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<ATL>METROPOLITAN STRATEGIES AND CLIMATE GOVERNANCE: Towards New Evaluative Approaches</ATL>

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<H1>Abstract</H1>

<ABSTRACT>In the new millennium, cities have become an emerging force among new forms of subnational climate governance. Of interest is how cities act unilaterally and directly in this new climate politics via the provision of relevant tools. Since metropolitan planning strategies have been considered as important mechanisms for achieving urban sustainability in this period, this research has sought to investigate the importance of these master plans in the delivery of urban responses to climate change. For this purpose, the study has employed a qualitative research methodology with the application of a comparative case study and the progression of a conceptual framework for evaluating climate policies in metropolitan plans of two selected cities—London and Melbourne. The study's results suggest that both the 'London Plan' and 'Plan Melbourne' incorporate critical elements to enhance climate governance, including the promotion of coordination principles, innovative technologies, a participatory planning approach and a long-term planning scale. However, the review identified a consistent omission of key principles as identified through the proposed matrix for analysing the climate policies of a city's government, which include risk assessment tools, monitoring systems, distribution, impact frame and accountability. Moreover, the research also revealed the lack of vertical integration in policy formulation and implementation of 'Plan Melbourne'. Our study suggests that a city's governance structure influences the way it undertakes its climate actions and the potential efficacy of these on a<H1> metropolitan scale.</ABSTRACT>

<H1>Introduction</H1>

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In recent decades, it has been universally acknowledged that most of the world's population have entered the 'urban condition' (Gleeson, 2014), and it is forecast that approximately three-quarters of the Earth's population (i.e. approximately 10 billion people) will live in cities by 2050 (UNFPA, 2007). In this context, cities and their urban activities are claimed to be the primary sources that generate more than 70% of the world's anthropogenic carbon dioxide emissions (UN-HABITAT, 2011). Additionally, recent studies on disaster impacts have revealed the significant vulnerability of cities to climate change risk, particularly extreme weather events (IFRC, 2010). Therefore, many cities are positioning themselves as critical sites for developing human prospects as well as meeting various global threats, especially climate change. Bulkeley *et al.* (2014: 175) indicate that contemporary climate politics are not limited to national and international forums; and cities are providing new directions in 'pursuing climate governance in their own right' (Davidson and Gleeson, 2015: 2). Scholarly debates now focus on the conceptualization of urban climate governance, while city policymakers have assumed leading roles in the development and communication of key climate responses. The prominent assertion of urban climate action is currently driven by networks of city governments, particularly the C40 Climate Leadership Group (C40), which includes the most politically and economically powerful cities worldwide committing to a post-carbon energy regime (Davidson and Gleeson, 2015). Acuto (2013) indicates that, through its legitimacy, the C40 has played a fundamental role in framing the evolving debate within climate change as an urban question and enabling cities to participate in global environmental governance. Nevertheless, along with the operation of climate networks, of particular interest is how cities and their components act directly and unilaterally to deliver timely responses to existing climate change risks (Bulkeley *et al.*, 2014).

Albrechts (2010) suggests that the practice of urban and regional planning has been central to the delivery of cities' responses to different issues, such as financial crises, environmental issues or globalization. Gleeson *et al.* (2004: 348) and Davidson and Arman (2014) point out that metropolitan planning strategies are a critical governance tool for accomplishing urban sustainability. Such documents could provide strategic visions and guidelines for policy formulation at local levels; hence, it is anticipated that metropolitan planning strategies should evolve to become key tools in facilitating the delivery of cities' climate actions. However, given the emergence of new directions in urban climate governance, it is recognized that the importance of metropolitan planning strategies in tackling climate change risks has not been researched to the same extent. This arguably reflects a more general failing of urban scholarship. More than 20 years ago, McLoughlin (1992) noted that Western scholars do not tend to evaluate metropolitan plans properly, and we believe that this

observation remains broadly valid today. The conceptual framework developed by Gleeson *et al.* (2004) is one exception to this view and offers a comprehensive tool for assessing these plans. And yet much has happened in global urban climate governance since its articulation. Therefore, it is important to innovate and reflect urban climate governance in the evaluation tools for metropolitan plans, such as those developed by Gleeson *et al.* (2004). This article is an explicit and empirically grounded extension and application of this earlier metropolitan strategy evaluation framework which attempts to better comprehend the emergence of new climate governance imperatives and their implications for mainstream planning. In so doing, it contributes to the wider theoretical work in the policy sciences that has evaluated emergent and evolving sustainability policy and planning (see Dovers, 2005; Berke and Conroy, 2007), in this case climate response and action.

This study investigates the apparent but underexplored question of how new directions in climate governance have influenced traditional metropolitan strategic planning frameworks. This investigation is reported in this article, organized in three main parts. The article begins by reviewing the importance of metropolitan plans as key tools to facilitate city responses to climate change. Second, it builds a conceptual framework for assessing climate policies presented in metropolitan planning strategies, drawing from the relevant literature in this field. Third, the study evaluates the metropolitan plans of two selected C40 cities, London and Melbourne, against this framework to ascertain the extent of their embedding of urban climate governance. The review will identify the key strengths and weaknesses of two metropolitan plans, and from this articulate a new research agenda.

<H1>New regionalism, city region and metropolitan governance with climate changes</H1>

Bai *et al.* (2010: 130) indicate that there is an inherent mismatch in terms of temporal, spatial and institutional scale between urban decision-making and global environmental concerns, 'where urban decision makers are often confined within their relatively short temporal scale of concern, within the spatial scale of their jurisdictions, and within nested governmental and other institutional settings'. In this circumstance, under the regionally oriented planning movement occurring over past decades, scholars advocate the concept of 'new regionalism' to provide relevant approaches for helping urban municipalities cope with different issues and policy contexts across multiple scales (Soderbaum, 2003; Herrschel, 2007; Bai *et al.*, 2010). Wheeler (2002: 271) indicates that the new regionalism requires 'a more sophisticated understanding of a range of governance options, as well as careful analysis of social movements and the development of social capital within the region' (Forster, 2000). In addition, since the

new regionalism is characterized by its complexity, nonconformity, multidimensionality and fluidity, new planning approaches under this concept usually involve 'a variety of state and non-state actors, who often come together in rather informal multi-actor coalitions' (Soderbaum, 2003: 1). As suggested by Bai *et al.* (2010), one such approach advocated by scholars of new regionalism is the establishment of coalitions or networks between individual local governments forming a 'policy' or 'issue' region to address a given development or environmental problems such as transport planning or water security. This approach is supported by Bai *et al.* as it can provide 'the capability of resource sharing and deliberative policy making which can encompass complex issues beyond a single urban boundary, while maintaining local autonomy and issue-relevance' (Herrschel, 2007, cited in Bai *et al.*, 2010: 132). Additionally, this strategy can enhance the voice of local actors, and thus increase the level of influencing action and policy at broader institutional or spatial scales (Bai *et al.*, 2010). The concept of new regionalism is therefore expected to provide useful implications for the planning profession to take a more holistic approach in addressing city-region problems created by the growth and fragmentation of metropolises (Wheeler, 2002).

