

CLIMATE FUTURES: CARBON MITIGATION ACTIONS BY ADELAIDE COUNCILS

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ABSTRACT

There is growing concern about climate change impacts on local government areas. This includes both climate change adaptation measures, and climate change mitigation through carbon reduction actions. In Australia, the new federal carbon tax, with effect from 1 July 2012, will also increase energy, materials and fuel costs for local councils. This paper profiles a research project about climate change mitigation by local councils. It evaluates what mitigation (i.e. energy, water, and waste management) actions have been implemented by local councils and why (or why not). Council governance of climate change mitigation actions is also assessed. This paper specifically reports on carbon mitigation actions adopted by Greater Adelaide councils (n=14) in South Australia. A survey of environmental officers profiled carbon mitigation actions, emissions auditing, and motives for emissions reduction by Adelaide councils. The main reasons for adopting carbon actions were a climate change plan, climate leadership by councils, and cost savings. Crucial issues for climate governance include council policies or plans on carbon mitigation, funding, and staff resources for carbon programs.

Keywords: climate change, carbon mitigation, governance, local councils, Adelaide, South Australia

INTRODUCTION

Climate change impacts and carbon mitigation initiatives are key issues for local government (ALGA, 2009, 2010a, b; 2011; ACELG, 2011; Pillora, 2011; Storey, Brennan, Pillora & Thomas, 2012). 'Mitigation involves taking actions to reduce greenhouse gas emissions being emitted to minimise the impact from climate change' (QLGA, 2009: 58). In Australia, local governments are legally required to report their emissions over a threshold of 25,000tCO₂-e under the *National Greenhouse and Energy Reporting Act 2007*. From July 2012 all local councils will also be liable for fugitive emissions from uncapped landfills and from stationary energy under the *Clean Energy Act 2011* (Tax Ed, 2011). The Australian government carbon tax of \$23tCO₂, with effect from 1 July 2012, will also increase council costs for electricity, gas, water, fuel and materials. Local councils are thus implementing eco-efficiency measures in energy, water and waste management to reduce operating costs, meet state government targets, and address liability for carbon emissions. This paper reports on carbon mitigation actions adopted by Greater Adelaide councils (n=14), in the wider metropolitan region of Adelaide and adjacent Adelaide Hills in South Australia. Adelaide has a population of 1.3 million people, 80% of South Australia's total population, and accounts for 84.5% of employment in the state. Greater Adelaide has a growing population, forecast

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to increase to 1.85 million people by 2036, and sprawling urban and industrial development extending into agricultural land. Adelaide city residents account for 17.59 tonnes of greenhouse emissions annual per capita, an eco-footprint of 6.77 hectares and annual average water use of 710,000 litres (Property Council, 2007). Adelaide has a Mediterranean type-climate, is subject to drought and heatwaves, and is reliant on rainfall-dependent water sources such as the Murray River. A new desalination plant was scheduled to supply 100 gigalitres of water a year, or half of Adelaide's potable water supply, by the end of 2012. Other water security measures for Adelaide include stormwater harvesting and recycling in urban areas, along with aquifer storage and recovery of reclaimed water (Government of South Australia, 2010). This paper reviews carbon programs implemented by the Local Government Association of South Australia, then presents survey results on carbon mitigation actions, emissions auditing, climate governance, and motives for emissions reduction by Greater Adelaide councils.

Climate change and carbon mitigation is a growing issue for Australian local government authorities (Nursey-Bray, 2010; Pillora, 2011). Local government strategies and reports include advice and case studies on greenhouse gas (GHG) mitigation for local councils (ICLEI, 2008; QLGA, 2009; ALGA, 2010a, 2010b, 2011). From 1997 to 2009, some 238 Australian councils participated in the International Council for Local Environmental Initiatives (ICLEI) Local Governments for Sustainability *Cities for Climate Protection* (CCP) program, by recording emissions data and analysing the carbon footprint of council operations and local communities. However, there is limited research on climate change mitigation by local government, apart from case studies of greenhouse gas reduction initiatives by CCP participants and other councils (Atkinson *et al.*, 2007; ALGA, 2009; Hoff, 2010; ACELG, 2011; Pillora, 2011; Storey *et al.*, 2012).

