkeley, 2013a). Yet, pioneering experiences in cities have demonstrated the crucial importance of local sustainability initiatives to deliver mitigation action (Betsill & Bulkeley, 2007; Bulkeley & Betsill, 2005a).

Unfortunately, a perspective of cities as "parasites" that degrade surrounding environmental resources has been too prevalent in international development discourses. Lack of data disaggregation leads to analyses which are largely blind to the geographical patterns of environmental degradation, and the gross inequalities that shape such patterns. For example, the attribution of over three quarters of global carbon

emissions to cities and urban areas provides a strong rationale for mitigation action targeting the provision of urban infrastructure, specially energy services (e.g., Sharifi & Yamagata, 2015). This manner of accounting obscures key aspects such as the differentiation of emissions within cities, the urban–rural linkages that characterize land transformations, and the inaccuracies inherent to carbon accounting (Dodman, 2009; Hoornweg, Sugar, & Trejos Gómez, 2011; Satterthwaite, 2008). Simultaneously, the relationship between urbanization and environmental (or land) transformation processes is not fully understood (Seto, Sánchez-Rodríguez, & Fragkias, 2010). From a governance perspective, current patterns of urbanization do not match administrative boundaries and existing governance structures. While in rural areas addressing climate change relates with decisions and conflicts about the use of natural resources (Boyd, Gutierrez, & Chang, 2007), in rapidly urbanized areas key challenges relate to service provision and the changing needs of an urban population. Local authorities may have to deal with the challenges of suburbanization (Knuth, 2010), metropolitanization (Padukone, 2012), or sub-serviced development at the peri-urban interface (Simon, 2008), further challenging established methods of accounting and mitigation planning.

An alternative approach has been to look into the city to harness opportunities for climate change which may build on practical experiences that may challenge the status quo and catalyze broader transformations beyond the adaptation/mitigation divide (Bulkeley, Castán Broto, & Maassen, 2014; Rutherford & Coutard, 2014). Infrastructure investments, for example, are a means to link mitigation and adaptation objectives (Martin & Rice, 2014). In the context of international development, clean energy infrastructures, such as clean cookstoves programs, may address directly structural drivers of poverty and vulnerability (Simon, Bumpus, & Mann, 2012). The discourse of cities as sites for opportunity has been powerful enough to reshape global discourses of climate action (see Section 2(c)) but, in practice, progress in climate change objectives has not met expectations (Azevedo, Delarue, & Meeus, 2013; Bulkeley, 2010). Shifting policy priorities, lack of awareness, and the difficulty to translate policy into concrete action often limits the possibilities to achieve lasting sustainability impacts (Bache, Bartle, Flinders, & Marsden, 2015; Radzi, 2015). At the global level, the conflict between prioritizing resources for mitigation or adaptation remains unsolved and confounded by the multiple impacts, co-benefits and unintended consequences of different actions. Research has turned to understand how local governments can address this conundrum through the institutionalization of climate change action in urban governance.

(b) *Climate change institutionalization and urban governance*

While international negotiations have often focused on discussions about the economics of climate change action and agreements on financing mechanisms, at the local level questions emerge about the lack of local governments' competence and capacity, and how climate change issues can be addressed alongside backlogs in infrastructure provision and services, particularly in informal or sub-serviced settlements (Baker, 2012; Dodman *et al.*, 2012; Satterthwaite, 2007). An initial step in this literature has been to analyze in-depth case studies, mostly from the Global North, to examine the institutional factors that enable effective climate change action (but see however: Bartlett & Satterthwaite, 2016; Leck & Simon, 2013). A useful analytical device has been to relate such factors with drivers and motivations for action, in an attempt to find routes toward improving local capacities for climate change action. For example, institutional analysis of experiences of early adopters of adaptation planning has led to an analytical differentiation between exogenous drivers of action (from external shocks to the agendas of the international climate regime) and endogenous drivers (from actors' motivations to their capacity to take advantage of the context of action) (Anguelovski & Carmin, 2011; Carmin, Anguelovski, & Roberts, 2012). Table 1 uses this analytical differentiation to provide an illustration of the literature on institutional drivers of climate change action in urban areas.

Endogenous factors are important to the extent that they may palliate the lack of resources and capacity of some local governments and foster innovation for climate change action (Anguelovski & Carmin, 2011). The cases of Durban, Quito, or Manizales demonstrate the potential of creative actions, particularly when they link new climate change agendas with ongoing sustainability actions and goals (Bartlett & Satterthwaite, 2016; Carmin *et al.*, 2012). Linking climate change action to additional co-benefits in the urban environment may be an effective way to motivate different actors to take action and foster shared creative processes (Sharma & Tomar, 2010). However, Table 2 should not be read alongside as a check list of desirable outcomes. None of these factors alone explain the success of local governments in taking effective climate action.

Different strategies may be effective depending on the context of action. For example, political leadership is one of the most often cited drivers of effective action (e.g., Burch, 2010; Janjua, Thomas, & McEvoy, 2010; Shey & Belis, 2013; Sánchez-Rodríguez, 2009). However, forms of collaboration and self-organization appear to promote both resilience and climate change innovation, particularly alongside equity and social justice goals (Djalante, Holley, & Thomalla, 2011; Sovacool, 2011). An excessive focus on political leadership may work against self-organizing movements and experimental initiatives which have not been foreseen by policy makers. Often, local governments' experiences in climate governance are best described as a "muddling through" process, in which policy makers may abandon aspirations to achieve a global, consensual vision of urban futures in favor of more pragmatic approaches that enable action (Marsden, Ferreira, Bache, Flinders, & Bartle, 2014). However, such pragmatic treatment of governance realities may represent an abandonment of transformative aspirations (Bulkeley, Castán Broto, & Edwards, 2014), particularly in contexts characterized by lack of governance capacity in the first place (Simon & Leck, 2015).