C40 (2016) recognizes that there are several member city governments (such as City of Melbourne and City of Sydney) constituting only a small part of their whole metropolitan area; and the lack of a unified metropolitan governance in this situation will limit the city-wide responses to climate change. Accordingly, while C40 is upscaling their climate actions from local scale to city-wide scale (C40, 2016b), it is vital for cities (especially in Australia) to develop more appropriate governance arrangements for large metropolitan areas to promote the coherence and integration across different municipalities, which are particularly important to deliver effective strategies for climate change mitigation and adaptation (McCarney *et al.*, 2011). Moreover, in Western countries, Lefèvre (1998: 9) indicates that 'European integration and "globalization" present the question of metropolitan government in a new light', in which the establishment of metropolitan authorities is essential for certain territories to help them face and benefit from a range of developments such as the spatial extension of urban areas, the crisis of the welfare state or the development of new information and communication technologies. In concurrence with Lefèvre (1998), Holman and Thornley (2015) demonstrate that the operation of a metropolitan government is critical in the face of inner-city global competition. This level of governance highlights values of partnership, negotiation, flexibility and voluntary participation in the constitution of new structures. In the UK, such a metropolitan government emerged from the operation of the Association of Greater Manchester Authorities (AGMA) established in 1986. This strategic layer of governance that sits between Greater Manchester's local authorities and the national level has a specific remit over

regeneration, economic development and transport, and can potentially facilitate strategic cross-authority governance approaches (Carter *et al.*, 2015). In addition, the AGMA was in charge of preparing the Great Manchester Strategy with a strong emphasis on the importance of adaptation to climate change, demonstrating 'an intention to produce strategic cross-authority, cross-sector adaptation governance arrangements' (Carter *et al.*, 2015: 10).

<H1>Metropolitan plans are key tools to help facilitate cities' responses to climate change</H1>

Recently, global trends of urbanization have reflected that cities are expanding in terms of density and horizontal space (McCarney *et al.*, 2011). Scott *et al.* (2014) demonstrated that there are more than 300 city regions worldwide with populations greater than 1 million, and at least 20 city regions have populations over 10 million. These city regions range from familiar 'metropolitan agglomerations dominated by a strongly-developed core such as the London region or Mexico City, to more polycentric geographic units as in the cases of the urban networks of the Randstad or Emilia-Romagna' (Scott *et al.*, 2014: 1). These city regions are expanding vigorously around the world in conjunction with the processes of economic integration and accelerated urban growth, and they present certain challenges to policymakers and researchers in providing appropriate planning approaches. Under these circumstances, 'new ways of thinking about these processes, and new ways of acting to harness their benefits and to control their negative effects are urgently needed' (Scott *et al.*, 2014). In addition, Albrechts (2010) indicates that cities are experiencing different challenges and opportunities, such as environmental issues, financial crises, globalization and the emergence of technology. To respond to these issues, 'the call for change' has been assigned to urban and regional planning. As suggested by Albrechts (2010: 1115), it is essential to establish new approaches to planning that can translate innovative concepts or ideas (such as changing the way resources are utilized, alternating the distribution of regulatory powers) into an 'array of practice arenas, which in turn will transform these arenas themselves, rather than merely being absorbed within them'. In agreement with this, Gleeson *et al.* (2004) and Davidson and Arman (2014) demonstrate that metropolitan planning is among the key governance tools for accomplishing urban sustainability. These scholars claim that metropolitan plans could provide strategic visions and targets for intervening in and managing changes in urban areas as well as guidelines for policy formulation at local levels. Additionally, Gleeson *et al.* (2004: 363) suggest that these documents can reverse 'the ecologically unsustainable pattern of urban growth with integrated, collaborative and participatory policy formulation and decision-making processes'.

Over time, it has been recognized that metropolitan strategies worldwide have concentrated on addressing contemporary urban challenges highlighted by pivotal policy discourses regarding governance and ecological sustainability (Finco and Nijkamp, 2001; Pinson, 2002; Gleeson *et al.*, 2004). As suggested by Banuri and Opschoor (2007), climate response has emerged as the most pressing objective of urban sustainability frameworks globally. Accordingly, with the emergence of urban climate governance as reported by Bulkeley *et al.* (2014), it is expected that metropolitan planning strategies will become critical mechanisms for facilitating the application of governance 'hypotheses' to the delivery of cities' responses to climate change (Gleeson *et al.*, 2004). In addition, C40 (2015b: 17) emphasizes that cities obtaining metropolitan plans with 'clear goals and targets take around three times as many climate actions as those without, which highlights the importance of vision setting and leadership'.

To understand the nature of metropolitan planning within these policy debates, there have been several critical reviews on the progress of plan-making within particular cities (e.g. Yencken, 2001; McGuirk and O'Neil, 2002; McGuirk, 2003; Whitzman and Ryan, 2015). Recently, Tozer (2017) also dissected the contents of 15 local governments' sustainability plans in Canada to examine the manifestation of the competing discourses of sustainability and climate change in local government planning. The study's findings show that although both sustainability and climate change are sharing discursive space and shaping local governance rationalities, climate change response rationales are not properly highlighted even when the action could contribute significantly to reducing greenhouse gas (GHG) emissions. Tozer (2017: 16) also indicates that in some listed plans, existing GHG practices are being rebranded as 'sustainable', which suggests 'a tension between discourses of sustainability and climate change that may undermine attempts to successfully address climate change through local sustainability planning'.