In Queensland, one report has reviewed mitigation actions by selected south eastern councils, prior to council amalgamations in 2008 (Burton 2005, 2007), while a local government manual outlines mitigation actions for councils (LGAQ, 2009). The Local Government Association of South Australia has produced an emissions measurement and management workbook (LGASA, 2010), and a guide for councils to develop a climate change action plan with carbon mitigation measures (LGASA, 2011a). Research about carbon mitigation by local councils includes climate change law and liability (England, 2008); methodologies to assess carbon emissions (Hamilton *et al.*, 2008); and an evaluation of carbon actions implemented by Australian and New Zealand councils in the CCP program (Hoff, 2010). Hoff's review of carbon mitigation actions implemented by CCP councils in Australia (n=238) and New Zealand (n=34) found:

- 47% of councils have a climate change action plan; 36% a cross-departmental plan,
- 94% of councils incorporated a climate change plan into a long term strategic plan,
- 76% of councils prioritised reductions of greenhouse gas emissions in action plans,
- 68% of councils provided climate change education programs for schools/citizens,
- 63% of councils created positions for a climate change officer/energy manager, and
- 21% of councils have a specific division responsible for climate change actions.

Prior research examines carbon reduction initiatives adopted by one council, or reports on the outcomes of specific carbon programs (e.g. CCP). There has been limited comparison of specific carbon mitigation actions, the climate change responses of

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different city councils across one metropolitan region, or critical evaluation of climate governance in councils. This paper evaluates carbon mitigation by 14 urban councils across the wider metropolitan region of Adelaide, the capital city of South Australia.

The main aims of this research about climate change mitigation by local councils (ACSBD, 2011) were to:

- review and benchmark greenhouse gas mitigation measures adopted by councils;
- evaluate motives for carbon emissions measures by different local councils;
- identify key council staff/divisions responsible for climate change mitigation; and
- assess opportunities for councils in sustainable technologies/renewable energy use.

This paper explores the premise that similar to greening businesses, key motivations for ecological responsiveness by local councils are competitiveness, legitimacy, and social responsibility (Bansal & Roth, 2000). The next section reviews carbon mitigation programs by the Local Government Association of South Australia (LGASA) to provide a context for the survey of Adelaide councils.

Local Government Association of South Australia

The Local Government Association of South Australia (LGASA, 2011b) has proactively led carbon mitigation measures for SA councils. These programs include:

- climate change survey (2007);
- 'Beyond Carbon' climate change summit; energy and carbon footprint audit survey (2008);
- renewable energy forum; update on NGERs reporting; Mutual Liability Scheme Climate Change Adaptation Program for councils to assess climate risks (2009);
- briefing papers on carbon offsets for local government (2009/10);
- emissions measurement and management course; energy and climate change web survey; discussion paper on sustainable public lighting; report about solar PV on council infrastructure; CSIRO Energymark trial report on household energy use (Mendham *et al.*, 2010);
- Solar Councils Innovation Fund; Clean Energy Future update; carbon tax package update; carbon tax modelling survey; climate change action plan guide (2011); and
- Integrated climate change vulnerability assessment (2012).

Key policy guidelines on mitigation actions by SA councils are outlined in the *LGASA climate change strategy 2008-2012* (LGASA, 2008a), and the *South Australian local government sector agreement – climate change* (LGASA, 2008b). These LGASA mitigation programs address the climate change and carbon reduction actions in the *Climate Change and Greenhouse Emissions Reduction Act 2007* and *South Australia's greenhouse strategy 2007-2020* (Government of SA, 2007); State government targets for climate action in *South Australia's strategic plan 2011* updated from 2007 (SA Plan, 2011), and *A renewable energy plan for South Australia* (Government of SA, 2011).

These greenhouse gas mitigation goals for the State of South Australia include:

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- *greenhouse gas emissions reduction*: limiting the state's GHG emissions to 108% of 1990 levels during 2008-2012;
- *renewable energy*: comprises 20% of the state's electricity production and consumption by 2014, and 33% by 2020;
- *GreenPower*: buy renewable energy for 50% of the government's electricity needs by 2014;
- *energy efficiency*: improve energy efficiency of government buildings by 30% and private dwellings by 15% by 2020; and
- *zero waste*: reduce waste to landfill by 35% by 2020 (SA Plan, 2011).