The one thing that seems to apply in every case is the need to understand the multi-level nature of urban governance, and harness it for climate change action. Ideas of multi-level governance acknowledge that local governments are not the only urban actors who can lead and deliver climate action (Betsill & Bulkeley, 2006; Bulkeley & Betsill, 2005b, 2013). Instead, a myriad of state and non-state actors play key roles in climate change governance (Biermann & Pattberg, 2012; Okereke *et al.*, 2009). First, state actors at the national level provide crucial support to local governments and may be leading action at the local level (Dodman & Mitlin, 2015; Fidelman, Leitch, & Nelson, 2013; Hughes, 2013; Jones, 2013; van Stigt, Driessen, & Spit, 2013). Second, supra-national levels and international organizations play a crucial role in informing regulation and enabling innovation (Monni & Raes, 2008). Finally, a range of other non-state actors, including business, networks and communities, play a key role in the governance of climate change in urban areas, opening up new areas of intervention and supporting action where there is little capacity (Amundsen, Berglund, & Westskog, 2010;

Table 2. *Examples of institutional factors that influence local governments taking climate action*

	Exogenous drivers	Endogenous drivers
Common drivers	National political context (Dodman & Mitlin, 2015) City networks and climate change diplomacy (see Section 2(c)) Lessons from other cities (Solecki & Leichenko, 2006) Public opinion and political support for climate action (Finnis, Sarkar, & Stoddart, 2015) Possibility to intervene at city-wide scales (Hallegatte & Corfee-Morlot, 2011) Availability of data and methodological uncertainties (Pitt & Randolph, 2009)	Political leadership (Sánchez-Rodríguez, 2009) Collaboration and coordination (Jones, 2013) Institutionalization and sectoral integration (Birkmann, Garschagen, Kraas, & Nguyen, 2010; Burch, 2010; Corfee-Morlot *et al*., 2011; Li, 2011) Political culture (Francesch-Huidobro, 2012) Possibilities to link-in co-benefits (Archer *et al*., 2014; Sharma & Tomar, 2010) Partnerships with local actors and scientists (Corburn, 2009; Corfee-Morlot *et al*., 2011; Pasquini & Shearing, 2014) Social and institutional capacity (Altenburg, 2012)
Drivers specific to mitigation	Market dynamics (Azevedo *et al*., 2013) Pressure from international negotiations (Newell *et al*., 2012)	Integration of environmental policy and planning (Barbour & Deakin, 2012) Regulatory frameworks (Cidell & Cope, 2014)
Drivers specific to adaptation	Previous experiences of disasters (Amundsen *et al*., 2010) Donor priorities and conditionalities (Dodman *et al*., 2012)	Multi-actor's capacity for negotiation and social learning (Burch, Sheppard, Shaw, & Flanders, 2010) Integration of disaster risk management and adaptation policies (Djalante *et al*., 2013; Howes *et al*., 2015)

Burch, Shaw, Dale, & Robinson, 2014; Dodman & Satterthwaite, 2008; Leck & Simon, 2013). The development of climate change policy in eThekwini Metropolitan Municipality, Durban, South Africa, suggests that multi-level governance is an important factor alongside more common factors such as the integration of climate change discourses in municipal plans and decision-making or the availability of resources for climate action (Roberts, 2008, 2010).

Attempts to look at multi-level governance in a normative way- as a means to order and coordinate different actors' actions- have been common in the Global North (e.g., Jones, 2012; Sperling, Hvelplund, & Mathiesen, 2011). Simultaneously, multi-level theories emerge in relation to an understanding of the messy and complex contexts in which governing happens, with multi-actor arrangements and ad hoc measures (Smith, 2007). The notion of governance has a tinge of optimism, in the sense of finding new possibilities for climate change interventions in complex contexts of action, and increasing local government's capacity to deal with a complex problem (Khan, 2013). However, a number of concerns can be raised in relation to notions of multi-level governance.

For example, when non-state actors address structural vulnerabilities, local and regional authorities may have less public pressure to meet their commitments to service provision. In informal settlements in the peri-urban areas of Maputo, communities organize collective activities, such as drainage cleaning, that address structural vulnerabilities to flooding while the municipal government focuses their climate change policy on meeting the needs of an incipient business sector whose activities have little impact on the welfare of the overall population (Boyd *et al*., 2014). In Lusaka, Zambia, the lack of planning and appropriate policies to deal with the changing dynamics of rural–urban divide means that the urban poor are left to themselves to resolve the increasing food insecurity challenges that follow the impacts of climate change in their city (Simatele, Binns, & Simatele, 2012).

Overall, such processes of reorganizing climate change governance relate to inevitable conflicts of power and interest (Meadowcroft, 2009). Some of them are invisible, because much climate change policy at the local level also occurs in "shadow spaces of governance", through mechanisms that escape formal analysis and that have received, so far, little attention in the literature (Leck & Roberts, 2015). Cities may also lack capacity and opportunities to activate mechanisms for multi-level governance: they may not be internationally (or regionally) connected; they may lack institutions to foster processes of dialog; they may be restricted by the regulatory context or by political priorities (Lidskog & Elander, 2010).