Additionally, it is worth considering the evaluation of US city climate action plans, noting they were special purpose initiatives not artefacts of planning agencies (Bassett and Shandas, 2010). These scholars evaluated 20 climate action plans (CAPs) from municipalities of a range of locations and sizes in the United States to 'understand both their processes and their products, including the extent to which they represent innovation in planning' (*ibid.*: 435). The study's results indicate that while some CAPs are merely motivational documents, other plans are extremely detailed with clear objectives, concrete goals, well reasoned methods and effective implementation plans. Bassett and Shandas (2010: 435) also find the decision to prepare a CAP reflects 'the existence of local political will and leadership, which also influences the planning processes used, the form of the resultant plan, and the actions it identifies'. From the

review on 20 CAPs, these authors point out that while some of the planned actions can be considered innovative, many CAPs are traditional planning strategies aligned with the current and long-range planning operations of city bureaus.

Although *ad hoc* attempts have continuously been made to investigate the nature of metropolitan planning, McLoughlin (1992) argues that international scholars do not have a propensity to properly evaluate valid metropolitan plans. Gleeson *et al.* (2004) suggest that a more comprehensive evaluation should be conducted to understand how metropolitan plans draw on different urban visions and policy tools for delivering actions to address existing urban challenges, particularly climate change impacts. In supporting their suggestion, these researchers critically examine the response of metropolitan planning in Australian cities to urban issues highlighted by contemporary governance and sustainability debates. Within this study, Gleeson *et al.* (2004) developed a comprehensive matrix covering five strategic themes (governance, policy, finance, space and democracy) to evaluate the metropolitan plans of six Australian cities/regions, namely, Sydney, Melbourne, Adelaide, Perth, South East Queensland and Canberra. However, within the field of urban climate governance, there is no such rigorous framework to investigate the importance of metropolitan planning in facilitating cities' responses to climate change. Additionally, as indicated by McLoughlin (1992) and Gleeson *et al.* (2004: 347), 'a stronger alignment of discussion about metropolitan planning with wider debates ... will strengthen the analytical foundations and efficacy of Australian urban policy'. It is therefore timely to undertake an extensive review of the role of metropolitan plans under the current climate governance structures.

<H1>Methodology</H1>

A comparative case study investigation is reported in this article, with the aim of elucidating the importance of metropolitan planning strategies in the delivery of urban responses to climate change. In this study, a comparative metropolitan case study provides an in-depth understanding of this contemporary issue within its natural setting, in its entirety and in its real-life context (Punch, 2013; Yin, 2014). Moreover, this approach delineates a phenomenon in relation to a variety of successive instances or patterns of repetition in several cases, and thus provides a good setting for addressing research questions (Zartman, 2005; Walliman, 2011).

The two current metropolitan planning strategies selected for analysis in this research are the 'London Plan' (London, UK) and 'Plan Melbourne' (Melbourne, Australia). These cases were selected due to their relevance to the research aims and objectives. Both London and Melbourne have European town planning heritage and are also recognized as using best practice in their responses to climate change (Searle and

Bunker, 2010). The two selected cities are members of the C40 network, which is the most progressive city network in the newly emerging urban climate governance area (Davidson and Gleeson, 2015). In 2015, both Melbourne and London were announced as finalists for the C40 Cities Award, which globally recognizes cities initiating world-leading climate solutions in terms of carbon emissions reduction, energy efficiency and sustainability improvement (C40, 2015a). Apart from these commonalities, the key distinctions between the two selected case studies are in their socio-political contexts, especially their governance arrangements. London has a strong city government in a unitary country. London's city governance is organized into two tiers: a city-wide metropolitan tier and a local tier. In detail, city-wide administration is delegated to the Greater London Authority (GLA), which plays a vital role in governing the capital and providing plans, policies and strategies for Londoners, including the metropolitan plan (Sandford, 2015). Meanwhile, the local administration is coordinated by 33 smaller authorities, who are responsible for delivering local services, such as planning regulation, schools, local roads and social services (London Elects, n.d.). Meanwhile, in a federation like Australia, the governance of Melbourne comprises two key authorities, the State Government of Victoria, and the local governments of the 26 cities and five shires constituting the metropolitan area. The constitutional authority of planning is delegated to the state government, which is responsible for providing strategic planning, guidelines for policy formulation, public housing bodies and other public services including education, transport and health in certain urban areas (Parkin, 1982; Forster, 2004). In this context, the local governments are responsible for developing policies, delivering local services such as drainage, road maintenance, public recreational facilities and manipulating routine planning matters, including local building regulations (Forster, 2004; Ruming and Gurran, 2014). Consequently, from these distinctions, this research study aims to analyse and compare the experience of how each city, with its different governance structures, delivers their climate actions through the facilitation of metropolitan planning strategies.

Qualitative data inform this study: they are largely collected from governmental publications that are available for download and use or disclosure for research purposes via their official websites. In detail, the research evaluates the metropolitan plans of two case studies, London and Melbourne, with a strong focus on climate policies and directions, and reviews relevant academic material in this field if appropriate. Under these circumstances, for the purposes of this research, document analysis is used as the main method of data analysis. Additionally, the process of analysis involves the development of a conceptual framework for evaluating and comparing two selected metropolitan plans. This framework is developed with reference to the matrix provided by Gleeson *et al.* (2004), which aims to evaluate the responses of contemporary

Australian metropolitan plans to challenges raised by existing sustainability and governance discourses. The framework is then used to elucidate the influence and direction of emergent climate imperatives and policies on the metropolitan plans of London and Melbourne.

<H1>A matrix to evaluate a metropolitan plan's ability to effect climate actions</H1>

The matrix for analysing the climate policies of a city's government is primarily derived from the conceptual framework developed by Gleeson *et al.* (2004). Their framework examined enduring strategic themes that elucidate the fundamental socio-political relations of general metropolitan planning throughout time, including governance, policy, finance, space, time and democracy (see Table 1).

