Urban Carbon Governance Experiments: The Role of Australian Local Governments

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Abstract

Cities, and particularly urban local governments, are now widely recognised for their part in the complex, multilevel landscape of climate governance and carbon reduction. Nonetheless local government projects and initiatives are often framed as of limited value, outside the formal governance framework and unable to contribute systematically. In contrast, this paper locates these initiatives as *already part* of the way in which governing climate and carbon is conducted and as governance experiments. We provide a descriptive analysis of these initiatives across Australia's capital cities, highlighting the domains, mechanisms and partners through which they operate. We illustrate the enactment of experimentation through a detailed examination of the Sydney-based initiative termed *Treading Lightly*, drawing out in particular the workings of institutional experimentation and experimentation in governance practices. We conclude with brief reflections on the governance implications of such experimentation and their importance as a site in the emergent politics of urban carbon governance.

Introduction

Persistent disappointment with the failures of international frameworks to effect global climate governance has led to the uneven proliferation of national- and local-scaled action. Cities in particular have emerged across the globe as a key scale of climate governance and carbon mitigation, as they extend traditional powers to climate governance and develop new roles that leverage their capacities to drive behaviour change, materialise low carbon built environments and economies, and enable transitions to low-carbon energy systems and practices (Rutland & Aylett 2008; Walker 2011). Cities are 'now firmly on the climate change map' (Bulkeley & Castán Broto 2012a, 2). Over the past decade, a rapidly growing body of research has shown the challenges urban local governments face in translating interest into climate change action, but also the depth and scope of activity (Betsill & Bulkeley 2007; Koehn 2008; Qi *et al.* 2008; Spath & Rohracher 2011; Jones 2012). For instance Bulkeley and Castán Broto's (2012b) analysis of 100 global cities produced a database of 627 urban climate change initiatives. Research in Australia, similarly, has identified a multiplicity of carbon reduction initiatives, both public and private, that litter the urban landscape with climate change interventions (Zeppel 2012; Dowling *et al.* 2014). This widening recognition of urban initiatives as part of a complex and multilevel landscape of carbon governance suggests the need to redress their framing as either trivial or ineffective due to their limited powers and resources and their fragmentary and short-term nature (Hoffman 2011; Bulkeley & Castán-Broto 2012a). Rather it emphasises the need for deeper understanding of the ways urban actors are being drawn into climate change responses and of the workings and implications of project-based initiatives (While *et al.* 2010; Bulkeley *et al.* 2012; M[c]Guirk *et al*. 2014b).

A growing body of literature has been begun to examine the urban area? as a node of concentrated social and knowledge capital, information and skills, ideally equipped as an experimental 'hub' where innovative approaches to climate governance and carbon reduction can be tested and wherein the emergent politics of urban carbon governance is played out (Evans 2011; Bulkeley & Castan-Broto 2012a; Evans & Karvonen 2014; Karvonen & Van Heur 2014). From this perspective, this paper examines the workings of urban carbon reduction initiatives that are initiated by local governments operating in the Australian context. We make two broad claims. First, that local government is a key actor in urban carbon governance, and second, that there is a strong thread of experimentation through local government's governance activities. We begin with the first claim, providing a descriptive analysis of local government carbon reduction initiatives in Australia's capital cities, highlighting the domains, mechanisms and partners through which they operate. We then outline the notion of governance experimentation and focus on the enactment of experimentation through a detailed examination of one initiative: the Sydney-based carbon governance experiment *Treading Lightly*, drawing out in particular the workings of institutional experimentation and experimentation in governance practices. The paper closes with reflections on the implications of experimentation for the emergent politics of urban carbon governance.

Local governments and urban carbon government initiatives; the Australian context

Australia's constitutional arrangements require multilevel cooperation (e.g. around energy policy, land-use and transport planning and building regulations) to induce significant change in governing climate and carbon. However, inconstancy and uncertainty have characterised national governance efforts. Fractious climate politics have witnessed

environment and economy pitted against each other, with positions on climate policy divided along major party lines (Curran 2009; Williams & Booth, 2013; McGuirk et al. 2014b). Despite federal and state government reluctance to recognise local government as legitimate partners in climate governance or to align climate policy with city development issues (Jones 2012; Storey et al. 2012), the federal policy vacuum has been filled by a profusion of state and local government policy responses and climate initiatives. Their active role in an unsettled landscape of multilevel, overlapping and often short-lived governance efforts has seen them undertaking innovative climate governance initiatives, especially in the larger cities, often in partnership with other local government authorities, other levels of government, corporations or community organisations (for recent reviews see Storey et al. 2012; Zeppel 2012).

Urban local governments' position at the forefront of carbon governance in Australia was confirmed in an extensive survey of government websites and related material conducted in 2011 in which we identified and documented more than 600 carbon reduction initiatives undertaken by local governments across Australia's state and territory capital cities (Sydney, Brisbane, Canberra, Darwin, Adelaide, Melbourne, Hobart and Perth) [i]. Using a framework developed by Bulkeley and Castán-Broto (2012b), we classified these initiatives according to what and who they attempt to govern, how this was taking place and the governance actors involved.