Rethinking urban governance as multi-level requires in any case an examination of the role of planning in delivering effective climate change action. Spatial planning approaches focusing on sector integration have tended to dominate climate planning agendas (e.g., Capon, Synnott, & Holliday, 2009; Pasimeni *et al*., 2014; Roggema, 2014). However, in a multi-level governance context, where the main objective may rather be the legitimization and institutionalization of climate action, multi-actor, deliberative and collaborative planning approaches are more effective (Carter *et al*., 2015; Cashmore & Wejs, 2014; Corfee-Morlot, Cochran, Hallegatte, & Teasdale, 2011). Planning is also regarded as a process of knowledge co-production between actors with different kinds of technical or contextual expertise, that integrates a range of insights from global circulation models to situated experiences of disasters and energy use experiences (Castán Broto, Ensor, *et al*., 2015; Corburn, 2009; Hillmer-Pegram, Howe, Greenberg, & Yarnal, 2012; Hughes & Romero-Lankao, 2014; Simon & Leck, 2015). Participation is a key feature of effective local governance for climate change (Altenburg, 2012). Participatory planning may deliver transformative outcomes by, for example, enabling new means of community-based adaptation (Archer *et al*., 2014; Castán Broto, Ensor, *et al*., 2015); creating governance partnerships (Burch *et al*., 2014; Castán Broto, Macucule, Boyd, Ensor, & Allen, 2015); dealing practically with institutional challenges (Barbour & Deakin, 2012; Fatti & Patel, 2013); facilitating social learning (Boyd *et al*., 2014; Djalante, Holley, Thomalla, & Carnegie, 2013); and fostering innovation (Head, 2014; Pitt & Bassett, 2014). There is evidence from a range of contexts against the widely held belief that participatory planning costs more resources and time than a non-participatory planning Castán

Table 3. *Examples of city and sub-national networks engaged in transnational climate governance*

Name	Describe themselves as:	Scope of operation	Significance
ICLEI- Local Governments for Sustainability iclei.org	"The leading global network of more than 1,500 cities, towns and regions committed to building a sustainable future"	They work directly with "members", local governments, in improving local practices and have policy influence globally	Formed in 1990, ICLEI has played a key role in driving forward sustainability agendas. ICLEI developed one pioneering methodology for emission inventories
C40 Cities-Climate Leadership Groupc40.org	"A network of the world's megacities [83] committed to addressing climate change"	The C40 coordinates processes of collaboration and knowledge-sharing, as well as developing city-based metrics	Formed in 2005, the network has raised the profile of the cities and climate change agenda, with famous Mayors and the intervention of the Clinton Foundation
The World Mayors Council on Climate Change worldmayorscouncil.org	"An alliance of committed local government leaders concerned about climate change"	The Council brings together Mayors, former Mayors and Council Members who make a personal commitment to political action for climate change	Founded in 2005 in Kyoto, the Council has 80 members and has worked to deliver politically-savvy initiatives that have put climate change on local agendas
United Cities and Local Governments (UCLG) uclg.org	"United Cities and Local Governments (UCLG) represents and defends the interests of local governments on the world stage, regardless of the size of the communities they serve"	UCLG mission is to advocate democratic self-governance, and promote initiatives to promote it, represent local governments and develop policy- many of which relate to climate change	Since their foundation in 2004, UCLG has had a strong voice in shaping international agendas, with a clear pro-democratic governance advocacy agenda, which has also promoted key climate change policy
Global Network of Regional Governments for Sustainable Development (NRG4SD) nrg4sd.org	"A non-profit international organization representing subnational governments and associations of subnational governments at global level"	They have been behind key initiatives such as the Saint Malo Declaration that led to UNEP/UNDP "Territorial Approach to Climate Change" with initial projects in Uganda, Uruguay, Albania, Algeria, Colombia, Ethiopia, Perú and Senegal	Since their establishment at the 2002 World Summit in Johannesburg, NRG4SD have worked in partnership with UN organizations, linking climate change objectives with Sustainable Development Goals
R20 Regions of Climate Action Regions20.org	"R20 is a coalition of partners led by regional governments that work to promote and implement projects that are designed to produce local economic and environmental benefits"	Mirroring the structure and forms of operation of C40, R20 puts emphasis on technologies and modes of finance that can deliver climate action without compromising economic growth	Founded by California Governor Arnold Schwarzenegger in 2010, the network recognizes different levels of subnational government. It has 580 members and a strong presence at the COP
Energy Cities energy-cities.eu	"The European Association of local authorities in energy transition"	The Association develops proposals to advance a transition, to help their members directly	Created in 1990, the network represent more than 1,000 local governments in Europe, mainly municipalities
Covenant of Mayors covenantofmayors.eu	"Signatory local authorities share a vision for making cities decarbonized and resilient where citizens have access to secure, sustainable and affordable energy"	By signing the Covenant, local governments commit to deliver a Sustainable Energy and Climate Action Plan and establish a monitoring process	Over 6,000 "democratically-constituted local governments" have signed the covenant since 2005, shaping both local and European Policy
Asian Cities Climate Change Resilience Network (ACCCRN) acccrn.org	"A multi-year initiative to strengthen the capacity of over 50 rapidly urbanizing cities in Bangladesh, India, Indonesia, the Philippines, Thailand and Vietnam to survive, adapt, and transform in the face of climate-related stress and shocks"	They work directly with members, mainly individual practitioners, to support the development of partnerships and provide access to a shared knowledge-based	Funded by the Rockefeller Foundation, the ACCCRN has had a strong influence in collaborative approaches to urban resilience, and has raised the profile of its national partners, such as the Mercy Corps Indonesia
Japan, the Coalition of Local Governments for Environmental Initiative (COLGEI) Colgei.org	Is a network of members representing local governments in Japan	Members include local governments but also other organizations, such as universities or concerned members of the public	Since the early 1990s, COLGEI holds an annual conference for sharing practices and experiences; works in partnership with ICLEI

Broto, Ensor, *et al*., 2015; Naustdalslid, 2015; Pitt & Bassett, 2014; Smedby & Neij, 2013). Participatory planning emerges as a long-term governance strategy, oriented toward the institutionalization of mechanisms for dialog, action and innovation (Orleans Reed *et al*., 2013; Tran Tuan, Tran Van Giai, & Mulenga, 2014). The major challenge is to move away from the instrumental use of participatory methods for governance, toward deliberative approaches that recognize both the multiple capacities of urban actors and their right to participate in the making of sustainable urban futures.