<Table 1 here>

From this foundation, the matrix will be adapted and incorporated into key literature in the field of urban climate governance. This adaptation is necessary because, as we pointed out above, the framework devised by Gleeson *et al.* (2004) predates the rise of climate governance—especially evident in the past decade—and the new city networks that have thrived outside the formal public sphere to support this innovation. The main governance problematic in the Gleeson *et al.* (2004) framework was the presence or absence of vertically integrated institutional forms within the traditional planning sphere. Patently, any contemporary analysis of urban governance must now be sensitized to 'lateral' connections (city to city, transinstitutional, etc.) as well as vertical scaling, including outside the formal public sphere. To address this need, in our revised framework we have incorporated the key governance challenges as reported by McCarney *et al.* (2011) in his study about 'Cities and climate change: the challenges for governance'. Moreover, the evaluation schema for this research is also built upon frameworks developed by Dovers (2005) in the research 'Policy framing', and by C40 (2015b) in the report 'Powering climate action: cities as global changemakers'. Berke and Conroy (2007) provide an important example of how sustainability evaluation can be applied to urban plans, and our study extends and hones this approach by considering the specific and increasingly significant environmental imperative of climate response. Bassett and Shandas (2010) have evaluated innovation in US city climate action plans, which were special purpose initiatives not artefacts of planning agencies. Conversely, our approach differs by evaluating climate action in mainstream urban plans, and our evaluation framework (below) adapts that of Gleeson *et al.* (2004) so that climate-focused content, not just broad sustainability ambition, is highlighted

for analysis. One limitation of the power of our adapted framework that must be acknowledged arises from the fluid and fast evolving nature of urban climate governance and the new networks driving this. Analysis of these protean evolutionary forces is necessary given the difficulty of discerning between the more enduring and the momentary changes, and between the local (metropolitan) and the supra-local outcomes (city regions and networks). We acknowledge this constraint on our framework and invite assessment and debate that can improve it.

Research by McCarney *et al.* (2011) indicates that city governments are experiencing several challenges, which could limit their capacity to undertake climate change mitigation and adaptation strategies. In this study, four major governance challenges are identified that have resulted in a more empowered local governance, addressing jurisdictional boundaries for developing appropriate governance arrangements, promoting effective planning, management tools and data measurement, and developing a more inclusive governance. As the governance capacity has a strong influence on cities' abilities to take programmatic action in response to climate change, it is practical to incorporate certain findings of this study into the proposed conceptual framework for evaluating metropolitan planning strategies. Dovers (2005) identifies 11 key principles guiding the formulation of environment and sustainability policies of countries worldwide, which include inter- and intra-generational equity, global dimensions, policy integration, long-term policy, biodiversity and ecological processes, information focus, precaution, interjurisdictional practice, participation, innovative policy approaches, and substantive/material principles. As Dovers (2005: 73) suggests, 'all policy decisions are influenced by a range of imperatives (policy principles) that bear upon different policy actors'; therefore, it is reasonable to integrate these principles to some extent into the matrix for comprehensively evaluating the city's climate policies. For the research of C40 (2015), this report outlines different dimensions of city power, action scales and instruments deployed by the city's government for delivering actions. C40's approach is considered important to understand the nature of metropolitan planning within particular cities, and thus invites incorporation within the proposed matrix.

For the aims of this research, five heuristic themes are identified: 'governance', 'climate policies', 'distribution', 'democracy' and 'finance'. Further, each theme contains different constituent attributes refining its critical content. We have made several modifications in selecting key themes and attributes to adapt the matrix and sensitize it to climate governance imperatives. Instead of 'space', a new key theme added is 'distribution' with two integral attributes; namely, action scales and distribution. Additionally, within the 'governance' theme, there are two new attributes, 'governance modes' and 'regional diffusion', derived from the review on governance challenges and

new regionalism respectively. Turning to the 'climate policies' principle, in comparison with Gleeson *et al.*'s (2004) model, this theme incorporates elements of two old themes 'policy' and 'time', and also develops new attributes regarding tools for facilitating climate actions as reported in the literature review and from the 'innovation' principle suggested by Dovers (2005). The key attributes of two themes 'democracy' and 'finance' are largely retained, with minor changes to make the matrix straightforward for assessing the climate policies outlined in the metropolitan planning strategies.

Table 2 outlines the key attributes of each theme with reference to the urban climate action literature to demonstrate the conceptual resources that our framework draws upon.

<Table 2 near >

<H2>Key attributes of the 'governance' theme</H2>

Five key attributes identified to inform the governance theme are power dimensions, vertical integration, coordination, governance modes and governance scale. First, power dimensions determine the levels of control or influence of city governments over assets and functions, which include owning or operating, setting or enforcing policy/regulations, controlling budget and setting vision (C40, 2015b). Second, vertical integration implies whether the metropolitan strategy and its operational ambit are integrated with the different activities of the national, state, regional and local authorities for conveying meaningful outcomes (Gleeson *et al.*, 2004; Hammer *et al.*, 2011). Third, coordination informs the plan's capacity for promoting levels of internal cooperation between public agencies or external coordination with different progressive networks and policy relationships (Bulkeley and Moser, 2007; Allain-Dupré, 2011). After that, the fourth attribute refers to the different modes of governance within cities as identified by scholars such as Bulkeley *et al.* (2011), and Broto and Bulkeley (2013a), which include self-governing (the city government has the capacity to independently manage its own resources and assets, make decisions and deliver actions without relying on other sectors), governing by provision (the city government becomes the main stakeholder in the management and delivery of public services, including the development of basic infrastructure relating to water, waste and energy), governing by regulation (the city government utilizes different forms of authority, including sanctions and control, to integrate climate change mitigation objectives into the planning of important sectors such as energy, transport or land use) and governing through enabling (the city government plays an important role in facilitating the delivery of climate actions through partnerships with voluntary private actors and also by strong engagement with communities). Fifth, governance scale refers to the scale at which the metropolitan plan governs, whether the policy scale is centralized with a

state planning authority or distributed with other institutional settings (Bai *et al.*, 2010). Finally, regional diffusion implies whether the metropolitan plan proposes the establishment of coalitions or networks between individual local governments forming a 'policy' or 'issue' region to address a given development problem such as transport planning or water security (Bassett and Shandas, 2010). Regional diffusion represents a 'systems understanding of urban environmental policy linkages to regional and global change' (Bai *et al.*, 2010: 130).