Table 1 illustrates who and what these initiatives attempt to govern. Initiatives focused on transport are the least frequently undertaken (146 initiatives,23%): a finding that is not entirely surprising given local governments' limited legislative and regulatory purview in this domain. Here, common themes are initiatives focused on transitioning to low carbon fleet

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vehicles and attempts to reduce motorised individual travel behaviour through demand management. About a third of initiatives focus on buildings (across residential, commercial, and public buildings) (214 initiatives,33%), using technological, regulatory and behavioural means to reduce buildings' energy demands, for example by increasing energy efficiency or promoting installation of renewable energy technologies. Most commonly, these initiatives govern carbon through technology, for instance employing direct techniques to enable householders and businesses to make their residential or commercial buildings technically more energy efficient. More than 40 per cent of initiatives focus on energy infrastructure (the provision of renewable and/or low carbon energy supply, encouraging reduced use of carbon-intensive energy sources) (277 initiatives,43%). Half of these focus on local governments' own processes or assets (for example via commitments to purchase green power), though the focus on households here is also pronounced. Almost half these initiatives mobilise behavioural mechanisms to reduce energy demand, frequently targeting the household and an equal number focus on achieving energy efficiency through existing technology rather than via promoting newer technologies.

Table 1 about here

Table 2 summarises *how* these initiatives attempt to govern carbon. Both technical and social measures are used, often in concert. A common technical measure was changing to more efficient forms of lighting (street and household). The provision of new infrastructure is much less common—again unsurprising, given financial strictures—though there are instances of councils bulk-buying solar for on-selling to households at a reduced rate, and encouraging alternative transport through providing walking and cycling infrastructure (e.g.

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dedicated cycleways). Most common are actions directed at residents and businesses within the local government area (LGA) using social measures such as enabling or 'soft' regulatory measures (such as targets), alongside an array of behavioural mechanisms to encourage more efficient use of energy: for instance providing free assessments of homes or business energy use or lay energy-auditing toolkits; running educational workshops on where and how energy is used in the home; and wider public accountability strategies, such as Newcastle's 'ClimateCam' that publicly displays carbon use for specified zones across the city. Below, we come back to the dominance of these forms of behavioural mechanisms.

Table 2 about here

In standard accounts of policy and governance, such a plethora of initiatives might be regarded as isolated, fragmented or 'stand-alone' projects, being somehow outside the scope of governance and unable to contribute systematically to carbon governance. Alternative approaches, which view governance as taking place through a 'dispersed form of rule' coordinated around a 'will to improve' (Li 2007) locate such projects as already part of the way in which governing is conducted (Bulkeley & Castán-Broto 2012a; Rutland & Aylett 2008; Stripple & Bulkeley 2013; McGuirk *et al.* 2014a). In this respect the audit reveals an ecology of initiatives through which carbon in the city is being addressed.

Urban experiments and the governance of carbon

This landscape of climate governance as conducted through initiatives has recently been explored through the notion experimentation (Farrelly & Brown 2011; Bulkeley & Castán-

Broto 2012a; Karvonen, Evans & Van Heur 2013; Karvonen & Van Heur 2014). With no pre-existing guidelines or framework through which to work, experimentation casts these initiatives as a means whereby urban actors are 'testing the waters' to develop carbon governance (Anguelovski & Carmin 2011). The initiatives established by local governments thus emerge as sites of experimentation around the institutions and practices through which carbon governance is unfolding and in which the authoritative roles and methods of governing citizens are being newly made (Bulkeley & Castán-Broto 2012a). Such initiatives are seen by local government actors to offer qualities of operating beyond the boundaries of standard procedures and measures, either innovative in a technical or social sense or as creating space for some degree of unscripted performance which in turn provides the scope for the evolution of governance mechanisms; as experiments with the potential to fail but also to create disruptive change, drive agendas and mould the means of addressing climate change (Hoffman, 2011, p.25) [ii]. Dismissing them risks failing to see and shape the evolution of carbon governance mechanisms, leaving us blind to their political implications (Bulkeley & Castán-Broto 2012a).

Experimentation can take multiple forms and occur in different sites across the urban arena. In the analysis that follows, we focus on two forms of experimentation that are identified in the literature and especially pertinent to the landscape of initiatives scoped above. The first concerns institutional experimentation: the extent to which an initiative involves novel configurations of institutions, actors or funding arrangements that create new political spaces for governing carbon. As other authors have also documented, the formation of such intermediary entities that cross existing boundaries and sustain new forms of partnership

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and collaboration have been central to the emerging politics of urban sustainability in many different sectors (Hodson & Marvin 2009), and underpins Hoffman's (2011) analysis of climate governance experimentation. This form of experimentation was certainly evident in our audit, as illustrated in Table 3's summary of the actors, if any, involved alongside local governments in these initiatives. While most initiatives (51 per cent) were undertaken by local governments operating on their own, using their own funding, partnering was also widespread (41per cent). Partnering with other local governments is most common but partnering with their state governments or with corporations is also widespread. Thus not only are there diverse capacities being drawn on and into the carbon governance landscape, but there is also a strong thread of experimenting with new institutional forms. Experimental governance initiatives bring a range of actors together in new roles to govern new targets and they extend intervention to sites and practices traditionally thought of as private (Pattberg & Stripple 2008). Such experimental initiatives, therefore, have much to say to the emergent political landscape of carbon governance.

Table 3 about here

A second form of experimentation concerns the practices or mechanisms of intervention and in particular attempts to govern the socio-technical relations through which the technologies and infrastructures that shape carbon consumption are embedded in everyday life (see Shove & Walker 2010). Governing carbon through attempts to change behaviour are most likely to address both the social and technical elements of practice, encouraging individuals, businesses and others to not only take up new technologies (such as solar PV), but to also incorporate them into social lives (Moloney *et.al.* 2010). In our audit, behaviour change was by far the most common focus of local government interventions,

encompassing 435 initiatives (see Table 4). While Table 4 shows that behaviour change initiatives were marginally more likely to be institutionally experimental, it also shows a focus on a variety of forms of social or technical innovation, and in particular a focus on both social **and** technical innovation. In other words, these local government behaviour change initiatives work through new institutional relationships and by trialling new governance mechanisms, especially those aimed at re-assembling the socio-technical relations that shape household carbon consumption. Experimentation with behavior change, and particularly in re-aligning social and technical relations, is the second form pertinent to the audit.