(c) *The role of cities and urban areas in transnational climate change governance*

City networks (and networks including other sub-national entities) play a key role in fostering, supporting and imple-

menting climate action. First, they may support processes of learning and exchange between local governments and other sub-national organizations. Second, they may support specific policies, building critical mass to pool resources and knowledge. Third, they may have access to international forums, raising the profile of cities and urban areas in international agendas and garnering the interest of influential actors.

City (and sub-national) networks represent one of the most ubiquitous forms of transnational climate change governance (Bulkeley, Andonova *et al*., 2014; Bulkeley, Castán Broto, & Edwards, 2014; Bulkeley, Castán Broto, & Maassen, 2014). Transnational climate change governance is concerned with how different organizations act in international arenas so that they gain sufficient authority to steer international policy (Andonova, Betsill, & Bulkeley, 2009; Bulkeley *et al*., 2012). This is a relatively recent phenomenon of rapid diffusion since the late 1980s and early 1990s, and it is associated both to the raise of global policy agendas (such as climate change) and to the internationalization processes that have followed broader processes of globalization and neoliberal ideologies (Bulkeley, Andonova *et al*., 2014). City networks emerge in a variety of forms with other forms of transnational climate change governance, alongside a continuum of public, private and hybrid actors (Bulkeley *et al*., 2012).

Table 3 compiles ten representative examples of networks of cities, urban areas, and sub-national entities that are seeking to build authority in international climate change arenas. While not intending to be an exhaustive compilation, the table illustrates some of the trends in terms of what are these networks, how are they formed, and what do they try to achieve. Table 3 illustrates the diversity that characterizes those networks. First of all, networks differ on when they were established, with a spectrum from networks that have been long active and for which climate change has raised into their agendas (e.g., ICLEI, Energy Cities, UCLG) and networks that were inspired by climate change interests, with some networks formed after the ratification of the Kyoto Protocol in 2005 (e.g., C40, C20, The World Mayors Council on Climate Change). Second, networks differ in terms of the scale of their operation, with some of them aiming at global representation (ICLEI, C40, R20) while others operate at regional or national scales (Energy Cities, ACCCRN, COLGEI). Third, they may differ in their membership. It is generally assumed that they consist of local governments "members", represented by either mayors or other local government leaders (e.g., ICLEI, C40). However, many networks consist of individuals in their personal capacity (World Mayors Council on Climate Change) or different organizations which may operate locally to deliver climate action (ACCCRN). In recognition of sub-national forms of governance other than municipalities and local government, regional networks have also been active in transnational climate governance (NRG4SD, R20).

Networks also differ in terms of their policy orientation and approach to climate policy. For example, ICLEI and NRG4SD link climate change action with other sustainable development agendas, and put emphasis in processes of governance, policy targets, and capacity building. Their carbon accounting tool, for example, has been instrumental in the development of climate planning methodologies. Networks such as C40 and its regional counterpart, the R20, have a strongest focus on sharing advanced technologies and accessing finance, presenting climate action as a means to advance economic growth and the green economy. They have developed a strong profile in international events and have showcased best practices, often moving local politicians to make public commitments to climate change action. Some networks are better understood as advocacy organizations, such as UCLG which works to put local governments in international agendas and to advance normative discourses of local democratic self-governance. Other networks, such as the ACCRN, provide specific sectoral measures, such as those for building resilience (Brown, Dayal, & del Rio, 2012). Networks emerge in a multitude of ways, whether this is through Mayor's agreements, supported by United Nations organizations, or sponsored by private funds such as the Clinton Foundation (which supported the creation of the C40) and the Rockefeller Foundation (which funds the ACCCRN). Overall, these are multiple networks which, despite their diversity, operate with high levels of cooperation. Table 4 illustrates various factors that demonstrate this diversity.

Transnational climate change governance networks have often representation of members of the Global South

Table 4. *Different characteristics of city networks involved in governing climate change*

Scale of operation	Global	
	Regional (e.g., European Union, North America, Asia)	
	National	
Types of action undertaken	Membership and tailored support (e.g., ICLEI, UCLG)	
	Networking and showcasing activities (e.g., C40)	
	Enforcing collective commitments (e.g., Covenant of Mayors)	
Proposed climate action	Holistic approach to climate planning, through different types of climate plans	
	Integration of climate change in ongoing local government activities-climate change mainstreaming	
	Specific sectoral interventions (e.g., adaptation, sustainable energy, water)	
	Collaborative approaches and partnership building	
Governance structures	Members	Mayors representing cities
		Mayors and other local leaders in their personal capacity
		Practitioners and policy-makers working in local governments
		Representatives of specific local government departments
		Specific organizations within cities, governmental or not, that play a role in climate leadership
	Management and operation and direction	Independent body with member's steering committee
		Independent body, fully autonomous
		Local governments coordination, with rotating management responsibilities among members
		Sub-section of an existing NGO