<H2>Key attributes of the 'climate policies' theme</H2>

Four key attributes identified for the climate policies theme are temporal scale and continuity, tools, innovation and analytic framework. First, 'temporal scale' refers to the temporal scaling integrated within metropolitan strategies, including the short, medium or long term (McCann, 2003). Additionally, continuity relates to whether the launch of current strategies and policies maintains consistency and continuity with former strategic metropolitan planning processes (Hallsworth *et al.*, 2011). The second attribute includes key tools that can facilitate a city's climate actions, such as planning tools, management tools, monitoring systems, risk assessment and standardized databases (McCarney *et al.*, 2011). Third, levers inform the instruments deployed by city governments to effect climate actions, including projects or programmes, policies or regulations, incentives or disincentives and procurement (C40, 2015b). Fourth, innovation encourages the application of new, innovative technologies for achieving development goals set out within the metropolitan plan (Dovers, 2005; Sampath, 2013). Finally, 'analytic framework' refers to the formulation of metropolitan strategies, whether they are developed based on 'a trend plan projecting patterns of the past or a predictive plan that emphasises options that can adapt to social change' (Gleeson *et al.*, 2004: 349; Hansen *et al.*, 2014).

<H2>Key attributes of the 'distribution' theme</H2>

Two key attributes have been determined for the distribution theme: action scale and equitable distribution. First, the action scale refers to the different levels of climate policies across the city, which include transformative (city wide), significant (across most of the city), pilot (being tested) and proposed (awaiting final authorization) (C40, 2015b). Second, distribution informs whether the metropolitan plan considers equitable access to different services and goods (public transportation) and green technologies (such as energy-saving appliances or electric vehicles) (Broto and Bulkeley, 2013b).

<H2>Key attributes of the 'democracy' theme</H2>

The five key attributes identified for the democracy theme are participation scale, responsibility, impact frame, accountability and reflexivity. 'Participation scale' refers to approaches for promoting community involvement, whether this could be spatially organized based on the identification of local aspirations and general principles, or implemented on a functional basis such as by consultation of the dominant groups within communities. Within this attribute, three important groups that should be closely involved in governance processes are identified as being local citizens, private sectors and NGOs (McCarney *et al.*, 2011). Second, 'responsibility' determines whether certain authorities will oversee implementation of metropolitan strategies or if the responsibility will be shared equally with other agencies (Olum, 2014). Third, 'impact frame' considers whether costs and benefits (both qualitative and quantitative) of the plan's strategies and programmes are clearly defined and presented to the public (Kelly, 2012). Fourth, 'accountability' refers to mechanisms for identifying and sanctioning agencies that do not achieve the targets and outputs set out within the metropolitan plan (Waldron, 2014). Finally, 'reflexivity' informs whether the limitations of the plan are identified and what mechanisms are to be deployed for the process of monitoring and evaluating those weaknesses (Misuraca *et al.*, 2013).

<H2>Key attributes of the 'finance' theme</H2>

The three key attributes identified for the finance theme are financial measures, formulation and implementation costs and budgeting processes. First, financial measures determine whether the plan utilizes positive planning financial measures, such as open space levies, betterment or congestion charges, for implementing development strategies (Merk *et al.*, 2012). Second, formulation and implementation costs refer to the capacity of different agencies to fund the process of formulating and implementing the plan (Hanzl *et al.*, 2003). Finally, budgetary processes identify any linkages between the orientation of expenditure to the plan and government budgeting processes, including spending and taxing (Gleeson *et al.*, 2004)

<H1>A review of metropolitan plans: Melbourne and London</H1>

<H2>Governance</H2>

Both the London Plan and Plan Melbourne are integrated with national, regional or state planning guidelines. However, while the London Plan clearly states that the metropolitan government provides relevant supplementary planning guidance, Plan Melbourne does not extend integration to this level. Hammer *et al.* (2011) indicate that strong integration of national, state, metropolitan and local planning approaches contributes to creating consistency and coherence in the formulation of policies and

regulations, better facilitating the implementation of plans. Therefore, the lack of integration within the local planning framework could be considered as a shortcoming in Plan Melbourne.

It is apparent that the governance mode used by both London and Melbourne is governing through enabling, with a framework for coordination with other departments, agencies, private sectors and the community. With respect to the power dimension, it is evident that this information is not available in the London Plan (which was produced by the metropolitan government—GLA) and Plan Melbourne (which was prepared by state government—Government of Victoria); the data were sourced from the online portal of the C40, of which both cities are members. However, it is noted that while London's data represent the mayoral power on a metropolitan scale (GLA), the data for Melbourne indicate the power of local government (the City of Melbourne, which only governs a small segment of the city). Additionally, when considering the governance scale, the climate policies provided in the London Plan are clearly targeted for implementation on a metropolitan scale, with the responsibility distributed between the metropolitan government (GLA) and relevant partner actors. Meanwhile, Melbourne does not have separate metropolitan governance, and climate directions in its metropolitan plan are indicated for delivery on the state scale. Notably, Plan Melbourne also states that a new metropolitan planning authority has been established to facilitate the implementation of the Plan. However, in 2016, this metropolitan authority was replaced with a state-wide body (Victorian Planning Authority), extinguishing the possibility that it might evolve into a new governance structure for 31 municipalities within greater Melbourne. This situation obviously worsens Melbourne's metropolitan governance dilemma, and thus limits the city's capacity to undertake climate actions on a city-wide scale. In the Australian context the constitutional authority for planning is delegated to state governments, and there has been less attention paid to the field of city planning, referred to as a 'governance deficit' by Gleeson *et al.* (2010: 1). These researchers suggest that Australian cities have evolved into large metropolitan areas with overlapping, complex and often disorganized governance structures. The governance challenge outlined above indicates the lack of apparent and efficient institutional arrangements, which are important for the delivery of urban services and the planning of urban development (Gleeson *et al.*, 2010; Burton, 2014).

With regards to regional diffusion, there is limited inclusion of this attribute in the London Plan, which involves establishing London's network of town centres, presented in Policy 2.15, to provide the main foci for commercial development and intensification, with a competitive choice of services and goods conveniently accessible for all Londoners (GLA, 2016). Additionally, the plan emphasizes that 'changes to the

network including designation of new centres or extension of existing ones where appropriate, should be co-ordinated strategically with relevant planning authorities including those outside London' (GLA, 2016: 70). Meanwhile, there is no such network or coalition presented within Plan Melbourne in consideration of regional diffusion.