Table 4 about here

While this overview provides a broad snapshot of where and how these initiatives are 'testing the waters', it can only give limited insight into the dynamics of experimentation. Detailed case study work is required to further understand how carbon governance experimentation works in practice: how partnerships are forged and what they achieve, as well as how socio-technical relations are being reassembled. With this in mind, we turn to analysis of the *Treading Lightly* initiative in Sydney's inner west, as an initiative that involves (i) institutional experimentation as a way of extending local government governing capacity and authority and (ii) experimentation in behaviour change in which household socio-technical practices are re-assembled and new environmental subjects created.

Experimentation in action: *Treading Lightly*

Treading Lightly (TL) is a carbon reduction initiative that began in 2006 through a partnership between the adjoining local governments of Ashfield, Burwood, Canada Bay, Leichhardt and Strathfield. It consists of approximately 50 workshops a year across the participating LGAs, run in six-monthly blocks of weekly workshops that target local householders and focus on domestic and household practices: domestic energy and waste reduction, green renovation, green gardening, domestic food production and local food sourcing as mechanisms of carbon reduction and sustainability (see Figure 1). While TL is a behaviour change initiative, rather than operate on the oft-critiqued information deficit model of behaviour change (Shove 2010; Moloney & Strengers 2014), TL has the wider aim of teaching residents practical carbon reduction skills through workshops tailored to the socio-technical relations of the urban household. In 2012 we conducted a case study of TL, through qualitative methods aimed at observing and understanding the practice and logics underlying the initiative. Methods included semi-structured interviews council officials and facilitators involved in running the workshops, participant observation in a number of workshops, content and discourse analysis of official documentation and promotional material for the initiative. All participants gave informed consent to participate in the study. We use this case study to consider experimentation in action.

Institutional experimentation: building capacity and authority

Treading Lightly involves a modest kind of institutional experimentation in the context of the realpolitik of Australian local government, wherein fragmentation leaves collaboration and joint service provision poorly developed (Jones 2012). In *TL,* the five adjoining participating local governments in Sydney's inner west have collaborated expressly to pool resources so as to expand their capacity to provide education programs to exceed the

conventional information-provision mode and to focus especially on interactive workshops that coach participants in practical skills to enable households to live lower carbon, more sustainable lives (see Table 5). The partnership enables building beyond more conventional styles of local government education by leveraging wider network formation to nurture the creation and dissemination of new knowledge and practices around carbon reduction. For instance, the launch of the 2012 workshop program brought community members to a screening of the climate change film *The Hungry Tide* to connect them to climate action groups operating in the locality. Together, the councils were "keen to introduce members of local environmental organisations at this 'mixer'. The joint Councils … cordially invite members of Climate Action Newtown to attend the screening and represent your group at this networking event" (www.facebook.com/events/315827425120938/). The institutional partnership allowed the launch to be mobilised to encourage new network formation with climate action activists from neighbouring councils so as to nurture further cross-jurisdictional connections. TL's institutional experimentation, then, involved establishing new partnerships across several LGAs – a modest 'new political space' newly enabling expanded modes of local government education provision.

This case is also illustrative of local government experimentation with forms of partnership, both with other local governments and with a wider array of environmental intermediaries, aimed at building their capacity to govern environmental issues. For example, other agents involved in TL include facilitators, identified through word of mouth or through trans-council networks and contracted to run workshops. The employment of facilitators builds the authority of the collaborative councils as legitimate carbon governors in the minds of

participants. As one workshop facilitator pointed out, the combination of a facilitator and council officer present at workshops delivers a message to participants:

'This is what the council is offering for you, we've brought someone from outside to help.' I think a lot of the [council] environmental sectors could run these workshops themselves…but it's good to have an extra person from outside the council … it makes them feel like council has taken that extra step (Interview, TL facilitator).

As one participant noted, the combination of a facilitator and council officer present at workshops delivers the message to participants that something special is on offer, something 'official', 'professional' and on larger scale than just the local council. Local governments' claim to authority, then, is reflected in the creation of effective partnerships able to build capacity, allocate resources and seek to coordinate the carbon practices of residents across inner-western Sydney.

Experimentation in governance practice: intervening in household socio-technical relations

TL's practice of governing behaviour change is a second stream of experimentation; intervening in the socio-technical relations and practices in which householders' everyday lives are embedded so as to reinscribe them in lower carbon, more sustainable formations. These socio-technical relations are made up of a myriad of infrastructures and technologies, norms and conventions around daily practices of heating, cooling, food sourcing and preparation, mobility, processing waste and so on (Paterson & Stripple 2010; Bulkeley *et al.* 2011). These conventions and practices, embedded in and through the materiality of the household, form the socio-technical networks that define and reproduce daily life (Moloney

& Strengers 2014). TL's activities shape a new space of political intervention aimed at producing self-governing household subjects, disposed to 'manage their climate-related practices themselves' (Paterson & Stripple 2010, 344).

Table 5 about here

TL's governing practices intervene in socio-technical relationships primarily by seeking to impart the practical skills for reinscribing these relationships and overcoming the practical constraints to reconfiguring them. The workshops provide hands-on skills development, changing the way citizens' interact with, and use, devices and objects in their homes (see Table 5 for an indicative summary of workshops). TL's workshop format arose as a conscious response to perceived community demand for more than information, but for hands-on skills development in which householders work through their embeddedness in socio-technical networks in and around their homes and develop the skills to reconfigure these networks into lower carbon configurations:

> We try and tailor the program to meet community demand for education and the hands-on skills development. We do get a lot of people who might come along to a film screening or talk who say "this is great but I want to learn how to implement it". *Treading Lightly* addresses that, skills they might need or want to try and improve the sustainability of their lifestyle, (Interview, LCC #3).