(Bulkeley *et al*., 2012). As city and other sub-national networks have grown in number and interconnectedness, their role influencing global climate change agendas has become visible. Networks have to be understood in relation to new partnership approaches to climate diplomacy (Bäckstrand, 2008), following the fragmentation of multi-lateral policies that constituted the holy grail of international negotiations until their collapse in Copenhagen in 2009. Following his analysis of the formation and influence of the C40, Acuto (2013) describes how the structuration of networks enables cities not just to expand their governance reach but also to constitute themselves as "obligatory passage points" for transnational climate change governance. In particular, he argues that through the development of specific demonstrative projects, city networks are able to de-politicize climate debates to open up spaces of intervention- while presumably silencing dissenting voices. Networks have undoubtedly created momentum for "practical policy action" (Dierwechter & Wessells, 2013). There is, however, a question of what causes what, as the likelihood for cities to join networks and campaigns such as ICLEI's campaign Cities for Climate Protection (CCP) depends on endogenous factors such as perceived vulnerabilities and socioeconomic-capacity (Zahran, Brody, Vedlitz, Grover, & Miller, 2008) (see also Section 2(b)).

This new climate diplomacy spaces have made cities even more visible in international events (Hoffmann, 2011). The first Climate Summit for Mayors took place in Copenhagen 2009, in parallel to the COP. Already then, the Mayor's dialogs were tinged by a tone of optimism and engagement with action on the ground, in contrast to the opaque negotiations between representatives of country states at the COP. In 2011, the COP established the Ad Hoc Working Group on the Durban Platform for Enhanced Action (ADP), a subsidiary body with the mandate to develop a legal instrument to be applied under the convention. At the request of the ADP, the UNFCCC secretariat organized an unprecedented forum on best practices in cities and subnational authorities, on the June 10, 2013 (UNFCCC, 2013). The event highlighted the importance of cooperation, voluntary action and participatory, people-oriented approaches, but it was not followed up in further ADP meetings. Mayoral events continued. The Nantes Declaration of Mayors and Subnational Leaders on Climate Change, in September 2013, urged national governments to consider seriously the potential of sub-national authorities in their efforts to tackle climate change. In 2015, the now-called Climate Summit for Local Leaders in Paris reaffirmed their commitment to climate change goals exceeding the goals agreed by national governments and stated that "advancing climate solutions is a shared responsibility, and a matter of rights, equality and social justice". [1] The first commitment reveals the complementary role that cities and urban areas play to meet carbon reduction aspirations, in the context of the Paris Agreement that, while constituting a diplomatic success, falls short from global ambitions to keep temperature changes within safe levels. ICLEI's Transformative Actions Programme (TAP), in partnership with twelve other networks and NGOs, aims to "to maximize investment in low-carbon and climate-resilient urban development and governance processes", thus demonstrating that action in cities is something more than a nice addition to national efforts: it is truly transformative local action that can make a difference to carbon reduction and resilience commitments (ICLEI, 2015).

The second statement, which reconfigures climate politics around discourses of rights and responsibilities, represents a relatively radical redefinition of global climate change discourses, staging justice concerns in local climate change policy (Bulkeley *et al*., 2013). Empirical evidence has demonstrated that local governments have multiple opportunities to incorporate justice discourses in local sustainability initiatives (Castán Broto & Westman, 2016). In the World Mayors' Assembly that preceded Habitat III in Quito, in 2016, Mayors staged their commitment to the simultaneous achievement of just and sustainable urban futures. City networks reveal the role they may play in creating new paradigms for climate governance and reconfiguring climate politics, for example, by redefining justice struggles in relation to the experiences of urban citizens, rather than abstract concepts of global climate justice. In that sense, urban governance is neither just a mechanism to deal with climate change issues in specific contexts nor a means to gain influence in global spheres to redirect climate finance to urban areas: instead, urban governance constitutes a means to build new forms of authority over both the city and climate change; means that have to be studied from a critical perspective, as explained in the following section.

3. URBAN GOVERNANCE AS A MEANS TO GAIN CONTROL AND AUTHORITY

Critical scholarship on climate change governance has moved away from understanding how to improve governance, looking instead at the reasons why people and institutions should feel compelled to make such improvement. Rather than understanding how to do "good governance", critical scholarship looks into who, why, and with what consequences urban governance is accomplished. This perspective "starts from the analysis of governing as the orchestration of distinct modes of power" seeking to explore its operation (Bulkeley, 2015, p. 3). These are not just well-intentioned means to respond to an urgent problem, but complex political entanglements which reveal the underlying paradigms and the contexts of intervention in which governing actors operate. The literature is presented in two sections, the first looking at how climate politics play out in local contexts, and the second, at how governing climate change in urban areas is reconfiguring climate politics, via the deployment of specific discourses of innovation, experimentation and transformation.

(a) *The production of climate politics at the local context*

Governance may be a means to control and dominate actors, things, and events. Critical theory, however, has highlighted how the act of governing emerges from within the circumstances in which it is accomplished. Rather than being a mere mechanism of control, governance should be understood as a mechanism of orchestration which sometimes requires domination, but most times works upon mechanisms of seduction and inducement (Bulkeley, 2015). A reinterpretation of Foucault's notion of governmentality, as the rationalities that facilitate "the art of government", has sparkled thought about the nature and operation of urban governance mechanisms (Bulkeley, Castán Broto, & Edwards, 2014). Bulkeley (2015) relates climate change "governmentalities" with the redefinition of power as relational, that is, as emerging from the coordination and negotiation of actors whereby power is consented. Such forms of governing unfold as open-ended processes, characterized by unexpected events. Finally, governmental technologies are implicated in the creation of self-governing individuals which enact particular discourses of action through their own conduct (Bulkeley, 2015).