The LGASA has set a target for SA local councils to purchase at least 20% GreenPower, with 38 local councils opting to buy 20% GreenPower electricity in 2007 (LGASA, 2007). South Australia has 56% of Australia's wind power and 30% of solar photovoltaic capacity feeding into Australia's national grid (Government of SA, 2010).

Carbon reduction goals are also included in: *The 30-year plan for Greater Adelaide*, and Adelaide Green City Sector Agreement (Government of SA, 2009, 2010). Key principles related to carbon mitigation, in *The 30-Year Plan for Greater Adelaide*, include '1. A compact and carbon-efficient city,' and '11. Climate change resilience.' Key actions for a carbon-efficient city relate to urban form and growth (i.e. land use policies, energy efficient buildings and design standards), water-sensitive urban design and energy efficiency targets for new buildings and residential developments, and the adoption of renewable energy (e.g. solar PV, co-generation). The plan includes specific policies and targets for climate change actions along with regional targets for different areas of the Greater Adelaide region. This plan for Greater Adelaide aims to achieve a 17% reduction in South Australia's greenhouse gas emissions by 2038 from 2009 levels (Government of SA, 2010). Seven Adelaide councils have climate change strategies (e.g. Adelaide City; Norwood, Payneham & St Peters; Onkaparinga; Port Adelaide Enfield; Salisbury; Tea Tree Gully; & Unley) with five included in this current study.

Methodology

South Australian and Queensland local council websites were reviewed for information on climate change strategies, carbon mitigation and offsetting measures (Zeppel, 2011a, b). Other mitigation actions by local councils were identified from news articles, reports by CCP partners, and the climate change programs of local government associations (e.g. ALGA, ICLEI, QLGA, and LGASA). Carbon mitigation actions in the Cities for Climate Protection program were also assessed. These provided the basis for the types of carbon mitigation actions listed in the council survey, along with questions about council motives for emissions reduction actions. The final survey included 28 questions in four sections: your local council; climate change; climate change mitigation; and carbon offsetting. The questions included check lists of climate change actions, open-ended questions on issues or reasons for climate responses, and rating of motives for carbon reduction actions by councils. A checklist of 56 mitigation actions covered energy, water, wastewater, vehicles, and other council climate change initiatives. Two sustainability officers at Queensland local councils with climate change programs provided feedback on a draft of this climate mitigation survey, with questions about constraints on climate actions by councils added. A survey of carbon actions by Greater Adelaide councils (n=14) was conducted, with specific information added about

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LGASA carbon programs and relevant SA government agencies (Zeppel, 2011b). Key results from the survey of 14 Adelaide councils are presented in this paper.

The climate mitigation survey of Greater Adelaide councils (n=14) was conducted during June to October 2011. Councils were contacted via contact details on their corporate website. The target group for this survey was environmental or sustainability officers at these SA councils. The survey was forwarded by email and by post to 20 Greater Adelaide councils, with follow-up phone calls to check that the survey was received and to speak with environmental staff. An email about this survey was also sent to the network for sustainability officers at SA councils. A total of 14 councils (70%) completed this carbon mitigation survey, by email or by post, with one survey completed via telephone interview. Three councils declined to participate, while three councils did not respond to emails or phone calls. The next section presents results from the survey of 14 Adelaide councils.

RESULTS

The 14 councils completing the survey covered coastal, inner city and suburban councils, across the southern and northern regions of the Greater Adelaide region, into the Adelaide Hills. Of the 14 Adelaide councils completing the survey, ten had participated in Earth Hour 2011. The council staff completing the survey were sustainability officers (n=8), including a sustainable energy coordinator; environmental officers (n=4); and sustainability planners (n=2). The number of council staff ranged from 89 to 250 (7 councils); 300-395 (3 councils); 400-465 (3 councils), and one council with over 600 staff. The size of the regional population served by the council ranged from 20,000 to 52,000 people (8 councils), 80,000 to 133,000 people (5 councils), and one council with 160,000 people (10% of state population). The main sources of cash revenue for these Adelaide councils was council rates (n=14, 100%); state or federal government grants (n=7, 50%); other council fees (n=6, 43%); and bank interest, or external contracting (n=2). The annual operating budget of the responding councils ranged from \$15 to \$38 million (5 councils), \$62 to \$72 million (4 councils), and \$90 to \$106 million (3 councils). The councils also reported damage from extreme weather events due to drought (n=10); heat waves (n=9); flash floods (n=8); bushfires (n=6); river floods and wind storms (n=5), and coastal erosion or storm surges (n=5). In regard to council insurance for damage to assets, eight said yes (*but not sea related*) while five were not sure or thought it could be in a mutual liability scheme.