> [Key workshops] are booked out in four days. Because they're practical and [residents] can do it in their house, or unit. The more practical workshops are most popular (Interview, AC #1).

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The workshops then consciously use practical skills development as a governance practice where the "main driver is what [citizens] derive from it that they can apply in a practical way at home (Interview, BCC#1). As a TL workshop facilitator put it:

> [The workshops] have hands on practical stuff so it's not just sitting there saying
> you must do this. You're building practical skills, actions residents can take away
> and do. Behaviour change is a lot about people feeling that they've got the skills
> to do it. (Interview, TL Facilitator).

Workshops teach citizens the skills to be energy and water efficient in the home, to count their carbon emissions and reduce food miles, as well as to bake their own bread, produce their own food and reduce their waste. The workshops involved explicit discussion on how *else,* or how *better,* appliances can be used, encouraging different ways of interacting with the materiality of the household (see Hobson 2006). At a water and energy efficiency workshop, participants learn how to take apart taps and replace the parts with more efficient, water saving components (Participant observation Canada Bay, 'Efficiency in the Home', 2012). At other workshops participants are shown how to use garden hosing to insulate external hot water pipes, as well as 'do it yourself' methods of checking rubber seals on fridges and freezers. At the 'Carbon Surgery for Your Home' workshop, run in partnership with a local energy firm, participants bring along their power bills and a list of the appliances they use for a free consultation with a power specialist. Local government practitioners interpreted this as going beyond 'normal' ways of governing carbon to test out new practices, even where these didn't meet 'normal' cost-benefit analysis criteria:

It's a project that's certainly got limited scope for having a big impact. Because

obviously in a three-hour session you might only get to talk to six householders

but we thought it was worth trying… …everyone's getting flyers in the mail and

notes on the electricity bills and things about reducing energy and everyone's kind

of aware of the some of the things they could do, but no one seems to be getting

necessarily the right advice for *their* home…. It's different to the normal model … I

think it's an interesting model to try and just to see what happens and see what

the results are and see if it is a way that we can start to get people to change their

habits (Interview, LCC#3).

The purchase of socio-technical intervention in the household as a governing practice is

fine-tuned by innovating with workshop design in response to how households' are

differentially and culturally situated in socio-technical networks (Hobson 2006). The

workshops are consciously designed to resonate with these particularities and the specific

barriers to and opportunities for socio-technical reinscription these might entail: "the

council looks at the media, culture and demographics of a place and caters to that"

(Interview, LCC#1). Past workshops, for instance, have focused on the practical barriers

faced by renting citizens with a workshop on 'Greening Your Apartment and Strata Law'.

Others are shaped by the perception of the cultural embeddedness of Sydney's inner-west

residents:

…getting community along to things that aren't traditionally run by councils, that

feels quite innovative to me. We've already done environmental education, but

now we're sourdough bread-making and doing food tours. We're trying to pick

up other aspects we haven't done before and just testing the waters to see if the community is interested in that (Interview, AC #1).

The workshops then, operate as an entry-point into household socio-technical relations, rendering them governable through shaping householders, practically-skilled to engage differently, and in lower carbon ways, with the materiality of their homes.

Alongside the practical mode of the workshops themselves, a key mechanism used to support practical up-skilling was what Marres (2008, p.32) has termed 'awareness technologies'. TL's deployment of these mechanisms included a variety of calculative mechanisms encouraging householders to calculate their carbon via food miles, household energy bills, and individual appliance energy use, all of which render household socio-technical interactions 'susceptible to evaluation, calculation and intervention' (Rutland & Aylett 2008, p.631). Participants calculate their carbon footprint based on their household practices and technologies (e.g. number of fridges), with the resulting tally indicating that most participants required 3.3 planets to sustain their carbon emissions (Participant observation, Canada Bay 'Efficiency in the Home'). Participants in the energy efficiency workshops had the opportunity to borrow *PowerMate* carbon calculators that measure the energy used for each appliance in the home and convert that to carbon emissions. *PowerMates* therefore 'define domestic energy use as a site of engagement with climate change, they enable the transformation of the home into a site that materially and physically implicates its occupants in matters of collective concern,' (Marres 2008, p.35). The Ashfield Council website described the tool in similar terms:

The *PowerMate* is a very useful tool for understanding energy use in your

home and will allow you to make more informed decisions about how you can

reduce energy consumption…and help combat climate change through

reduction of GHG emissions. (Ashfield Council 2012).

These mechanisms work to make visible the carbon impacts of household practices and

intervene in the social practice of domestic technology by inducing a moment of

'(ir)responsibility' around householders' decisions on how and when they use technology

(Marres 2008). These measurements are 'never simply numbers; they represent

immediately moralised activities on which the footprinter is invited, exhorted to act'

(Paterson & Stripple 2010, p.350). Such mechanisms, especially where supported by

practical skilling, can change socio-technical interactions with the materiality of the home

and its devices and appliances. TL's experimentation with practical workshops and

deployment of 'awareness technologies' are developing the means through which local

governments gain access to the private spaces of the home, making household socio-

technical relations (and their conscious reinscription) an object of governance.