<H2>Climate policies</H2>

In terms of temporal scale and continuity, it is evident that the London Plan and Plan Melbourne have long-term policy frameworks extending to 2036 and 2050 respectively. These plans are also consistent with previous versions (in the case of London) and other planning guidance (in the case of Melbourne) due to their extensive consultation processes and the application of feedback mechanisms. As Tewdwr-Jones states (cited in Hutt, 2016: 1), a long-term planning approach is the key to 'ensure short-term decisions do not compromise those cities' longer-term needs'. In the context of climate change, this temporal framework allows the government to consider the impacts of long-term environmental and extreme weather events when delivering economic growth objectives (which are generally associated with high levels of carbon emissions). Furthermore, Plan Melbourne has a more explicit temporal scale in which each direction or initiative is indicated by specific implementation milestones (short, medium and long term). For instance, within initiative 5.8.2 for developing new waste systems to satisfy the demands of medium- and high-density developments, all three practical actions, which include providing good planning guidelines, reviewing and streamlining regulations, and encouraging precinct-wide innovations relating to waste management and recycling, should be implemented within the short term (Victorian Government, 2014).

Regarding tools, both plans engage different planning and management tools to manage the link between urban form and emissions, especially within the domains of transportation, land use or building energy consumption. Additionally, the two listed plans rely on different databases to provide relevant policies and directions to efficiently manage their urban areas (Victorian Government, 2014; GLA, 2016). However, within both metropolitan plans, monitoring systems and risk assessment have not been considered. The absence of a monitoring framework to precisely measure the contribution and vulnerability of a city to climate change can generate certain challenges for governments in producing appropriate policies due to a lack of information (McCarney *et al.*, 2011). Moreover, as indicated by the World Bank (2016: 1) and the UNDP (2010), urban risk assessment plays an important role in helping cities to identify not only 'where and how many people are vulnerable' to climate change risks (such as extreme weather events or rising sea levels) but also 'susceptible infrastructure that if damaged, would have knock-on detrimental effects on the population'.

Therefore, the omission of monitoring systems and risk assessment tools within metropolitan plans could limit cities' capacities to deliver appropriate policies to address the causes and results of climate change occurring in their governance areas (McCarney *et al.*, 2011).

For levers, it is recognized that the London Plan and Plan Melbourne use several delivery mechanisms to achieve their climate actions, which include policies, projects and procurements or incentives. Along these lines, C40 (2015b: 57) suggests that 'the levers employed by cities are influenced by the powers they hold'. Nonetheless, neither of the two selected plans contains any explicit measure regarding the practical number of each of the levers applied by the government; thus, it is difficult to identify the link between the use of particular delivery mechanisms/levers and cities' power dimensions.

Turning to innovation, both plans clearly promote green technologies as a means for creating greener cities and moving towards sustainable development. In detail, green technologies, such as renewable energy or electric vehicles, can provide energy efficiency with fewer environmental effects, and thus contribute significantly to addressing 'many of urban society's biggest challenges', including climate change (IFHP, 2016: 1). With the integration of these innovative technologies into policy frameworks, both plans show great interest in applying knowledge and science in general to open new development opportunities and overcome existing urban challenges (Siyanbola *et al.*, 2016).

Finally, in terms of their analytic frameworks, it is noted that the London Plan and Plan Melbourne have been partially developed on projections rather than past trends. In this context, Duit *et al.* (2010: 367) indicate that we are living in an era of global environmental change 'in which past behaviour of the system is no longer a reliable predictor of future behaviour, even when circumstances are similar'. Therefore, it is fundamental to note that planning requires new instruments since traditional toolkits 'such as extrapolation of past trends in forecasting and for reducing uncertainties' to deal with yesterday's problems are proving irrelevant, particularly in the face of climate change (Davoudi, 2012: 303). Accordingly, the analytical framework based on projections could be considered as progress in the two selected plans.

<H2>Distribution</H2>

For action scales, the findings indicate that the climate policies and directions of the London Plan and Plan Melbourne are implemented on different scales, ranging from transformative, significant, and pilot to proposed. In the case of London, from the analysis of power dimensions, it is noted that although the GLA mostly has partial and limited powers over assets and functions, the city delivers many practical climate actions on a transformative or significant scale. To clarify, C40 (2015: 48) suggests that

'thanks to their capacity to deploy their powers in innovative ways and to collaborate with other actors', C40 cities including London 'are in a unique position to catalyse climate actions' and implement them on a city-wide scale. In the case of Melbourne, although there is no explicit information regarding the powers and competencies of the state government, the Victorian Government implements a considerable number of climate actions on a state scale, resulting in city-wide-scale problematics in the absence of a metropolitan government.

Turning to distribution, both plans give inadequate consideration to issues of distribution, particularly equitable access to services and green technologies. However, within a democratic society, the right to access green services and technologies (beneficial to social development) has an important role in the progression towards a sustainable city. Therefore, from a social equity perspective, it is important for global cities such as London and Melbourne to align the development of different green services and technologies with considerations relating to social justice and social inclusion, and present these clearly within their metropolitan plans (Cook and Swyngedouw, 2012; Broto and Bulkeley, 2013b; UNEP, 2013).

<H2>Democracy</H2>

For the participation scale, it is apparent that the principle of community engagement is well embedded within the London Plan and Plan Melbourne, as illustrated through the consultation processes used prior to the official release of the metropolitan plans. Additionally, in both plans, within several climate policies or directions, the aspect of consultation is also considered as essential prior to implementation. Moreover, within both plans, two key groups closely involved in consultation processes prior to policy implementation are identified as local citizens and stakeholders (including the private sector and other stakeholders). It seems evident that both metropolitan plans partially embrace the concept of participatory planning, in which the approach to planning is aligned with benefits to citizens and the development of communities (Wilson *et al.*, 2015). This indicates a shift in urban planning in both countries that moves from 'a view of planning being an expert-driven technocratic activity to one that is inclusive of relevant stakeholders and communities'; and this can be viewed as a progressive aspect of both selected plans (Wilson *et al.*, 2015: 64).