Climate Change and Greater Adelaide Councils

All of the surveyed councils (n=14, 100%) agreed that climate change was an important issue for local councils. Comments about climate change impacts referred to natural hazards, risk management, legal liability, service delivery and community safety, damage to infrastructure, cost, and council leadership on climate change. One coastal council mentioned increasing sea water rise and greater risk of flooding, with a climate change adaptation plan being prepared for western Adelaide. One environmental officer thought climate change was important *however it is rarely on the radar of senior management or elected members who are more interested in roads, rates & rubbish*. Another respondent noted the need for planning and holistic strategies by councils since

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climate change/variability has implications for roads, waterways, open space and buildings. Hence, climate change actions need to be incorporated in operational plans.

The council strategies or policies that included climate change were an: Environmental policy (n=9), Water cycle management plan (n=7), or Waste management plan (n=7). Other specific climate change documents were: Climate change risk assessment (n=6); Climate change strategy (n=6) with one adopted in March 2011; Greenhouse gas or carbon neutral action plan (n=5); Climate change adaptation plan (n=4); Climate change policy (n=3); and Carbon emissions policy (n=3). Energy documents were: Sustainable energy action plan (n=3); Renewable energy policy (n=2); and Peak oil/energy transition plan or strategy (n=1). Other climate change strategies were in environment plans (n=4), including a *Healthy Environment Plan*, *Biodiversity Action Plan*, and an *Energy and Water Efficiency Management Plan* that included *energy, GHG and water objectives and targets*. The areas dealt with in council climate change plans included: Energy efficiency/conservation (n=13); Renewable energy (n=12); Waste reduction (n=10); Water conservation/water recycling (n=8); More sustainable living (residents) (n=8); Sustainable transport (n=8); and Sustainable business (industry) (n=3). One council included carbon actions for residents and businesses in their *Community Wellbeing Plan*, and *Economic Development Plan*, with another council reviewing climate change issues in their environmental plan for 2011/12. Other climate change areas (n=6) in council plans were community engagement, public lighting, adaptation planning, and carbon reduction targets.

The council staff identified as being responsible for climate change issues included: Environmental or Sustainability Officer (n=11); Environmental Manager (n=6); Water and Waste Manager (n=1); Energy Manager (n=1); Sustainability Planner (n=1), and Infrastructure (n=1). One respondent noted climate change projects were assigned to relevant council units but the *Sustainability Unit has responsibility for coordinating response*. Respondents identified the council sections responsible for climate change issues as: Planning and Environment/Sustainability (n=5); Environment team (n=3); Policy and Planning (n=3); Water and Waste (n=3); Infrastructure Services/Engineering (n=2); and Corporate Services (n=1). Two councils had a specific Sustainability Unit, or Sustainable Futures Department *responsible for strategic planning and policy and coordination of Council's overall response to climate change; other departments are responsible for operational activities and initiatives (i.e. implementing the Plan)*. The climate initiatives that councils participated in were: Cities for Climate Protection (CCP) (n=13); Earth Hour (n=11); Climate change workshop (n=8); Solar City or other solar scheme (n=6); Sustainable street lighting program (n=6); National Water Initiative/Water Week (n=5); and NGERs report on emissions (n=4). Other council actions for climate change (n=4) were: Emission reports (not NGERs); Zero Waste SA Resource Efficiency Assistance Program; and the LGASA Mutual Liability Scheme Climate Change Adaptation Program.