Experimentation and the production of collective environmental subjects
TL's experimentation with institutional forms for governance and with governance practices

has a distinctive outcome in terms of the way they both imagine and work towards

producing carbon subjectivities. In particular, TL's experimentation works at the production

of collective environmental subjects. The workshops act on the individual household yet

locate that household as part of a collective citizenry reflecting recognition that 'the

collective' is not a 'pre-existing collective political community which can be invoked and

which needs to 'act,' but instead is a group that is constructed and re-constructed from the individual scale (Paterson & Stripple 2010, p.344). Almost all interviewees commented on the aim to create a supportive carbon-aware community through TL's governing practices:

> [TL] is not about the environment alone. It's about growing the community, growing people and sharing" …[Through workshops] you can connect those early adopters; they can spread the word... and the environment and community then benefits. That's what council is about isn't it? (Interview, TL facilitator).

> A real social community has developed around *Treading Lightly*…the weekly nature of the workshops allows people to develop social connections. Hopefully people can get more out of it than knowledge (Interview, LCC#3).

Council staff also indicated that the interactive workshops were run expressly to provide residents with the opportunity to network and learn from one another (Participant observation, Leichhardt Council 'Herb Spiral Design'). The telling of personal stories in workshops was also used to help citizens to get to know one another and have a participatory role in workshops (Participant observation, Ashfield Council 'Edible Weeds and Seed Propagation'):

> Behaviour change is about engaging people, to get them thinking for themselves…so the whole story telling thing, about my experiences and wanting to hear back. Showing they're important, their values and ideas are important, that's what behaviour change is about, bringing the big picture things and making it personal…so they often say that if you tell stories about your personal experience, how you learn about things, people will really remember that more than other things (Interview, TL facilitator).

Thus TL mobilises intervention in households socio-technical relations to attempt to build collective social structures to ingrain long-term behaviour changes. Its governance practices experiment with the notion that active participation in workshops as public collaborative opportunities can breach the barrier between information supply and action, and improve local government governance capacity (see Rutland & Aylett 2008). These practices build on recognition of the importance of interaction to shaping a shared community of practice (Bulkeley & Betsill 2013) to better embed individual behaviour change, while developing or reinforcing shared values and collective concerns (Gustavsson *et al.* 2009; Hards 2011; Hobson & Niemeyer 2011; Walker 2011). By teaching practical skills in collective settings, TL seeks to create a connected carbon-aware community which has the capacity to reduce carbon practices without constant or regulatory intervention. In one sense then, this constitutes a kind of experimentation to recreate with the role of the subject (from regulated to self-governing) and its relationship to the local authority (from one of command to one which can be governed 'at-a-distance').

Conclusion

This paper's identification and interpretation of local government carbon reduction initiatives positions them as experiments that are exploring institutional partnerships to expand governance capacity and authority, and testing governance practices in ways that shape new sites and subjects of governance intervention. The national survey indicates the broad dimensions of these initiatives in the emergent landscape of carbon reduction for climate governance, while the *Treading Lightly* case study offers an heuristic that delves into

the dynamics of how such experimentation is being exacted. These dynamics point towards the role of these initiatives the evolution of carbon governance and their political implications (Bulkeley & Castán-Broto 2012a). We close with observations on these politics particularly with regard to: the politics of responsibilisation; the extension of political authority into the home as a site of public intervention; and of the creation of self-governing political subjects.

Treading Lightly's governing practices (participatory, skill-based workshops) and objects of governance (socio-technical relations in the home, the community of practice) sit beyond traditional channels of centralised governance authority and outside an institutional account of the politics of urban carbon governance (see Hoffman 2011; Bulkeley & Castán-Broto 2012a;). Nonetheless both reflect and reinforce particular governing rationalities. TL, in common with the majority of initiatives across the survey, works with the logic of responsibilising households with carbon reduction as a climate change response, and its objects and mechanisms of governance derive from that logic (see Bulkeley *et al.* 2007; Rice 2010). Through these initiatives, citizens are encouraged and enabled to see themselves as carbon emitters, to calculate their carbon and to take practical household action to reduce their emissions. Doing so becomes a duty in 'the private sphere to pursue public good' (Paterson & Stripple 2010, p.347), with the onus for carbon reduction placed squarely on the household. This, and multiple other household-focussed initiatives across the survey, suggests the extension of political authority through repositioning the home as a site of governance intervention. This represents an important moment which has significant political ramifications for ideas of 'public', 'private' and citizenship. These interventions,

common across the survey and explored here as they occur in *Treading Lightly*, suggest the incursion by government into the 'private' realm of citizens' homes and daily lives.

Finally, both the survey and the specific dynamics of TL point to the prevalence of behavioural mechanisms and the emphasis on behaviour change across local government initiatives. Yet this need not be restricted to a politics of individual responsibilisation or individualised forms of political subjectivity. Rather, as the dynamics of TL suggest, it can connect to the formation of collective political subjects, in this case in the form of a self-governing carbon-aware community, enabled and resourced by local government. Such communities of practice have the potential to become sites in which collective concerns can be defined and demands formulated to put pressure on formal political responses that do not conform to discourses of ecological modernisation that, thus far, have flourished in Australian climate policy (Christoff 2010). As such, then, the profusion of urban carbon governance experiments — explored here through the lens of local government — constitutes an unpredictable political moment in carbon governance. Their proliferation and development have the potential to shape and redirect approaches to climate change response in terms of governance rationalities, objects of intervention and governing mechanisms (Hoffman 2011).

REFERENCES

Anguelovski I, Carmin J (2011) Something Borrowed, Everything New: Innovation and

Institutionalisation in Urban Climate Governance. Environmental Sustainability 3, 169-175.