The relational dimensions of governmentality are manifest, for example, in dilemmas about who should act and what is

the most appropriate scale for action (Lundqvist & von Borgstede, 2008). Positive views on the proliferation of actors in urban governance contrast with perspectives that see in this profusion of actors as the root cause of a dilution of responsibilities thus constraining carbon reduction and climate protection efforts (Marsden & Rye, 2010; Newell *et al*., 2012). Recent research has engaged with the emergence of "strategic intermediary organizations", or simply "intermediaries", which under the umbrella of climate action play a key role in reconfiguring urban politics (Hodson & Marvin, 2009; Hodson, Marvin, & Bulkeley, 2013). The governance of climate change in cities requires the formation of actor-constellations mediating social, institutional, and technological change (Rohracher & Spath, 2014). However, intermediaries play a central role in the orchestration of those constellations, because they are able to use global discourses of climate change to shape local processes (Fischer & Guy, 2009; Hodson *et al*., 2013). Intermediaries include a diverse, complex, and interrelated set of actors-NGOs, unions, private consultancies, designers, regulators, and even travel agents, just to mention some- who mediate and work in between other actors, sharing, regulating and most of all, controlling a diverse set of production and consumption processes involved in low carbon, climate resilient transitions (Guy, Marvin, & Medd, 2011). Middling technocrats, those who internalize global environmental concerns and deploy them in specific contexts for the reproduction of the space (Roy & Ong, 2011), may play key intermediation roles.

Urban regime theory has looked at the city as a site of power pluralism, where power fragmentation generates a need to build authority through processes of intermediation and negotiation (Mossberger & Stoker, 2001; Shey & Belis, 2013). Urban regime theory fits a city that follows the logic of markets, and disregards local politics in favor of efficiency-oriented forms of coordination. This approach explains how environmental policy is often tied to ideas of economic competitiveness and technological development, such as, for example, in smart cities and green economy discourses (de Oliveira *et al*., 2013; Herrschel, 2013), in efficiency-oriented spatial and economic planning (Hu, 2015; Storbjork & Hjerpe, 2014; Taylor, Harman, Heyenga, & McAllister, 2012) and in economic-oriented demonstration projects of sub-national networks such as the C40 and the R20 (see Section 2(c)). However, urban regime theory's emphasis on the city as a site of entrepreneurialism has meant that it has largely neglected the regulatory impulses embedded in discourses of resilience building and carbon control (Jonas, Gibbs, & While, 2011). Overall, the encounter of urban regime theory with climate change governmentalities speaks of a contradiction between the impulse to control the city and the suspicion of state-led forms of control embedded in the local politics of climate change.

Establishing the means to measure carbon or resilience is a key issue in climate change governance, both in terms of measuring climate impacts and in estimating the need for carbon reductions (e.g., Bulkeley, 2015; Pearce & Cooper, 2011; Rice, 2010). Intervening in a relatively new area of governance, such as climate change, requires narratives that provide a rationale for intervention, some sort of "calculus". Constructing those rationales requires efforts to link local contexts of action- material, spatial, social- to the actual possibilities of intervention, both to legitimate diverse climate publics and demonstrate the effectiveness of the proposed action (Knuth, 2010). Scholars of innovation, particularly, have looked at urban infrastructure regimes to explain how knowledge and institutions are configured together with the material artifacts that constitute infrastructure networks (Monstadt, 2009). In contrast to urban regime theory, regimes here refer to dominant configurations that shape the social and material aspects of urban life and which may become unstable under global pressures. Climate change politics is deployed as a means to organize materials and spaces, orchestrating new modes of service provision and alternative urban futures (Bulkeley, Castán Broto, & Edwards, 2014).

Foucault famously described governing as the conduct of conduct. Governmentalities direct attention to processes of self-governing, whereby individuals attempt to regulate the behaviors of themselves and others. Self-governing has long been recognized as an important mode of governance in municipal governments that, given their control of buildings and infrastructures, attempt to "lead by example" (Bulkeley & Kern, 2006). The creation of self-governing institutions and individuals is also related to an emphasis on individual behavior change. Local governments in countries such as the UK and the US have actively encouraged a pro-environmental behavior change in the population, with the consequent displacement of responsibilities for carbon reduction (Revell, 2013; Rice, 2014). As climate change is framed as a problem that can be addressed via consumer choice, so local authorities and other intermediaries have been casted in the role of educators, whose actions are directed toward creating self-governing mechanisms of carbon control (Dowling, McGuirk, & Bulkeley, 2014; While, Jonas, & Gibbs, 2010). In vulnerable cities climate change governance may be directed toward the creation of citizens capable of dealing with the consequences of disasters, so that responsibility for safety and service provision is once again displaced to the urban poor, who suffer the most and have least access to global resources (see for example this concern explained in: Douglas *et al*., 2008).

Both urban regime theory and governmentality-inspired approaches to urban governance have sparkled creative interpretations of how the politics of climate change unfold in urban locales. City actors may attempt to build authority and legitimate their interventions through orchestration and self-governing. However, there is a question of how discursive narrations of intervention encounter the actual realities of implementation, which is often experienced as a contradiction in governance (Castán Broto, 2015). At a more mundane level, these theories downplay how existing institutions and material arrangements exclude actors from the possibility of exercise control over the city, and how the urban governance of climate change is also embedded in processes of contestation and political struggle (Rutherford & Coutard, 2014). Paradoxically, by highlighting forms of situated agency, governmentality theory questions the extent to which dominant paradigms of action and change can be challenged or even just disrupted by those who necessarily operate within that paradigm.