The sectors targeted by councils for climate change actions were: Households (n=11); Community organisations (n=9); Businesses (n=8); Schools (n=7); Developers (n=4); Youth groups (n=3), and Landholders (n=2). One peri-urban council noted: *we have tried to develop climate change activities with residents, but response rates are low, with limited active engagement external to the activities of Council (concentration on*

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getting our own house in order). Climate change initiatives were mainly funded by: Council operating budget (n=11); and State or Federal government grants (n=7). A few councils funded carbon actions with: Council climate change action fund (n=2), one with a climate change response fund established in 2008; or Savings generated by CO₂ reductions (n=1) with a revolving climate action plan fund since 2005; and a Council environmental levy or trust fund (n=1). The four councils with carbon action funds had also adopted climate change or energy strategies.

Carbon Mitigation by Greater Adelaide Councils

The respondents all strongly agreed (n=10, 71%) or agreed (n=4, 29%) that it was important to reduce the carbon emissions of their local council. Eight councils employed a consultant to assess council emissions, with council staff internally assessing carbon emissions at six other councils. Three councils outsourced their emissions data collection and assessment to Planet Footprint, Balance Carbon and Energy Analytics. The main source of council carbon emissions was energy consumption from electricity used for office buildings, council facilities, and wastewater plants (32%, 43%, 45%, 45%, 51%, 54%); street lighting (19%, 32%, 33%, 49%, 57%, 59%, 60%); water storage and pumping (24%); the council vehicle fleet (14%, 14%, 16%, 16%, 24%); and other emissions from fugitive sources, business travel, corporate waste, paper consumption (8.5%). Respondents stated the Electricity Trust of SA (ETSA) charged councils more to install and service energy efficient bulbs in public lighting, while future emissions reporting for all street lighting could be taken over by ETSA. One council noted their 2005/06 CCP emission data was out of date with *questions about their accuracy*. The carbon calculators used to assess council emissions were: NGERs (National Greenhouse Energy Reporting System) (n=5); council spreadsheet (n=4) using National Greenhouse Accounts factors; and ICLEI's Greenhouse Gas Application (n=3). One council previously used CCP software to *complete inventories of energy & GHG emissions* but was *now looking at an alternative that will align with NGERs reporting requirements even though we will not trigger mandatory reporting*. Key issues for councils in assessing carbon emissions were staff resources, reconciling accounts, formats, and data analysis. To manage accounts, one council had developed *shared spreadsheets that are used to manage and track payment and energy/water use*.

The Greater Adelaide councils adopted a wide range of emissions reduction actions (Table 1). These actions mainly related to energy efficiency, water conservation, and fostering behavioural change by residents (n=12), neighbouring councils, businesses and suppliers (n=8 each) in reducing emissions. Other mitigation measures by councils were solar or heat pump hot water heaters, roofing insulation, aquifer storage and recovery of reclaimed water (n=7 each), and capturing methane gas from landfills for power (n=5). Other carbon actions related to fuel efficient/LPG/hybrid electric vehicles (n=7/6/5), but few used biofuels (n=2). One council *made smaller, energy efficient cars more financially viable in work packages but some staff still preferred larger cars*, while *waste services no longer had to use E10 in council vehicles (as) green waste bins cost extra to pick up*. Hence, behavioural actions and costs limit some carbon actions.

Only one council in each case had installed a co-generation or tri-generation power plant; used reverse osmosis to produce recycled water; or installed mini hydroelectric

systems in water facilities. The carbon actions not implemented by Adelaide councils related to water and wastewater treatment as these services are mainly managed by SA Water. Overall, a total of 272 carbon actions were adopted by 14 Greater Adelaide councils (av. 19.4 measures per council out of 45 actions implemented).