Ashfield Council (2012) Saving Energy. Available from:

http://www.ashfield.nsw.gov.au/page/saving_energy.html accessed 29/09/12.

Betsill M, Bulkeley H (2007) Looking Back and Thinking Ahead: a Decade of Cities and

Climate Change Research. Local Environment: The International Journal of Justice and

Sustainability 12, 447-456.

Bulkeley H, Betsill M (2013) Revisiting the Urban Politics of Climate Change. Environmental

Politics 22, 136-154.

Bulkeley H, Castán Broto V (2012a) Government by Experiment? Global Cities and the

Governing of Climate Change. Transactions of the Institute of British Geographers 37(4), 1-

15.

Bulkeley H, Castán Broto V (2012b) A Survey of Urban Climate Change Experiments in 100

Cities. Global Environmental Change 23, 92-102.

Bulkeley H, Moser S (2007) Responding to Climate Change: Governance and Social Action

beyond Kyoto. Global Environmental Politics 7(2), 1-10.

Bulkeley H, 2010, 'Cities and the Governing of Climate Change. *Annual Review of*

Environment and Resources 35, 229-253.

Bulkeley H, Castán Broto V & Edwards G (2012) 'Bringing climate change to the city: towards

low carbon urbanism?'. Local Environment, 17(5), 545-551.

Bulkeley H, Watson M & Hudson R (2008) Modes of Governing Municipal Waste39, 2733-

2753.

Bulkeley H, Castán Broto V , Hodson M & Marvin S (2011) Cities and Low Carbon Transitions. Routledge, New York.

Christoff P (2010) Touching the Void: The Garnaut Review in the Chasm between Climate Science, Economics and Politics. Global Environmental Change 20, 214-217.

Curran G (2009) Ecological Modernisation and Climate Change in Australia. Environmental Politics 18, 201-217.

Cuthill M (2002) Exploratory Research: Citizen Participation, Local Government and Sustainable Development in Australia. Sustainable Development 10, 79-89.

Dowling R, McGuirk PM & Bulkeley H (2014) Retrofitting Cities: Local Governance in Sydney, Australia. Cities 38, 18-24.

Evans J (2011) Resilience, ecology and adaptation in the experimental city. Transactions of the Institute of British Geographers 36 (2), 223-37.

Farrelly J, Brown R (2011) Rethinking Urban Water Management: Experimentation as a Way Forward. Global Environmental Change 21, 721-732.

Gustavvson E, Elander I, Lundmark M (2009) Multilevel Governance, Networking Cities, and the Geography of Climate-Change Mitigation: two Swedish Examples. Environment and Planning C 27, 59-74.

Hards S (2011) Social Practice and the Evolution of Personal Environmental Value. Environmental Values 20, 23-42.

Hobson K (2006) Bins, Bulbs and Shower Timers: One the 'Techno-Ethics' of Sustainable Living. Ethics, Place and Environment 9, 317-336.

Hobson K, Neimeyer S (2011) Public Reponses to Climate Change: The Role of Deliberation in Building Capacity for Adaptive Action. Global Environmental Change 21, 957-971.

Hodson, M & Marvin, S (2009) Cities mediating technological transitions: understanding visions, intermediation and consequences. Technology Analysis & Strategic Management21, 515-534.

Hoffman M (2011) Climate Governance at the Crossroads – Experimenting with a Global Response after Kyoto. Oxford University Press, New York.

Jones S (2012) A Tale of Two Cities: Climate Change Policies in Vancouver and Melbourne: Barometers of Cooperative Federalism. International Journal of Urban and Regional Research 36, 1242-1267.

Karvonen A, Evans J & Van Heur B (2013) The Politics of Urban Experiments. In: Hodson M, Marvin S (eds) After Sustainable cities? Pp 104-115. Routledge, London.

Karvonen A, Van Heur B (2014) Urban Laboratories: Experiments in Reworking Cities. International Journal of Urban and Regional Research 38, 379-392.

Koehn P (2008) Underneath Kyoto: Emerging Subnational Government Initiatives and Incipient Issue-Bundling Opportunities in China and the United States. Global Environmental Politics 8, 53-77.

Leck H, Simon D (2013) Fostering Multi-scalar Collaboration and Cooperation for Effective Climate Change Adaptation. Urban Studies 50, 2130-2138.

Li TM (2007) The Will to Improve: Governmentality, Development, and the Practice of Politics. Duke University Press, London.

Marres N (2008) The Making of Climate Publics: Eco-Homes as Material Devices of Publicity. Distinktion: Scandinavian Journal of Social Theory 9, 27-45.

McGuirk PM, Bulkeley H & Dowling R (2014a) Practices, Programs and Projects of Urban Carbon Governance: Perspectives from the Australian city. Geoforum 52, 137-47.

McGuirk PM, Dowling R & Bulkeley H (2014b) Repositioning Urban Governments? Energy Efficiency and Australia's Changing Climate and Energy Governance Regimes. Urban

Studies. DOI: 10.1177/0042098014533732.

Moloney S, Strengers Y (2014) 'Going Green'? The Limitations Behaviour Change

Programmes as Policy Response to Escalating Resource consumption. Environmental Policy

and Governance. DOI:10.1002/eet.1642.

Moloney S, Horne RE & Fien J (2010) Transitioning to Low Carbon Communities – From

Behaviour Change to Systemic Change: Lessons from Australia. Energy Policy 38, 14-7623.

Paterson M, Stripple J (2010) My Space: Governing Individuals; Carbon Emissions.

Environment and Planning D 28, 342-362.

Pattberg P, Stripple J (2005) Beyond the Public and Private Divide: Remapping Transnational

Climate Governance in the 21st century. International Environmental Agreements 8, 367-

388.