(b) *The rise of experimentation in global climate politics*

Theories of experimental governance follow both empirical observations of what actually happens in cities- how governance is accomplished- and theorizations of transformation and change that relate governing rationalities to situated agencies. This is an example of how processes of urban governance have shaped the politics of climate change beyond the arena of urban interventions. Consultants and business innovators look at urban areas as laboratories where new policy and technological innovations can be essayed (Evans, 2011; Evans & Karvonen, 2014). The appeal of experimental approaches is clear:

> "The concept of experimentation feeds on attractive notions of innovation and creativity (both individual and collective) while reframing the emphasis of sustainability from distant targets and government policies to concrete and achievable actions..."
>
> [Evans, Karvonen, and Raven (2016)]

Experimentation is often distinguished from other climate change governance strategies such as negotiation or standardization (Wejs, 2014), but in practice, experimentation- associated with a vague promise of alternative urban futures and social innovation- is the dominant form of climate change governance in urban areas (Bulkeley & Castan Broto, 2013; Bulkeley, Castán Broto, & Edwards, 2014). The global extent of experimentation as a form of governance has changed debates on the politics of climate change (Hoffmann, 2011).

Govermentality theory supports the notion that change aspirations follow a "will to improve" (Li, 2007) whereby "improvers" find mechanisms to enforce different conducts. Experiments are thus central to the development of specific intervention rationales and the processes of self-regulation that move both "improvers" and those who "receive" such improvement. Experimentation also fits theories of governance in which governing is never quite accomplished, but always in-the-making (Cochrane, 2010). Following this, Bulkeley, Castán Broto, and Edwards (2014) have developed a framework to characterize experiments as they travel through specific contexts of urban change. The MML framework refers to three interrelated processes that experiments go through as "making", "maintaining", and "living". Making refers to the need to assemble a wide range of elements together for the experiment to work. There is a need to link the actual material actions to suitable narratives that link the experiment to the objectives of addressing climate change. Governing requires, first of all, assembling the means for that governing. Experiments have to be maintained, both because they need upkeep and repairs to work over relatively long periods of time and because they need to be integrated within the dynamic context of the city. This means material integration in physical networks as much integration with discourses of urban governance that cast it as relevant and imagine it as new and innovative. Mere integration alone may miss the experimental character of the action (Castán Broto & Bulkeley, 2013b). Experiments are also lived, that is, they are integrated in daily routines. In this way, experiments shape and make conducts, constructing and solidifying specific government rationalities that may then transcend the experimental context and modifying urban life (Bulkeley, Andonova *et al.*, 2014; Bulkeley, Castán Broto, & Edwards, 2014; Bulkeley, Castán Broto, & Maassen, 2014). This framework enables a historicist account of experiments as embedded in particular contexts of action and relates them with context-based theories of change. In this perspective, experiments become complex processes of arrangement and trying, where both the constitution of the experiment (its transformative potential) and the receptivity of the situation (the milieu viscosity) influence the potential for transformation (Figure 1).

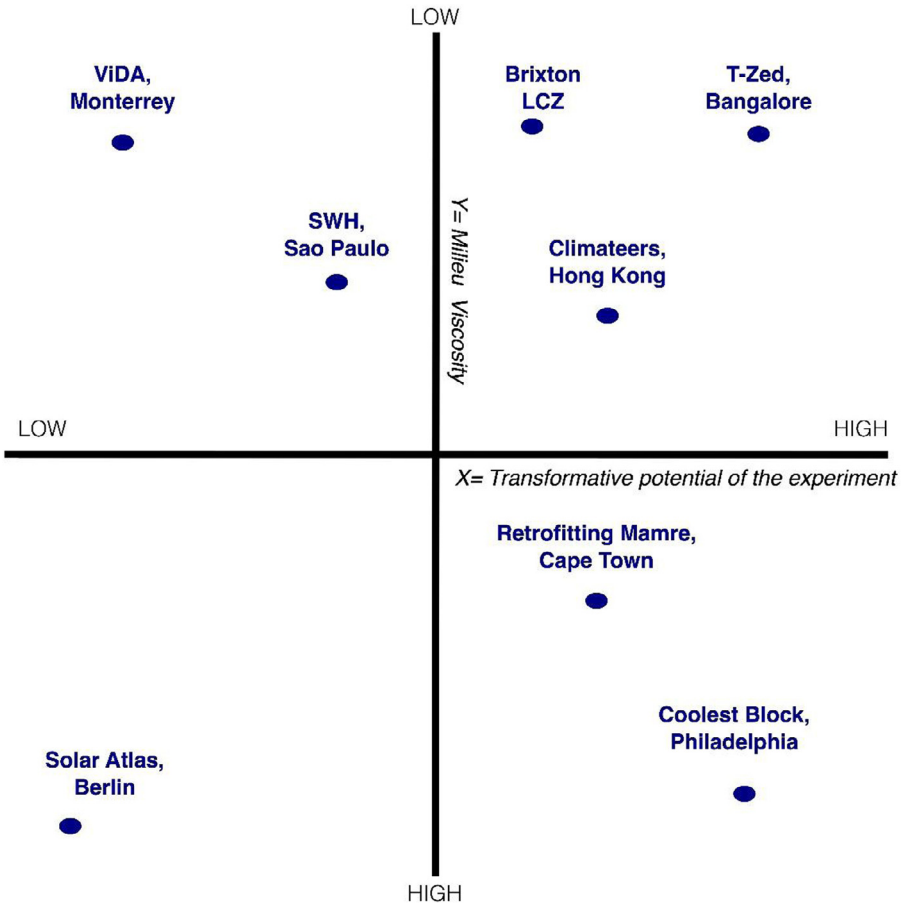

Figure 1. *Impact of climate change experiments depending on their "transformative potential" and their "milieu viscosity" (originally published in Bulkeley, Castán Broto, & Edwards, 2014 used with permission).*