Table 1: Top 30 emissions reduction initiatives by Greater Adelaide councils (n=14)

Install solar photovoltaic (PV) power on council buildings (n=14)
Purchase GreenPower electricity from renewable energy for council facilities (n=13)
Practise rainwater harvesting (i.e. capture roof water from council buildings) (n=13)
Install energy saving CFL bulbs or LED lights in council buildings (n=12)
Provide information to residents on reducing their emissions (n=12)
Include emissions reduction targets in council corporate plans (n=11)
Install energy efficient computers in council offices/council libraries (n=11)
Install energy & water efficient technology in council amenities blocks (n=10)
Solar powered public lighting (e.g. walkways) (n=10)
Practise stormwater harvesting & filter through wetlands or bioretention system (n=10)
Install timers, daylight sensors or motion detectors on council building lights (n=9)
Purchase energy efficient appliances (e.g. fridges) (n=9)
Produce or use recycled water – Class A+, Class A, Class B, Class C (n=9)
Install council-owned renewable energy generation systems (n=9)
Practise recycling and minimise amount of solid waste (n=8)
Share information with neighbouring councils on emissions reduction (n=8)
Provide information to businesses on reducing their emissions (n=8)
Choose suppliers taking actions to reduce their emissions (i.e. green purchasing) (n=8)
Practise aquifer storage and recovery (ASR) of reclaimed water (n=7)
Install solar or heat pump hot water heaters in council buildings & facilities (n=7)
Install roofing insulation in council buildings & facilities (n=7)
Operate new fuel efficient council vehicles or vessels (n=7)
Market the emissions reduction initiatives of your council (n=6)
Drive electric cars or hybrid-electric council vehicles (n=6)
Use of dedicated LPG fuelled vehicles as part of council fleet (n=5)
Capture methane gas from council landfills to generate power (n=5)
Train staff or volunteers on your emissions reduction actions (n=4)
Switch off council appliances at the wall to reduce standby power (n=4)
Implemented any other energy initiatives (n=4)
Install energy saving fluorescent or LED lights in street lighting (n=3)

The top five reasons for Greater Adelaide councils adopting emissions reduction actions (ranked 1, highest to 5, lowest) were:

- council climate change strategy/action plan (1.8);
- demonstrate climate leadership to local businesses/residents (2.4);
- cost savings (2.5);
- differentiate your council as a ‘climate friendly’ region (3); and
- council resolutions on climate change/energy efficiency (3.2).

Other lower-ranked reasons were certification (e.g. CCP) (4.3), attracting low carbon industry investment (4.5), SA’s *Greenhouse Strategy or Act*, and the *LGASA Climate Change Strategy* (5). The main reasons for councils not adopting carbon actions were

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cost; staff resources; funding; asset ownership; measurement tools, and *when payback periods are excessive (e.g. more than 15 years)*. One council respondent noted *missed opportunities by staff/work areas not seeing this as a priority*.

The main opportunities for Adelaide councils in reducing carbon emissions were identified as: waste management (n=7); green building design (n=7); renewable energy-solar, wind, cogeneration (n=7); sustainable technologies (n=6); water management (n=5); eco-efficiency measures (n=4); landfills (n=3); and carbon offset markets (n=2). Future carbon mitigation goals included recovery of waste for ethanol, aquifer recharge projects, and methane gas generation from landfills. One council aimed to *maximise sustainable design and integration of appropriate technologies* at all developments.

Other comments about the role of local councils in carbon mitigation were:

- *Local Government is a leader in this space. More support from Commonwealth and State governments through partnerships are needed;*
- *Council should be focusing on avoiding or reducing their emissions as the offset side of things does not sit well with me; and*
- *Our Environmental Advisory Committee has decided to prioritise our funds into emission reduction and alternative energy generation for the current year.*

These comments and survey results indicate the main focus of Adelaide councils is on reducing greenhouse gas emissions through a range of carbon mitigation and renewable energy measures. State and federal government support for carbon reduction actions by local councils was important, along with community partnerships for climate leadership.

DISCUSSION

This study of emissions reduction actions by Greater Adelaide councils compares and highlights responses to climate change mitigation across one metropolitan region. LGASA carbon programs and GreenPower targets, along with SA state government targets for greenhouse gas emissions reduction, influence the carbon actions adopted by Greater Adelaide councils, with mitigation measures demonstrating leadership on climate issues to ratepayers and related agencies. Council responsibility for climate change issues, however, was mainly delegated to environmental services, sustainability, and planning areas, rather than infrastructure, finance, or community development. Asset and finance managers at councils also need to be aware of carbon liability issues. The opinions of sustainability officers in regard to climate change issues may well differ from CEOs, other council managers or elected councillors (Nursey-Bray, 2011).