Qi Y, Zhang H & Li H (2008) Translating a Global Issue into Local Priority: China's Local

Government Response to Climate Change. The Journal of Environment and Development

17, 379-400.

Rhodes R (1996) The New Governance: Governing without Government. *Political Studies* 44,

652-667.

Rice J (2010) Climate, Carbon, and Territory: Greenhouse Gas Mitigation in Seattle,

Washington. Annals of the Association of American Geographers 100, 929-937.

Rutland T, Aylett A (2008) The Work of Policy: Actor Networks, Governmentality and Local

Action on Climate Change in Portland, Oregon. Environment and Planning D 26, 627-646.

Shove E (2010) Beyond ABC: climate change policy and theories of social change.

Environment and Planning C 42, 1273-1285.

Shove E, Walker G (2010) Governing Transitions in the Sustainability of Everyday Life.

Research Policy 39, 471-476.Spath H, Rohracher H (2011) The 'eco-cities' Freiburg and

Graz: the Social Dynamics of Pioneering Urban Energy and Climate Governance. In:
Bulkeley H, Castan-Broto V, Hodson M & Marvin S (eds), Cities and low carbon transitions,
pp.88-106. Routledge, London..

Storey H, Brennan M, Pillora S & Thomas C (2012) Local Action for a Low Carbon Future.
Australian Centre of Excellence for Local Government, University of Technology, Sydney.
Available from;
http://www.acelg.org.au/upload/program1/1340074932_Final_Local_Action_for_a_Low_
Carbon_Future_13jun2012_lowres.pdf. Accessed 23/10/12.

Stripple J, Bulkeley H (2013) (eds) Governing the Climate: New Approaches to Rationality,
Power and Politics. Cambridge University Press, Cambridge.

Walker G (2011) The Role for 'Community' in Carbon Governance. Wiley Interdisciplinary
Reviews: Climate Change 2, 777–782.

While, A, Jonas, A, & Gibbs, D (2010) From Sustainable Development to Carbon Control: Eco-
State Restructuring and the Politics of Urban and Regional Development. Transactions of
the Institute of British Geographers 35, 76-93.

Whitehead M (2009) State, Science and the Skies: Governmentalities of the British
Atmosphere. Blackwell Chichester Wiley, London.

William S, Booth K (2013) Time and the Spatial Post-Politics of Climate Change: Insights from
Australia. Political Geography 36, 21-30.

Zepple H (2012) Governing carbon mitigation and climate change within local councils: A
case study of Adelaide, South Australia. Commonwealth Journal of Local Governance 10, 70-
85.

TABLE 1	Transport			Energy Infrastructure			Buildings			
	#	% of LG transport initiatives (146)	% of all LG initiatives (637)	#	% of energy initiatives (277)	% of all LG initiatives (637)	#	% of buildings initiatives (214)	% of all LG initiatives (637)	Total %
Total initiatives (637)	146	100	23	277	100	43	214	100	34	100
Target audience										
Own organization	71	49%	11%	151	55%	24%	54	25%	8%	43
Household/travellers	92	63%	14%	115	42%	18%	110	51%	17%	50
Builder/developer manufacturers	1	0.6%	0.2%	6	2%	3%	29	14%	5%	6
Business	12	8%	2%	28	10%	4%	55	26%	9%	15

Table 1: Local government carbon reduction initiatives: target audience (Source: authors' survey)

TABLE 2	Transport			Energy Infrastructure			Buildings			
	#	% of LG transport initiatives (146)	% of all LG initiatives (637)	#	% of energy initiatives (277)	% of all LG initiatives (637)	#	% of buildings initiatives (214)	% of all LG initiatives (637)	Total %
Total initiatives (637)	**146**	**100**	**22.92**	**277**	**100**	**43.49**	**214**	**100**	**33.59**	**100**
Governance Mechanism										
Technical Innovation	50	34%	8%	172	62%	27%	183	86%	29%	**64%**
Social Innovation	112	77%	18%	199	72%	31%	146	68%	23%	**72%**
Mechanism - Regulation	17	12%	3%	58	21%	9%	61	29%	10%	**21%**
Mechanism - Market	23	16%	4%	82	30%	13%	54	25%	8%	**25%**
Mechanism - Enabling	96	66%	15%	234	84%	37%	188	88%	29%	**81%**
Mechanism - Provision	52	36%	8%	109	39%	17%	81	38%	15%	**34%**

Table 2: Local government carbon reduction initiatives: governance mechanisms (Source: authors' survey)

TABLE 3	Transport			Energy Infrastructure			Buildings			
	#	% of LG transport initiatives (146)	% of all LG initiatives (637)	#	% of energy initiatives (277)	% of all LG initiatives (637)	#	% of buildings initiatives (214)	% of all LG initiatives (637)	Total %
Total initiatives (637)	**146**	**100**	**23**	**277**	**100**	**43**	**214**	**100**	**34**	**100**
Institutional Form										
No partners	80	55%	13%	141	51%	22%	103	48%	16%	**51%**
Partners – Federal govt	5	3%	0.7%	14	5%	2%	14	7%	2%	**5%**
Partners – State govt	30	21%	5%	49	18%	8%	42	20%	7%	**19%**
Partners – Local govt	15	10%	2%	92	33%	14%	68	32%	11%	**27%**
Partners – NGO	8	5%	1%	8	3%	1%	14	7%	2%	**5%**
Partners – Corporation	29	20%	5%	68	25%	11%	55	26%	9%	**24%**
Federal govt funding	7	5%	1%	13	5%	2%	15	7%	2%	**5%**
State govt funding	34	23%	5%	63	23%	10%	42	20%	7%	**22%**
Local govt funding	136	93%	21%	235	85%	37%	191	89%	30%	**88%**