Turning to responsibility, the London Plan and Plan Melbourne clearly indicate that the implementation of these plans will be distributed between the metropolitan (or state) government and other agencies, local councils or private sector. However, Plan Melbourne takes a step further than the London Plan when it explicitly nominates

specific authorities and stakeholders that oversee implementation of their climate directions on a particular temporal scale (short, medium or long term).

In terms of reflexivity, both listed plans have explicit monitoring frameworks which effectively contribute to measuring the progress of their implementation over time (Victorian Government, 2014). Additionally, these frameworks help the government and relevant stakeholders identify the strengths and limitations of these plans, and thus provide timely alterations when feasible (Gleeson *et al.*, 2004).

Within impact frame and accountability, it is evident that neither plan has an explicit framework for measuring the losses and gains inherent from the implementation of climate policies and directions, or specific formal mechanisms for sanctioning agencies that do not achieve the targets and outputs set out within the metropolitan plan. The absence of these two aspects represents the shortcomings of the London Plan and Plan Melbourne because it reduces the transparency and accountability of planning processes and 'undermines their ability to secure the wide democratic support necessary for sustainability policy settings' (Gleeson *et al.*, 2004: 362). The inclusion of an impact frame with a clear analysis of costs and benefits within a metropolitan plan is fundamental to help citizens and stakeholders assess the pragmatic effectiveness of the proposed climate policies, and provide useful feedback or recommendations for practical implementation (Sunstein, 2010). Moreover, a clear framework for sanctions can contribute to increasing the effective delivery of climate actions for achieving the plan's objectives. Therefore, it is critical for both London and Melbourne to include these socio-political objectives within their metropolitan plans.

<H2>Finance</H2>

The London Plan (via its associated Implementation Plan) and Plan Melbourne present their formulation and implementation costs quite clearly. Each plan also promotes different funding opportunities for facilitating the implementation of their policies. Nonetheless, in comparison with the London Plan, which states that costs for the delivery of strategic infrastructure in London would be derived from the budget stated in the National Infrastructure Plan (approximately £50 billion) for London (GLA, 2013: 17), Plan Melbourne is less clear about the origins of funding opportunities and only indicates that 'ultimately, the community funds the infrastructure and services' (Victorian Government, 2014: 190). Additionally, 'Plan Melbourne' outlines that several local projects (such as road improvements, community centres or parks) are funded by a combination of general taxation, direct user charges and by capturing the value to indirect beneficiaries via the rating system, and this funding mix will 'generate more funds for investment ... increase fairness and the efficiency of assets and services through astute pricing policy' (Victorian Government, 2014: 190).

Regarding budgetary processes, while no specific link is provided for this aspect in the London Plan, Plan Melbourne clearly states that the plan is built upon the fiscal and economic strategy of the Victorian Government. Plan Melbourne also provides general information regarding the process of budgetary assessment, which is a useful reference for stakeholders to rely on before they commence new projects. McLoughlin (1992) and Gleeson *et al.* (2004: 361) demonstrate that within metropolitan plans, 'the weak links to budgetary processes in the strategies are likely to impede their implementation'. Therefore, it is important for the London Plan to take this aspect into consideration when revising their metropolitan plan in the future and Plan Melbourne to be clear about likely funding possibilities.

<H1>Discussion: an evolving nexus</H1>

As explained above, the sustainability evaluation matrix by Gleeson *et al.* (2004) was modified to sensitize it to the new phenomena of climate networking and governance that have evolved since its formulation. Using this framework, our review has identified similarities and the differences in the approach taken by each city to deliver climate actions through *inter alia* metropolitan planning strategies. These convergences and divergences are summarized in Table 3.

<Table 3 here>

From the comparative analysis of the similarities and differences between the London Plan and Plan Melbourne against five key themes of the matrix, it is evident that both plans contain several positive aspects, such as the promotion of coordination principles, innovative technologies, a participatory planning approach and a long-term planning scale. Differences are evident in our comparative case study, indicating mixed evolutionary pathways as climate governance continues to influence planning systems. For example, while the London Plan promotes the vertical integration of climate policies into local planning frameworks, Plan Melbourne is poorly articulated across policy scales. This situation demonstrates a prominent wider challenge in Melbourne and other Australian cities, explained as a 'governance deficit' by Gleeson *et al.* (2010: 1). This means that Australia's cities have evolved in the past century into large metropolitan areas with overlapping, complex and often disorganized governance structures that hinder policy innovation and application in response to new imperatives, including most recently, as our analysis shows, climate action. Furthermore, disorganized and distributed governance inevitably hinders policy application generally on a city-wide scale.

This study also shows the omission of key attributes within the two metropolitan plans examined, including risk assessment tools, monitoring systems, distribution, an impact frame, accountability, regional diffusion and financing. We feel it is essential for the governments in London and Melbourne to take these findings into consideration and revise their plans to include identified attributes, as they are surely critical for developing more appropriate and comprehensive climate policies. Our investigation was limited to two cities—both leading metropolitan advocates of climate action—and so a wider comparative evaluation of urban climate planning on a global scale is needed. As our cases show, the evolving nexus between climate imperatives and planning frameworks, while driven by networked global advocacy such as C40, nonetheless is powerfully shaped by local institutional and political conditions, many of which exhibit long-term path dependencies that are unique to context; for example, Melbourne's metropolitan governance deficit.

<H1>Conclusions</H1>

This article has expanded the sustainability evaluation matrix by Gleeson *et al.* (2004) to sensitize it to the new phenomena of climate networking and governance. The application of this matrix began the process of unpacking the evolving nexus between climate imperatives and planning frameworks that are shaped by local institutional and political conditions, many of which exhibit long-term path dependencies that are unique to context; for example, Melbourne's metropolitan governance deficit hindering city-wide-scale metropolitan climate policies. In addition, the review revealed emerging, positive aspects of city climate policies such as the promotion of coordination principles, innovative technologies, a participatory planning approach and a long-term planning scale. The matrix revealed the omission of key attributes within the two metropolitan plans examined, including risk assessment tools, monitoring systems, distribution, an impact frame, accountability, regional diffusion and financing.