Experimentation relates climate politics to the practical dimensions of intervention (Evans, 2011). In doing so, experimentation ties climate change action to specific actors, blurring forms of private and public authority and redefining intervention as forms of technical intervention in infrastructure networks (Bulkeley & Castan Broto, 2013). The mechanisms for influencing broader climate change politics beyond the city are varied, but the following examples illustrate their importance:

- Experimentation has gained currency as a means to deal with the complexity and uncertainty inherent to climate change issues because it allows for initiatives which have tangible and measurable results but they do not need to be conclusive to be persuasive and convincing (Stead, 2016).
- Experiments are often linked to demonstrations, as a means to visualize, materialize or prove innovative or unusual ideas to facilitate transformations. New forms of calculation in an uncertain context have to be actively performed to gain validity (Cidell, 2015). Evans *et al.* (2016), for example, mention Bogotá as an example of "experimental city" whose perceived success went on to inspired interventions elsewhere in the world, to the point that some of the rationales for intervention become adopted as global discourses. The city is thus approached as an strategic space in which broader climate politics can be essayed and redefined (McGuirk, Dowling, & Bulkeley, 2014).
- Experimentation is also tied to grassroots initiatives that attempt to bring utopian visions of the city, so that activities directed toward contesting hegemonic urban visions become in themselves attempts at governing the city (see examples in: Bulkeley *et al.*, 2010; Evans *et al.*, 2016). Ideas of experimental governance have helped to legitimize actors often excluded from global international politics, thus questioning the structuration of the international climate regime in relation to country states and international diplomacy (Hoffmann, 2011).

For all its emphasis on open-ended processes in governance, experimentation has often been approached in an instrumental way. As discourses of urban governance become technical, there follows an increasing emphasis on controlling experiments themselves and actively affirming the strategic role of cities and urban areas in climate change politics. The proliferation of projects that recast the city as a laboratory represent attempts to harness the experiments' power in controlled conditions, most often "reinforcing spatial differentiation and uneven participation in urban development" (Evans & Karvonen, 2014). Urban laboratories bring discussions of knowledge co-production and participation back to institutionalist arguments about the need for visionaries who provide leadership in urban governance, whether this is within local governments or beyond (see for example: Nevens, Frantzeskaki, Gorissen, & Loorbach, 2013). Notions of innovation, experimentation, and urban laboratories contribute to the proliferation of fantasy plans for property development in cities where a large part of the population lacks basic services such as Kigali, Lagos, Nairobi or Dar es Salam. This urban fantasies are seldom realized, but nevertheless have enormous impact on the lives of people, for example, with the removal of less powerful groups from land earmarked for development and the lack of recognition that these plans afford to people deemed to be living in "empty land" (Watson, 2013). Overall, beyond instrumental notions of good governance we lack a theory which can constitute a foundation for a progressive politics of climate change and which can activate positive, emancipatory action within urban areas and beyond.

4. CONCLUDING THOUGHTS

This review serves as a reminder of the enormous interest generated by debates about cities and climate change. Urban governance is, however, still thought of as a complement, rather than a principal means to govern climate change. Given that the proposed voluntary contributions from nation-states will fall far from the aspiration of keeping changes in temperature under 1.5 degree in the 2015 Paris Agreement, there is a need to understand the contribution that non-state actors can make to mitigation objectives, particularly in urban areas.

Clearly, scholarly and policy efforts are moving in this direction. In 2015 and 2016 we have witnessed profound changes in international discourses of climate change and sustainable development. The inclusion of an "urban goal" in the Sustainable Development Goals and the agreement of a New Urban Agenda that "leaves no one behind", the positive role that cities can play in achieving have been means to recognize as well the transformative role of cities toward sustainable societies.

Urban areas and cities are, most of all, complex and heterogeneous arrangements of people, discourses and artifacts, in which history and future visions come together in encounters and events. The city is neither a perfectly oiled machine of synchronized components, nor is a random agglutination of human activities. Cities pollute as much as they restore; they both destroy and create. Neither they are parasites nor are they the holy grail of human organization. Most of all, cities are so different, so contingent, that it does not make sense to build cities on a common global objective or shared recipes for best practice. Rather, recognizing their history, the way social and material relations have been produced and the trajectories that shape people's lives are essential components of any process of urban governance, let alone one directed toward addressing an existential crisis such as climate change.

While it is now commonplace to assume the important role that cities and urban areas can play in addressing climate change, what is far less understood is the profound impact that the translation of climate change discourses has had on urban governance. Climate change has become an issue to be addressed in cities, whereby cities may structure plans and struggle to compete in international arenas. Climate change has become a driver of urban innovation, a political arena where city initiatives can be showcased. A myriad of actors in urban areas play a role in climate change politics demonstrating innovation, implementing ideas, bringing action to scale, recognizing vulnerabilities, and doing additional voluntary contributions that contribute to reduce carbon emissions overall.

Compelling questions remain to understand the extent to which urban governance experiences can truly challenge and reconfigure climate change politics. A demonstration and showcasing ethos in urban areas, evident in climate change experiments, moves away from finding the minimum common denominator. Instead, it seeks to establish the best possible outcomes that can be attained with the existing capacities and resources. The idea that a low carbon, climate resilient city should also be a just one may be the greatest contribution of urban governance debates to the politics of climate change.

NOTES

1. Climate Summit for Local Leaders, Paris City Hall Declaration, available at http://climatesummitlocalleaders.paris/content/uploads/sites/16/2016/01/CLIMATE-SUMMIT-LOCAL-LEADERS-POLITICAL-DECLARATION-PARIS-DEC-4–2015.pdf (last accessed 31/05/2016).

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