Table 3: Local government carbon reduction initiatives: institutional form (Source: authors' survey)

	#	% of LG behavior change initiatives
Total initiatives (435)	**435**	**100**
Institutional Form		
No partners	207	47%
Partners – Federal govt	25	6%
Partners – State govt	106	24%
Partners – Local govt	128	30%
Partners – NGO	23	5%
Partners – Corporation	115	26%
Target Audience		
Own organisation	100	23%
Household/travellers	295	68%
Builder/developer manufacturers	21	5%
Business	41	9%
Governance Mechanism		
Technical Innovation	256	58%
Social Innovation	378	86%

Table 4: Local government behaviour change initiatives (Source: authors' survey)

Topic	Title	Description
Gardening/ Food Production	Waterwise Gardening	Gardening methods and plant choices to reduce water use.
	Balcony Gardening	Garden design and methods to increase garden produce in limited space with an emphasis on reducing food miles, industrial agricultural resources and packaging.
	Backyard Gardening	Tips and hints for growing food at home with an emphasis on reduction of food miles and industrial resource use.
	Sustainable Food Tour & Organic Market Tour	Workshop to encourage awareness and support for local farmers and local organic produce, and to emphasise reducing food miles.
	Growing Food In Small Spaces	Tips and hints to use space efficiently and differently for gardening in small city housing with an emphasis on reducing food miles.
	Growing Herbs At Home	Tips and hints for growing herbs at home, including uses for health, cleaning and food.
	Sourdough Bread making Workshop	Teaches methods for sough dough bread making with short tutorial on food miles.
	Growing Food in Small Spaces	Tips and hints for growing food in small city housing with an emphasis on benefits of reduced carbon, including reduced food miles, packaging and use of industrial fertiliser.
	Herb Spiral Design	Tips and hints for growing food sustainably at home with an emphasis on minimal resource use and low-carbon living.
	Edible Weeds and Seed Propagation	Teaches identification of edible weeds and how to grow food at home from seeds.
	Composting and Worm farming	Teaches methods for worm farming and rules for composting at home, outlines the negatives of buying commercial compost including carbon emissions.
	Pickling and Preserves	Teaches home pickling methods and encourages awareness of sustainable food.
Energy use	Easy Ways To Save The Environment - Reducing Waste And Saving Energy	Household tips and hints for a more efficient, low-carbon lifestyle.
	How To Reduce Your Power Bills	Tips and hints on household design features and appliances use to reduce daily energy use.
	Energy, Carbon Price, GHG Emissions - What Does This Mean For You?	Workshop to help residents understand science and policy around carbon reduction and to reduce their daily carbon use, including a short tutorial on carbon emissions from different household appliances.
	Efficiency in the Home	Tips and hints on household design features and use of appliances to reduce daily energy use, including a short tutorial calculating individual carbon emissions.
	Carbon Surgery For Your Home	Tips and hints on household design features and use of appliances to reduce carbon use with assessment of individuals' energy bills.
Water	Easy Ways To Save The Environment -	Tips and hints for water and waste efficient meal preparation.

	Sustainable Eating And Saving Water	
Recyling/ Waste Reduction	Create – Recycled Art Workshop For Kids	Encourages children to think of new uses for household objects to reduce waste and create artwork.
	DIY Upholstery	Workshop teaching ways to reuse old furniture and reduce waste.
	Make Do & Mend	Methods to reuse household items, particularly worn out clothes and bags.
	Create – Recycled Art	Ways to reduce waste and create artwork, highlights the importance of reducing waste.
	Ladies' Clothing Swap	Workshop encouraging waste minimisation by providing an opportunity to buy and sell second-hand clothing.
Renovation/ Building	Sustainable Renovation -Designing Your Green Home	Tips and hints on sustainable household designs which minimise energy and carbon use.
Mobility	Back On Your Bike - Cycling Skills For Adults	Workshop to encourage safe and sustainable transport and minimise carbon emissions.
	Bicycle Skills Training	Offers safety training to encourage sustainable transport and reduce carbon emissions.
	Big Bike Day	Workshop to encourage safe and sustainable transport and minimise carbon emissions.
	Learn To Cycle For Kids	Workshop to encourage safe cycle skills for kids and awareness of carbon emissions.
Household Maintenance	Sustainable DIY - Home and Garden	Tips and hints for sustainable, efficient and low-carbon household practices.
	Green Cleaning - Living With Less Chemicals	Tips and hints to cleaning with home-made solutions in order to reduce carbon emissions from industrial chemical production.
General sustainability	GreenWay Eco History Walk	Fieldtrip through Sydney's Inner West focusing on local history and the ecological significance of the Greenway Corridor.
	Sustainability Film Festival	Film festival promoting understanding of energy and waste efficiency and sustainable living.
	Ferragosto Italian Festival – Eco Hub	Street fair celebrating local culture and advocating and educating on sustainable lifestyle.
	Footprints Film Festival	Film festival promoting understanding of energy and waste efficiency and sustainable living.
	Footprints Eco Festival	Street fair showcasing sustainable local produce, advocating sustainable lifestyle.
	Zoomobile	Entertainment for children which highlights sustainable values.

Table 5: Indicative program of *Treading Lightly* workshops, 2012

Figure 1: Advertisements for Treading Lightly workshop program at Leichhardt, February-June 2014

Available at: http://www.leichhardt.nsw.gov.au/News-and-Events/Our-Events/Treading-Lightly