In conclusion, we provide three recommendations for further comparative work that we think will extend and deepen our preliminary investigation of the growing nexus between climate action and metropolitan planning. First, our analysis of secondary materials detailing the two metropolitan plans for London and Melbourne invites more detailed primary analysis to gather information which is not explicit in each plan—for example, in the areas of budgets or the coordination status between different levels of governments and departments. This would deepen our insight into the origins and potential efficacy of the rapidly developing nexus between subnational climate responses and urban planning.

Second, it is possible to refine, consolidate and further expand the conceptual framework developed within this study. Future research could consider debates around emerging urban climate politics more closely and identify new key themes and attributes to add to the matrix when feasible. For example, the rapidly developing field of urban resilience thinking and action should be considered as a new imperative in the climate–planning nexus. This development should not be merely conceptual and would benefit from empirical broadening and evaluation. As stated above, we call for more case studies to improve frameworks and tools for understanding how cities worldwide are developing their metropolitan plans to deliver timely climate actions. Without doubt, new empirical and conceptual work will extend and sharpen the themes and attributes we proposed and deployed in the framework used in this comparative case study.

Third, further research could concentrate on identifying the key factors that affect cities' capacities to develop appropriate and comprehensive metropolitan plans, particularly in the context of urban climate governance. Our work suggests that a city's governance structure influences the way it undertakes its climate actions and the potential efficacy of these on a metropolitan scale. Further investigations could illuminate the prospects of these actions in an urban age overshadowed by ecological threat: the just and effective governance of the 'climate frontline', world cities.

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Table 1 An evaluation schema for assessing metropolitan plans in conjunction with governance and sustainability debates

	Governance	Policy	Time	Democracy	Finance	Space
Key attributes	Planning mode	Policy ambit	Temporal scale	Participatory commitment	Financial measures	Morphology
	Governance scale	Operational frame	Continuity	Participation scale	Formulation and implementation costs	Spatial ambit
	Vertical integration	Analytic framework	Temporal focus	Responsibility	Budgetary processes	Spatial scale
	Coordination	Planning model		Reflexivity		Ecological space
				Impact frame		
				Accountability		

Source: adapted from Gleeson *et al.* (2004)

Table 2 A matrix for evaluating city climate policies

	Governance	Climate policies	Distribution	Democracy	Finance
Key attributes	Power dimensions (C40, 2015b)	Temporal scale and continuity (McCann, 2003; Hallsworth <i>et al.</i> , 2011)	Action scales (C40, 2015b)	Participation scale (Burns <i>et al.</i> , 2004; McCarney <i>et al.</i> , 2011)	Financial measures (Merk <i>et al.</i> , 2012)
	Vertical integration (Gleeson <i>et al.</i> , 2004; Hammer <i>et al.</i> , 2011)	Tools: <ul style="list-style-type: none"> • Planning and management tools • Monitoring systems, standardized databases • Risk assessment (McCarney <i>et al.</i>, 2011) 	Distribution — equitable access to services and green technologies (Kenworthy, 2006; Cuthill, 2010; Broto and Bulkeley, 2013b)	Responsibility (Olum, 2014)	Formulation and implementation costs (Hanzl <i>et al.</i> , 2003)
	Coordination (OECD, 2006; Bulkeley and Moser, 2007; Allain-Dupré, 2011)	Levers (C40, 2015b)		Impact frame (Kelly, 2012)	Budgetary processes (Gleeson <i>et al.</i> , 2004)
	Governance modes (Alber and Kern, 2009; Bulkeley <i>et al.</i> , 2011; Broto and Bulkeley, 2013a)	Innovation (Dovers, 2005; Sampath, 2013)		Accountability (Waldron, 2014)	
	Governance scale (Bai <i>et al.</i> , 2010)	Analytic framework (Gleeson <i>et al.</i> , 2004; Hansen <i>et al.</i> , 2014)		Reflexivity (Misuraca <i>et al.</i> , 2013)	
	Regional diffusion (Bassett and Shandas, 2010)				

Table 3 A comparative analysis of the 'London Plan' and 'Plan Melbourne'

A comparative analysis of 'London Plan' and 'Plan Melbourne'		
Theme		
Governance	Similarity	<ul style="list-style-type: none"> • Both plans are integrated with higher level (national, regional or state) planning guidelines • The governance mode of both cities is governing through enabling
	Difference	<ul style="list-style-type: none"> • While London Plan is also integrated within the local planning framework, Plan Melbourne does not extend integration to this level • The governance scale of the two plans is different — London Plan has a metropolitan scale while Plan Melbourne has a state scale • London Plan points to the limited inclusion of regional diffusion while Plan Melbourne does not mention this attribute
Climate policies	Similarity	<ul style="list-style-type: none"> • Both plans have long-term policy frameworks and are consistent with previous versions and other planning guidance • Both plans engage different planning and management tools to deliver their climate actions • There is a lack of consideration of monitoring systems and risk assessment within both plans • Both plans use different delivery mechanisms to implement their actions (policies, projects, procurements or incentives) • Both plans promote the use of green technology for moving towards sustainable development • Both plans have been partially developed on projections rather than past trends
	Difference	<ul style="list-style-type: none"> • Plan Melbourne has a more explicit temporal scale (i.e. direction or initiative is indicated by specific implementation milestones, short, medium and long term) in comparison with London Plan
Distribution	Similarity	<ul style="list-style-type: none"> • Climate policies of both plans are implemented on different scales (transformative, significant, pilot to proposed) • Both plans do not give adequate consideration to issues of distribution
	Difference	Not apparent
Democracy	Similarity	<ul style="list-style-type: none"> • Both plans embrace the concept of participatory planning • The implementation of both plans is distributed between metropolitan or state government and other agencies, local councils or private sectors

		<ul style="list-style-type: none">• Both plans have explicit monitoring frameworks to measure the implementation progress• There is an omission of impact frame and accountability within both plans
	Difference	<ul style="list-style-type: none">• Plan Melbourne provides clearer indications of the responsibility for policies implementation in comparison with London Plan
Finance	Similarity	<ul style="list-style-type: none">• Both plans present their formulation and implementation costs quite clearly
	Difference	<ul style="list-style-type: none">• Plan Melbourne is less explicit about the origins of funding opportunities than London Plan• While Plan Melbourne provides clear information on budgetary processes, London Plan does not mention this attribute

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