Respondents at Adelaide councils noted the legal liability of councils for climate change actions, but some felt it wasn't a priority for funding, or that staff missed opportunities to address climate change issues across council. Nursey-Bray (2010: 173) also found Tasmanian councils were concerned about dealing 'with the uncertainty surrounding climate change impacts and how to incorporate climate change into day-to-day management or 'governance structures''. Council managers also felt climate change management needed to be incorporated within 'governance regimes in more permanent

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and sustainable ways' (Nursey-Bray, 2010: 174). Local government associations thus need to provide information on how climate change and carbon mitigation measures should be included in decision making by all sectors and divisions of councils. Carbon reduction and renewable energy guidelines also need to be included in council planning. The LGASA has already noted 'Structure and Precinct Plans should be required to demonstrate commitment to minimising energy and water use' while *The 30-Year Plan for Greater Adelaide* should also 'strive to achieve significantly higher than national benchmarks in solar, wind and water re-use' (2009: 25).

This study found key motivations for ecological responsiveness by Adelaide local councils in reducing carbon emissions are legitimacy, social responsibility and competitiveness (Bansal & Roth, 2000; Zeppel, 2011c; Zeppel & James-Overheu, 2012). The key drivers for councils to reduce emissions were carbon actions in a climate change strategy, demonstrating climate leadership/being 'climate friendly', and cost savings. Climate change actions were mainly funded from council rates. Four Adelaide councils with carbon action funds had adopted climate change or energy strategies, while smaller councils lacked climate strategies or staff. Hoff (2010) found 45% of CCP councils altered their council organisation to include positions or departments responsible for climate change actions. Two Adelaide councils had sustainability units.

Further support and funding is needed to assist local councils in developing climate change plans; auditing carbon emissions; and installing energy (e.g. co-generation) or water efficiency devices. This will enable councils to meet their legal and community liability to reduce carbon emissions. Climate governance by local councils will become more important with the *Clean Energy Act 2011* and the requirement for local councils in Australia to report their NGERs emissions over a threshold of 25,000tCO₂-e.

CONCLUSIONS

This study of carbon mitigation actions by metropolitan local councils across Adelaide highlights climate governance issues and motives of both councils and environmental staff for reducing carbon emissions. The main reasons for Greater Adelaide councils to reduce greenhouse gas emissions were climate change plans; demonstrating climate leadership, cost savings, being a 'climate friendly' region, and carbon resolutions. Key motivations for local councils in reducing their carbon emissions are legitimacy (i.e. rules, targets), social responsibility (i.e. community, environment), and competitiveness (i.e. cost savings, leadership). Carbon mitigation actions currently being undertaken by metropolitan councils across Adelaide are driven by energy and water efficiency targets outlined in the *The 30-Year Plan for Greater Adelaide*. These include energy efficient building and design standards, water-sensitive urban design, energy efficiency targets for new buildings and residential developments, including a six star energy efficiency rating for new residential buildings from 2011 and an energy-use database for non-residential buildings by 2013, and new distributed and renewable energy through solar PV, gas co-generation and a smart grid. These mitigation measures in the Adelaide region aim to reduce South Australia's greenhouse gas emissions by 17% by 2038 (Government of SA, 2010). The challenge will be in how Adelaide councils implement these policy and planning measures to manage urban growth and carbon emissions.

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More research is needed on how local councils are addressing climate change governance and adopting carbon mitigation actions. This includes State and local government policies, funding, and staff resources for carbon initiatives. The barriers and constraints to carbon mitigation and offsetting actions by local councils also need to be reviewed. This will highlight the impact of climate change practices on the organisational behaviour and governance of local councils, along with environmental, social, and business benefits from greening councils and planning for a renewable energy future. Strategic planning for climate change mitigation by local government will be essential for this task. The resulting carbon mitigation actions by metropolitan councils will play a key role in shaping urban climate futures.

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UPE10 NEXT CITY

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24–27 July 2012

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Papers may be selected for inclusion in themed publications following the Symposium. The papers for the book will be selected according to theme and fit. As well, participants may elect to submit papers for blind refereed conference proceedings to be published online (meeting Australian Higher Education Research Data Collection (HERDC) specifications).

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